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**Modelling and Categorisation of Portuguese GPs' Prescribing Behaviour:
The Case of Patients with Hypertension**

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**A thesis submitted for the degree of Doctor of Philosophy
to the Department of Management Studies
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THE ORIGINAL THESIS

6 CHAPTER SIX THE PATIENT TYPOLOGY MODEL

6.1 Introduction

The work contained in this chapter relates to the presentation of *the patient typology model* (PTM), *a theoretical framework to guide the introduction of variables into the multiple logistic regression model*, which will be used as a pharmaceutical marketing tool for categorising Portuguese GPs according to their first-line anti-hypertensive drug therapy.

After pointing out the contribution of the exploratory phase of this research to the development of the PTM, the chapter identifies the constructs¹ that support the PTM and its importance for the categorisation process. Particular relevance is given to the most representative clinical values derived from the MEC analysis developed in Chapter Five. Using research on cognitive schemas, the Chapter explains why the PTM was formulated from domains which extend beyond the marketing field, particularly from the medical guidelines presented in Chapter Two.

Finally, given the requirement for objectivity in marketing research (Hunt, 1993) and in order to avoid the failure to blend the theoretical domain with the empirical process (Bagozzi, 1984), this chapter describes the thirteen patient typologies that will be used to categorise Portuguese GPs' first-line anti-hypertensive therapy.

¹ "A construct is a concept that has been deliberately and consciously invented or adopted for a special scientific purpose" (Hepler, 1980: 262).

6.2 The PTM: The Relationship Between the Conceptual Basis and the Theoretical Literature Review

In accordance with the review of the literature on doctors' prescribing behaviour (see **Chapter Three**), an extensive amount of research in decision making has focused attention on understanding the cognitive processes underlying *clinical problem solving* and *drug choice*. Most of the previous studies on drug choice have used the compositional method in dealing with attitudes or preferences (Knapp and Oeltjen, 1972; Lilja, 1976; Segal and Hepler, 1982; 1985; Chinburapa et al., 1987). All these researchers and Denig et al. (1988) have utilized cognitive models to attempt to explain the drug prescribing process. Most of the proposed cognitive models were generally based on the *expectancy-value theory* that stated that a doctor's drug choice is a function of the subjective beliefs that certain outcomes will occur from various drug choices and the values attached to those outcomes. That is, the *expectancy-value framework* assumes that physicians use linear compensatory decision-making processes in which all relevant drug attributes or outcomes are considered, tradeoffs among attribute values are made, and an overall evaluation is formed independently on each alternative and the alternative with the highest overall evaluation values is chosen (Bagozzi and Edwards, 1998).

However, Rosenberg and Webster's (1984) study provided evidence showing that:

“well educated, cognitively sophisticated decision makers (physicians) varied in the degree to which they employed all information available (compensatory decision rules) to make decisions on a relatively high involvement product class” (ibid: 221). Furthermore, their study suggests “a need to recognize that individual decision makers may be flexible in their decision strategies and may change the way in which they use attribute information depending upon the specific information available. For example, doctors in study II appeared to be more willing to make trade-offs on a greater number of attributes when the most important attribute (cardiovascular side effects) was not presented” (ibid: 211-212).

In the same vein, Chinburapa and Larson (1988) and later Chinburapa et al. (1993) found that there is not a single and context-free decision-making process. For example, the latter study indicated that doctors shifted from using compensatory to noncompensatory decision-making processes when task complexity increased. Thus, studies based on expectancy-value theory have produced equivocal findings.

This hypothetic-deductive approach, *“is a formal, explicit model constructed to aid decision makers under conditions of uncertainty. By structuring the clinical situation in the form of a decision tree, with the clinical events, the probabilities of their occurrence, and the importance of these outcomes (utilities), a clinician can determine the optimal treatment choice” (Mancuso and Rose, 1987: 1284).*

Mancuso and Rose disagree with the *expectancy-value theory* proposed by researchers studying therapeutic decisions because they found that the

drug choice could be predicted solely by consideration of *clinical criteria*. Thus, they believe that doctors use a selection of a few facts (*focal points*) for prescribing decisions. The theoretical framework underlying Mancuso and Rose's study on problem solving and choice is the *Newell and Simon's (1972) information processing theory* developed in the field of cognitive psychology. This line of research directly collects information regarding the actual process used by doctors in making the therapeutic decision. For example, in Mancuso and Rose's study, the goal was to identify the decision making strategies employed by doctors as they choose among treatment alternatives for *hypothetical patients* with coronary artery disease. As pointed out in **Chapter Three**, this research approach may be obscured by the use of *hypothetical patients*. This means that for modelling the way prescribing-relevant knowledge is stored and organized in doctor memory the clinical problem to be solved has to be a realistic representation of GPs' daily clinical work. This is only possible when doctors' prescribing-relevant knowledge is obtained from their cognitive structures. That is, our research approach regards prescribing behaviour as being directed by cognitive structures² and cognitive processes³.

² A cognitive structure is the organization of clinical experience and other types of information in doctor memory. Cognitive structures are usually modelled as a network of cognitive categories and the associations between them or as schemas relate by inference processes (Grunert and Grunert, 1995).

³ Cognitive processes are the processes by which the cognitive structures are changed due to new information from the environment, and by which information is retrieved from the cognitive structures and used to direct prescribing behaviour (Grunert and Grunert, 1995).

According to this version of the problem-solving approach, the human decision maker acts as an information processor, having mechanisms for information input and output, capabilities for interpreting and processing information, and memories for storing and retrieving information. The individual decision maker acquires information from the external/ **contextual environment** and/or from **memory** (i.e., *knowledge structures*).

In terms of doctors' therapeutic approach, the **contextual environment** was described in **Chapter Three** (see *Section 3.6: Information Exchange Networks*) and **prescribing-relevant knowledge** was elicited during laddering interviews (see **Chapter Five**). Both **contextual environment** and **prescribing-relevant knowledge** will be used for developing the PTM (see **Chapter Two - Flow Chart/Figure 2.2: Study Overview**).

Our claim is simply that GPs use different sources of drug information from the contextual environment and simultaneously develop patient typologies which encapsulates clinical values that are used for guiding therapeutic decision-making.

The theoretical notion that guided this study focus on the acknowledged premise that clinical values represent higher-order, cognitive-oriented clinical criteria having influence on GPs' drug choice. Thus, the PTM, is a new cognitive model developed by the researcher.

6.3 From the Exploratory Research to the Conceptual Model

As is typical in exploratory research using means-end chains (Gutman, 1982; Olson and Reynolds, 1983; Reynolds and Gutman, 1988), protocols and means-end maps for individual Portuguese GPs were obtained in order to understand their first-line anti-hypertensive therapy. These patterns of responses and observed similarities in terms of relationships between patient typologies and therapeutic categories were used in model development. This theoretical framework was named “*The Patient Typology Model (PTM)*” because several patient typologies were elicited from GPs in the exploratory phase of this study (see Chapter Five). Therefore, the PTM is mainly related with the cognitive data derived from the **exploratory research** which provided the opportunity to investigate concepts and their relationship: “*Located between hypothesis testing and descriptive analysis is exploratory research, which is essentially concerned with the selection and clarification of hypotheses. The researcher typically has in mind a theory or a set of hypotheses and thus certain expectations about what might be found. Even so, the nature of an exploratory mission is to clarify existing ideas about relations among concepts and perhaps discover new hypothesis*” (Zaltman, 1973: 17).

To delve deeply into the relationship between the concepts encapsulated within the PTM, both medical guidelines for the treatment of hypertension (see Chapter Two) and the literature review (see Chapter Three) were used.

6.4 The Patient Typology Model (PTM): An Overview

At the beginning of his or her clinical work, the doctor, as a therapeutic decision maker (DM), constructs a mental representation of the problem to be controlled (Huber, 1995). This representation comprises the structure of the clinical problem, which is a system with different variables and various relations between them (Kahney, 1993). If an appropriate mental representation is already available, it is activated. Such an identification strategy would presumably lead to formal structures of knowledge in memory, and such categorical knowledge would act as an input in a **problem-solving** context to determine behaviour (Cohen and Basu, 1987). Most of the time the representation is unstable, especially during the early phases of the interaction between the doctor and the patient during the **problem recognition** phase. As a result, the mental representation may be updated, changed, adapted, and so forth, in accordance with the patient's complaints. **Problem-recognition** and **problem-solving** activities are dependent on information obtained from the **contextual environment** (Fletcher, 1988). However, GPs' personal and professional characteristics may dramatically influence the way information is obtained from the **contextual environment**. As a result, perceived control in terms of heuristic competence to define clinical mental representations may differ from doctor to doctor:

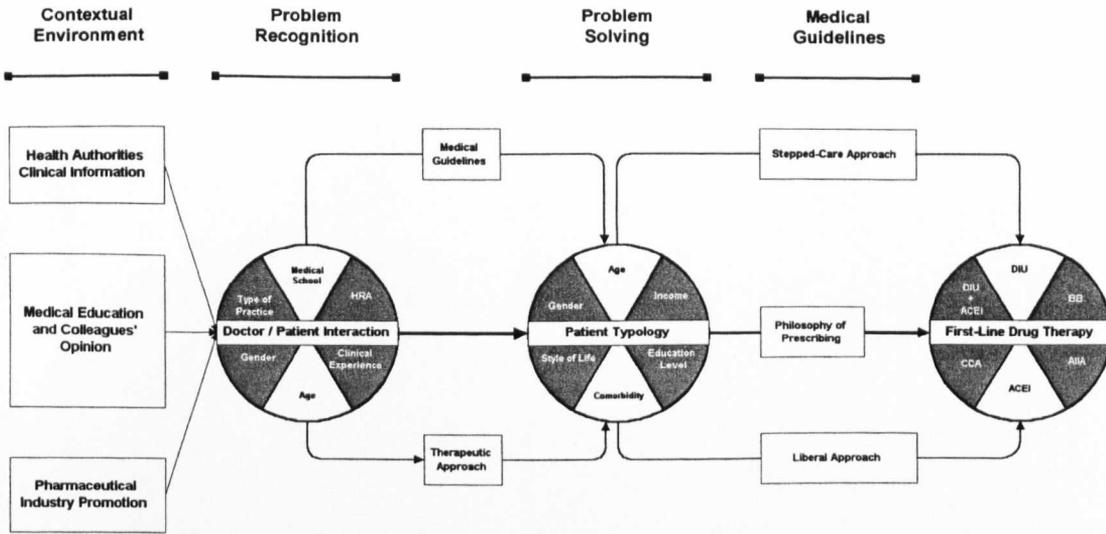
“a higher degree of perceived control may be the result of having higher heuristic competence, or, internally may cause people to acquire more actively problem solving heuristics” (Huber, 1995: 171). Therefore, medical guidelines for the therapeutic approach may also be different from doctor to doctor because information for constructing mental representations (i.e., patient typologies) stems from both external and internal sources. The former are in the form of “instructions” derived from the scientific and non-scientific contextual environment, while the latter is the DM’s clinical experience of the problem domain. The assumption that the patient typology is the result of a doctor’s intra-personal, cognitive clinical information processing activity reinforces the importance of the **external environment** in terms of sources of drug information. In line with this reasoning, the content of patient typologies developed by doctors allows the encoding, processing, storage, and retrieval of large amounts of clinical data obtained from the **external environment**. The information processing perspective suggests that the encoding and consequent information processing and storage operations are driven by existing cognitive structures (Strauss, 1992). These cognitive structures encapsulate cognitive schemas that are *“learned, internalized patterns of thought-feeling that mediate both the interpretation of on-going experience and the reconstruction of memories”* (Strauss, 1992: 3). Therefore, these cognitive schemas guide the incoming information of unique stimuli into pre-existing categories. It follows, then, that the patient

typology is a prototypical abstraction induced from past experience with the specific instances of the phenomenon and provides the basis for identifying of features through which the phenomenon is categorised. As such, this cognitive schema captures a person's knowledge structure (Fiske and Taylor, 1991). Hypertensive patient typologies are, then, cognitive schemas, which are the result of cognitive processes, and, in turn, shape subsequent cognitive processes in terms of a therapeutic approach. The factual nature of information contained in cognitive schemas enables a classification of patients (i.e., objects) and drug choice (i.e., events) according to specific **medical guidelines** for the management of hypertension. According to this cognitive approach, GPs are supposed to analyse clinical information obtained from the **external environment** by relating it to information already stored in memory:

“Possible solutions to a diagnostic problem are retrieved from a physician's long term memory store via an associative process that links cues to content stored in memory” (Elstein et al., 1978: 278).

Therefore, patient typologies may be described as prescribing-relevant knowledge stored and organised in doctors' long-term memory for therapeutic decision-making, as described in Figure 6.1: The Patient Typology Model (PTM).

Figure 6.1: The Patient Typology Model (PTM)



According to this cognitive view, doctors analyse clinical information obtained from the **contextual environment** by relating it to information already stored in memory, and use that information to direct **first-line drug therapy** in accordance with **medical guidelines** for the management of hypertensive **patient typologies**. In line with the reasoning that has been advanced, four different constructs are presented in the patient typology model (PTM) (see Fig. 6.1):

1. Contextual Environment;
2. Problem Recognition;
3. Problem Solving; and
4. Medical Guidelines.

6.4.1 Contextual Environment

Following Grunert et al.'s (1995) cognitive view of consumer behaviour, the assumption underlying the model is that doctors' **first-line drug therapy** is preceded by a sequence of mental information processing. Doctors seek and use clinical information from the **contextual environment** as part of their **problem-recognition** and **problem-solving** activities, which are developed according to **medical guidelines**. Both scientific (e.g., health authorities' clinical information, medical education, and doctors' colleagues opinions) and commercial (e.g., **pharmaceutical industry's promotion**) sources of drug information were reported to influence these **medical guidelines** (Gaither et al., 1996).

Novel data from both scientific and commercial sources of drug information are analysed in accordance with doctors' cognitive schemas. These cognitive schemas serve a number of functions. When **external stimuli** to which one is exposed match or overlap sufficiently with existing categories in memory, "schema-based" processing will be activated (Kinderman and Humphris, 1995). When **external stimuli** do not match or overlap sufficiently with existing categories, no "schema-based" processing will be activated (D'Andrade, 1995). Further processing of stimuli requires additional effort and may proceed in an atomistic way whereby individual elements of information are evaluated and perhaps

integrated without reference to a schema (Bagozzi, 1998). In this case, “piecemeal” processing activity is developed. Expectancy-value models presume piecemeal processing of consequences, which is assumed to be bottom-up (i.e., data driven) and memory based (Hastie and Park, 1986). In contrast, processing new information in relation to a cognitive schema is interpreted holistically rather than atomistically (Bagozzi, 1998): *Under schema-based processing, new information is categorised and then a schema (if one exists) is activated* (ibidem: 618). As has been noted, there is also evidence that *“the perception, remembrance, later retrieval, and subsequent inferences based on new information tend to be schema-consistent, although a number of factors moderate the relationships, such as schema strength, expertise, time for processing, and situational complexity”* (ibidem, 618). It is important to bear in mind, however, that the *“Memory and judgment will be directly related, though, when the judgment is based directly on the retrieval of evidence information in memory-based judgment tasks”* (Hastie and Park, 1986).

Although the capacity of GPs to recognise information via the senses is generally greater than their capacity to process the huge amount of internalised information effectively, it has been recognised that the reception process avoids saturation through highly selective mechanisms of attention (Schneider and Conrad, 1981). The capacity of these selection mechanisms to discriminate and deal with novel information is the result of attentive and perceptual filters by which sensory overload is avoided.

Cognitive schemas mentioned earlier, may be seen as perceptual filters that organise all this novel information obtained from the **external environment** and the reconstruction of memories (Strauss, 1992). The individual's remembered and recalled experience has been found to facilitate the comprehension, interpretation and positioning of novel stimuli within pre-existing cognitive schemas: "*Shared meanings and assumptions about that which is categorized and various aspects of its environment are embedded in the typology itself. Typologies are used to define experience and may be used as a basis for action toward that and subsequent similar experience*" (Schneider and Conrad, 1981: 211). Some of the huge amount of novel internalised information is of particular interest to the individual, who uses these cognitive schemas to select those pieces of information that have to be stored in their short term (or temporary, working) memory and which then interacts with their long term memory (or permanent memory store).

The cognitive approach to the analysis of individual consumer choice is usually understood as a **problem-solving** and decision-making sequence of activities (Foxall, 1990). The process is initiated by **environmental inputs** which are encapsulated into existing cognitive schemas that govern the flow of information in the memory system, particularly the working memory: "*Short term memory holds the key to the control of the entire information processing sequence precisely because it mediates, co-ordinates and integrates immediate environmental inputs with the permanent memory store which*

encapsulates past experience in subjective form. Short term memory processes carry out these functions while editing and giving a subjective meaning to the information received by the sensory registers so that subsequent processing or use of the data can take place” (Foxall, 1983: 17). Thus, the short-term memory shapes the multiplicity of new information that is processed, interpreted and classified by the individual consumer in order to evaluate its personal relevance. Consequently, the working memory *“has particular implications for exposure to new information, the precise operation of selective attention and perception, forgetting and the modification and effect of attitudes and behavioural intentions”* (ibidem: 17).

Our understanding of the GP’s decision-making process, derived from the laddering results, enables us to argue that information processing derived from the **external environment** is stored within the long term memory. In a similar vein, researchers of medical clinical activity have stressed the relationship between information processing and long term memory: *“In solving different problems in different patients, the doctor needs to be able to integrate information derived from a variety of sources and stored in the memory in different ways and to link this to a variety of clinical skills”* (Morrell, 1993: 46). The working memory interacts with the permanent memory to reduce the cognitive dissonance produced by some new internalised clinical information from the **external environment** (Howard, 1989).

6.4.2 Problem-Recognition

During the doctor-patient encounter a medical routine is developed to clarify the patient's complaints which are important indicators for describing the natural history of illness and disease (Ridsdale, 1995). Thus, the doctor-patient dialogue is useful for identifying focal points which predict the development of the patient's clinical problems (Mancuso and Rose, 1987). Based on this **problem-recognition activity**, GPs are able to define a **patient typology**, which summarises the clinical situation (Kinderman and Humphris, 1995; Bordage and Zacks, 1984). This argument that doctors, as individuals, have mental models (i.e., **patient typologies**) that serve as internal representations of their clinical world to solve patients' problems, is in line with recent research on problem-solving (Huber, 1995; Moustakis, 1995; Kahney, 1993), mental models (Carley and Palmquist, 1992) and network analysis (Faust and Wasserman, 1992).

6.4.2.1 Doctor Profile

Problem-recognition activity is based on hypertensive patient typologies that encapsulate a complex mixture of patients' demographic profile, life style and pathology. However, "*So complex are these interacting variables that two patients with the same diagnosis may be managed in different ways*" (McWhinney, 1979: 1477). Doctors will obviously vary in the extent to which they ascribe importance to those medical and non-medical factors.

The further the hypertensive typology deviates from the “classic patient scenario”, “*the more the doctor’s style will influence the process and outcome of treatment*” (Norton and Smith, 1994: 10). To understand GPs’ prescribing behaviour it is necessary to define not only different hypertensive **patient typologies**, but also the doctor’s style in terms of prescribing behaviour. More specifically, it is important to analyse doctors’ individual variables, from demographics to the professional environment, in order to analyse their influence on the selection of **medical guidelines** and the **therapeutic approach**. This information is critical to the categorisation of GPs’ philosophy of prescribing. For example, Rawlins (1984) argued that ethical drug manufacturers developed their marketing strategies in accordance with a categorisation process based on the speed of adoption of new drugs which is able to identify ‘conservative’ or ‘risk-taker’ GPs:

“Some companies categorise GPs as “conservatives” or “risk takers” and use different marketing strategies for the two groups. Conservatives are cautious about using new drugs, at least until the local hospital specialist has started to prescribe them: with this group, reps will therefore concentrate on expounding the merits of their established lines, and push the new one only when the “opinion-formers”, in the form of local consultants, have begun to use it. Risk-takers are much more prepared to try new lines and reps will try to obtain a commitment from them to use their new products on a few patients in the first place” (ibidem: 276).

Generally, the process of categorising GPs as ‘*conservatives*’ or ‘*risk takers*’ is based on information obtained by “reps” from local pharmacists about the prescribing behaviour of individual doctors. However, the identification of ‘*conservatives*’ or ‘*risk takers*’ has been done without any theoretical framework and based on prescribing rates of new drugs. This approach has, however, been criticised as inappropriate: “*A quantitative model can be built without theory, but it is much more limited in what it can contribute to explain and predicting consumer behaviour. For example, Pfizer, Inc., can develop a useful model for each of its domestic products, telling the marketing manager how much promotion expenditures for drugs influence the doctor’s prescription level. But to use it, the company must have had three years of experience with the particular drug. This requirement renders the model much less useful because the most crucial period in a product’s marketing life is the first three years* (Howard, 1989: 42). That is, in looking at GPs’ drug choice researchers need to define the best theoretical framework to explain the “*tremendous variations in the volume and cost of prescribing between different geographical areas and between individual prescribers*” (Bradley, 1991: 276). If only medical factors influenced prescribing, the variation in prescribing practice might be explained by differing patient typologies but factors such as GPs’ demographics and professional environment have been found to affect prescribing: *Individual factors, practice factors, and indirect methods are thought to influence prescribing decisions by influencing the thought process of the physician* (Lambert et al., 1997: 1768).

6.4.3 Problem-Solving

When confronted with a problem, a GP has a natural inclination to bring to bear the experience gained from solving similar problems, or to *analogue*. For example: “A doctor, faced with a patient who has an unusual combination of symptoms, could remember another patient with similar symptoms and propose the same diagnosis as in the previous case (Kolodner, 1993)” (Wierenga and Bruggen, 1997: 23). **Analogical reasoning**, then, is a fast and appropriate way of problem solving (Kahney, 1993). It follows, then, that the **patient typology** represents a **problem solving** step towards a **therapeutic approach** which depends on a set of **analogical reasoning principles** that are dependent of **medical guidelines**.

6.4.3.1 Medical Guidelines

Both the **problem recognition** and **problem-solving** steps are guided by **medical guidelines** for managing hypertensive patients. Medical opinion leaders’ comments and suggestions on those antihypertensive guidelines (Birkenhager, 1996; Beevers and MacGregor, 1995; Kaplan, 1994; Hart, 1993; Houston, 1992) have provided an interesting dialectic reflection on drug choice, which had a significant impact on prescribing in general practice in the last decade. As pointed out in Chapter Two, these guidelines can be viewed as “philosophies of prescribing⁴”.

⁴ Cluff (1967) argued that the doctor has “a philosophy of drug utilization, a critical approach that will permit him to seek the right answers to the right questions at the right time” (ibidem: 100).

The dialectic reflection on the two antihypertensive “philosophies of prescribing” has been expressed in different sources of drug information for the medical community. Educational events and peer group discussions have been also used for the dissemination and implementation of these guidelines (Newton et al., 1996). For example, Wensing et al. (1998) suggested that *“interventions using well-respected colleagues or group of colleagues for the dissemination and implementation of guidelines and innovations may be particularly effective in general practice”* (ibidem: 994).

To reduce morbidity and mortality attributable to hypertension, medical guidelines strongly encourage that high blood pressure is prevented by lifestyle modification as a definitive therapy for some, and as adjunctive therapy for all persons with hypertension (WHO-ISO, 1999; 1993; Veterans Health Administration, 1996; WHO, 1996). A recent study conducted by the Canadian Hypertension Society to determine what proportion of patients with hypertension were managed in accordance with these medical guidelines concluded that *“there is a variation in the contemporary care of patients with hypertension. Further studies are required to determine the reasons underlying physicians’ non-compliance with the evidence-based guidelines established by the Canadian Hypertension Society”* (McAlister et al., 1997). Current models on drug choice, however, do not recognise the importance of medical guidelines advanced by expert committees and medical opinion leaders on the treatment of hypertensive patients.

6.4.3.2 Hypertensive Patient Typologies

Our exploratory study suggests that GPs use clinical values (i.e., focal points) in arriving at therapeutic decisions. For example, the patient's *clinical focal points* such as *age, gender, comorbidity, and the degree of blood pressure elevation* are aggregated to define the patient typology. This cognitive schema enables doctors to differentiate between therapeutic categories in order to adapt the first-line drug therapy in accordance with the patient's clinical focal points. That is, from their long-term memory structures, GPs usually elicit patient typologies in order to organise their first-line anti-hypertensive drug therapy. Therefore, it does not make sense to separate hypertensive patient typologies from therapeutic categories because they are two faces of the same coin: "*The decision to initiate pharmacological treatment requires consideration of several factors: the degree of blood pressure elevation, the presence of target organ damage, and the presence of clinical cardiovascular disease or other risk factors*" (JNC VI, 1999: 2423). As hypertensive patient typologies differ with respect to age, blood pressure elevation, organ damage and concomitant diseases, different cognitive schemas in terms of patient typologies require different therapeutic interventions: "*The physician should tailor the choice of drug to the individual patient, after taking all these factors, together with patient preference, into account in each case*" (WHO-ISO, 1999: 168).

6.5 The PTM: A Clinical Value Theoretical Framework

Particularly important to the PTM was the confirmation of an important application of the MEC theory which postulates that is possible to categorise “*consumers with respect to their values orientation for a product class or brand*” because “*the value orientations in a person’s ladder may serve as the basis for classification*” (Reynolds and Gutman, 1988: 25).

In Chapter Five, *Portuguese GPs’ clinical values were found to have greater discriminant power to differentiate doctors according to their prescribing behaviour than the lower hierarchical chains*. Therefore, *the PTM follows a clinical value orientation*, which confirms that “*For many product categories or subclasses of categories, respondents are much more likely to make preference judgements at the consequence and values levels than at the attribute level*” (Reynolds and Gutman, 1988: 26). Therefore, emphasis has been placed upon *clinical values* elicited from respondents rather than on the anticipated beliefs proposed by the expectancy-value approach: “*beliefs are determined in a pre-test, and a fixed list is presented to respondents in the main study. To the extent that people differ in the criteria taken into account in decision making (relying on more or less beliefs than found in the set of beliefs presented to them), an incomplete picture of goal setting will result*” (Bagozzi and Edwards, 1998: 606). The *PTM* overcomes this problem by organising its discriminant power according to the *clinical values* elicited from respondents during the qualitative exploratory phase of this research.

6.6 From Clinical Values to Patient Typologies

The operationalisation from *GPs' clinical values* to hypertensive *patient typologies* was found to be relevant in all GPs' ladders (see Appendix Five). As a result, *patient typologies* are crucial *explanatory variables* within the PTM. An understanding of the relationship between these hypertensive patient typologies and their associated therapeutic categories offers the promise of improving our knowledge of how *focal points* of the clinical situations “*determine what self-meanings are accessed or activated from long-term to working memory*” (Walker and Olson, 1991: 113). The laddering results have shown that the patient typologies are *cognitive schemas* which serve as indicators of drug choice. Thus, they provide information that is critical for testing predictions of Portuguese GPs' first-line drug therapy. It follows, then, that *the theoretical framework should include the patient typology as its main and central concept and the typology should be surrounded by the clinical values that organise its existence*. That is, the patient typology is the critical element of a clinical **problem-solving**⁵ activity which connects this excerpt of GPs' cognitive structures with specific first-line drug therapies.

During the laddering interviews, three different vectors were found to be critical for defining different hypertensive patient typologies. The first

⁵Kahney (1993) characterizes problem-solving as an interaction between a *task environment* (that is, a problem) and a problem solver, who is thought of as an information-processing system.

vector includes the patient's age, sex, and race. The second vector stipulates the level of blood pressure to constitute hypertension "...a SBP of 140mmHg or greater and/or a DBP of 90mmHg or greater in subjects who are not taking antihypertensive medication" (WHO-ISH, 1999: 162). Finally, the third vector estimates the combined effect of several concomitant disease/risk factors associated with hypertension: "*Decisions about the management of patients with hypertension should not be based on the level of blood pressure alone, but also on the presence of other risk factors, concomitant diseases such as diabetes, target-organ damage, and cardiovascular or renal disease, as well as other aspects of the patient's personal, medical and social situation*" (WHO-ISO, 1999: 162).

Therefore, different clinical values (i.e., focal points) were used to define hypertensive patient typologies:

- Age*
- Gender*
- Family history of premature cardiovascular disease*
- Previous cardiovascular events*
- Previous cerebrovascular events*
- Left ventricular hypertrophy
- Systolic blood pressure
- Diastolic blood pressure
- Lifestyle (i.e., nutritional factors; sedentary lifestyle; smoking; alcohol)
- Dyslipidaemia (i.e., high total and low-density lipoprotein-cholesterol and low high-density lipoprotein-cholesterol)
- Obesity
- Diabetes
- Renal disease
- Micro-albuminuria

* not modifiable

One of the most important findings from the Means-End Chain exploratory research was the importance that Portuguese GPs attached to *clinical value orientation* in their therapeutic approach. Doctors' cognitive schemas in terms of *clinical values* are of paramount importance to hypertensive patient typologies. GPs' ladders were found to use these cognitive schemas for therapeutic decisions, which in turn are in line with different medical guidelines for the management of hypertension. As pointed out earlier, medical guidelines to treat hypertensive patients describe several clinical values (WHO-ISH, 1999; 1993; WHO, 1996). These focal points are relevant for discriminating between GPs' therapeutic approaches. It is, therefore, not surprising, that this contemporary thinking on the management of hypertension places more emphasis than earlier reports on absolute risk and benefit, and uses risk stratification as part of the patient typology treatment strategy in accordance with the clinical values described earlier.

In terms of the present research, all the clinical values that have been found important for discriminating between therapeutic approaches will be used to categorise Portuguese GPs. That is, the content of patient typology derives from the clinical values identified in the Hierarchical Value Map, particularly the combinations among *age*, *gender*, and *comorbidity*.

6.7 Definition and Analysis of Patient Typologies as Explanatory

Variables

It has already been pointed out that there is mounting evidence that “*the patient’s demographic profile*”, the “*level of blood pressure*” and “*cardiovascular risk*” are the main clinical values for drug choice (WHO-ISH, 1999; 1993; WHO, 1996). When respondents in the exploratory study discussed the clinical values of their therapeutic approach, they used the term patient typology several times, describing a wide variety of hypertensive typologies that provided guidance for their first-line pharmacological therapy. As has been noted, there is also evidence that the patient typologies must be defined in such a way that they can be mutually exclusive and exhaustive in terms of therapeutic approaches (Bailey, 1994).

Though many GPs in the exploratory research agreed on cues that signalled clinical values, they differed, not considerably, in the number of patient typologies they were able to identify in their individual ladders. Patterns of responses from the exploratory study can be grouped into two main types of clinical values to define a patient typology: (1) demographic, and (2) comorbidity (see Table 6.1). From these explanatory variables, thirteen patient typologies have been selected (see Tables 6.2; 6.3; 6.4; 6.5; and 6.6).

Table 6.1 - The Value Dimension and Importance

VALUE DIMENSION AND IMPORTANCE	NUMBER OF CATEGORIES
Age (314)	3
Age and Comorbidity (482)	5
Age and Drug Combination Therapy (90)	1
Age and Gender (107)	3
Age and Level of Blood Pressure (46)	1
Age and Preventive Effect (8)	1
Age and Socio-Economic Status (27)	1
Age and Treatment (24)	1
Age and Type of BP (63)	1
Age/Gender/Comorbidity (145)	2
Comorbidity (207)	10
Race/Ethnicity (6)	1

As pointed out earlier, *age*, *gender*, and *comorbidity*, isolated or in association, are the main clinical values that guide prescribing behaviour.

Therefore, patient typologies have to be defined according to a set of linkages between *explanatory variables* such as *age*, *gender*, and *comorbidity*. These linkages between the explanatory variables represent a network that has strong discriminate power on GPs' first-line therapy.

For example, Bearden et al. (1993), in their handbook of marketing scales, recognised the interest of Means-End Theory (Gutman, 1982; Reynolds and Gutman, 1988) in eliciting general values: “*The network or “ladders” constructed represent combinations of elements that serve as the basis for distinguishing between and among products in a given product class*” (Bearden et al., 1993: 99).

Although the present analysis is only focused on the link between clinical values and the therapeutic categories attached to them, it represents the first attempt to study doctors’ clinical value structures. Other researchers have also proposed means-end chains for the study of value structures as a more promising alternative than the expectancy-value approach (Bagozzi and Dabholkar, 1994).

As mentioned at the beginning of this Chapter, it is also possible to follow Reynolds and Gutman’s (1988) suggestion that value orientation for a product class in a person’s ladder enables the researcher to categorise respondents. Furthermore, the link between each patient typology and the specific therapeutic category attached to it reinforce the importance of these two faces of the coin, as has been proposed in all the different medical guidelines for the management of hypertension. As a result, it was decided to use three different matrixes in the questionnaire, in which the *rows* represent the patient typologies (i.e., explanatory variables) and the

columns represent the *therapeutic categories* (i.e., drug choice), to categorise respondents according to their therapeutic approach. All three matrices have the same six therapeutic categories in the column. The *first* matrix includes the *age clinical value*, with *three* explanatory variables, the *second* matrix represents the *middle-age/gender/comorbidity clinical values*, with *four* explanatory variables, and the third matrix encapsulates the *elderly-age/comorbidity clinical values*, with *six* explanatory variables. These explanatory variables are *the thirteen most important patient typologies* encapsulated within the clinical value dimension represented in the Hierarchical Value Map (HVM):

Table 6.2 - Age Clinical Value

CATEGORIES of AGE	IMPORTANCE of the CATEGORY
YOUNG-ADULT	104
MIDDLE-AGED	108
ELDERLY	102

All three categories were selected:

1. *Young-Adult* (less than 45 years old)
2. *Middle-Aged* (45 - 64 years old)
3. *Elderly* (65 or more years old)

In a similar vein, **age** (elderly hypertensive patients) and **comorbidity** were also dimensions that were used for patient typology development.

Table 6.3 - Age and Comorbidity (Elderly Patients)

<i>Elderly Hypertensive Patients with:</i>	<i>IMPORTANCE of the CATEGORY</i>
ANGINA	114
CEREBROVASCULAR DISEASE	112
PERIPHERAL VASCULAR DISEASE	39
RENAL INSUFFICIENCY	106
CONGESTIVE HEART FAILURE	111

For *elderly* hypertensive patient typologies, all the categories were selected, except peripheral vascular disease:

4. *angina;*

5. *cerebrovascular disease;*

6. *congestive heart failure; and*

7. *renal insufficiency.*

Gender is another important descriptor in terms of prescribing behaviour, particularly in *middle-aged* (i.e., age) hypertensive *women* (i.e., gender) in *perimenopausal period* as Table 6.4 suggests.

Table 6.4 - Age and Gender

AGE and GENDER	IMPORTANCE of the CATEGORY
HYPERTENSIVE WOMAN IN PERIMENOPAUSIC PERIOD	92
YOUNG-ADULT WOMAN	6
YOUNG-ADULT MAN	9

Only the category *hypertensive woman in perimenopausal period* was selected. As pointed out in Chapter Five, Portuguese General Practitioners (GPs) have differentiated the hypertensive *woman in perimenopausal period* from other *middle-aged* patients with hypertension:

8. hypertensive woman in perimenopausal period

This hypertensive typology was found to be particularly vulnerable to *anxiety* and/or *depression* problems, as well as *obesity* (i.e., comorbidity) (see Table 6.5). As a result, another patient typology was defined:

9. obese hypertensive woman in perimenopausal period with anxiety/depression

Table 6.5 - Age/Gender/Comorbidity

HYPERTENSIVE WOMAN in PERIMENOPAUSIC PERIOD with:	IMPORTANCE of the CATEGORY
OBESITY	47
ANXIETY/DEPRESSION	98

Comorbidity was also found to be an important discriminator in terms of prescribing behaviour. Table 6.6 identifies the most important comorbidity factors.

Table 6.6 - Hypertensive Patients with *Comorbidity*

COMORBIDITY	IMPORTANCE of CATEGORIES
DIABETES/DYSLIPIDAEMIA	95
LEFT VENTRICULAR HYPERTROPHY	29
CENTRAL OR PORTAL OBESITY	26
GOUT	6
INTELECTUAL ACTIVITY	2
TACHIARRHYTHMIAS	18
DRY COUGH	8
DYSLIPIDAEMIA	12
PROSTATISM PROBLEMS	1
DIABETES	10

Only the category *DIABETES/DYSLIPIDAEMIA* was selected. It has been proposed that dyslipidaemia and hypertension are associated with patients' gender, obesity and diabetes mellitus (Eaton et al., 1994). Thus, the patient typologies that have *comorbidity* derived from lipid metabolism and insulin hypersensitivity problems should be treated carefully.

Medical guidelines have called for greater recognition of the diverse effects various antihypertensive agents on lipid metabolism and insulin hypersensitivity (WHO-ISO, 1999; 1993; WHO, 1996). In terms of antihypertensive drug therapy it has been recognised for some time that **diuretics** and **beta-blockers** can impair glucose tolerance and increase insulin resistance, thereby actually increasing cardiovascular risk despite reducing blood pressure. In contrast, **ace inhibitors** and **calcium antagonists** appear to be metabolically neutral, which means that they decrease insulin resistance. That is, these two therapeutic categories do not aggravate co-existing risk factors such as hyperlipidaemia or glucose intolerance. (Hansson, 1999; Therapeutic Bulletin, 1998; Birkenhager, 1996; Hart, 1993; Houston, 1992) .

Some medical researchers have argued that “*Studies of diabetic and obese subjects have demonstrated a link between hypertension, insulin resistance, and body fat distribution*” (Eaton et al., 1994: 18). This distinct metabolic syndrome associated with hypertension was termed ‘*syndrome X*’ and it presents hormonal influences. With low levels of androgen, women tend to put on extra weight around the lower body, which makes **obesity**, **diabetes**, and **dyslipidaemia** very common in **hypertensive women in their perimenopausal period**.

Both Table 6.5 and Table 6.6 and secondary information obtained during the laddering interviews confirm the importance of syndrome X, as represented by the link between hypertension in Table 6.7 and diabetes in Table 6.8:

Table 6.7 - Hypertension Report	Year: 1996
Lisbon and Tagus Valley Health Administration <i>Setúbal Health Sub-Region</i>	

Age	Hypertension					
	Controlled		Diagnosed		In Treatment	
	Male	Female	Male	Female	Male	Female
> 15	4	4	2	2	2	4
15-44	1512	2155	1190	1738	997	1512
45-64	7704	12616	6398	10603	5125	8908
>=65	8955	15434	7527	12902	6496	11114
SUB-TOTAL	18175	30209	15117	25245	12620	21538
Total	48384		40362		34158	

Table 6.8 - Diabetes Report**Year: 1996**Lisbon and Tagus Valley Health Administration
Setúbal Health Sub-Region

Age	DIABETES					
	INSULIN TREATMENT		NO INSULIN TREATMENT		TOTAL	
	Male	Female	Male	Female	Male	Female
> 15	48	25	0	2	48	27
15-29	144	135	95	141	239	276
30-64	508	595	2884	3452	3392	4047
>=65	382	541	2953	4010	3335	4551
SUB-TOTAL	1082	1296	5932	7605	7014	8901
Total	2378		13537		15915	

Given the importance of obesity (Table 6.5), diabetes and dyslipidaemia (Table 6.6), and the link that has been established between hypertension and diabetes and dyslipidaemia, particularly with middle-aged and elderly hypertensive patients (Table 6.7 and Table 6.8), it was decided to disaggregate 'syndrome X' in four hypertensive typologies:

10. *obese hypertensive woman in perimenopausal period with diabetes*
11. *obese hypertensive woman in perimenopausal period with dyslipidaemia*
12. *elderly hypertensive patients with diabetes*
13. *elderly hypertensive patients with dyslipidaemia*

It has already been pointed out that these thirteen hypertensive patient typologies derived from the clinical values *age and gender, comorbidity, and age and comorbidity*, which were found to be the most important sub-dimensions within the HVM. As a result, these **cognitive schemas** have the potential to instigate GPs' prescribing behaviour. Other researchers have also provided evidence showing that **cognitive schemas** have the potential to instigate individuals' actions (D'Andrade, 1992), and are also useful in product and service differentiation (Alba and Hutchinson, 1987). Furthermore, "*it is not meaningful, for example, to attempt to compare the therapeutic efficacies of different drug treatments when the drugs are used with different types of patients. Clinical diagnosis or empirical profile similarity grouping can be used in the attempt to establish comparable patient groups*" (Overall et al., 1972: 144).

In accordance with previous considerations, the PTM uses these thirteen **cognitive schemas** (i.e., patient typologies) for categorising Portuguese GPs according to their **first-line drug therapy**.

6.8 The PTM Objective

A primary motivation in undertaking this research was to develop an objective method of grouping Portuguese GPs for purposes of studying differences in treatment responses.

Using evidence-based medicine and consensus, **medical guidelines** update contemporary approaches to hypertension control. However, two different “**philosophies of prescribing**” have been advanced for **first-line drug therapy**:

- the **stepped-care** approach; and
- the **liberal** approach.

As pointed out in Chapter Two, doctors who follow the “***stepped-care approach***” use **diuretics** and **beta blockers** as **first-line drug therapy**, while their peers who have a more “***liberal approach***” prefer to prescribe **ace inhibitors** and **calcium antagonists**.

During the laddering interviews, the vehemence with which some respondents have reinforced their preference for the “***stepped-care approach***”, while their peers refuse to accept anything other than the “***liberal approach***” to the same hypertensive *patient typology*, reinforces the strong conviction that Portuguese GPs can be categorised according to these two “philosophies of prescribing”.

6.9 Summary

It appears that the patient typology model (PTM) provides both a *meta-theoretical* point of reference, and a clear indication of the *sort of functions* that such a theoretical framework can be expected to play in the categorisation process of Portuguese GPs' **first-line drug therapy**. Four different constructs were included in the PTM:

1. Contextual Environment;
2. Problem Recognition;
3. Problem Solving; and
4. Medical Guidelines.

An important role was attributed to **scientific** and **commercial** sources of drug information because they represent the initial data obtained from the **contextual environment**.

According to the PTM, Portuguese GPs analyse information obtained from the **contextual environment** by relating it to information already stored in memory, and use of that information in **problem recognition** and **problem solving** activities. The former is influenced by **GPs' individual** and **professional** characteristics, while the latter depends on several clinical values that organise the different **patient typologies**. **Medical guidelines** were advanced to guide antihypertensive **first-line drug therapy**. However, two different "**philosophies of prescribing**" are available to treat the **thirteen hypertensive typologies** described earlier.

7 Chapter Seven Research Design and Methodology

7.1 Introduction

The purpose of this chapter is to explain the reasoning behind the research process. The aim of this discussion is therefore to justify the research design and data collection methods, to show how various considerations shaped the research design adopted in the present study, and to outline some of the implications this had for the study's results.

This chapter also describes and explains the procedure followed to achieve an efficient questionnaire and accurate sample within budgetary and resource constraints.

The Chapter concludes by looking at the importance of statistical analysis techniques for achieving the research objectives and for hypotheses testing. Thus, a brief explanation of the statistical procedures and their relationship to the research objectives and hypotheses testing is given to clarify the structure within which this study was conducted. The discussion further illustrates the relevance of understanding the intimate connection between the research hypotheses and the empirical approach from which statistical techniques are derived. Specifically, the Chapter looks at formulating and testing the research hypotheses according to the research objectives.

7.2 Research Design

Every research project begins with the research objectives followed by a definition of the research design (Moutinho et al., 1998). The former determines the characteristics desired in the research design whilst the latter is a critical, basic plan that guides data collection and subsequent analysis phases (Tacq, 1997). The design framework specifies the type of information to be collected, the sources of data, and the data collection procedure. The vast majority of marketing research studies involve a descriptive research design (Kinneer and Taylor, 1991). The descriptive approach typically makes use of cross-sectional and longitudinal data. However, *“The distinction between the two is quite important because it determines whether inferences regarding change can be made”* (Diamantopolous and Schlegelmilch, 1997: 6). When the data is derived from a sample of population elements who are interviewed at a particular point in time it assumes the designation of cross-sectional data. On the other hand, longitudinal designs encapsulate the data relating to a fixed sample of population elements from whom information is obtained repeatedly in different time periods. The cross-sectional design is by far the most widely used in marketing (Churchill, 1991). The relative simplicity of its administration makes it the most appropriate method for fulfilling the research objectives of this study.

7.3 Evaluating the Alternative Data Collection Methods

The initial data used to develop this research were secondary data, i.e., published data which have been compiled for a purpose other than the present study (Diamantopolous and Schlegelmilch, 1997). These kind of data have the advantage of having already been collected and published, which represents an important saving in time and money (Kinnear and Taylor, 1991). For example, Moutinho and Evans (1992) pointed out that *“it is always worth exploring the possibilities of using secondary sources – as a first resort – before commissioning what would usually be a more expensive and time consuming programme of collecting ‘new’ information using ‘primary’ research methods”* (Moutinho and Evans, 1992: 12). In addition to these advantages, secondary data are considered relevant to:

- understand the problem under investigation;
- reflect on different research designs and data collection methods; and
- provide comparative data by which primary data can be interpreted and evaluated more meaningfully.

Three different sources of secondary data were used in this research:

- (1) health authorities’ publications;
- (2) private consultancy organisations and pharmaceutical companies’ publications; and
- (3) specific literature related to the research problem.

Health authorities' publications are an important source of secondary data because they provide information about the policies that have been put forward concerning doctors' rational prescribing in Portugal. Therapeutic bulletins were particularly important for understanding the problem under investigation (Therapeutic Bulletin, 1998).

Different drug information was screened from private pharmaceutical consultancy organisations concerning the therapeutic approach towards hypertensive patients in Portugal. Particular attention was given to International Marketing Services' (IMS) Portuguese reports, whose doctors' prescribing information is widely used by pharmaceutical companies (see Appendix Three). A close relationship between the researcher and a Swiss International Company (Novartis)¹ was developed and secondary data collected, which was fruitful in terms of obtaining different perspectives on doctors' prescribing behaviour.

The third type of secondary data used in this study, the specific literature related to the research problem, was the most relevant and important source of reflection on paradigmatic and theoretical assumptions. This literature is relevant for understanding different research designs and data collection methods to tackle the problem (May, 1997).

¹ At no time during the study did the company try to determine the direction of the study design, questionnaire development, sampling method, or data analysis.

Most of the secondary data were elegantly and convincingly elaborated, which was important when adapting Portuguese research to that of other countries. It was possible, therefore, to compare the literature with the findings from the primary data of this research and evaluated it more meaningfully.

Synergies between the three secondary data sources were obtained and a global picture of the “*state-of-the-art*” was developed. However, in spite of their importance, it was found that secondary data did not fulfil all the interrogations of the researcher, particularly those related to patient characteristics and medical guidelines for a therapeutic approach. Consequently, primary data was required to fulfil the needs of the present research. Primary data can be obtained by *surveys* (conducted *face-to-face*, by *telephone*, or through the *mail*), *experiments* (carried out in the *laboratory* or in a “*natural*” setting) or *observation methods* (Diamantopolous and Schlegelmilch, 1997). However, as mentioned in Chapter Two, the doctor’s drug choice is based on medical guidelines which represent different “philosophies of prescribing”. As a result, experimentation is not the most convenient way to obtain the *motives* that channel prescribing behaviour. Thus, the doctor has to be the main source of primary data collection, by one of the two basic methods of collecting data from respondents: *communication* or *observation* (Kinnear and Taylor, 1991).

One can argue that it is naive to assume that doctors are prepared to give information about their own prescribing behaviour. In line with this reasoning, *observation* would obtain more accurate primary data, since distortions derived from respondents would be reduced. *Observation* collection methods are also less demanding in terms of respondents' co-operation. However, "*participants in an observational study might behave differently if they know they are being observed*" (Levin, 1999: 8).

Some researchers argue that respondents' distortions and co-operation can be minimised by properly designing the data collection instruments (Kinnear and Taylor, 1991). If this goal is obtained, respondents can give accurate information about their own reasoning on drug choice, which is not possible by observation procedures. This assumption eliminates one of the two primary data collection methods proposed by Diamantopolous and Schlegelmilch (1997) and Kinnear and Taylor (1991), *the observation method*. Thus, only the *communication method of data collection* is suitable for this study.

7.4 Deciding on the Most Appropriate Type of Questioning Methods

The next major decision in the research design related to the method of data collection (Moutinho et al., 1998). Three main questioning methods have been used by most researchers: *the telephone interview, the personal interview* and *the postal or mail interview* (Kinnear and Taylor, 1991).

The *telephone interview* is not acceptable to Portuguese doctors who normally refuse to discuss a personal matter such as prescribing behaviour, without knowing the researcher, the context of the interview, and the objectives of the study. In Portugal there is a general lack of acceptance and familiarity with the telephone interview for gathering such important and confidential information. Furthermore, a cultural reluctance to give any kind of data or information to external people other than health authority representatives, or people under their control, made telephone interviews inappropriate.

One of the central benefits offered in a *personal interview* is the opportunity to address more complex issues, which would have presented the option of exploring new areas spontaneously or keeping to a rigid interview schedule. Furthermore, the *personal interview* enables the researcher to collect quantitative information by using a questionnaire completed by the interviewer. This would have offered the benefit of being able to check that the respondents had understood the question and interpreted it in the intended way. However, “*A market researcher needs to be able to select the data collection technique which is most likely to elicit the necessary information reliably, in the required time and within the available budget*” (Moutinho et al., 1998). Our experience during the *exploratory phase* of this study, which was described in Chapter Four and Five, reinforced our

consciousness on **four main problems** with *personal interviews*:

- (1) *in-depth interviews are time consuming and it can be difficult to orient the interviewees towards the information that is required;*
- (2) *it is difficult to co-ordinate interviews within Portuguese health centres. So, the interview became more time consuming and expensive;*
- (3) *when personal interviewing was in progress, the researcher experienced delays because of the need to time interviews to fit the GPs' schedules; and*
- (4) *national interviews required strong financial support in terms of hotels, meals, and travelling (by car, train or aeroplane).*

In line with the reasoning that has been advanced, **the mail survey was considered the most appropriate questioning method for the next step of the field work.** A mail survey requires *less time*, is *less costly* (Petrie and Sabin, 2000), and generates “*an acceptable compromise between reliability and validity, and cost considerations*” (Moutinho and Evans, 1992: 26). Furthermore, the fact that *mail surveys* may require less field time than *personal interviews*, and as there were limited financial resources for the study, the researcher decided not to undertake *personal interviews*. Irrespective of time constraints and financial resources, the *mail survey* is an accepted method of collecting quantitative data from a relatively large number of people (Greer et al., 2000; Petrie and Sabin, 2000; Chisnall, 1992; Shosteck and Fairweather, 1979).

7.5 Advantages of Mail Questionnaires

The easy answer for the question “*Which communication medium should be selected for a study*” is, most of the time, “*the medium which is best capable of meeting the information needs of the study given the time and cost constraints*” (Kinnear and Taylor, 1991: 327). Without doubt, *the mail questionnaire* is cheaper than other methods such as *personal interviews*. However, *the problem can not, like many others in survey methodology, be reduced to time and cost constraints.*

The exploratory phase of this study was designed as a deductive piece of research (see Chapter Four). This stage of the study involved *focus group* and *personal interviews*, mainly GPs, whose answers were very important for understanding their therapeutic decision. The inherent limitation of this type of research includes the possibility of socially (Kruger, 1994) and therapeutically desirable responses.

In the course of research encounters, whether in a *personal interview* or in a *focus group discussion*, we are involved in asking questions and receiving answers which we normally take for granted as representing some accurate feeling state of the respondent. However, asking is a highly limited form of obtaining information because respondents’ attitudes are governed by the impressions they are trying to make upon the researcher. Thus, GPs may be responding with what they believe is expected of them

because prescribing is a very sensitive topic (Tootelian and Gaedeke, 1995). In other words, the quality of data may not be the best.

Data quality is an old problem in survey methodology. For example, Moser and Kalton (1971) argued that: “*The mail questionnaire of course avoids the problems associated with the use of interviewers; there are several sources of interviewer errors, which may seriously undermine the reliability and validity of survey results, and it is reassuring not to have to worry about them*” (ibid: 258).

Churchill (1991) also suggests that “*the mail questionnaire permits control of the bias caused by the interviewee’s perception of the interviewer*” (ibid: 334).

We have just touched upon a major disadvantage of the two methods. As a result, data both from *personal interview* or *focus group discussion* are not free from potential bias (Kruger, 1994).

Besides potential bias, the interviewer cannot use the evidence derived from *focus group interviews* in a conclusive research manner (Kruger, 1994; Churchill, 1991). That is, the findings from the *focus group discussion* are not projectable to a target segment for two reasons:

- *the sample may not be representative of the target segment in the sense that quantitative statements can be made regarding the significance of the research findings; and*
- *the evidence itself is highly dependent upon the experience and perception of the researcher.*

As pointed out earlier, the *focus group interview*, as an exploratory research technique, was extremely valuable in developing ideas about the decision-making process that GPs use when prescribing drugs. However, it is difficult to determine which GP made a particular therapeutic comment.

Kinnear and Taylor (1991) pointed out that the advantage of the *depth interview* over the *focus group interview* relates to the greater depth of insight that can be uncovered and the ability to associate the response directly with the respondent. In line with the reasoning that has been advanced, it is possible to argue that *focus group interviews* generated a list of potential cognitive categories, whereas the *laddering interviews* were used to link those cognitive levels. That is, the research design comprised two phases.

During *phase one*, we determined what product attributes, therapeutic consequences and clinical values were important on drug choice. To identify the importance of those critical cognitive categories on therapeutic decision-making we used laddering interviews. For developing *phase two*, we analysed the findings of the *focus group* and *laddering interviews* to determine which cognitive material should be included in the *quantitative phase* of the present research (Lambert et al., 1997; Hakim, 1987).

The combination of different methods such as *focus group* and *laddering interviews* to determine factors to be included in a *quantitative phase* of

research on consumers' value judgements was recently suggested (Mattila, 1999). The survey instrument was a *questionnaire* which “*was personally delivered and collected by the research assistant. In just three cases the survey had to be mailed to respondents who had agreed to participate in the study*” (ibid: 43). However, research on the service-evaluation process used by business executives who are luxury-hotel customers is **not** a *sensitive topic* as happens with research on doctors' prescribing behaviour.

Kinnear and Taylor (1991) suggest that *mail survey* is the best approach to overcome this problem:

“*For sensitive topics, there is evidence that mail surveys collect better-quality data than personal interviews*” (ibid: 324).

For sensitive topics such as GPs' drug choice, confidentiality is an important matter. Thus, methods that avoid face to face interviews such as the *mail survey* may improve the quality of the data:

“*Some people may answer certain questions – perhaps those of a personal or embarrassing nature – more willing and accurately when not face to face with an interviewer who is a complete stranger*” (ibid: 258).

That is, the *self-administered questionnaire* - and particularly *mail questionnaires*, enabled respondents to read, interpret, and respond to each question in the comfort of their own homes, reducing the possibility of any interviewer bias entering the investigation (Bush et al., 1994).

With the *self-administered questionnaire*², GPs are also able to work at their own pace: “*the mail interview consists of a questionnaire mailed to the respondent and the return by mail of the complete questionnaire to the research organization*” (Kinnear and Taylor, 1991: 319). The bulk of the returns will probably be received within two weeks (Moser and Kalton, 1971). Thus, the *mail questionnaire* is a particularly quick method of conducting a survey (Weisberg et al., 1989; Fink and Kosecoff, 1985; Sheatsley, 1983). For the reasons discussed above, the *mail questionnaire* may produce a deeper reasoning concerning GPs’ therapeutic approach with the consequent improvement of the quality of the data. This is particularly true when respondents know they cannot be identified (Fowler, 1993).

Some doctors may be reluctant to talk with the interviewer either in person or on the phone. Doctors’ reluctance to talk with strangers about sensitive topics such as prescribing behaviour has increased in Portugal (see Chapter Five). The same GPs may, however, be willing to respond to a *mail questionnaire*.

² A self-administered questionnaire is an instrument used to collect information from GPs who complete the instrument themselves. There are two types of self-administered questionnaires, best described as the ends of a unidimensional continuum. At one end are questionnaires that people answer in the presence of the surveyor or other supervising personnel. At the opposite end of the continuum are questionnaires completed by the respondent outside the presence of the surveyor or other monitoring personnel. Questionnaires sent through the mail, frequently called mail questionnaires, provide the most common example of unsupervised administration. This was the case with the present research.

Respondents are much more willing to complete a self-administered questionnaire when it can be done at their convenience rather than having to make a commitment to an interviewer to be available at an appointed time for a specific length of time to do an interview (Fowler, 1993).

For drug choice researchers who want to study the influence of pharmaceutical companies' promotional and scientific activities on prescribing, mail questionnaires' advantages are particularly important.

Pharmaceutical companies' communication practices are under attack because many of them are viewed simply as attempts to promote drug use by giving gifts and incentives (Gans, 1992). In line with this reasoning,

“Much of the criticism about pharmaceutical promotion has been directed thus far toward the relationship that exists between the pharmaceutical industry and the medical profession, and in fact, it has been that relationship that has usually felt the heat over the years” (ibid: 149). However, doctors, *“who rarely write or speak on the subject of their personal business relationships, often privately concede that the entire profession is now being punished due to the questionable practices of a small minority of their colleagues”* (Barton, 1993: 76).

Mail questionnaires are of especial value for these doctors who rarely write or speak about the influence of the pharmaceutical industry on their prescribing behaviour. And this will be easier because a return envelop was provided to ensure that respondents could not be identified. That is, to increase the accuracy of the responses, GPs were guaranteed anonymity.

Portuguese GPs were assured that their responses were completely confidential and anonymous, and that no individual questionnaire would be shown to any member of private or public organizations.

Unlike almost all methods of data collection, it can be assumed that when a questionnaire is sent through the mail all members of the sample receive it simultaneously. Thus, the potential influence of events outside or unrelated to the study that might influence a potential respondent's attitudes are reduced and can be assumed to be equal for all recipients of the questionnaire. All the questionnaires were mailed on the same day and were received by all respondents within the same 2 or 3 - day period.

A final point in favour of *mail questionnaires* is that a questionnaire can be mailed anywhere in the world, whereas face-to-face interviews tend to be restricted to a defined geographic area or areas. This was very important in the present study which used a mailed questionnaire for obtaining information from GPs who were non-continental respondents (Madeira and Azores islands). The lower cost of a mail questionnaire combined with its ability to cover a wider geographic area with little additional cost for respondents at a distance allows surveyors to study a larger sample of persons or groups. Furthermore, the problem of non-contacts, in the strict sense of respondents not being at home when the interviewer calls, is avoided (Fowler, 1993).

7.6 Implications of Using a Mail Survey

A common occurrence in all field surveys is that a proportion of the sample of people selected for *personal* or *questionnaire* interview do not respond to the request for information (Armstrong and Ashworth, 2000; Childers and Skinner, 1996). That is, the decision to use a *mail survey* is not free from some concomitant limitations, the most problematic of which is bias due to non-response: “*Although the loss in sample size from non-response must be considered, the problem is really the probability that non-respondents are significantly different in their opinions from respondents*” (Chisnall, 1992: 124). Differences between respondents and non-respondents were also found: “*As ever, there will be those who respond and those who do not. This study suggests that the latter group are more ‘conservative’ than their keener colleagues and also likely less sympathetic to intended collegiate nature of recent primary care initiatives*” (Armstrong and Ashworth, 2000: 480). Therefore, “*researchers are often concerned with the issues of potential bias of survey results due to low response rates*” (Greer et al., 2000).

Bias arises because the returns are almost invariably not representative of the original sample. Nevertheless, evidence of *non-response bias*³ was gathered by administering the same instrument to doctors on two different occasions, which coincided with the two different waves of questionnaires.

³ Because the respondents in the final mailing had not responded to an earlier attempt, they represented a sample of non-respondents for the initial mailing.

Other implications of using a *mail survey* relate to the confounding effects of *measurement error* and the influence of respondents upon the *interpretation* of the data (Churchill, 1991). *Measurement error* is usually assumed to be random in nature, while *extraneous factors* exert a systematic source of bias. An appropriate interview structure helps reduce the effects of both random and systematic error (Kinnear and Taylor, 1991).

7.7 Deciding on the Appropriate Structure of the Questionnaire

An interview can be analysed by its structure⁴ and directness⁵. Two types of interviews can be found in most surveys: *structured* and *unstructured*. When researchers want to ensure that all respondents are replying to the same questions, a ‘structured-direct’ technique is used. It imposes that the questions are presented with exactly the same wording and in exactly the same order to all respondents (Moutinho et al., 1998). Since there are different ways to classify the data collection techniques which utilize the method of communication, the degree of structure and the degree of directness were used. A *mail questionnaire* was used in this study because a *structured-direct* technique makes the work simpler in terms of administration, tabulation and analysis (Kinnear and Taylor, 1991).

⁴ Kinnear and Taylor (1991) defined structure as the degree of standardisation imposed on the questionnaire; and

⁵ Directness is the degree of knowledge about the main goals of the field work communicated to a respondent.

7.8 Deciding on the Domain of Respondents and the Clinical Context

Freeman et al. (1993) argued that most studies of doctors' prescribing behaviour produced equivocal findings. This may be caused by two common methodological problems (Gaither et al., 1996):

1. Different Medical Settings and Clinical Contexts

Different patient characteristics are not identified within each medical setting and clinical context. This generates a global drug choice which is not representative of the complex reality of doctors' prescribing behaviour.

To overcome the problem of different medical settings and clinical contexts in this study, the Portuguese antihypertensive market was chosen for analysis. As pointed out in Chapter Two, it represents the most frequent medical problem seen by GPs, and it accounts for more office visits and prescriptions than any other disease (Jordão, 1995; Carrageta, 1985).

2. Different Medical Specialities

A wide variety of medical specialities can be found in most sample procedures. Consequently, neither the data collection methods nor the prescribing behaviours are homogeneous. However, statistical procedures used in most studies of drug choice have been developed assuming homogeneous prescribing behaviours across different medical specialities.

To avoid the problem of collecting information relating to different medical specialities, GPs' prescribing behaviour was selected. We therefore sacrificed a degree of generalizability for a gain in internal validity. Thus, the study was directed toward the population of active, health-centre, office-based doctors providing primary care to ambulatory patients, and the survey unit was the individual GP.

7.9 Sample Size

Sampling error is a function of sample size (Petrie and Sabin, 2000). On the basis of the research objectives, and the data analysis techniques to be employed, it was considered particularly important to have a large sample in order to minimise the sampling error (Moutinho et al., 1998). In line with this reasoning, almost 23.5 % of the 6 402 Portuguese GPs were selected as eventual respondents. Assuming a response rate of 25%, the goal was to obtain 375 usable questionnaires (see Appendix Six).

The sampling frame was taken from the official listing of the Portuguese Medical Association (PMA), which includes all known GPs practising in Portugal, PMA members and non-members alike. Updated on an annual basis, it is the most complete, current, and easily accessible list in existence. This sampling frame was obtained from a Swiss company (Novartis) operating in Portugal that had partially supported the financial costs of the research.

7.10 Sampling Procedure

The sampling procedure has been found critical when researchers have insufficient time and resources to interview all individuals who could potentially be included in a study (Moutinho et al., 1998; Bryman and Cramer, 1997). Thus, the sampling procedure has to be defined quite precisely in order to enable the researcher to make valid inferences about a wider population which the sample is supposed to represent. The primary determinant of the validity of these inferences is whether or not the sample is representative. A perfectly representative sample would be a microcosm of the population from which it is drawn, identical to the population in every way. This would enable inferences to be made about any aspect of the population from this sample. According to statistical sampling theory, the representativeness of a given sample is determined by the mechanism used to select it from the population in question (Diamantopolous and Schlegelmilch, 1997).

The way GPs were selected for inclusion in this research and how it was possible to generalise to the population from which doctors have been drawn, was based on statistical sample theory. Thus, the distinction between probability and non-probability sampling is a basic distinction which is of paramount importance to the issue of representativeness (Petrie and Sabin, 2000). With the former, each GP has a specific probability of inclusion in a sample in order to improve our ability to generalise our findings to the

population from which it was selected. The latter, however, does not guarantee that inferences are correct because respondents are selected by chance. That is, with the non-probability sampling procedure there are too many doubts about its representativeness.

There are five different ways in which probability samples may be selected from a sampling frame (Moutinho et al., 1998):

1. simple random sample;
2. systematic sampling;
3. stratified sampling;
4. cluster sampling; and
5. a combination of these.

In its purest form, a **simple random sample** guarantees that every person in the population has a known and equal probability of inclusion in the sample. Like all forms of probability sample, the simple random sample requires a sampling frame which provides a complete listing of all the units in a population. Simple random samples may be drawn by random number generation on a computer, provided that all members of the population to be sampled are assigned a number in advance. In this way, human choice is eliminated from the decisions about who should be included or not. That is, each unit has a probability of 'n' (units in a sample) divided by 'N' (units in a population).

With the above method every Portuguese GP would have a probability of $1500/6402$ of being included in the sample, i.e. approximately 1 in 4. With this random process for the selection of doctors, the possibility of bias in the selection procedure is drastically reduced and the chances of generating a representative sample is enhanced. However, the simple random sample procedure can be particularly time-consuming when a large sample has to be selected.

Due to considerations of cost and convenience, some researchers prefer the **systematic sample** rather than a simple random sample because it obviates the need to plough through a table of random numbers and to tie in each number with a corresponding case. According to the systematic sample approach, the selection of doctors is undertaken directly from the sampling frame without the need to connect random numbers and cases.

When the researcher wants to improve the level of precision to a simple random or systematic sample, the **stratified sampling** approach is chosen. As a result, the population is divided into strata which represent categories of a criterion. For example, the population of Portuguese GPs was stratified according to the criterion of medical university from which they obtained their undergraduate studies. Given the influence of medical university on doctors' approaches to therapeutic decisions, this stratifying criterion was considered relevant to the issues in which the researcher was interested. Regional Health

Administration was another important stratifying criteria that was advanced in tandem. After this stratified sampling procedure was obtained, a systematic sample approach was taken from the listing in each stratum in order to improve accuracy of data. However, neither the systematic nor the stratified sampling procedure deals very well with the geographically dispersed population of doctors in Portugal. As a probability sampling procedure, the multistage **cluster sampling** procedure allows such a geographically dispersed population of doctors to be adequately covered. Consequently, a multistage cluster sampling was developed simultaneously. That is, the stratification approach accompanied the sampling of clusters and every GP from the sampling frame was selected in accordance with a pre-defined interval (K). With this procedure, stratification will ensure that clusters are properly represented in terms of the chosen criteria.

When the final mailing list was obtained, every fourth doctor from the national sampling frame was systematically sampled. This provided a stratified random sample selection and enabled a proportional strata from the national frame of GPs. Thus, the 1500 Portuguese GPs that were initially selected, representing 23.34% of the entire population of respondents, were considered representative of this medical class.

7.11 Deciding on the Appropriate Instrument of Measurement

When a researcher has to reflect about measurement, “*he or she usually means the assigning of numbers to observations in such a way that the numbers are amenable to analysis by manipulation or operations according to certain rules*” (Siegel and Castellan, 1988: 23). Therefore, measurement may be defined as “*the rules for assigning of numbers to objects in such a way as to represent quantities or attribute*” (Churchill, 1991: 414), or “*the assignment of numbers to characteristics of objects or events according to rules*” (Kinnear and Taylor, 1991: 222). That is, the measurement problem is related to the way we move from the language of theory to the language of research: “*measurement is a process involving both theoretical as well as empirical considerations*” (Carmines and Zeller, 1994: 2). In line with this reasoning, measures facilitate the empirical representation of theoretical concepts and thereby enable a theory to be tested (McIver and Carmines, 1994).

At least two alternatives are open to marketing researchers wanting to design measures for constructs contained in the theory subject to testing: to develop a set of measures, or adopt a measure developed previously.

A review of the theory on doctors’ prescribing behaviour and its existing measures along with the specificity of the research objectives provided an opportunity to test alternative measures. Since the content of the measures tended to be specific to the context in which they were developed, the

development work was concerned primarily with making the scale items applicable to the antihypertensive market.

Several scale items from previous studies were found to have a format compatible with the present research, particularly those related to the construct of source of information. In some instances it was therefore possible to use the format of these measures without substantial alteration. Whenever this was not the case, new variables were designed to measure the construct.

Since people have differing experiences, variables are useful because they enable the researcher to measure the variance between them, bearing in mind that variables are measures and measurement is a form of description which allows us to analyse variance (Hutcheson and Sofroniou, 1999). It is important to note, however, that the way in which we can analyse variance depends on the ways we measure. That is, the idea of a variable as a measure encapsulates the assumption that variables may be measured at different *levels of measurement* (depending on the type of variable). Therefore, the level of measurement is sufficiently flexible to embrace and determine the kinds of analysis that may be performed (Petrie and Sabin, 2000). If unfamiliar with the problems of measurement one may question, '*if there are different levels of measurement why not to choose the highest possible level?*'. However, research in both social psychology and consumer behaviour has tended to stress that the choice of the level of measurement is a function of the nature of

the problem, the characteristics of the respondent and the planned mode of administration (Levin, 1999; Fowler, 1995).

There are four commonly distinguished levels of measurement normally used in the analysis of social or psychological data, which are distinguished as *nominal*, *ordinal*, *interval* and *ratio* scales (Petrie and Sabin, 2000):

Table 7.1: Levels of Measurement

<i>SCALE</i>	<i>CHARACTERISTICS</i>
• Nominal	<i>This classificatory scale transforms a given class into a set of mutually exclusive subclasses.</i>
• Ordinal	<i>The fundamental difference between a nominal and an ordinal scale is that the ordinal scale incorporates not only the relationship of equivalence (=) but also the relationship "greater than" (>).</i>
• Interval	<i>The interval scale has all the properties of an ordinal scale, and in addition, the distances between any two numbers on the scale have an important meaning.</i>
• Ratio	<i>The ratio scale has all the properties of an interval scale and, in addition, has a true zero point as its origin.</i>

Some authors have supported the view that:

"The empirical evidence indicates that none of the attitude scaling devices is superior in all instances. Each one has its place. Nor is there one single optimal number of scale positions or single optimal condition for other measure characteristics. The nature of the problem, the characteristics of the respondents, and the planned mode of administration will and should affect the choice of which technique should be used in a particular instance and what features the scale should possess" (Churchill, 1991: 444).

We wish to emphasise that *most studies developed by social scientists are based on categorical scales* (Hutcheson and Sofroniou, 1999; Diamantopolous and Schlegelmilch, 1997; Rose and Sullivan, 1993; Siegel and Castellan, 1988).

Multivariate models for the analysis of categorical⁶ variables have been developed recently and continue to evolve at a rapid pace (Hutcheson and Sofroniou, 1999; Agresti, 1996). So impressive is this development during the last two decades, that it is possible to say that we are in an age of progress in the analysis of categorical data. Categorical variables are measured on scales that consist of a set of discrete categories which may be nominal or ordinal (Hutcheson and Sofroniou, 1999; Magidson, 1997). The former express qualitative differences, while in the latter, data are discrete but can be ranked in order. Since the final scores can take on a wide range of discrete values, it is often acceptable practise to treat them as continuous variables. For example, “*ordinal data can be assigned numerical scores and treated as continuous in nature, or variants of categorical statistical models can be developed that make use of the extra information in the ranks*” (Hutcheson and Sofroniou, 1999: 17).

In the present research, both nominal and ordinal categorical data were used to categorise Portuguese GPs according to their *first-line drug therapy*.

⁶“*Categorical variables differ from continuous variables in that they are classified into a relatively small number of mutually exclusive and exhaustive groupings or intervals called categories, as opposed to being measurable more and more finely, on some continuous scale*” (Magidson, 1997: 80).

7. 12 Questionnaire Design

The nature of the clinical problem, the characteristics of the respondent and the planned mode of administration, require the use of both ordinal and nominal scales (Himmel et al., 1997; Lambert et al., 1997; Freeman et al., 1993). In line with the reasoning that has been advanced, these two levels of measurement were used as follows:

- in the first section of the questionnaire (from Q1 to Q5) the level of measurement was based on nominal scales;
- on most of the second section of the questionnaire the level of measurement was based on ordinal scales. The exceptions were Q13, Q20, Q24 and Q30 which represent nominal/categorical scales;
- in the third and fourth sections of the questionnaire the level of measurement used was ordinal scales.
- in the last section of the questionnaire (from Q95 to Q99) categorical variables were used.

As has been noted, the second, third and fourth sections of the questionnaire were based on a 7 point ranking scale. The main reason for this decision was the fact that most doctors who were interviewed on the pre-test phase indicated that the clarity and interpretability of the survey contents would be better measured by a 7 point ranking scale rather than a 5 point ranking scale.

This decision is strongly supported by Churchill (1991) who pointed out that respondents generally find the 7 point ranking scale easy to respond because the responses categories allow sufficient expression of intensity of feeling. There is also evidence that the validity and reliability of different scales would be increased as the number of items used in the final scale, as well as the number of the scale points, increased. Two further reasons suggested it would be better to use the seven-point ranking scale:

- (1) the nature of the problem under research is closely related to the doctor's normative importance, familiarity with and commitment to drug choice. As such, it was considered relevant to have flexibility in determining how connected or engaged a therapeutic category was with the GP's clinical values. For example, Chinburapa and Larson (1988), who have studied doctors' preferences among multi-attribute pharmaceutical alternatives, used a seven-point unipolar scale, which ranged from "of less importance" to "of more importance". Lambert et al. (1997) have also used a seven-point response scale to identify attitudinal and social normative factors associated with the prescribing of oral antibiotics to ambulatory patients in a managed care setting; and
- (2) it is relatively easy to construct and administer.

7.13 The Questionnaire Development Process

The questionnaire development process was based on Churchill's (1991) nine steps methodology. The first two steps have already been presented (see sections 7.3 and 7.4).

Step (1): Specify what information will be sought;

Step (2): Determine the type of questions and method of administration;

Step (3): Determine the content of the individual question:

the purpose of this step is closely related to the substance of the study. As such, the variables that are comprised within the constructs that form the patient typology model were designed according to the type of data required to understand the doctor's prescribing behaviour, the data collection methods that would be used, and the ultimate use of the results. Those variables were developed in accordance with the literature review, and the doctors' opinions expressed during the qualitative phase of the study.

Step (4): Determine the form of response to each question:

the marketing research literature has listed several forms of response including the dichotomous question, polytomous question, the open-ended question, and the scale. All of these forms of response were used to understand drug choice.

Step (5): Decide on question wording:

since doctors have a specific medical language, most questions were organised on a Likert-type scale or rank-order scale using the adequate medical terms or sentences. Particular attention was drawn to the meaning of the questions in order to avoid any statement that was not relevant to the respondent's daily practice.

Step (6) Decide on question sequences: the question sequence was organised according to the strategy proposed by Churchill (1991). As a result, interesting general questions with the categorical format were presented first. More sensitive questions, particularly those that in the *exploratory phase* of the research were found uninteresting to doctors, were placed on the fourth section of the questionnaire. For example, the doctor's personal information, such as demographic profile and clinical experience, was placed in the last section of the questionnaire. The final version of the questionnaire comprises **five sections**. However, only part⁷ of the questionnaire was used in this study:

- In section **one**, **5** categorical variables were defined to characterize GP practices, in terms of the type of region where the health centre is allocated, the number of other GPs at the primary practice site, the number of patients seen daily, the number of patients on each GP record, and the number of patients with hypertension.
- In section **two**, **5** seven-point Likert scales, ranging from completely agree to complete disagree, and **3** categorical variables were used to characterise the hypertensive patient typologies, and drug choice.

⁷ The author of this study is a researcher at ISCTE (see footnote 9) where the doctoral student has been doing research on doctors' prescribing behaviour for a long time. As the researcher is planning to develop a book on Portuguese GPs' prescribing behaviour, based on his PhD, a reduced part of the questionnaire was used for this project. However, no restrictions on the research design were imposed by this project. Hakim (1987) suggests that "*A good deal of post-graduate student research is carried out this way*" (ibid: 163).

- The **third** section of the questionnaire included all drug information sources. Seven-point rating scales were used to analyse eleven frequently cited commercial and scientific information sources:

1. Manufacturers' literature, promotional activities and reputation;
2. GPs' colleagues;
3. Patient feed back;
4. Medical opinion leaders;
5. Pharmacists;
6. Medical journals;
7. Pharmacological textbooks;
8. Medline;
9. INFARMED⁸
10. Therapeutic Bulletins; and
11. Desk Reference.

- In the first part of the **fourth** section of the questionnaire the perceptions about a new therapeutic category (i.e., Angiotensin II antagonists) were investigated. **8** seven-point scales were used in order to analyse the GPs' posture towards this therapeutic innovation.

⁸ The National Institute of Pharmacy and Medicines (Instituto Nacional da Farmácia e do Medicamento - INFARMED).

- The **last** section of the questionnaire was developed to encapsulate all relevant demographic profiles and clinical experience. The classificatory data included demographic variables such as age, gender, medical school, health region, and clinical experience.

Step (7) determines the questionnaire's physical characteristics. Mail surveys are, inevitably, self-administered and have to be completed without the guidance of interviewers. Greer et al. (2000) suggest that the content and design of the questionnaire is important if a high response rate is to be achieved. Other researchers also argue that "*Appearance factors may project an image of professionalism that could result in greater trust on the part of the recipient*" (Childers and Skinner, 1996: 196). Given the importance of the physical characteristics of the questionnaire (see Appendix Seven) to maximise response (Greer et al., 2000), the latest enhancement techniques were used:

- the mail interview was clearly identified as sponsored by the Portuguese Foundation for Science and Technology;
- the questionnaire was accompanied by a covering letter on the researcher's Portuguese university⁹ stationery. The researcher was identified as an academic researcher at this Portuguese university;

⁹ Higher Institute of Labour and Business Studies - Instituto Superior de Ciências do Trabalho e da Empresa (ISCTE) is a Public University Institute with activities in the broad areas of social and business sciences. It is located in the northern part of Lisbon in Cidade Universitária (University Campus) together with the main Faculties of Lisbon University.

- both the questionnaire's mailing envelopes and the answer envelope (see Appendix Ten) were provided, on the researcher's Portuguese university stationery (see Appendix Nine), which identified quite precisely the address, the telephone and fax number of the university in order to allow the respondent to check the veracity of the request, if necessary;
- a follow-up questionnaire to initial non-respondents, in which all the physical characteristics were maintained;
- a new cover letter, accompanied by the previous one, (see Appendix Eight) reinforcing the importance of the study;
- undersized paper stock for the questionnaire;
- coloured ink for the questionnaire;
- oversized mailing envelopes;
- some notations on the face page of the questionnaire itself were used:

"your collaboration is paramount for the success of this research" and

"we guarantee that all information provided individually in this questionnaire will be treated confidentially and anonymously"

- the average time to rank or to tick each sentence or question, and the subsequent time to fulfil the all questionnaire was also impressed on the face page of the questionnaire itself.

In accordance with the initial questionnaire lay-out indications, a specialist organisation was contracted to develop the questionnaire's presentation, which was slightly modified in accordance with comments received from the doctors invited to preview it.

Step (8) re-examine Step 1 - 7 and revise if necessary

Following Churchill's (1991) advice, each question was reviewed to ensure that it was not confusing or ambiguous, potentially offensive to the respondent, leading or bias inducing, and that it was easy to answer.

Step (9) pre-test questions and revise if necessary (Reynolds et al., 1992)

The pre-test development was organised in **two** different stages.

(1) In the **first stage**, the questionnaire was pre-tested according to two main goals (Greer et al., 2000; Woodward, 1988):

- content validity; and
- length.

The questionnaire was previewed for completeness and understanding by a convenience sample of 9 GPs, 1 cardiologist, and 2 pharmaceutical marketing managers. In the next step, the questionnaire was tested on a convenience sample of 17 GPs for clarity and interpretability of the survey contents, as well as to decide whether the 7 point ordinal/ranking scale was adequate. As a result of these self-administered interviews, the 7 point ranking scale was chosen and minor changes were necessary. These changes related specifically to two confusing sentences, which were modified according to doctors' comments. The *length* of the questionnaire was considered acceptable by these doctors, who spent between 16 and 25 minutes to complete all the questions. Consequently, it was considered that the questionnaire met all the

stated objectives of the research. One week later, 10 GPs from Coimbra and 5 rural GPs from Aveiro were added to the initial convenience sample of GPs. This convenience sample was selected because previous work on the clarity and interpretability of the survey contents of the questionnaire was done by doctors who develop their clinical work both in a large city (e.g., Lisbon) or in a urban in industrial environment (e.g., Setúbal). The final version of the questionnaire was then mailed to all these 32 selected GPs. Based on the results from the first 5 returned questionnaires (approximately 16% response rate), which were obtained less than a week later, no changes were necessary. Consequently, the questionnaire was considered ready for the pilot study.

(2) In the **second stage**, a pilot study was developed.

Approximately 13.3 % of the initial sample (200 of 1500 Portuguese GPs) was selected using a systematic, random selection process for the pilot study. The questionnaire was mailed by the end of March 1988 to the selected 200 GPs. Based on the results from the 17 returned questionnaires (approximately 9 % response rate¹⁰), it was evident that no significant changes had to be made in the pre-test questionnaire, which was used for the nation-wide survey.

¹⁰The final sample size was not adjusted after the low response rate (9%) resulting from the pilot study because it was larger than the response rate reported in previous studies. For example, Freeman et al.'s (1993) study reported a 7% response rate in their pilot study. For the main study, our final sample size represents 23.43% of the GP population, while it represents only 4.63% in that study.

7.14 The Interview Schedule and Response Rate

The interview schedule for data collection was organised according to the plan developed earlier for the qualitative phase of this study. That is, as soon as the findings from the laddering technique were identified, the questionnaire was elaborated and the interview schedule defined accordingly.

On the 6th of April 1998, a twelve-page questionnaire and a covering letter were sent to 1500 Portuguese General Practitioners (23.43% of all GPs). Three months later, a replacement questionnaire, a new covering letter, accompanied by the old covering letter, were sent to all non-respondents. The return date for the questionnaire was the 15th of September 1998. The survey receipts were closed on the 6th of October 1998. That is, six months after the initial wave of questionnaires.

In order to adequately describe and apply criteria either for determining the eligibility of respondents or for establishing responses rates (Shosteck and Fairweather, 1979), six methodological concepts are advanced:

(1) *initial sample* refers to all doctors originally drawn from the sampling frame. In the present case, these consisted of 1500 office-based GPs who have been working for the NHS.

With rare exceptions, initial samples only approximate the population under study.

Errors in the sampling frame (e.g., for this study, GPs not in office practice, unknown at the indicated address, deceased, or retired) eroded the initial sample. Because of such errors, after attempts at contact, the initial sample was redefined to include only respondents who were potentially available and eligible for inclusion in the study. This redefined group is the effective sample.

(2) ***effective sample*** - the greater the difference between the effective and initial sample, the lower the “efficiency” of the initial sample. Two sources of low sample efficiency have been identified: first, deficiencies in the sampling frame, which can be caused by an expected number of deaths, retirements and addresses unknown; second, deficiencies in conceptualising the population of inquiry, which can lead to selecting an inappropriate sampling frame. In the present study, only a few deficiencies were detected in the sampling frame. Most of them were related to 19 unknown doctors at the indicated addresses and 2 retirements. As a result, the effective sample was 1479 GPs.

(3) ***gross response rate*** - The gross response rate measures the extent to which persons in the initial sample either complete the questionnaire or are otherwise accounted for. In addition to questionnaire respondents, gross contacts include persons identified as ineligible for inclusion and those who explicitly refuse to cooperate. However, gross contacts exclude both persons apparently available but never contacted and non-respondents. The

utility of the concept is that it explicitly separates ineligible respondents and non-respondents. Only two doctors wrote to the researcher explaining why they were ineligible for inclusion. However, the gross response rate includes doctors identified as ineligible. Thus, the gross response rate was 22.93 % (321) doctors who returned the questionnaire, plus 23 (19 unknown, 2 retirements and 2 ineligible) divided by the number of doctors in the initial sample (1500 GPs).

(4) **gross completion rate** - The gross completion rate measures only that proportion of the initial sample who either partially or fully answer the questionnaire. This is equivalent to Kviz's (1977) term "completion rate". In accordance with this concept, the gross completion rate obtained in this research was 21.4 % (i.e., 321 doctors who returned the questionnaire divided by the number of doctors in the initial sample (1500 GPs)). As the proportion of ineligible initial respondents is extremely low, the gross response rate and the gross completion rate are quite similar.

(5) **final sample** - The final sample indicates the precise number of available and eligible respondents who eventually answer the questionnaire. In accordance with the concept definition, this encapsulates 1477 GPs who were considered available and eligible for the study. Only doctors within the final sample who did not answer the questionnaire are correctly designated as non-respondents. Although somewhat expected, the significant number of 1156

GPs who decided not to collaborate in this study represent the non-respondents. We will be returning to them later.

(6) *final completion rate* - Designated by Kviz (1977) as “response rate”, ***the final completion rate*** will always equal or exceed ***the gross completion rate***.

The larger the proportions of the initial sample ineligible for the effective sample, the greater the discrepancy between ***final*** and ***gross*** completion rates.

In the present study, as has been noted, the difference between the initial sample and the final sample is not significant. As such, the final completion rate (21.73 %) is not too different from the gross completion rate (21.4 %).

7.15 Preparing for Data Analysis

This section examines the ‘processing’ of marketing research data, once it has been collected using the methods discussed earlier. Three different stages had to be undertaken before starting the data analysis: **editing**, **coding** and **processing** the data (Roughton, 1986). All these stages, as well as the data analysis, were done manually and directly to the system by the researcher.

Editing:

the concept of editing refers to the process of examining returned questionnaires in order to develop the corrective actions that have been found necessary to ensure that the data is of a high quality.

Most of the time, the editing process is done in two stages: the field edit and the central-office edit. The former is a preliminary edit which tries to detect the most obvious omissions and inaccuracies in that edit, while the later involves a more complete and exacting scrutiny and correction of the completed, returned questionnaire (Churchill, 1991). Central-office editing is considered crucial for the final quality of the data under analysis.

Central-Office editing: in this phase, efforts focused on analysing the completeness, legibility, consistency, accuracy and response classification of the data (Kinneer and Taylor, 1991).

The 321 returned questionnaires were checked to ensure that they were properly filled in, and that no significant omissions were allowed. It follows that it was important to analyse whether the returned, partially filled in questionnaires were in an adequate condition for statistical analysis. The question arose as to whether the 13 (4 %), partially filled in questionnaires were of a quality sufficient for inclusion in the statistical procedures. As a rule, all the partially filled in questionnaires in which questions were left unanswered were omitted from analysis, except where it was recognised that doctors simply overlooked the question rather than deliberately omitted it. Incomplete questionnaires were also accepted when the omitted questions were related to a lack of experience with a specific pharmacological characteristic of the drug or the sentence to be ranked was not familiar to the

doctor. However, the acceptable number of omitted questions was no more than three, none of which were to be Q13 which is the dependent variable in terms of the prescribing philosophy.

In the present research, 8 partially filled in returned questionnaires (2.5 %) were not thought to fulfil all the requirements for statistical analysis. The values for items with missing data in the remaining 5 partially filled in questionnaires were calculated using the item's mean score, because the number of missing items was small. Four other questionnaires (1.25 %) were not accepted for the final analysis because they were returned after the survey receipts were closed. As a result, a total of 12 questionnaires (3.74 %) were excluded from the data analysis, which was performed on 309 respondents. Thus, *the final completion rate* is reduced to 21 % (rounded up).

Coding and Processing the Data:

Coding is the procedure through which the answers are translated into both class membership and into a symbolic representation of this membership. This conversion process is called coding (de Vaus, 1991). Processing the data was the final step: “*Once in this form the data can be analysed, using various statistical tests, and conclusions drawn*” (Moutinho and Evans, 1992: 64).

7.16 Model - Building Approach for Multivariate Analysis

7.16.1 From Multiple Regression and Discriminant Analysis to

Logistic Regression Analysis

The most common example of model-building techniques used in statistics is the usual *linear regression model* where the outcome variable is assumed to be continuous. Furthermore, it provides “*a widespread belief that it remains a reasonable procedure even if some of the assumptions underlying it are not met in the data (a property statisticians refer to as ‘robustness’*” (Aldrich and Nelson, 1984: 9) As a result, regression analysis has become a standard statistical tool in the social sciences. Thus, we will use it as useful point of departure for, and comparison with, the logistic regression model, in order to illustrate both the similarities and differences between logistic regression and the linear regression model (Petrin and Sabin, 2000).

We have mentioned that the technique of *simple linear regression*, which is but one example of a group of related techniques known as general linear models (*GLMs*), considers a value of a dependent variable (Y) to be a function of the linear effects of two independent variables (Hutcheson and Sofroniou, 1999). A random or error component expressing the variation not accounted for by the relationship between the dependent and independent variables (residual variance) was also included.

When we move on to a discussion of multiple linear regression, we are introducing more independent variables into the equation to explain the dependent variable (Y). As a result, multiple regression has been assumed to be a statistical technique for estimating simultaneous correlations between multiple predictor variables and a single dependent (“criterion”) variable (Frude, 1993). It follows then, that reporting tests of assumptions and handling violations does not have to be an arduous task because all the same structures and assumptions that were outlined for the simple linear regression model apply here as well (Menard, 1995). Thus, what follows is a simple description of the underlying principles of one of the most commonly used and important GLMs, the *multiple linear regression model*, and its statistical tests. This movement from $Y = \alpha + \beta X + e$ to $Y = \alpha + \beta_1 X_1 + \beta_2 X_2 \dots + \beta_n X_n$, where X_1 , X_2 and X_n are interval-level independent variables and β_1 , β_2 , and β_n are *partial slopes* or *partial regression coefficients*¹¹, is organised within the conviction that the introduction of these new variables into the equation will improve the predictive power of Y. As a result, *regression methods* are found to be integral components of any data analysis concerned with describing the relationship between a response variable and the explanatory variables that

¹¹ (i.e., the effect of each of the independent variables on the predicted value of the dependent variable when the values of the other independent variables are maintained constant).

are introduced into the regression equation (Petrie and Sabin, 2000; Hutcheson and Sofroniou, 1999; Silver, 1992).

Multiple regression analysis is a multivariate technique used to interpret the effect of two or more independent variables on the dependent variable (Bryman and Cramer, 1997). Metric data are required, both for the independent and dependent variables (Evans et al., 1996). According to the study goal, the independent variable may be assumed to be a predictor or explanatory variable. Hutcheson and Sofroniou (1999) have suggested that the independent variable must be labelled *predictor variable* when its function is prediction. When the prediction role is developed, the dependent variable is assumed to be the criterion variable. When prediction is not the goal, independent variables have an explanatory role, through which they explain variation in the dependent variable. Thus, multiple regression can be classified either as a descriptive or inferential technique. In the former the linear dependence of one variable on an other is summarised and decomposed, while in the latter the relationship is the population evaluated from the examination of the sample data. Multiple regression can be particularly helpful when the researcher has a single dependent variable which is presumed to be a function of other independent variables (Rose and Sullivan, 1993). When a model is defined, its predictive or explanatory capacity is a function of the variables

that were included therein. That is, when constructing the model, the researcher must be aware of all the relevant variables that it should encapsulate. If the analyst is able to include all the independent variables that may explain the phenomena under observation, a saturated model is obtained. Otherwise, the power of the model is drastically reduced.

The *sample size* is also relevant to the acceptance of additional variables in a *regression equation*. However, “*the inclusion of large numbers of variables in a model, especially those that are highly correlated, may lead to spurious results that are inconsistent with expectations*” (Petrie and Sabin, 2000: 80).

That is, too many variables in a model may reduce the level of explanation of their respective effects on the dependent variable and as a result, some *partial correlation coefficients* become low. When this occurs, a good indicator has been identified and these independent or predictor variables can be dropped from the equation in order to provide a more simple and coherent model (Hutcheson and Sofroniou, 1999). This is *the principle of parsimony*. It postulates that a variable might be added to the model or deleted from it in accordance with its contribution to the overall square of the multiple correlation coefficient.

In multiple regression analysis the relationship is assumed to be linear¹²

¹² The assumption of linearity means that for each independent variable, the amount of change in the mean value of the dependent variable associated with a unit increase in the independent variable, “holding all other independent variables constant”, occurs regardless of the level of independent variable.

and additive¹³. Consequently, the primary question that the researcher has to consider is: '*which of the independent variables has the greatest influence upon the dependent variable?*'. This can be answered by obtaining the "*partial*" slopes or "*partial regression coefficients*", known as *beta coefficients*. Since these coefficients can be compared with each other in order to evaluate the relative effect of predictor variables, the larger the beta coefficient, the stronger the impact of that variable upon the criterion variable (Hutcheson and Sofroniou, 1999; De Vaus, 1996; Menard, 1995). In addition, the beta weight enables the researcher to analyse how well a set of explanatory variables explain the criterion variable, and to determine the most explanatory variables. Besides the partial regression coefficients, the *multiple regression coefficient* is also an important indicator of the degree of association between the variables. In the same way that r^2 , *the square of the Pearson product-moment correlation coefficient*, was used to identify the proportion of the linear variance in the dependent variable which was predicted by the independent variable in simple linear regression, R^2 (the square of the multiple correlation coefficient) is able to identify the proportion of the linear variance in the dependent variable that can be explained by all of the independent variables acting together.

¹³ For each independent variable, the amount of change is the expected value of the dependent variable associated with a unit increase in the independent variable "holding all other independent variables constant" (Berry and Feldman, 1985).

The coefficient of multiple determination or simple R^2 tends to overestimate the population value of R^2 . As a result, the adjusted R^2 must be used in order to correct the optimistic bias of the simple R^2 , because it does not necessarily increase as additional variables are added to an equation. Consequently, it represents the preferred measure of fit because it is not subject to the inflationary bias of unadjusted R^2 .

Several assumptions were defined when describing multiple regression analysis. However, the indicator (dependent) variable can be categorical. In this case, multiple discriminant analysis¹⁴ is the appropriate statistical technique for the direct prediction of group membership, if and only if “*the assumption of multivariate normality of the independent variables, as well as equal variance-covariance matrices in the two groups*” (Norusis, 1994: 1) is not violated. That is, both the regression and discriminant analysis require continuous predictor (explanatory) variables. Furthermore, the indicator (dependent) variable can have only two values (dichotomous variable).

¹⁴ Kinnear and Taylor (1991) suggested that “*discriminant analysis (DA) is a technique that is appropriate with a nominal dependent variable and interval independent variables...The basic idea of DA is to find a linear combination of the independent variables that makes the means scores across categories of the dependent variable on this linear combination maximally different. This linear combination is called the discriminant function (DF). In symbols, $DF = V_1X_1 + V_2X_2 + \dots + V_mX_m$, where X_m is the m th independent variable. The objective is to find the values for the V 's that give us the required DF*” (ibidem: 633/4).

This means that the number of categories of the dependent variable may also avoid the use of multivariate regression analysis. Thus, another problem that needs to be tackled is the number of categories of the dependent variable: “*When the dependent variable can have only two values, the assumptions necessary for hypotheses testing in regression analysis are necessarily violated*” (Norusis 1994: 1). Although it is possible to violate some assumptions underlying the the regression analysis, those that have been described are crucial, and their failure will lead to quite unreasonable estimates (Hutcheson and Sofroniou, 1999). This problem has been highlighted with particular emphasis when the dependent (indicator) variable is non-metric (qualitative): “*regression estimates with a qualitative dependent variable may seriously misestimate the magnitude of the effects of independent variables, that all the standard statistical inferences such as hypotheses tests or the construction of confidence intervals are unjustified, and that the regression estimates will be highly sensitive to the range of particular values observed for the independent variables (thus making extrapolations or forecast beyond the range of the data especially unjustified*” (Aldrich and Nelson, 1984: 9-10). In contrast to this approach to data analysis, *Generalized Linear Models* (GLMs) have been developed, which have been applied mainly in the biological and medical fields, and offer multiple-variable techniques for dealing with data that do not meet all the requirements of traditional parametric statistics (Hutcheson and Sofroniou, 1999).

7.16.2 *Generalised Linear Models (GLMs) for Categorical Response*

Variables

It should be noted that social scientists use different non-metric variables for measuring attitudes and opinions on various issues (Hutcheson and Sofroniou, 1999; Diamantopolous and Schlegelmilch, 1997; Rose and Sullivan, 1993; Siegel and Castellan, 1988). Categorical scales are also pervasive in the health sciences for measuring responses such as whether a patient survives an operation (yes, no) and stage of a disease (initial, advanced) (Hutcheson and Sofroniou, 1999). Though categorical variables are common in the social and health sciences, they are by no means restricted to those areas. The use of categorical data, in which ordinal and nominal scales are relevant, frequently occurs in the behavioural sciences (e.g., categories of mental illness such as “schizophrenia”, “depression”, “neurosis” diagnosis), as well as in marketing (e.g., to analyse consumers’ preference among leading brands of a product).

We now turn to multivariate analysis for categorical variables in order to introduce an extremely important class of models in health, marketing and behavioural sciences: *GLMs*¹⁵ for *categorical response variables*.

¹⁵ “The term *Generalized Linear Model*, refers to a family of statistical models that extend the linear parametric methods such as ordinary least-squares (OLS) regression and analysis of variance, to data types where the response variable is discrete, skewed, and/or non-linearly related to the explanatory variables” (Hutcheson and Sofroniou, 1999: 2).

All generalised linear models (GLMs), have three components: The *random component* identifies the response variable Y and assumes a probability distribution for it. The *systematic component* specifies the explanatory variables used as predictors in the model. The *link* describes the functional relationship between the systematic component and the expected value (mean) of the random component (Hutcheson and Sofroniou, 1999). We have introduced GLMs in order to unify a wide variety of statistical methods, which include the two most important GLMs for categorical response variables, **logistic regression** models for binary data with a binomial random component and **log-linear** models for count data with a Poisson random component. Both GLMs relate a function of the mean to the explanatory variables through a linear prediction equation. It has already been pointed out that whenever a dichotomous dependent variable is specified, the assumptions required for hypotheses testing using *normal* GLMs are violated. Because regression analysis and linear discriminant analysis are inadequate for a simple dichotomous dependent variable, the **logit** and the **log-linear** models are particularly relevant for predicting whether an event will or will not occur (Hutcheson and Sofroniou, 1999, Agresti, 1996). GLM models have a close association with other statistical techniques because the GLM fitting process utilises maximum likelihood methods for choosing the random component. Since

normality and *constant variance* are no longer required in the generalised framework, one need only know the way in which the variance is a function of the mean (Huthcheson and Sofroniou, 1999, Andersen, 1997; Agresti, 1996; Aldrich and Nelson 1984). That is, although this group of models falls into the same family of models as the multiple regression model (i.e, GLMs), it does not depend on the same assumptions concerning underlying distributional form. Although the relationship between discriminant analysis and logistic regression and their coefficients is well established, some studies presented a comparison of these methods when used to evaluate risk factors for coronary deaths (Brenn and Arnesen, 1985). Unlike the multiple regression equation and discriminant analysis, which are predominantly used with interval-level data, GLMs for binary data are used with categorical response variables that have only two categories. That is, these statistical techniques are used to obtain regression models for dichotomous categorical response variables (Andersen, 1997). As in multiple regression, logistic regression modelling allows the interpretation of the simultaneous effects of a number of independent variables. However, the multiple regression requires an interval-level dependent variable which, for the statistical significance of the coefficients to be assessed, is assumed to be normally distributed with respect to the categories of the independent variables. As we have already

noted, this assumption has been violated: “*A significant limitation of traditional regression analysis is that it relies heavily on the normal distribution, an assumption that is typically violated with social science (especially survey) data*” (Magidson, 1994: 113). That is, whilst the normal distribution plays a central role for regression and analysis of variance (ANOVA) models for continuous and discrete variables, for *categorical data*, the *Poisson and binomial* distribution are important. The latter has been found relevant for predicting a *binary dependent variable* from a set of independent variables (Petrin and Sabin, 2000). The next section introduces an important GLM for binary response data, which is assumed that the random component in the model has a binomial distribution.

7.16.3 Differences Between Linear and Logistic Regression

As discussed in the previous section, it is possible to claim emphatically that two important differences can be found between the linear and logistic regression. The first difference concerns the *nature* of the relationship between the indicator (response) and predictor (independent) variable. When the researcher faces a regression problem, the mean value of the outcome variable is the reference value, which is derived from the value assumed by the independent variable. This reference value is called the **conditional mean** (Hutcheson and Sofroniou, 1999; Agresti, 1996;

Hosmer and Lemeshow, 1989). It can be shown that the conditional mean represents the expected value of Y , given the value of x and it is represented by the quantity " $E(Y | x)$ ". The nature of this relationship changes in a linear regression, and the conditional mean is obtained from the linear equation in x (or some transformation of x or Y), such as:

$$E(Y | x) = \beta_0 + \beta_1 x$$

According to this expression, it is possible to realise that $E(Y | x)$ is able to assume any value of x between $-\beta$ and $+\beta$. For example, if we were interested in exploring the relationship between age and the presence or absence of coronary heart disease (CHD) it would be possible to define intervals for the independent variable and compute the mean of the outcome variable within each group. In this way, it would be possible to determine, for each age group, the frequency of the occurrence of each outcome as well as the conditional mean (or proportion with CHD present).

With dichotomous data, the conditional mean can be found in the interval $[0; 1]$ [i.e., $0 = E(Y | x) = 1$]. In addition, the conditional mean approaches both extremes of the interval $[0; 1]$ "gradually". In other words, the change that can be found in the $E(Y | x)$ per unit change in x , follows an **S-shaped curve** (becomes progressively smaller as the conditional mean gets closer to zero or 1). The **S-shaped curve** suggests

that as age increases, the proportion of individuals with evidence of CHD increases. According to this evidence, it would be possible to suggest that cumulative distributions should be used to provide a model for $E(Y | \mathbf{x})$ in the case where Y is dichotomous. However, there are two primary reasons for choosing the logistic distribution:

1. *“from a mathematical point of view, it is an extremely flexible and easily used function; and*
2. *it lends itself to a biologically meaningful interpretation”* (Hosmer and Lemeshow, 1989: 6).

Following these researchers notations, and assuming the use of the logistic distribution, the conditional mean of Y given \mathbf{x} can be represented by the quantity $\pi(\mathbf{x}) = E(Y | \mathbf{x})$. Therefore, the logistic regression model converges to: $\pi(\mathbf{x}) = \frac{e^{\beta_0 + \beta_1 \mathbf{x}}}{1 + e^{\beta_0 + \beta_1 \mathbf{x}}}$

When a **logistic transformation** is performed on $\pi(\mathbf{x})$, the logit equation $g(\mathbf{x})$ assumes many of the desirable properties of a linear regression model and converges to:

$$\begin{aligned} g(\mathbf{x}) &= \ln [\pi(\mathbf{x}) \div 1 - \pi(\mathbf{x})] \\ &= \beta_0 + \beta_1 \mathbf{x} \end{aligned}$$

This transformation enables the logit $g(\mathbf{x})$ to be linear in its parameters, to be continuous, and to range from $-\infty$ to $+\infty$, depending on the range of \mathbf{x} . This **logit transformation** represents the link function, and for this

reason logistic regression models are often called *logit models*. The logit is the natural parameter of the binomial distribution, so the logit link is its canonical link. Whereas $\pi(\mathbf{x})$ is restricted to the range (0 - 1), the logit can be any real number. The real numbers are also the potential range for linear predictors (such as $\alpha + \beta\chi$) that form the systematic component of a GLM, so this model does not have the structural problem that the linear probability model has (Hutcheson and Sofroniou, 1999; Agresti, 1996; Hosmer and Lemeshow, 1989).

The second important difference between the linear and logistic regression models can be found in the *conditional distribution* of the outcome variable. In the former it is possible to represent an observation of the outcome variable as $y = E(Y | \mathbf{x}) + \epsilon$. The quantity ϵ (error) is supposed to measure an observation's deviation from the conditional mean, and it is assumed to follow a normal distribution with mean zero and a level of variance that is constant across different observations of the independent variable. Therefore, the conditional distribution of the outcome variable given \mathbf{x} has a bell shape with mean $E(Y | \mathbf{x})$, and a variance that is constant. However, a dichotomous outcome variable does not follow such an assumption. It follows then, that in the latter, the value of the outcome variable given \mathbf{x} , may be described as $y = \pi(\mathbf{x}) + \epsilon$. In this case the error (ϵ) may assume only one of two possible values. If $y = 1$ then $\epsilon = 1 - \pi(\mathbf{x})$

with probability $\pi(\mathbf{x})$, and if $y = 0$ then $\mathbf{e} = -\pi(\mathbf{x})$ with probability $1-\pi(\mathbf{x})$.

According to these assumptions, it is possible to stress that the error (\mathbf{e}) has a distribution with mean zero and a variance equal to $\pi(\mathbf{x})[1-\pi(\mathbf{x})]$.

That is, the conditional distribution of the outcome variable when we are in presence of a binary population follows a binomial distribution, which in turn enables the researcher to determine the probabilities of the possible outcomes (Hutcheson and Sofroniou, 1999; Andersen, 1997; Agresti, 1996; Hosmer and Lemeshow 1989; Siegel and Castellan 1988). These probabilities will be derived from the conditional mean of Y given \mathbf{x} when the logistic distribution is used ($\pi(\mathbf{x})$).

Strictly speaking, the main difference between the basic logistic regression model and the linear regression model is that the outcome variable in the former is **binary** or **dichotomous** while in the latter it is **continuous**.

The purpose of the previous considerations was to further illustrate the relevance of understanding the importance of logistic regression analysis when the outcome variable is dichotomous. In line with the reasoning that has been advanced, three main conclusions are drawn:

1. the conditional mean of Y , given \mathbf{x} , when the logistic distribution is used ($\pi(\mathbf{x})$), fulfils the following requirement: *the conditional mean of the regression equation must be formulated to be bounded between zero and 1*; and

2. with a dichotomous outcome variable, the distribution of errors follows a binomial distribution, *not the normal*; and
3. the logit transformation of $\pi(\mathbf{x})$ into $g(\mathbf{x})$ is able to assume the desirable principles of a linear regression model when performing an analysis using the logistic regression model. That is, the linear combination of the values of the predictor variables and the regression coefficients is a *logistic transformation* of the probabilities of the response categories.

When there is more than one explanatory variable, the logistic regression model can be written as (Hutcheson and Sofroniou, 1999):

The probability of an event happening = $e^z : (1 + e^z)$, where 'e' is the natural logarithm base, and 'z' is the linear (systematic) component of the model and equals $\alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3, \dots, + \beta_k x_k$. The relationship between the probability of an event happening (p) and the linear predictor (z) in the first equation is non-linear. However, if ' p ' is transformed to logit (p) (i.e., the log odds of p), this relationship can be made linear as the equation belows shows.

$$\text{logit}(p) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3, \dots, + \beta_k x_k .$$

where logit (p) is the log odds of an event happening.

7.17 The Statistical Methods Used for Research Objectives

7.17.1 *The Logistic Regression Model*

Logistic regression is very similar in its construction to multiple regression and variations of regression techniques but differs in the way it is interpreted (Petrie and Sabin, 2000; Hutcheson and Sofroniou, 1999).

Logistic regression has been considered the most popular model for binary data (Hutcheson and Sofroniou, 1999; Andersen, 1997; Agresti, 1996; Hosmer and Lemeshow, 1989; Brown, 1982; Halperin et al., 1971).

Logistic regression has also been useful for epidemiological analysis (Truett et al., 1967).

Some researchers considered the logistic regression model to be a multivariate statistical technique that “*has become the standard method for regression analysis of dichotomous data in many fields, especially in the health sciences*” (Hosmer and Lemeshow, 1989: vii). “*Berkson (1944) first proposed its use for the analysis of experimental bioassays while Cox (1970) describes its application for a variety of problems*” (Brown, 1982: 1087). Although it has been used in statistical analysis for a long time, it was only with the “*Framingham Heart Study*” developed by Truett et al. (1967) that it became familiar to the research community. Its full power and applicability has been expressed by the large and rapidly growing literature on logistic regression, particularly in the field of medical sciences:

“Nearly every issue of such major journals as The American Journal of Epidemiology, The American Journal of Public Health, The International Journal of Epidemiology, and The Journal of Chronic Diseases has articles whose analysis are based on the logistic regression analyses” (Hosmer and Lemeshow, 1989: vii).

Multiple logistic regression has also been used to investigate factors associated with treatment approaches to hypertension (Nichol et al., 1997) and to analyse the association between self-reported prescribing behaviour and covariates (Himmel et al., 1997; Mante et al., 1995).

7.17.2 Fitting the Logistic Regression Model

The logistic regression model is “pregnant” with meaning because the regression part of the model, i.e., a linear combination of the values of the explanatory variables and the regression coefficients, is a logistic transformation of the probabilities of the response categories. Logistic regression models are special cases of GLMs, in which the random component for the (success, failure) determinations is binomial (Hutcheson and Sofroniou, 1999). The ultimate aim of any GLM, as with other statistical techniques, is usually to find the simplest (most parsimonious) description of the relationships between variables. This involves the successive elimination of parameters from the model, through an iterative process, to arrive at the model which produces the best “fit” between the frequencies predicted by the model and the observed frequencies, with the

minimum number of parameters. A good-fitting model has several benefits. The structural form of the model describes the patterns of association and interaction. Inferences for model parameters give the researcher the opportunity to evaluate which explanatory variables affect the response, while controlling effects of possible confounding variables. The sizes of the estimated model parameters determine the strength and importance of the effects. Finally, the model's predicted values smooth the data and provide improved estimates of the mean of the response distribution.

As with other model-building statistical techniques, the logistic regression procedure is applied whenever the researcher looks for the best fitting and most parsimonious model to describe the relationship between a dependent or response binary variable and a set of independent or predictor variables. Once the difference between the assumptions underlying a particular statistical model are kept in mind, it is reasonable to accept that the methods employed in an analysis using logistic regression are based on the same general principles used in linear regression. The logistic regression model, by contrast with the usual linear regression model where the outcome variable is assumed to be continuous, is particularly relevant when the outcome variable is discrete, taking on two (binary response data) or more possible values (Brown, 1982). Several statistical tests have been advanced for the purpose of assessing the goodness-of-fit of the

multiple logistic regression model. Some statisticians examined those goodness-of-fit tests (Lemeshow and Hosmer, 1982), particularly chi-square distribution, discriminant analysis and maximum likelihood (Hosmer and Lemeshow 1980). Under the usual assumptions for linear regression, the method that has been found particularly relevant for estimating the unknown parameters β_0 and β_1 is least squares. Unfortunately, if this method is applied to a model with a dichotomous outcome (binary variable) the estimators will lose their properties.

In practice, sampling models such as the 'Poisson' and 'binomial' have unknown parameter values. Using sample data, we estimate these parameters. That is, for a particular sampling model, we can substitute the sample data into the probability function and then view that probability as a function of the unknown parameter value. The probability of the observed data, expressed as a function of the parameter, is called a *likelihood function*. The maximum likelihood estimate of the parameter is defined to be the parameter value from which the probability of the observed data takes its greatest value (Agresti, 1996). Consequently, the maximum likelihood estimation (MLE) must be adopted in any approach estimation of the logistic regression model in order to define the best estimators of the unknown parameters β_0 and β_1 (Aldrich and Nelson, 1984).

ML estimators of model parameters work best when the sample size is large compared to the number of parameters in the model. When the sample size is small, or when there are many parameters relative to the sample size, improved inference results using the method of conditional maximum likelihood. This method bases inferences for primary parameters of interest on a conditional likelihood function that eliminates the other parameters. The inferential analysis in this study used large-sample approximation. However, analysis of some epidemiological studies reveals contradictory approaches in estimating these unknown parameters.

Whilst Halperin et al (1971) assumed the maximum likelihood estimators to define the constants, Truett et al.'s (1967) study suggested the use of the linear discriminant function in estimating the coefficients α and β_i . An important methodological imposition was derived from the latter researchers' approach. Truett et al.'s (1967) findings are theoretically correct if the distribution of (x_1, \dots, x_k) is multivariate normal both for the "healthy" and for the "diseased" populations, with equal variance-covariance matrices in the two populations, "*or if the linear compound $\alpha + \sum \beta_i x_i$ is univariate normal for the two populations, again with equal variance-covariance matrices, where the β_i are now the population values of the linear discriminant coefficients... On theoretical grounds the maximum likelihood method is preferable, since it does not assume any particular distribution for (x_1, \dots, x_k) and it gives results which asymptotically converge to the proper values if the logistic model*

holds (Halperin et al., 1971: 152). That is, the method of maximum likelihood has the capacity to find out the best estimators for the unknown parameters which maximise the probability of obtaining the observed data set. Furthermore, “*estimators based on the method of maximum likelihood are popular because they have good large-sample behaviour*” (Agresti, 1996: 10).

The method of calculating regression parameters in logistic regression is different to that which is used in OLS regression (which uses the least squares method¹⁶). In logistic regression, a form of maximum likelihood estimation is used which selects parameters that make the observed results most likely for a response variable with binomial errors (Hutcheson and Sofroniou, 1999).

¹⁶ The assumption of a linear regression based on a multivariate normal distribution, and consequently the choice of the method of least squares yields estimators with a number of desirable statistical properties. Unfortunately, it is well known that the use of the least square method is only possible when it is applied to a model with no dichotomous outcome. In the case where the outcome variable is binary, the estimators no longer have these same properties, and an iterative procedure which gives maximum likelihood estimates for the coefficients should be applied.

7.17.3 Testing for the Significance of the Logistic Regression Model

Once we have fitted the model, the next step is to assess it. As in the univariate case, the process has to be able to determine the likelihood-ratio test for overall significance of the p coefficients for the independent variables. In other words, it is necessary to assess the significance of the variables in the model. Therefore, it is necessary to state the null hypothesis (H_0), its alternative, and to choose the right statistical test.

There are three methods for performing significance tests of hypotheses ($H_0 : \beta = 0$) about the parameters in this GLM: the **Wald statistic**, **likelihood-ratio**, and **score test**. For very large samples, they behave similarly. In this study, we used the Statistical Package for Social Sciences (SPSS), in its menu-driven windows environment, which presents both the Wald and the likelihood-ratio test statistics to analyse the null hypothesis for the logistic regression model (Kinnear and Gray, 1999; Norusis, 1994; Frude, 1993).

For large sample sizes, the **Wald test statistic**, provides an alternative test to the likelihood-ratio test statistic for hypotheses analyses. It is also a chi-square statistic (Hutcheson and Sofroniou, 1999; Agresti 1996; Norusis 1994). Generally speaking, the null hypothesis states that the p “slop” coefficients for the covariates in the model are equal to zero, the distribution of the regression equation will be chi-square with p degrees of

freedom. After the *significance level* has been established (most of the time $\alpha = 0.05$), the rejection of the null hypothesis would confirm that at least one, and perhaps all p coefficients are different from zero. Thus, the *Wald statistic* (W) is particularly suitable for indicating which of the variables in the model may or may not be significant. Hosmer and Lamshow (1989) suggest a critical value of 2 for the *Wald statistic* because it would lead to an approximate level of significance of 0.05. However, the use of the *Wald statistic* (W) to assess the significance of the coefficients should be done with a clear understanding of the influence of the multiple degrees of freedom. When a variable has a single degree of freedom, the *Wald statistic* is just the square of the ratio of the coefficient (parameter estimation) to its standard error. For categorical variables, the *Wald statistic* has a degree of freedom equal to one less than the number of categories. Strict adherence to the $\alpha = 0.05$ level of significance (*Wald statistic* (W) ≥ 2) may justify deselecting “biologically important” variables, which is entirely wrong. It follows, then, that the *Wald statistic* should be carefully analysed in order to obtain the most parsimonious yet “biologically important” model. Furthermore, when the absolute value of the regression coefficient becomes large, the estimated standard error is too large. This produces a Wald statistic that is too small. As a result, the researcher may fail to reject the null hypothesis that the coefficient is zero,

when in fact it is not zero (*type II error*). Therefore, whenever a large coefficient is obtained, the Wald statistic for hypotheses testing is not the best choice. Given this undesirable property of the Wald statistic, the researcher should build a model with and without that variable and base the hypotheses test on the change in the likelihood (Hutcheson and Sofroniou, 1999; Norusis, 1994).

7.17.4 Odds Ratio: A Measure of the Adequacy of the Fitted Model

As soon as the logistic regression model has achieved best fit (i.e., the variables in the model are significant in either biological or statistical sense, and the model fits according to some statistical measure of fit), the researcher is able to interpret the significance of estimated coefficients and their values (Petrie and Sabin, 2000; Hutcheson and Sofroniou, 1999). However, the adequacy of the model has to be tested before interpretation is assumed: “*Strictly speaking, an assessment of the adequacy of the fitted model should precede any attempt at interpreting it*” (Hosmer and Lamshow, 1989: 38). The reason to stress the importance of the adequacy of fit is linked to the capacity to draw practical inferences from estimated coefficients¹⁷.

¹⁷ The coefficients for the explanatory variables (i.e., the parameter values β) show the change in logit (p) that is associated with a unit change in the explanatory variable when all other variables in the model are held constant ... The coefficient for the constant (α) shows the value of logit (p) when all explanatory variables have a value of zero (Hutcheson and Sofroniou, 1999).

In multiple linear regression, the interpretation of the regression coefficients is straightforward. They give us the amount of change in the indicator variable for a one-unit change in the predictor variable. However, to understand the interpretation of the logistic coefficients, the logistic model has to be rewritten in terms of the odds of an event occurring. That is, the ratio of the probability of the event occurring to the probability that it will not, has to be calculated (the **odds** of an event occurring). This probability is the parameter for the binomial distribution.

The logistic regression model has a linear form for the logit of this probability. Therefore, the logistic model can be represented in terms of the log of the odds:

$$\log \frac{\text{Prob (event)}}{\text{Prob (no event)}} = \beta_0 + \beta_1 X_1 + \dots + \beta_p X_p$$

In this form, the logistic coefficient can be interpreted as the change in the log-odds associated with one-unit change in the predictor variable. Furthermore, each estimated coefficient provides an estimate of the log-odds adjusting for all other variables encapsulated into the multivariate logistic regression model. Consequently, an important use of multiple logistic regression analysis is to obtain estimates of odds ratios controlling for other variables (Lemeshow and Hosmer, 1984).

Since it is easier to think of odds than log odds, an alternative formula for logistic regression refers directly to the success probability. This formula uses the exponential function $\exp(\chi) = e^\chi$. Therefore, the logistic equation can be written in terms of odds as:

$$\frac{\text{Prob (event)}}{\text{Prob (no event)}} = e^{\beta_0 + \beta_1 X_1 + \dots + \beta_p X_p}, \text{ or}$$

$$= e^{\beta_0} e^{\beta_1 X_1} \dots e^{\beta_p X_p}$$

It is possible to confirm that “ e ” raised to the power β_i is the factor by which the odds change when the i th predictor variable increases by one unit. If β_i is positive, this factor will be greater than 1, which means that the odds are increased. If β_i is negative the opposite conclusion is valid. When β_i is zero, the factor equals 1, which leaves the odds unchanged.

The odds ratio is a measure of association which is widely used in the medical field, especially in epidemiologic research (Hutcheson and Sofroniou, 1999; Menard, 1995). For example, if the indicator (dependent) variable denotes the presence or absence of lung cancer and if the predictor (independent) variable defines whether or not the person is a smoker, then an odds ratio equal to 2 indicates that the lung cancer occurs twice as often among smokers than among non-smokers.

7.17.5 The Odds-Ratio and Indicator-Variable Coding Scheme

In this study, the interpretation of the logistic regression model was done using the odds and the odds ratio. We have studied how the fit of a logistic regression model helps the researcher to describe the effects of a predictor on a response variable. We now present the importance of indicator-variable coding scheme and its importance on odds-ratio statistics.

Since we have been assuming conceptually an “indicator” as a dependent variable for “predictor” variables, and bearing in mind we will be writing an “indicator” repeatedly in this analysis for an “indicator-variable coding scheme” (Norusis, 1994), this can be a source of confusion. Thus, the former will be referred to as the dependent variable.

Problems in computing of the odds ratio estimate can arise for categorically scaled covariates measured at only two levels; as the number of levels increases, these computational problems may become extensive. The appropriate way to include a categorically scaled variable with K distinct categories in a statistical model is to construct $K - 1$ design (dummy or indicator) variables. These *dummy-variables* or *indicator-variables* are relevant for obtaining estimated odds ratios and their associated confidence intervals (Hutcheson and Sofroniou, 1999; Menard, 1995).

In logistic regression, just as in linear regression, it is important to create meaningful independent variables. Therefore, independent categorical variables such as sex, which has only two-categories, can be coded as 0 or 1 to indicate either female or not female. However, when we have an independent variable with more than two categories, it is necessary to create new variables to represent the categories. The number of new variables required to represent an independent categorical variable is one less the number of categories. Following the indicator-variable coding scheme, the therapeutic categories prescribed by GPs to treat each of the patient typologies that were selected by the logistic regression model has to be recoded according to one of the therapeutic categories. That is, “*with categorical variables, the only statement you can make about the effect of a particular category is in comparison to some other category*” (Norusis 1994: 12). Although the choice of *reference category* is arbitrary, it becomes important to define the *reference category* in accordance with the main characteristics that distinguish the two different groups of doctors. This means that if our experience and common sense indicate that the therapeutic class of diuretics can be a good descriptor of stepped-care approach and liberal approach, this therapeutic class will be assumed as the reference category and, thus, should be coded ‘0’.

Although somewhat arbitrary without empirical confirmation, the approach developed and illustrated here enables the researcher to be sure that the coefficients for these new variables (therapeutic classes) represent the effect of each category compared to the diuretic category. For example, with these categorical variables the only statement we can make about the coefficient that measures the effect of “angiotensine-converting-enzhime (ace) inhibitor is in comparison with the diuretic. To the latter, the coefficient for ace inhibitor is the change in log odds when we have that therapeutic category compared to the diuretic. The coefficient for this reference category is necessarily ‘0’, since it does not differ from itself. Whenever the coefficients for the other categories are negative, it means that compared to diuretic those therapeutic classes are associated with decreased log odds of prescribing philosophy. The coefficients for these therapeutic classes will indicate the level of influence of each on the log odds. This fact concerning the interpretability of the odds ratio, which is usually the parameter of interest in a logistic regression due to its ease of interpretation, is crucial for understanding additional columns in tables which present the results of a logistic regression analysis. Along with the importance of the odds ratio as measure of association, it is also possible to define other parameters such as the log-likelihood (Hutcheson and Sofroniou, 1999; Menard, 1995; Lemeshow and Hosmer, 1984).

7.17.6 Model-Building Strategy

In addition to the estimated coefficients, the log-likelihood, and minus two¹⁸ times the log-likelihood (i.e., -2LL) are important criteria for selecting parameters in the logistic regression model. In a model-building strategy, the latter may be used to test for the significance of coefficients for variables added to the model, in order to obtain the most parsimonious structure. As a result, the criteria for including the different variables in the model were based on four crucial steps:

1. *Checking the Predictor Variables*

Before proceeding to a formal multivariate analysis of the data, descriptive statistics and displays were used: “*An initial examination of the data should begin with a look at the range of the variables, using summary statistics such as the mean and standard deviation. With categorical variables a check should be made to see if the coded values are out of range, and whether missing values are correctly coded*” (Hutcheson and Sofroniou, 1999: 17). Independent variables were also tested through basic cross-tabulation. All these procedures were very helpful for planning subsequent analysis, and interpreting the results. The selection process began with a careful univariate analysis of each variable. Contingency tables of outcome ($y = 0, 1$) versus the k levels of each of the independent variables were developed. The likelihood ratio chi-square test

¹⁸ “*In presenting information on the log-likelihood, however, statistical packages usually present not the log-likelihood itself but the log-likelihood multiplied by -2 . The reason for this is that the log-likelihood when multiplied by -2 has approximately a χ^2 (chi-square) distribution*” (Menard, 1995: 19).

with $k-1$ degrees of freedom or the Pearson chi-square test was performed on those variables. In addition to the overall test, the individual odds ratio was also determined by those variables exhibiting at least a moderate level of association. Particular attention was given to the possible appearance of any contingency table with a zero cell, and it was found that none of the categories needed to be collapsed or eliminated. For continuous variables such as age and clinical experience, a univariate logistic regression model was developed to obtain the estimated coefficient, the estimated standard error, the likelihood ratio test for the significance of the coefficient, and the Wald statistic. After these procedures had been performed, the appropriate categories of discrete variables were re-evaluated and the continuous scaled variables were checked in terms of linearity in the logit. Consequently, by plotting the fitted line on a scarplot of the outcome versus the independent variable, it was possible to evaluate any systematic deviation from the normal distributional line.

2. Selecting Predictor Variables

After obtaining all the information from the univariate analysis, it is possible to continue to build a logistic regression model by selecting predictor variables. However, the researcher has to be sure that those independent variables are not highly correlated. When this problem occurs, where the predictor variables are not truly independent of each other,

multicollinearity is said to exist (Petrie and Sabin, 2000; Hutcheson and Sofroniou, 1999; Menard, 1995; Lemeshow and Hosmer, 1984). Such correlation between the predictor (explanatory) variables in the logistic regression equation makes the identification of a structural relationship difficult or impossible. Five major approaches have been advanced to avoid multicollinearity (Mason and Perreault, 1991; Hair et al., 1984). Firstly, it can be simply ignored, particularly when the variables that are highly correlated represent only a subset of predictor (independent) variables which have been found not account for a large proportion of the variance in the data. Secondly, it is possible to omit one or more of the highly correlated predictor (independent) variables. For example, GPs' clinical experience was found highly correlated with doctors' age and for this reason age was omitted. Thirdly, the correlated variables can be combined or otherwise transformed to produce unrelated variables. Fourthly, the correlated variables can be summarised in a set of factors using factor analysis. Finally, multicollinearity can be avoided by increasing the sample size.

Given the fact that the overall sample size was adequate to begin to develop the multivariate logistic regression model with scientifically relevant variables, and adequate for testing the number in each outcome group relative to the total number of candidate variables, a non-stringent

'*p-value*' was chosen. However, this univariate approach is not free from an important problem:

“One problem with any univariate approach is that it ignores the possibility that a collection of variables, each of which is weakly associated with the outcome, can become an important predictor of outcome when taken together. If this is thought to be a possibility, then we should choose a significance level large enough to allow the suspected variables to become candidates for inclusion in the multivariate model” (Hosmer and Lamshow 1989: 86).

The initial criterion for inclusion of different predictor variables in the logistic regression model was based on a *p-value* < 0.25, in order to introduce variables of known 'biologic' importance. As has been noted by Mickey and Greenland (1989), there is evidence that the use of the 0.25 level as a screening criterion for the selection of candidate variables rather than the traditional level of 0.05 avoids the risk of failing to identify variables known as scientifically relevant in the model. In a similar vein, Agresti (1996) pointed out that:

“it often makes sense to include certain variables of special interest in a model and report their estimated effects even if they are not statistically significant at some level” (Agresti, 1996: 129).

In order to include the most representative variables in the model, the predictor variables were selected in accordance with the $-2LL$ (i.e., minus two times the log-likelihood) because this approximates to the chi-square

distribution and enables significance levels to be determined (Hutcheson and Sofroniou, 1999). This approach is possible because the p - values calculated in a stepwise¹⁹ selection procedure are not p - values in the traditional hypotheses-testing context. Consequently, they must be assumed as indicators of relative importance among variables. The number of parameters being tested was then analysed in order to evaluate the consequences derived from the use of a more stringent p - value (.05). Subsequent analysis identified the subsets of predictor variables that were good predictors of the indicator variable. Then, all questionable variables added to the model were tested by different statistical criteria.

The stepwise selection procedure has been found to be a fast and effective means for screening large numbers of variables and simultaneously fitting a number of logistic regression equations (Hutcheson and Sofroniou, 1999; Kinnear and Gray, 1999; Menard, 1995; Norusis, 1994). Any stepwise procedure for selecting or deleting variables is based on a statistical algorithm which determines the “importance” of variables in accordance with a measure of statistical significance of the coefficient of the variable. As has been noted, the statistic used depends on the assumptions of the model.

¹⁹ “Stepwise selection is simply a combination of forward selection and backward elimination and is one of the most commonly used methods of automated variable selection” (Hutcheson and Sofroniou, 1999: 97).

In stepwise linear regression an F -test is recommended when the errors are assumed to be normally distributed (Hutcheson and Sofroniou, 1999). This is not the case in logistic regression, since the errors are assumed to follow a binomial distribution. Therefore, the statistical significance of the coefficients is assessed via the likelihood ratio chi-square test. Since the magnitude of the likelihood ratio chi-square test statistic of a polytomous variable with k levels depends on its degrees of freedom, any procedure based on this statistic must account for possible differences in degrees of freedom between variables. In accordance with this statistical reality, the p value for the likelihood ratio test statistic should be used to assess significance. The step-by-step procedure will indicate the most important predictor variable, in statistical terms, as a function of the greatest change in the log-likelihood relative to a model not containing the variable. The most important variable is the one with the smallest p value (given a previous choice of an “alpha” level to judge the importance of variables), in order to assure that the stepwise procedure will select variables whose coefficients are different from zero. At each step, the variable with the smallest significance level for the score statistic is entered into the model, provided it is less than the chosen cut-off value (by default the SPSS logistic regression procedure will assume 0.05).

Whenever the significance level for the residual chi-square is smaller than the cut-off value, the model proceeds with variable selection. Once a new variable is added to the model, it is relevant to check if this “new” model accepts all the previous variables that have been included. Thus, a check for backward elimination is developed in every forward step (forward stepwise selection). That is, “*all variables in the forward stepwise block that have been entered are then examined to see if they meet the removal criteria*” (Norusis 1994: 15). If the Wald statistic is used for deleting variables, all the “new” model is reanalysed in order to eliminate any variable for which the Wald statistic exceeds the chosen cut-off value (by default 0.1). If no variables meet the removal criteria, the next candidate variable is entered into the model. For each selected predictor variable not yet in the model, the Wald statistic and its significance level is shown. This continues until no more variables are eligible for removal. While the forward selection procedure starts without any variables in the model, the backward elimination starts with all of the variables in the model. Again, at each step, the predictor variables are evaluated for entry and removal. The score statistic analyses whether the variables should be added to the model, while the Wald, likelihood-ratio, or conditional statistics, are used to select variables for removal, as in the forward selection procedure.

3. Assessing the Goodness-of-Fit of the Model

The logistic regression model can be checked in two different ways: firstly, by using a goodness-of-fit test statistics and secondly, by developing a graphical method, primarily by using residual diagrams (Petrin and Sabin, 2000; Hutcheson and Sofroniou, 1999; Norusis, 1994; Hosmer and Lamshow, 1989; Landwehr et al., 1984; Pregibon, 1981). Both these approaches were used to analyse the data. Following the goodness-of-fit test statistics of the multivariate model, all the variables accepted by the stepwise statistical analysis were checked in terms of (a) the Wald statistic for each variable and (b) a comparison between each estimated coefficient and the coefficient derived from the univariate model containing only that variable. No variables were found to have changed markedly in the magnitude of their estimated coefficients. It was assumed to be an important indicator that the excluded variables were not biologically or statistically relevant for the multivariate logistic regression model. Furthermore, we decided to analyse a classification table in order to assess how well our model fits the data. Thus, a comparison was developed between the predicted and the observed outcomes in terms of prescribing behaviour. The classification table indicated an overall significant percentage of correctly classified cases. Another method used to assess whether the patient typology model fits the data was based on a histogram

of the estimated probabilities. By looking at the histogram of predicted probabilities it was possible to see whether the model was useful for obtaining a clear idea of how different classification rules might be applicable. The results suggested that the two different groups (step-by-step approach and liberal approach) clustered at their respective ends of the plot. This indicates that the two groups have very different estimated probabilities, which assures that the logistic regression model could to classify the observed data in a way that reinforced the conviction of the goodness-of-fit obtained by the model (see Chapter Eight).

4. Diagnostic Methods

One point should be kept in mind when interpreting the success of a multiple logistic regression model: "*Successful modelling of a complex data set is part science, part statistical methods, and part experience and common sense*" (Hosmer and Lamshow, 1989: 82).

Whenever a statistical model is constructed, it is important to examine the adequacy of the resulting model. Once the final multivariate logistic regression model was accepted on the basis of interpretability, parsimony, an ease of variable acquisition, the predictor variables that had been chosen were again critically analysed. Particular attention was given to identifying points at which the model did not fit well, points that exerted a strong influence on the estimates of coefficients, and variables that were

suspected of being highly related to other predictor variables. As a result, we have looked at a variety of residuals, measures of influence and indicators of collinearity. For example, the *standardised residual*²⁰ was determined. The *Cook's distance* was also performed to analyse the influence of cases identified as problematic, in order to evaluate the extent to which deleting a case affected not only the residual for that case, but also the residuals of the remaining cases.

7.18 Reasons for the Use of Logistic Regression Analysis

7.18.1 The Level of Measurement

In recent years the model building approach has been extended to categorical data, with the development of logistic regression and loglinear methods (Petrie and Sabin, 2000; Kinnear and Gray, 1999; Huthcheson and Sofroniou, 1999; Menard, 1995). In ordinary logistic regression modelling, explanatory variables can be numerical and categorical (Petrie and Sabin, 2000). The researchers' knowledge of the Portuguese GPs' population determined that the level of measurement achieved in this research was mainly based on nominal and ordinal scales (i.e., categorical variables). These level of measurements, however, can be problematic in

²⁰ The residual is the difference between the observed probability of the event and the predicted probability of the event based on the model, while its standardised value derives from the residual divided by an estimate of its standard deviation (Huthcheson and Sofroniou, 1999).

terms of alternative valid statistical tests: “*Ratings are a grey area: there has been much dispute as to whether they should be analysed with parametric or nonparametric tests*” (Kinnear and Gray, 1999: 139). Nonparametric²¹ tests such as the chi-square test were chosen because they focus on frequencies in categories, i.e., on enumerative data (Siegel and Castellan, 1988).

Categorical variables were also used to characterise Portuguese GPs. This level of measurement was only applied in the first and last part of the questionnaire, particularly on doctors’ demographic analysis. In accordance with the assumptions underlying these measurement levels (Wright, 1997), both the multiple regression analysis and the discriminant analysis were found unsuitable for predicting doctors’ group membership in terms of first-line anti-hypertensive therapeutic approach.

7.18.2 The Dependent Variable Characteristics

The characteristics of the dependent variable also play an important role in adopting statistical procedures compatible with the level of measurement in this research (Tacq, 1997; Sheth, 1971; Kinnear and Taylor, 1971).

²¹ “*The t-test is an example of a parametric test, that is, it is assumed that the data are samples from a population with a normal distribution. Other tests, known as nonparametric tests, do not make specific assumptions about population distributions. For that reason, they are often referred to as distribution-free tests*” (Kinnear and Gray, 1999: 139).

Tacq (1997) suggested that “*discriminant analysis (of two or several groups) is the pre-eminent example of a dependent technique with dependent variable(s) of low measurement level, as distinct from other dependent techniques like multiple regression and analysis of variance and covariance, where the dependent variable ‘has to be’ quantitative (at least an interval scale). There are, however, other alternatives for the analysis of models with a dependent variable measured at a low level, like the logit model, the probit model and others. These alternatives are reducible to attempts to lift a non-quantitative dependent variable to the quantitative measurement level by means of a mathematical transformation, so that a classical technique like multiple regression can be performed*” (ibidem: 39).

Binary response models are often applied in empirical marketing research where, for example, individuals can be classified as respondents and non-respondents to direct mail (Franses, 2000). Examples of such a model are the logit (Chapman, 1984) and probit²² models.

With multcategory logit models at each combination of levels of the explanatory variables, the models assume that the response counts for the categories of Y have a multinomial distribution. Logistic regression models are a special case of these models for binary responses (Petrie and Sabin, 2000; Hutcheson and Sofroniou, 1999; Menard, 1995; Norusis, 1994).

²² “An econometric model which deals with explaining Y_i is a so-called **binary response model**. Its general expression is $y_i^* = \alpha + X_i \beta + u_i$, where β is a $p \times 1$ parameter vector containing β_1 to β_p and y_i is an unobserved variable such that $y_i = 1$ if $y_i^* > 0$ and $y_i = 0$ if $y_i^* < 0$. When the cumulative distribution function of u_i is the logistic function, the resultant model is called the **logit model**, and when it is the normal distribution function it is called the **probit model**” (Franses, 2000: 240).

The indicator variable “philosophy of prescribing” was found to be a binary reality for GPs, who treat patients with essential hypertension. Therefore, the logistic regression model was selected to predict whether Portuguese GPs could be classified as *stepped-care prescribers* or *liberal prescribers*. In line with this reasoning, the *logistic regression analysis* was chosen because this multivariate technique has been found suitable for estimating direct prediction of group membership. This model has the advantage of requiring far fewer assumptions than multiple regression or discriminant analysis (Petrie and Sabin, 2000; Hutcheson and Sofroniou, 1999; Menard, 1995; Norusis, 1994).

7.19 Including Factors in Logistic Regression

In accordance with the *objectives* of this study, *the logistic regression analysis* was selected. The *primary purpose* behind using this *statistical techniques* was:

- (1) to analyse whether the construct of **contextual environment** represented by *GPs’ sources of information*, was relevant when categorising GPs on *stepped-care* followers or *liberal* followers;
- (2) to predict whether *GPs’ demographic characteristics* are linked to each of the prescribing philosophies (the construct of **problem recognition**);
- (3) to determine the most important *patient typologies* in terms of predictor prescribing variables in order to classify GPs on *stepped-care* followers or *liberal* followers (the construct of **problem solving**).

(4) to define the major pharmacological values attached to the two philosophies of prescribing in terms of the therapeutic categories (the construct of **medical guidelines**);

(5) **to fit a model** with *all the relevant variables* in order to allow the *prediction of group membership* in terms of *prescribing philosophy*.

As outlined in (1), a large number of *sources of information* with different characteristics have been found important for understanding doctors' drug choice (Gaither et al., 1996; 1994). In a previous study (Bunn, 1993), respondents ratings of the various medical sources provided insights about the way consumers think about each source. To determine the influence of these *medical sources of information* on GPs' drug choice, a list of items in a *Likert-scale format* was presented to selected doctors. They embrace **concepts** such as *health authorities' clinical information, medical education and colleagues opinion, and pharmaceutical industry' promotional and scientific activities*. These concepts and their variables were able to describe the doctors' perceptions about all multivariate sources of drug information. However, one of the problems that sometimes occurs when computing multiple logistic regression is the presence of multicollinearity which is caused by strong interrelations amongst the explanatory variables. To avoid this problem, "*a collection of techniques which go under the heading of factor analysis can be useful in collapsing variables to*

reduce the level of multicollinearity and thereby enable GLMs to be more successfully applied to data” (Hutcheson and Sofroniou, 1999: 217).

Since the object of *factor analysis* is to reduce the number of variables we have to handle, this would not be achieved if we use all the sources of drug information. Consequently, the next step is to decide how many factors we should include into the logistic regression analysis. The identification of these factors has been found relevant for further statistical analysis:

“The identification of factors is important for at least two reasons. Firstly, it can provide useful theoretical insights into underlying relationships and patterns in the data, and, secondly, it can enable data containing highly correlated variables to be modelled using GLMs” (Hutcheson and Sofroniou, 1999: 217). That is, *“each case can be described in terms of factors as opposed to the original variables, and ‘factors scores’ can be computed and saved as new variables (Hutcheson and Sofroniou, 1999: 237).* Other researchers also argue that *“factor scores can be very useful ... because they can subsequently be used as input for further statistical analysis” (Kinnear and Gray, 1999: 359).* It follows from the previous assumptions that before running a *factor analysis* it is important to be aware of some of its features in order to provide information about theoretically interesting underlying patterns in the data which can inform the process of categorisation. Therefore, we present *factor analysis* here as a useful technique that can be used to improve the quality of logistic regression for predicting Portuguese GPs’ first-line drug therapy.

7.20 Factor Analysis

The popularity of factor analysis in different fields such as psychology, marketing management, medical science and consumer behaviour, is based on its simplicity to describe a large number of variables or objects through a smaller number of factors²³ (Kinnear and Gray, 1999; Hutcheson and Sofroniou, 1999; Kinnear and Taylor, 1991).

Factor analysis techniques are supposed to be used for three main purposes (Bryman and Cramer, 1997; Chisnall, 1992; Worcester and Downham, 1986; Hair et al., 1984):

1. they can assess the degree to which the chosen items are important in defining the underlying concept. That is, it is possible to assess the factor validity of the questions which make up our scales by analysing the extent to which they seem to be measuring the same concepts or variables;
2. whenever we have a large number of variables that are expected to belong to different concepts, factor analysis is able to evaluate the extent to which they can be reduced to a smaller set without losing relevant information within the original variables; and
3. close to the previous one but more ambitious, the third main purpose of factor analysis to make sense of the bewildering complexity of the data,

²³ A factor is a continuous latent variable which is assumed to account for relationships in the data.

by reducing it to a more limited number of factors. That is, factor analysis can be used to identify underlying relationships and patterns in the data by deriving dimensions which combine each group of similar variables under specific termed factors.

A factor analysis usually takes place in three different stages (Kinnear and Taylor, 1999):

1. a matrix of correlation coefficients is generated for all the variable combinations; if there are no significant correlations between these variables, then this means that they are unrelated and that we would not expect them to form one or more factors;
2. from the correlation matrix, factors are extracted. "*It is assumed that factors may represent the causes of relationships in the data and that observed correlations are the result of variables sharing common factors*" (Hutcheson and Sofroniou, 1999: 218); and
3. the factors (axes) are rotated²⁴ to maximise the relationships between the variables and some of the factors.

To appreciate more fully the process of defining factors it is useful to look at some preliminary concepts.

²⁴ "It should be noted that rotating the factors does not affect the goodness-of-fit of a factor solution. Although the factor matrix changes, the percentage of the total variance explained for each variable (the communality) does not change. Rotation merely redistributes the explained variance (Hutcheson and Sofroniou, 1999: 234).

7.20.1 Factors Loadings Coefficients, Communalities and Specificities

In consumer behaviour, as well as in other social sciences, much use is made of standardised variables²⁵ (Bryman and Cramer, 1997; Chisnall, 1992), therefore, it is assumed in this discussion of *factor analysis*, that the observational variables have been standardised. According to this assumption, we will express these standardised variables in terms of a basic, underlying, but unmeasurable general factor (Frude, 1993). Thus, whereas the items' responses are directly observable, the underlying factors which may have produced the patterns of results are not: "*Each variable in a data set can be expressed as a linear combination of factors which are not observed (these are the latent variables which are assumed to account for the correlations between the variables)*" (Hutcheson and Sofroniou, 1999: 220). This means that it would be possible to obtain a factor structure with different Z_n scores given by linear combinations of a standardised general source of information score, F , and specific e_n (i.e., the variable to be explained). We also suppose that F and e_n are uncorrelated. The coefficients of F are called *factor-loading coefficients* through which it is possible to describe the way Z_n scores "load onto" the underlying factor F . Consequently, it is possible to investigate which Z_n scores are more

²⁵ A standardised variable is one that has mean zero and variance unity. A variable is standardised by subtracting its mean and then dividing by its standard deviation.

important to the factor F .

The F measure can be made a little more precise because the factor-loading coefficients give the correlation coefficients between Z_{ns} and F .

That is, “*the relationship between each item or test and a factor is expressed as a correlation or loading*” (Bryman and Cramer, 1997: 283), which indicates its importance within the factor: “*The greater the value of a test’s co-ordinate, or loading, on a factor, the more important is that factor in accounting for the correlations between that test and others in the battery*” (Kinnear and Gray, 1999: 358).

The squares of the factor-loading coefficients are called *communalities* and are also directly interpretable (Bryman and Cramer, 1997). They give the fractions of the variances of Z_{ns} accounted for by the common factor F (common variance). The remaining portions of the variances are called *specificities* (specific variance). It is also possible to calculate the communalities and specificities from the factor-loading coefficients. This requires forming the matrix product AA' from the matrix A , of factor-loading coefficients. The diagonal elements of AA' give the communalities. Thus, it is possible to state that the variance of the test score is the sum of two components: a part common to all test scores called *communality*²⁶ and a part specific to a particular test score called *specificity*.

²⁶ Communality is the percentage of total variance explained for each variable.

7.20.2 Sample Size and Factor Reliability

The reliability²⁷ of the factors emerging from a factor analysis depends on the size of the sample: “*Factor analysis is based on correlation coefficients, which tend to be most reliable when computed for large samples. Comrey and Lee (1992) recommended that for a ‘good’ factor analysis solution a data set should contain at least 300 cases*” (Hutcheson and Sofroniou, 1999: 222). Therefore, it is essential that the sample is sufficiently large to enable the researcher to be sure about the reliability of the final dimensions. However, there is no consensus on what the size should be: “*the reliability of the factors emerging from a factor analysis depends on the size of the sample, although there is no consensus on what the size should be. There is agreement, however, that there should be more subjects than variables. Gorsuch (1983), for example, has proposed an absolute minimum of five subjects per variable and not less than 100 individuals per analysis*” (Bryman and Cramer, 1997: 279). Nevertheless, it is possible to overcome this problematic point if the researcher knows the risk in computing factors on small samples:

“*It should be noted, however, that these recommendations are for studies designed specifically to investigate underlying processes and that factor analysis may be usefully applied to much smaller samples... One should always keep in mind, however, that computing factors on small samples can be problematic and the solutions variable*” (Hutcheson and Sofroniou, 1999: 222).

²⁷ “*The aim in estimating the reliability of a test is to assess how much of the variability in test scores is due to error and how much it reflects the variability in the true scores (Frude, 1993: 194).*”

7.20.3 Methods of Extracting Initial Factor Solution

Two different methods have been used extensively for extracting initial factor solutions: *principal components analysis* and *principal-axis factoring* (Norusis, 1994). The former examines all the variance of a score or variable in a way that guarantees that the variable is perfectly reliable and without error (set at 1), while the latter analyses only the variance which is common to, or shared by, the test (varies between 0 and 1) (Bryman and Cramer, 1997). Although there is more than one method that can be used to extract factors from a data set, only the principal components analysis will be used in this study.

In both *principal component analysis* and *principal-axis factoring*, the first component or axis that is extracted accounts for the largest amount of variance shared by the test (Tacq, 1997). The second factor consists of the next largest amount of variance that is not related to, or explained by, the first one, and so on. In other words, this procedure has a descending level of variance and all these factors are unrelated or *orthogonal* to one another. The total variance explained by the selected factors is simply the sum of their eigenvalues²⁸. In terms of variance, the *eigenvalue* is linked to the factor while the *communality* is linked to the variable to be explained.

²⁸ An *eigenvalue* is the amount of the total test variance that is accounted for by a particular factor, the total variance for each test being unity (Kinnear and Gray, 1999).

7.20.4 Number of Factors to be Retained

According to the principle of data reduction without losing information that guides factor analysis, a decision has to be made about the number of factors with lower eigenvalues to be retained. Two main criteria are available. The first, known as the ***Kaiser's criterion***²⁹, selects only those factors whose eigenvalue is greater than 1. As has been noted, the total variance attached to a variable has been standardised as 1. In practical terms, an eigenvalue greater than 1 means that any factor that explains less variance than a standardised variable must be excluded. The Kaiser criterion is particularly appropriate for large samples (greater than 250), where the mean communality is greater than or equal to 0.60, or situations where the number of variables is less than 30 and the average communality is greater than 0.70 (Stevens, 1992).

The second method, developed by Cattell (1966), is the ***screen test*** of eigenvalues which is a graphical representation of the descending variance accounted for by the factors initially extracted. All the factors with low eigenvalues on the factor screen plot are discarded because they are considered unimportant. Only those which lie before the point at which the eigenvalues seem to level off, are retained.

²⁹ Such measures are based on an index which compares correlation and partial correlation coefficients (these measures of sampling adequacy are also known as Kaiser-Meyer-Olkin, or KMO statistics) (Hutcheson and Sofroniou, 1999).

7.20.5 *Rotation of Factors*

Particular attention has been given to the higher eigenvalues of the two or three more important factors because they account for the maximum amount of variance. However, their interpretation on “purest” form is not easy since items will not correlate as highly with them as they might (Hutcheson and Sofroniou, 1999; Kinnear and Gray, 1999).

After the factors have been extracted, they are subjected to “transformation” by a mathematical process known as “rotation” through which they will increase their interpretability. Thus, the final factor solution translates a “*complex correlation matrix in a simple, easily interpreted, form*” (Frude, 1993: 238). The interpretability of factors is facilitated when individual factor loading³⁰ is high or low (Rennie, 1997). Several methods have been advanced to rotate factors. Two of them became very popular: the *ortogonal rotation* using the *varimax method* and *oblique rotation* produced by the *oblimin method*. Both methods present advantages and disadvantages. Although controversy over which one of them should be chosen has been discussed in the literature (Bryman and Cramer, 1997), “*The choice of which rotation method to use is based on theoretical considerations about the nature of the factors and whether a degree a correlation between them might be expected*” (Huthcheson and Sofroniou, 1999: 233).

³⁰Although Hair et al (1987) stated that variables which load above or equal .30 are considered significant, it was decided that the cut-off point for the factor loadings should not be less than .50.

The advantage of orthogonal rotation concerns the “quality” of the information (Tacq, 1997). That is, the factors are rotated in such a way that they remain perpendicular (i.e., orthogonal or uncorrelated) and therefore eliminate the *collinearity*. The disadvantage of orthogonal rotation, on the other hand, is that the factors may not be accurate in their representation of the “real world”, since those factors may have been “forced” to be unrelated. This misrepresentation of the world is less likely with oblique rotation, which has been found to be suitable when the factors are correlated. Three matrices are produced by the oblimin method in an oblique rotation. The first, the *pattern matrix*, analyses the correlations between the items and the factors. The second, the *structure matrix*, is similar to that produced by orthogonal rotation except that the relationship established between the loadings and the factors produced by the oblimin method are higher. The loadings (weights) present in the structure matrix reflect the unique variance each factor contributes to a variable. The third matrix is important for ascertaining the level of correlation between the factors. For this reason it is labelled the *correlation matrix*. The main disadvantage of the oblique rotation is that the amount of variance accounted for by oblique factors is not individualised since the variance is shared between the correlated factors as can be understood by an analysis of the correlation matrix.

7.20.6 *The Use of Factor Analysis in this Research*

Two uses of factor analysis have been reported which distinguish its output (Kinnear and Gray, 1999; Hutcheson and Sofroniou, 1999; Bryman and Cramer, 1997):

1. in the *exploratory approach* the relationships between the variables are examined without any other further purpose. That is, the relationships between various variables are examined without determining the extent to which the results fit a particular model.
2. *confirmatory factor analysis*, on the other hand, compares the solution found against a hypothetical one.

In this research, *exploratory factor analysis* was used for the following objectives:

- (1) *to analyse the main patterns of factors* that underlie each **concept** of *doctors' source of information*, in order to evaluate the importance of the **construct "contextual environment"** on GPs' prescribing behaviour;
- (2) *to incorporate factor analysis output*, as an intermediate step, to the **regression analysis working file**. Doyle and Saunders (1985) have provided evidence showing that *factors derived from a factor analysis can be used in subsequent statistical procedures*. Consistent with this finding, a factor analysis was also performed and the *factors derived from it were included in the logistic regression approach*, in order to attain the first objective described above; and
- (3) *to overcome eventual multicollinearity* within the logistic regression model, derived from the use of intercorrelated independent variables.

7.20.7 Factor Analysis Input/Output

The Likert-format scale scores for variables used to analyse each of the different sources of information were the input of the factor analysis. As pointed out earlier, “*factor analysis makes a few assumptions about the data, most notably with regards to the underlying distribution and the sample size needed for a ‘robust’ solution...Factors are determined on the basis of the Pearson correlation coefficient, r , which requires data to be measured on a continuous scale. In practice, however, this requirement is often relaxed so that ordered categorical data can be included (data from Likert scales, for example). The relaxation of the requirement for continuous data can be justified for exploratory factor analysis as the usefulness of the procedure is based purely on the interpretability of the factors*” (Hutcheson and Sofroniou, 1999: 222).

To test the importance of different sources of information as a predictor of whether Portuguese GPs could be classified as stepped-care prescribers or liberal prescribers, a factor analysis was performed, using the principal component procedure for initial factor solution, reinforced by the Kaiser’s criterion, with a varimax rotation. *Principal component analysis* was chosen because it has been found particularly relevant for reducing a large number of variables to a smaller set of *uncorrelated* factors for subsequent use in a regression or other prediction techniques (Hutcheson and Sofroniou, 1999; Hair et al., 1984).

7.21 The Research-Logic Approach

The research-logic approach is a continuous circular sequence of steps that link theory, concept formation, hypotheses derivation, operationalisation, data analysis and causal inference (Foxall, 1986).

Previous sections have so far covered *research design, data collection methods* and *data preparation*. From a philosophy of science perspective, the most convincing argument we can make in support of our research rationale is to conduct research showing that empirical phenomena fit our predictions. In line with this reasoning, in the following sections we therefore turn to look at *the importance of statistical analysis techniques* for achieving the research objectives and research hypotheses. Thus, a brief explanation of the statistical procedures and their relationship with the research objectives and research hypotheses is advanced in order to clarify the structure within which this study was conducted. The purpose of this discussion is to further illustrate the relevance of understanding the intimate connection between the research hypotheses and the empirical approach from which statistical techniques are derived. Specifically, we are going to look at formulating and testing the research hypotheses according to the research objectives. However, “*to correctly use these tests a clear understanding of the assumptions underlying the tests, as well as the type of measurement used, is required*” (Moutinho et al., 1998).

7.22 Parametric versus Non-Parametric Tests

To choose the most appropriate statistical test for hypotheses testing, the first step was to decide whether to use a parametric or a nonparametric procedure. The former was used when both of the following statements were true:

1. the data are collected and analysed using an interval or ratio scale of measurement; and
2. all the assumptions required for the validity of the parametric procedure can be verified.

Otherwise, a nonparametric procedure should be used. Nonparametric statistics test the null hypothesis that two independent samples come from populations exhibiting the same distribution form, but that they do not specify what this form is. Therefore, it is possible to use the most powerful of the nonparametric tests, to test the similarity of the distribution of variable(s) in random samples. In short, it appears that nonparametric tests are not as demanding in terms of assumptions as parametric tests, neither are they less powerful if a large sample size is obtained: *“Because the power of any test may be increased by simply increasing N , and because behavioral scientists rarely have data satisfying the assumptions of the parametric test which includes achieving the sort of measurement permitting the meaningful interpretation of parametric tests, nonparametric statistical tests play a prominent role in research in the behavioral and social sciences”* (Siegel and Castellan, 1988: 34).

As we have already noted, when either parametric, *nonparametric* or “*distribution-free*” tests can be applied, the choice may depend on whether it is possible to recognise that the variable is truly continuously distributed. Unlike the classic statistical methods which are valid only for data measured on at least an interval scale, there are nonparametric statistical tests that may be applied appropriately to data measured in an ordinal scale, and others to data in a nominal or categorical scale. As has been pointed out, most research in social and behavioural sciences use categorical data, particularly ordinal data: “*ordinal data are very frequently encountered in social and behavioral science research. Almost all opinion surveys today request answers on three-, five-, or seven-point Likert scales that measure respondents’ degrees of agreement with questionnaire items*” (Gibbons, 1993: 1).

Particular attention has been given to the *power of a test* because it gives the researcher the opportunity *to reject the null hypothesis* when appropriate. Bearing in mind that the power of a test increases as the sample size increases, most researchers believe that is more important to emphasise the correct option of the statistical methods used for testing research hypotheses than to aspire to create interval scales or use parametric statistical tests that may prove misleading (Diamantopoulos and Schlegelmilch, 1997, Bryman and Cramer, 1997; Rose and Sullivan, 1993; Kanji, 1993, Siegel and Castellan, 1988). In line with this reasoning,

some researchers pointed out that: “*Violations of the normality assumption ... can render a great deal of parametric statistical techniques inoperative*” (Diamantopoulos and Schilegelmilch 1997). “*Therefore a test should only be carried out when the normality assumption is not violated*” (Kanji, 1993: 3).

If any researcher is unsure whether the normality assumption is not violated and decides to follow such an unrealistic parametric approach, the results can be disastrous: “*When parametric techniques of statistical inference are used with such data, any decisions about hypotheses are problematic. Inasmuch as most of the measurements made by behavioral scientists culminate in nominal or ordinal scales, this point deserves strong emphasis*” (Siegel and Castellan, 1988: 33). Again, this statement implies that *the level of measurement*, the characteristics and *nature of the variables*, and *the research objectives* get together in a coherent framework that gives the researcher the opportunity to evaluate different assumptions (Petrie and Sabin, 2000). In Levin (1999) words, “*To assure that the data obtained from a study can be analysed and interpreted in a proper manner, choice of the appropriate statistical test should be an integral part of the design of the study. The present contention is that this is one of the most important, but least emphasized, parts of research design*” (ibidem: 70). In contemporary terms this positivist position can be understood like this: *if you have a theory or model about how things work, then data (and their appropriate statistical tests) can provide an objective test of that theory or model.*

7.23 The Research Hypotheses and their Statistical Tests

As pointed out in Chapter One, the aim of the present research is *to categorise Portuguese GPs in accordance with their first-line drug therapy to hypertensive patients*. As the research is *conclusive*³¹, based on *the patient typology model (PTM)*, hypotheses have to be presented.

In this section we present several nonparametric statistics which were used to test different hypothesis. Siegel and Castellan (1988) suggest that the *one-sample test* is often a goodness-of-fit test. The chi-square test may be used to test whether a significant difference exists between an *observed* number of objects or responses falling in each category and an *expected* number based upon the null hypothesis.

TABLE 7.2: HYPOTHESES (test of differences)	STATISTICAL TEST
H0 (1): <i>There is no difference between an observed number of responses falling in each therapeutic category and an expected number of frequencies in the treatment of hypertensive patients, with no comorbidity.</i>	<i>Chi-Square</i>
H0 (2): <i>There is no difference between an observed number of responses falling in each therapeutic category and the expected number of frequencies in the treatment of hypertensive patients, with comorbidity.</i>	<i>Chi-Square</i>
H0 (3): <i>There is no difference between an observed number of responses falling in each therapeutic category and the expected number of frequencies in the treatment of young, adult and elderly hypertensive patients with no comorbidity.</i>	<i>Chi-Square</i>

³¹ "Conclusive research is conducted through the main research design and is aimed at measurement of the variables identified from the exploratory exercises" (Evans et al., 1996: 190).

There are a number of ways in which the goodness-of-fit of a logistic regression model can be assessed. Perhaps the most widely used and most powerful, is *the log-likelihood statistic* and this is explained in some detail below. The *goodness-of-fit statistic* is usually quoted as ‘– two times the log-likelihood (-2LL)’ as this has approximately a χ^2 distribution, thus enabling significance to be evaluated. The *Wald statistic* is broadly comparable with -2LL.

Table 7.3: HYPOTHESES (Measures of Association)	STATISTICAL TEST
H0 (4): <i>There is no significant relationship between the predictor variables represented by hypertensive patient typologies with no comorbidity and the criterion variable, taken together.</i>	<i>Wald statistic</i>
H0 (5): <i>There is no significant relationship between the predictor variables represented by hypertensive patient typologies with comorbidity and the criterion variable, taken together.</i>	<i>Wald statistic</i>
H0 (6) <i>The MLRM with the ‘Contextual Environment’ explanatory variables is not a better fit than the model which does not have those variables.</i>	-2LL
H0 (7) <i>The MLRM with the ‘Problem Recognition’ explanatory variables is not a better fit than the model which does not have those variables.</i>	-2LL
H0 (8) <i>The MLRM with the ‘Problem Solving’ explanatory variables is not a better fit than the model which does not have those variables.</i>	-2LL
H (9) <i>The MLRM with the ‘Medical Guidelines’ explanatory variables is not a better fit than the model which does not have those variables.</i>	-2LL
H0 (10) <i>The final MLRM with the selected explanatory variables is not a better fit than the model which does not have those variables</i>	-2LL

7.24 Description of the Selected Statistical Tests

Through the previous section there has been an emphasis on moving away from the traditional hypothesis testing framework using goodness-of-fit significance tests, towards one of **model building**. This approach to data analysis has been recommended by Hutcheson and Sofroniou (1999):

*“Alongside this wider development of statistics has been an emphasis on **model building** rather than on mere **hypothesis testing** with greater use of confidence intervals to enable the predictive utility of models to be estimated in addition to their statistical significance”* (Hutcheson and Sofroniou, 1999: 1). Therefore, the description of the selected statistical tests follows the **model building** approach, because models which provide a good fit for the data offer several advantages over the use of significance tests:

- *one can examine patterns of association and interaction between the factors by studying residuals and estimating odds ratios that describe the associations;*
- *the contribution of each effect can be evaluated by examining the estimated model parameters; and*
- *the predicted model values provide a smoothing of the original data and a greater degree of parsimony since irrelevant or weak effects can be removed from the model.*

7.24.1 The Chi-Square Goodness-of-Fit Test

The chi-square goodness-of-fit test is used to categorise respondents according to whether their responses fall into different categories. The technique is a goodness-of-fit type in that it allows the researcher to test the null hypothesis that there are no differences between an observed number of responses falling in each category and an expected number of frequencies (Siegel and Castellan, 1988).

The Chi - Square (χ^2) test is particularly relevant when we need to know the probability that a relationship occurs between two variables in the population from which a random sample was derived. Along with the Chi - Square (χ^2) test, contingency tables are widely used. This test of statistical significance compares the observed frequencies in each cell in a contingency table with those that would occur if there were no relationship between the variables (expected frequencies). The greater the difference between observed and expected frequencies, the larger the value assumed by the Chi - Square (χ^2) test, given a pre-defined significance level and the number of degrees of freedom associated with a cross - tabulation (number of columns minus 1) (number of rows minus 1).

The Chi - Square (χ^2) test presents four main limitations. First, the strength and the direction of a relationship are not established. Second, the combination of a contingency table and chi - square is preferable when

both variables are nominal (categorical) or when one is nominal and the other is ordinal. When the level of measurement is ordinal or interval/ratio, other approaches to the elucidation of relationships, such as correlation, are likely to be preferred. Third, whenever 2 by 2 tables are used a “*Yates*” *Correction for Continuity* must be introduced on the chi - square calculation. Furthermore, it is problematic to know whether the chi - square must be used with two dichotomous variables. Some statisticians suggest that when pairs of variables are dichotomous, the *phi coefficient* should be given serious consideration because it is preferable as a test of association with these sorts of variables. Fourth, carefully analysis must be done whenever expected cell frequencies are less than 5 because the chi -square test can be unreliable. Again, in the case of a 2 by 2 table in which there are fewer than 20 cases “*Fisher’s exact test*” is preferable.

7.24.2 The Wald Statistic:

The Wald statistic tests the hypothesis that the regression coefficient for the explanatory variable is zero (that is, the explanatory variable has no effect on the response variable) (see Section 8.15.3 *Testing for the Significance of the Logistic Regression Model* for further details). Given the restrictions to its use, some statisticians recommend the $-2LL$ to assess the goodness-of-fit of a MLRM (Hutcheson and Sofroniou, 1999).

7.24.3 -2 Times the Log of the Likelihood-Ratio Statistic

The likelihood-ratio (LR) test is used for determining variables to be removed from the logistic regression model. This step-by-step procedure estimates “*the model with each explanatory variable eliminated in turn and looking at the change in the log likelihood when each variable is deleted. The likelihood-ratio test for the null hypothesis that the coefficients of the terms removed are zero, is obtained by dividing the likelihood for the reduced model by the likelihood for the full model. If the null hypothesis is true and the sample size is sufficiently large, the quantity -2 times the log of the likelihood-ratio statistic has a chi-square distribution with r degrees of freedom, where r is the difference between the number of terms in the full model and the reduced model ... When the likelihood test is used for removing terms from a model, its significance level is compared to the cut-off value (Norusis, 1994: 15-16). This process is continued, and each time a term is removed, a statistical test is carried out ($-2LL_{diff}$ statistic shows the change in $-2LL$ which would result if a term was omitted from the model)* to determine whether the accuracy of prediction falls to a sufficient extent to show that the component most recently excluded should indeed be one of the components in the final model. The interpretation of $-2LL$, which is a measure of deviance for the logit link³², is quite straightforward – the smaller its value, the better the model fit.

³² “The logit link is an example of a GLM where the variance of the probability distribution for the response variable is a fixed function of the mean” (Hutcheson and Sofroniou, 1999: 127).

7.25 The Statistical Software Package

As pointed out earlier, the Statistical Package for Social Sciences (SPSS), in its menu-driven windows environment, was used in this study. *SPSS 6.1* is a powerful software package for microcomputer data management and analysis. *SPSS Advanced Statistics 6.1* option is an add-on enhancement that provides additional statistical analysis techniques (Norusis, 1994).

This statistical software package has been found particularly relevant to fit logistic regression models using the *logistic regression* procedure (Cramer and Bryman, 1997; Norusis, 1994; Frude, 1993). The researcher identified the indicator (dependent) variable and the explanatory predictors (covariates), and defined qualitative predictors using the “categorical” option. This statistical tool was also used for stepwise model selection procedures. Both the forward and backward elimination procedures were chosen for selecting predictor variables. A wide variety of regression diagnostics were developed for determining variables to be removed from the model. The indicator-variable coding scheme was selected from several options for setting up dummy variables for categorical predictors. The SPSS statistical package also provides a variety of diagnostic methods to examine the adequacy of the model. For example, the residual and the standard residual, as well as the Cook’s distance are but a few of the statistics that were applied to the data.

7.26 Summary

As mentioned in this Chapter, the problem investigated in this research has not previously been studied in Portugal. Thus, the international marketing academic community was uninformed about Portuguese GPs' prescribing behaviour. In accordance with previous considerations, it was decided that a nation-wide study was necessary for the current research objectives. Consequently, the purpose of this chapter was to present the available procedures through which the research instrument was selected and designed, and explain the data collection decision. A review of the main data collection methods, including observations, experiments and questioning has been presented.

After the advantages and disadvantages of the different methods were presented, questioning was found to be the right method to be used in this research. An explanation for using this method rather than an alternative method was also provided. The different methods of questioning techniques, particularly the direct interview (including telephone interviewing) and the postal interview, were also discussed along with the rational for accepting and/or rejecting them. The questionnaire structure was discussed and it was explained why the direct - structured version was considered the most appropriate form for this study. The study population, as well as the context of the research, were presented and explained.

A deep analysis of the four levels of measurement was organised in order to justify the decision to use ordinal and nominal scales on this research. The reasons to use the 7 point scale (in Likert-format or not) were also advanced.

Great attention was given to the questionnaire development, which was organised in accordance with the various stages suggested by prestigious marketing researchers. The pre-test stage of the questionnaire was explained and subsequent changes highlighted.

Strong emphasis was given to the criteria for evaluating survey outcomes. A discussion of this interesting part of the survey methodology was offered in order to adequately describe and apply criteria either for determining the eligibility of respondents or for establishing response rates. In light of this situation, it was considered mandatory for us to conceptualise definitions for evaluating the outcomes of the mail questionnaire. Accordingly, six methodological concepts were presented for evaluating the survey outcomes.

The procedures broadly accepted for obtaining a high quality of raw material for data analysis were evaluated. A few drawbacks were identified and described, particularly those related to partially filled in returned questionnaires. The solution for overcoming this barrier to obtaining and ensuring that the data was of a high quality was explained.

The purpose of the last part of the chapter was to introduce and develop the research methodology. Particular emphasis was given either to the description of the *logistic regression* analysis and *factor analysis*.

After a brief description on the appropriate steps to avoid wrong statistical assumptions, the selection of appropriate statistical tests for hypotheses testing was discussed. Following this, several statistical tests for multivariate analysis were chosen and described for further application in this study. We then moved on to consider the practicalities of hypotheses-testing by going through a description of all those statistical tests. Following a *model building* approach, a number of ways in which the goodness-of-fit of a multiple logistic regression model can be assessed were described.

In the last section of this chapter, the statistical software package that was used for processing the data was briefly described. SPSS for Windows was chosen because of its friendly interface and widespread availability. SPSS Advanced Statistics 6.1 for Windows was considered an important software package for fitting *logistic regression models* using the *logistic regression analysis*.

8 Chapter Eight Results of Factor Analysis and Logistic Regression

8.1 Introduction

This chapter presents the main findings from both the *factor analysis* and the *logistic regression analysis*. The former was used as a contribution to the latter. Results from uni and bivariate analysis are also presented. It was considered appropriate to follow such a procedure in order to facilitate the understanding of the selection of variables for the logistic regression analysis.

We first present the results from the demographic characterisation of GPs (section 5/questionnaire) and their daily practice activity and environment (section 1/questionnaire), and then go on to an overview of the importance of hypertension and its therapeutic algorithm. These results are followed by an analysis of the pharmacological therapeutic approach to patient typologies (section 2/questionnaire). Thereafter, results from the factor analysis (section 3/questionnaire) and doctors' attitudes towards innovation (section 4/questionnaire) are analysed. Finally, the results from the *logistic regression analysis* are presented.

The Chapter draws these results together in a brief discussion which is subsequently developed more fully in Chapter Nine, particularly in terms of the links with the theoretical/conceptual basis of the research.

8.2 Sources of Drug Information

In the dissemination of clinical information, three key players have been identified: *medical schools*, *health authorities* and the *pharmaceutical industry* (Lambert et al., 1997; Himmel et al., 1997; Gaither et al., 1996; 1994). That is, when the physician graduates into the world of clinical practice, s/he is aware of different sources of drug information for updating his/her therapeutic approach. It follows that doctors usually have to update their pharmacological knowledge in order to efficiently and effectively deal with various diseases (Gaither, et al., 1996; 1994; Williams and Hensel, 1991a; b). Although the pharmaceutical industry has been found to play a particularly important role in the dissemination of clinical information, its influence is not well received by members of the WHO: "*It is a sad reality, however, that in many countries, adequate information is not available even at the highest level of the health care system, and doctors are largely reliant upon promotional information from industry*" (Couper, 1995: 599). Therefore, the evaluation of all the different sources of drug information, particularly the pharmaceutical industry, is necessary for a better understanding of how doctors organise their therapeutic approach. Table 8.1 presents the sources of clinical information to that most Portuguese GPs generally refer to.

Table 8.1: Sources of Drug Information

Pharmaceutical Manufacturers (9 variables):

- II_48 Product literature
- II_49 Information role
- II_50 Scientific credibility
- II_51 Marketing activity
- II_52 Medical Meetings (therapeutic approach)
- II_53 Manufacturers' representatives (Reps) importance
- II_54 Reps' technical skills
- II_55 Reps' differentiation
- II_56 Trilogy (Manufacturer; Product; Sales Representatives)

GP Colleagues (2 variables)

- II_57 Exchange of Information (formal therapeutic approach meetings)
- II_58 Informal Exchange of Information (chat with some colleagues)

Opinion Leaders (4 variables)

- II_59 Regional (consultants)
- II_60 National (medical congresses/conferences)
- II_61 National opinion leaders' differences on therapeutic approach
- II_62 Pharmacists

Medical Specialised Information (4 variables)

- II_63 Medical Journals
- II_64 UPDATE Medical Journal
- II_65 Medical textbooks
- II_66 Medline

Health Authorities Information (2 variables)

- II_67 Bulletins (therapeutic approach)
- II_68 Bulletins' credibility

Clinical Experience (3 variables)

- II_69 Personal reflection from clinical daily activity
- II_70 Scepticism towards Pharmaceutical Manufacturers' Information
- II_71 Patient feed-back

Regional Health Administration's Control (4 variables)

- II_72 INFARMED (Portuguese Institute of Pharmacy and Medicines) Bulletin
- II_73 Prescription profile (usefulness)
- II_74 Drug brand-name profile
- II_75 Drug brand-name profile's utility (Doctor/Industry Relationship)

GPs' Desk Reference (1 variable)

- II_76 Therapeutic Index

TOTAL NUMBER OF VARIABLES: 29

All the sources of clinical information described in Table 8.1 will be used to scale the development and refinement of the measurement instrument. They were identified from the literature as the ones most widely used (Himmel et al., 1997; Gaither et al., 1996; 1994; Williams and Hensel, 1991a; b).

8.2.1 Scale Development and Refinement

The initial instrument was made up of 29 items, each representing one of the dimensions that were found relevant in previous research studies on sources of drug information. To assess the instrument in terms of the *reliability*¹ of its measurements and the eventual need to purify the measures, we used the method proposed by Churchill (1979). In this way, it was possible to identify reliable and valid measures that best represent the underlying process for doctors' utilisation of drug information sources. Unless the dimensionality of the scale is known a priori, Churchill strongly recommended his paradigm to aid researchers in the development of such measures. As suggested by Churchill's framework, we decided to take a measure of *internal consistency* as the first step in assessing the quality of the data set. We therefore resorted to the *Cronbach Alpha coefficient in order to assess the reliability of the instrument*.

¹ Reliability concerns the degree to which results are consistent across repeated measurements.

Churchill (1979) suggested that item pools (i.e. the set of 29 variables which represent drug sources of information in the present study) which are found to have high Cronbach Alpha coefficients have good *internal consistency* and as such can be treated as unidimensional. Churchill also suggested that Cronbach Alpha coefficients above 0.8 determine the capacity to avoid to test the hypothesis of multi-dimensionality through the application of principal component analysis (PCA) or other techniques, and the data set should be accepted as unidimensional. Nevertheless, Churchill recognised other measure purification procedures: “*some analysts like to perform a factor analysis on the data before doing anything else in the hope of determining the number of dimensions underlying the construct...theoretical arguments support the iterative process of the calculation of coefficient alpha, the elimination of items, and the subsequent calculation of alpha until a satisfactory coefficient is achieved. Factor analysis then can be used to confirm whether the number of dimensions conceptualised can be verified empirically*” (Churchill, 1979: 69).

The use of item-total correlations in the construction of unidimensional scales has been long advocated. For example, Nunally (1978) pointed out that “*Items within a measure are useful only to the extent that they share a common core – the attribute which is to measured*” (ibidem: 274).

Nunnally (1978) argue that the Cronbach Alpha is a function of both the inter-item correlations and the length of the scale. What seems to emerge from this assumption is that the Cronbach Alpha estimate of reliability can be improved by adding measures as well as selecting items that are more cohesive. Nunnally (1978) highlighted this problem with internal consistency measures, including Cronbach Alpha, pointing out that it was “*not so much that the item to total analysis will fail when there are several prominent factors, but rather that item-to-total analysis will work exceedingly well*” (ibidem: 279). It is also possible to prove that item to total correlation is favourable when several groups of items relate strongly to different factors, as well as when items relate moderately to the same factor. This statement implies that a scale can have good internal consistency, as measured by Cronbach Alpha, homogeneity, as measured by inter-item correlations, and yet be multi-factorial. The conviction with which many researchers made this point (Gerbing and Anderson, 1988; Nunnally, 1978) supports the use of **exploratory factor analysis** in assessing dimensionality before undertaking scale purification and assessing scale reliability. In line with this reasoning, the present study, like other studies on doctors’ prescribing behaviour (Doyle and Monteiro, 1994; Freeman et al., 1993) conducted exploratory factor analysis before assessing scale reliability. Once the dimensions had been defined, the reliability of each dimension was

checked by means of Cronbach Alpha. There is, however, some conflicting opinion over assuming the Cronbach Alpha as a pure measure of homogeneity (Gerbing and Anderson, 1988) such that use of the Cronbach Alpha coefficient remains a controversial issue. For example, some health-care research on patient satisfaction and response styles suggest that correlations between items to determine reliability can be influenced by respondents when they adopt high scores in most measures (Greenleaf, 1992a;b). Additionally, poor design of the measuring instrument can determine a perception of similarity between some items, which in turn may result on high alpha values.

In terms of both scale development and psychometric analysis of measurement instruments, the reliability of a developing measurement instrument is assured when the Cronbach Alpha coefficients are equal to, or above, 0.70 (Carmines and Zeller, 1994; Payne 1993; Churchill, 1979; Nunnally, 1978). However, *“What is “low” for alpha depends on the purpose of the research. For early stages of basic research, Nunnally (1967) suggests reliabilities of .50 to .60 suffice and that increasing reliabilities beyond .80 is probably wasteful. In many applied settings, however, where important decisions are made with respect to specific test scores, “a reliability of .90 is the minimum that should be tolerated, and a reliability of .95 should be considered the desirable standard (p. 226)” (Churchill, 1979: 68/footnote 1).*

The common factor variance of the main items from each factor was very high and unitary (accounted for by one factor), which gave a strong coherence to most factors, thus improving their reliability. The factor structure was further verified by re-analysing the reliabilities for each of the dimensions.

Measures were further purified by examining the item-to-total correlations. If the alpha value for the item-to-total correlation improved by dropping that item, the item was removed. Individual variables with corrected item-to-total correlations of below 0.50 were deleted. Consequently, each item was able to have a certain amount of distinctiveness or specificity even though it was integral to the concept. However, no single item was used to provide a perfect representation of any concept or dimension that was organised around a multi-item structure. After calculations to purify the measures, it was found that most items in a measure were highly inter-correlated. When this was not true, we correlated each item with the total score and then plotted those correlations in an order of decreasing magnitude. Items with correlations near zero were eliminated. Further, items which produced a substantial or sudden drop in the item-to-total correlations were also deleted. However, items which had a value that was not included within any of the previous situations, but which had presented reliabilities of 0.50 or 0.60, were accepted.

Following Churchill's (1979) advice, an iterative process was then used for the calculation of alpha coefficients and the elimination of "garbage items".

Together, three different tests (alpha coefficient, alpha coefficient if the item was deleted, and the corrected item-to-total correlations²) were used to assess whether the internal consistency of dimensions could be improved. It should be noted, however, that research on *Churchill's paradigm for the development of service quality measurement scales* advises that this purification process had to be realistic and in accordance with the substance of the information, otherwise: "*the pursuit of high alpha values would have resulted in the deletion of those items most important to the consumer*" (Smith, 1999: 117). That is, variables were only removed from the initial set of variables described in Table 8.1 after confirmation that they were not of major importance in terms of their content³. As a result of the purification process described above, the following variables were removed:

² Item-total correlations are useful supplementary indicators of the technical validity/reliability of an instrument. This is because a scale may meet the normal requirements for internal reliability (e.g., a high coefficient alpha), yet many of its items may be unrelated (Briggs and Cheek, 1986).

³ Substantial research attention has been focused on the sources of information that doctors depend upon in their drug decision-making process (see Chapter Three). Although their importance changed over time, the sources themselves, both in number and type, remain constant (Gaither et al., 1996; William and Hensel, 1991; Haayer, 1982; Worthen, 1973). Thus, there is a considerable knowledge about the frequently used drug information sources. None of the deleted variables were reported in those studies. It is important to note, therefore, that the remaining variables were found to exhibit "content" or "face validity" because they are consistent both with the theoretical and operational domains of previous studies.

- II_61 – *opinion leaders' differences on therapeutic approach*;
- II_62 – *pharmacists*⁴;
- II_66 – *Medline*;
- II_69 – *doctors' reflection from clinical daily activity*;
- II_70 – *scepticism towards pharmaceutical manufacturers' information*;
- II_71 – *patient feed-back*; and
- II_76 – *therapeutic index*

The overall alpha coefficient improved by 0.0326 (from 0.7861 to 0.8187/standardised alpha⁵). The remaining 22 items were further verified by reanalysing the reliabilities for each of the seven dimensions derived from the exploratory factor analysis. The described procedure provided evidence showing that the alpha coefficient from dimension 5 improved by removing the variable II_51 – *pharmaceutical manufacturers' marketing activity*. As a result, dimension 5 improved its **alpha value** from 0.6701 to 0.7174. In this way, it is possible to avoid any differences resulting from ambiguities derived from measuring

⁴ In contrast with their peers from other European Union countries, Portuguese GPs refuse to accept pharmacists as an interesting and reliable source of drug information.

⁵ Cronbach Alpha procedure returns two coefficients:

- **Raw:** It is based upon **item correlation**. The stronger the items are inter-related, the more likely the test is consistent
- **Standardised:** It is based upon **item covariance**. The higher the correlation coefficient is, the higher the covariance is.

instruments (e.g., vague or ambiguous items which are interpreted differently by respondents and which were undetected during the pre-test procedure).

When factor analysis is developed prior to the purification procedure, the “garbage items” identified above may induce more dimensions than can be conceptually identified (Churchill, 1979). To test this problem, exploratory factor analysis before and after the purification process was developed (Tables 8.1. and 8.2). This procedure was found to produce reliable measures which have face, or content, validity⁶ (Carmines and Zeller, 1994). Almost all the dimensions had reliability scores above 0.70 and were therefore considered reliable.

Although dimensions six and seven produced reliability scores below 0.7 (see Table 8.2), which means less reliability (Nunnally, 1978), only factor seven actually had a low reliability score (0.4813). The items encapsulated within each dimension were then organised according to their decreasing order of importance to the dimension. The final instrument contained **21 items**. Its *internal consistency* was measured by estimating *alpha coefficient* (see Table 8.2).

⁶ Validity can be defined as the extent to which any measuring instrument measures what it is intended to measure. There are three most basic types of validity: criterion-related or predictive validity, face or content validity and construct validity. “*Content validity depends on the extent to which an empirical measurement reflects a specific domain of content*” (Carmines and Zeller, 1994: 12).

Table 8.2: Dimensions and Items' Alpha Values

Dimension	LABEL	ITEMS	ALPHA (std)
1	Pharmaceutical Industry's Promotional Activities	II_53 - Reprs Importance II_50 - Scientific Credibility II_49 - Pharma Role II_48- Product Literatures II_54 - Reprs Skills II_52 – Meetings	0.8902 0.8914(std)
2	Health Authorities' Drug Information Bulletins	II_67 - Therapeutic Bulletin II_68 - Scientific Credibility II_72 - INFARMED	0.7608 0.7706 (std)
3	Prescription Profile	II_75 - Doctor-Industry II_73 - Usefulness II_74 - Brand-Name Drugs	0.6933 0.7070 (std)
4	GP Colleagues	II_57 - Formal Meetings II_58 - Informal Meetings	0.8124 0.8155 (std)
5	Pharmaceutical Manufacturer's Influence on Prescribing	II_55 - Reprs Differentiation II_56 - Triology (M;P;R)	0.7073 0.7174 (std)
6	Opinion Leaders	II_60 - National II_59 - Regional	0.6337 0.6388 (std)
7	Non-Commercial Sources of Drug Information	II_63 - Medical Journals II_64 - UPDATE II_65 - Pharmacology Text Books	0.4671 0.4813 (std)

Reliability (Global Scale): 0.8187

Bearing in mind that “*empirical measures that are reliable have only come half way toward achieving scientific acceptance*” (Carmines and Zeller, 1994: 8), *criterion validity*⁷ was also assessed. This step is important to know whether the measure behaves as expected in relation to other dimensions. Thus one often tries “*to assess whether the scale score could differentiate the positions of “known groups” or whether the scale correctly predicts some criterion measure (criterion validity)*” (Churchill, 1979: 72). For example, ‘*do the pharmaceutical industry’s promotional activities, as measured by the scale, relate to the pharmaceutical manufacturer’s influence on prescribing in terms of stepped-care or liberal approaches?*’. They should, according to what is known about doctors’ sources of drug information (Himmel et al., 1997; Gaither et al., 1996; 1994; Williams and Hensel, 1991a; b). If they do not, then the quality of the measure in terms of *criterion/ predictive validity* would be very suspicious. The *validity* of the dimensions was further assessed by examining whether the dimensions identified as part of the overall emotional feeling/attitude towards different sources of drug information were empirically associated with measures of other conceptually-related variables using an approach similar to that described by Carmines and Zeller (1994).

⁷ “*Technically, one can differentiate between two types of criterion-related validity. If the criterion exists in the present, then concurrent validity is assessed by correlating a measure and the criterion at the same point in time. Predictive validity, on the other hand, concerns a future criterion which is correlated with the relevant measure*” (Carmines and Zeller, 1994: 10).

Doctors answered nine general questions about overall pharmaceutical industry's commercial/scientific activities and firms' reputation. If GPs were not distinguishing between *general* and *specific* characteristics, then the items representing each of these dimensions should cross-load or group together. However, the results shown in Table 8.5 indicate that the items used to evaluate general features were identified as a separate dimension, whereas items that contained specific information about the firm's influence on prescribing loaded on other dimension. This final step showed that the measure behaves as expected in relation to other dimensions. These findings further support the *construct validity*⁸ of the survey instrument, and are in line with recent research on doctors' use of drug information sources (Himmel et al. 1997; Gaither et al., 1996). Here it should be emphasized that the alpha coefficient from Table 8.2 reinforces these findings: "*The internal consistency of the instrument was measured by estimating coefficient alpha. Not only is this coefficient a measure of the reliability of an instrument, but it is also a reflection, to some extent, of its construct validity (Nunnally, 1967)*" (Khazanchi et al., 1998: 85).

⁸ "Fundamentally, construct validity is concerned with the extent to which a particular measure relates to other measures consistent with theoretically derived hypotheses concerning the concepts (or constructs) that are being measured" (Carmines and Zeller, 1994: 15).

8.2.2 Scale Results

When we talk about emotional feelings or attitudes, we are talking about constructs of the mind as they are expressed by a raw score on a measuring instrument in response to our items or questions (Gaither et al., 1996). Typically, to assess the position of the respondent in a specific item related to his or her emotional feelings or perceptions towards the sources of drug information, it is important to have different raw scores derived from a scale (Bunn, 1993).

In a marketing investigation, meaning is imputed to a specific score when it is possible to compare the raw score with the total distribution of scores, and this distribution is summarised by calculating a *mean* and *standard deviation* (Churchill, 1979). With these basic statistics, it is possible to develop *norms* to classify and compare doctors according to their mental standard of what is average.

Bearing in mind that “*norm quality is a function of both the number of cases on which the average is based and their representativeness*” (Churchill, 1979: 72), Portuguese GPs’ mental standards towards different sources of drug information were assessed.

In line with the reasoning that has been advanced, the final 21 items were analysed in terms of their *mean* and *standard deviation* (see Table 8.4). These basic descriptive statistics were obtained after frequencies were calculated for the responses on each item, to examine the distribution of responses for each item. We tabulated the frequency of responses for each of the individual scale items to provide an insight into GPs' perceptions of the different sources of drug information.

As pointed out earlier, previous research has highlighted the importance of the pharmaceutical industry as a source of drug information (Gaither et al., 1996; Doyle and Monteiro, 1994; Freeman et al., 1993; Williams and Hensel, 1991a; b). However, we know only little about Portuguese GPs' attitudes towards the different sources of drug information. For example, at the time of writing, Portuguese GPs' mental standards towards pharmaceutical manufacturers' sources of drug information were not available. Consequently, Table 8.3: Pharmaceutical Industry's Scale Item Rating represents the first step for understanding the Portuguese GPs' attitudes towards pharmaceutical manufacturers' sources of drug information.

Table 8.3: Pharmaceutical Industry's Scale Item Rating

Scale Item	Response Category						
	1	2	3	4	5	6	7
	n; %;	n; %;	n; %	n; %;	n; %;	n; %	n; %
	(cum %)	(cum %)	(cum %)	(cum %)	(cum %)	(cum %)	(cum %)
II_48: Literature's scientific and pedagogic quality	12	53	80	90	49	16	9
	3.9	17.2	25.9	29.1	15.9	5.2	2.8
	3.9	21.1	47.0	76.1	92.0	97.2	100.0
II_49: Pharmaceutical Industry's Role	2	23	45	68	66	60	45
	0.6	7.4	14.6	22.0	21.4	19.4	14.6
	0.6	8.1	22.7	44.7	66.0	85.4	100.0
II_50: Pharmaceutical Industry's Credibility	6	48	63	86	58	39	9
	1.9	15.5	20.4	27.8	18.8	12.6	2.9
	1.9	17.5	37.9	65.7	84.5	97.1	100.0
II_52: Manufacturer's Clinical Meetings	15	23	43	65	66	57	40
	4.9	7.4	13.9	21.0	21.4	18.4	12.9
	4.9	12.3	26.2	47.2	68.6	87.1	100.0
II_53: Manufacturer's Sales Representatives	12	40	41	75	63	50	28
	3.9	12.9	13.3	24.3	20.4	16.2	9.1
	3.9	16.8	30.1	54.4	74.8	90.9	100.0
II-54: Reps' Skills	12	27	49	69	81	51	20
	3.9	8.7	15.9	22.3	26.2	16.5	6.5
	3.9	12.6	28.5	50.8	77.0	93.5	100.0
II_55: Reps' Influence on Prescribing	45	33	47	52	41	61	30
	14.6	10.7	15.2	16.8	13.3	19.7	9.7
	14.6	25.2	40.5	57.3	70.6	90.3	100.0
II_56: Triology's Influence on Prescribing	13	10	20	50	65	93	58
	4.2	3.2	6.5	16.2	21.0	30.1	18.8
	4.2	7.4	13.9	30.1	51.1	81.2	100.0

Table 8.4: Scale's Mean and Standard Deviation by Variable

SCALE's Mean and Standard Deviation by Variable <i>Reliability</i> (<i>Global Scale</i>): 0.8148				
Var N°	Variable	Attribute	Mean	Standard Deviation (SD)
1	II_48	Product Literature	3,5893	1,3059
2	II_49	Information Role	4,6893	1,4810
3	II_50	Scientific Credibility	3,9250	1,3775
4	II_52	Medical Meetings	4,5214	1,6547
5	II_53	Reps' Importance	4,2500	1,6025
6	II_54	Reps' technical skills	4,2929	1,5098
7	II_55	Reps' influence	3,9929	1,9083
8	II_56	Triology	5,0750	1,5651
9	II_57	Formal Exchange	2,9607	1,6640
10	II_58	Informal Exchange	2,7393	1,5310
11	II_59	Regional	3,5071	1,5427
12	II_60	National	5,0857	1,3116
13	II_63	Medical Journals	5,7786	1,0613
14	II_64	UPDATE	5,3657	1,4389
15	II_65	Medical Textbooks	3,9536	1,7581
16	II_67	Therapeutic Bulletins	2,3893	1,6918
17	II_68	Bulletins' credibility	3,5107	2,0530
18	II_72	INFARMED	3,5357	2,1316
19	II_73	Prescription Profile	5,0679	1,6349
20	II_74	Brand-Name Profile	4,9643	1,5423
21	II_75	Doctor – Industry Relationship	3,6537	1,8621

In addition to looking at the results that were found for the pharmaceutical industry's scale item rating, we tabulated means and standard deviations for all the items related to GPs' sources of drug information (see Table 8.4). This procedure was chosen primarily because it gives reliable information concerning a common underlying attitude toward the different items. As a result, it allows for comparison of doctors' mental standards. Additionally, it is consistent with tradition in attitudinal research that is applied to pharmaceutical marketing (Creyer and Hrsistodoulakis, 1998; Freeman et al., 1993; Doucette and Wiederholt, 1992).

Results from Tables 8.3 and 8.4 suggest:

- There is a positive view of the pharmaceutical industry as a whole, particularly in terms of its contribution to the GPs' understanding of therapeutic approaches to hypertensive patients.
- Unfortunately for the pharmaceutical companies, the overall impression of the scientific credibility of the information provided by them about their products remains a delicate and controversial subject among GPs.
- Although the role of the pharmaceutical sales reps as a source of drug information was assumed to be important, research results suggest that a

significant number of GPs refuse to accept their influence on prescribing behaviour.

- Respondents believe that the choice of drug should be tailored to the individual hypertensive patient, taking into account coexisting diseases and the medical guidelines to treat them. Thus, the pharmacological approach is developed according to the therapeutic quality of the drug and the scientific credibility of the pharmaceutical firm promoting the drug.
- GPs do not openly discuss their prescribing behaviour with their colleagues. Thus, it is possible to say that each general practitioner jealously protects his or her personal evoked set of drugs, and may be sensitive and even reluctant to discuss it.
- To develop their evoked set of drugs, GPs prefer medical journals, medical national opinion leaders, and their clinical experience reinforced by the feedback obtained from patients.
- Although doctors recognised their credibility, independence, and interest, health authorities' bulletins are a polemic source of drug information. However, health region administration's information reporting prescription profiles is also assumed to be very useful.

8.2.3 Exploratory Factor Analysis

Before exploratory factor analysis was conducted, the data were examined for their appropriateness for such a statistical procedure (Hutcheson and Sofroniou, 1999):

“One of the problems that sometimes occurs when computing generalized linear models (GLMs) is the presence of multicollinearity which is caused by strong interrelationships amongst the explanatory variables” (ibid: 217).

Given the high levels of multicollinearity, factor analysis was used to identify underlying constructs. This enabled a relatively small number of distinct factors to be entered into the regression models rather than a larger number of correlated variables. Identifying single dimensions in this way enabled relatively robust models (that is, models which are not sample specific) to be constructed (Afifi and Clark, 1996). Thus, exploratory factor analysis was developed as a preliminary analysis of dimensionality in the data and as a data reduction technique to reduce multicollinearity. Furthermore, exploratory factor analysis served as a data reduction mechanism for input into the logistic regression model by providing a more parsimonious explanation of relationships between variables (Hutcheson and Sofroniou, 1999).

8.2.4 - Operationalising Exploratory Factor Analysis

8.2.4.1 Appropriateness of Data for Exploratory Factor Analysis

The use of sampling adequacy measures for the total data set of the 21 items, demonstrated the applicability of a data-reduction technique. The Kaiser-Meyer-Olkin measure of sample adequacy (KMO statistic) (0.77478) and Bartlett's test of sphericity⁹ (2437,5946), ($p = 0.00000$) indicated that a factor analysis of the statements was appropriate as there was a high enough degree of association between the variables to indicate the presence of different factors. In accordance with previous results the hypothesis of independence was rejected at $p \ll 0.000$.

Hutcheson and Sofroniou (1999), quoting from Kaiser and Rice (1974), suggested that a KMO measure of sampling adequacy of above 0.9 suggests that the data are "marvellous", above 0.8 suggest the data are "meritorious" and above 0.7 suggests the data are "middling". In this analysis, the KMO test of sampling adequacy did not achieve the "meritorious" status (0.77478). However, the KMO measure of sample adequacy was strong enough to indicate that the variables belonged together (see Appendix Eleven).

⁹ Bartlett's test of sphericity tested the hypothesis that the correlation matrix came from a population of independent variables.

The Bartlett's Test of Sphericity was also significant, indicating that the correlation matrix came from a population of variables that were not independent (Hair et al., 1987). Furthermore, it is worth mentioning that a good factor structure can be reached, provided that certain technical criteria are met in the factor analysis, of which the four most important are:

- good sampling of variables;
- good sampling of subjects;
- large samples, with 100 subjects as the minimum; and
- a ratio of subjects to variables of at least 2:1.

The sample size guarantees the robustness of the principal component solution, because it has at least three times more respondents by variable than what has been suggested (Bryman and Cramer, 1997; Kline, 1994). Even when this ratio is assumed to be less important than the ratio of subjects to factors (which should be more than 20:1 as proposed by Arrindel and van der Ende (1985)), the data from this study have a ratio of 44:1, which is twice that proposed by Arrindel and van der Ende. All these indicators are robust enough to develop the PCA in order to obtain a strong factor structure.

8.2.4.2 Choosing the Number of Factor Components to Extract

The extraction of the correct number of factors is a vital part of good factor analysis (Afifi and Clark, 1996; Kline, 1994). There is much debate over which are the most appropriate criteria to be used in determining the number of factors to be extracted in factor analysis because the rules that have been proposed for deciding how many components to retain have shown that none of them appear to work well in all circumstances. Nevertheless, there is some guidance on this topic, in particular the eigenvalue criterion. It is generally agreed that the criterion of an eigenvalue of greater than 1 is the most appropriate to define the correct number of factors (Hutcheson and Sofroniou, 1999). Because the sample of doctors used in the study was >250 and the mean communality scores were equal to 0.675 only those factors with eigenvalues greater than one were considered (Kaiser, 1960). Furthermore, the criterion of an eigenvalue of greater than 1 has been found to be the most reliable when there are between 20 and 50 variables (Mitchell, 1993). The PCA in the present study contained 21 variables and as such the eigenvalue >1 was deemed to be a suitable method for choosing the number of component dimensions to extract.

Following Hutcheson and Sofroniou's (1999) advice, eigenvalues and scree plots were used to provide a first indication of the number of factors needed to adequately describe the data.

Seven dimensions were extracted using factor analysis with missing data deleted listwise, and were interpreted after a varimax rotation¹⁰. This means that the rotated factors by varimax are uncorrelated and the communalities and the ability to reproduce the original correlation matrix are identical to the original factor analysis. This rotation method simplifies the factor structure thereby improving the interpretation of the latent factors by removing the ambiguities which are found to be problematic in unrotated solutions (Afifi and Clark 1996; Kline, 1994). In particular, orthogonal rotation results in principal components that are independent of all other factors, which is particularly desirable when factor results are to be employed in subsequent analysis as this rotation eliminates collinearity (Rennie, 1997; Hair et al., 1995).

¹⁰Computationally, the varimax rotation is achieved by maximizing the sum of the variances of the squared factor loadings within each factor. Further, these factor loadings are adjusted by dividing each of them by the communality of the corresponding variable. This adjustment is known as the Kaiser normalization. This adjustment tends to equalize the impact of variables with varying communalities. If it were not used, the variables with higher communalities would highly influence the final solution.

Loadings were tested for significance, and items with loadings > 0.3 were retained for the interpretation of results, as suggested by Kline (1994). As factor loadings are the correlations of the variables with the factors, the weighted combination of variables which best explain variance, a higher loading value will guarantee a better item's interpretation. Thus, in order to obtain a strong meaning for each item within each dimension, a cut-off point of 0.60 was used for the analysis of loadings¹¹ of the different items encapsulated within the factors. Of course, the last few components have little variance, from which small loadings may be derived .

Only Factor 7 present two items with loadings lower than 0.60 (see Table 8.6).

Dimensions were named with respect to the items which had the highest loadings, because they represent the variables that correlate highly with each factor.

Since the entries are variable/factor correlations, the square factor loading of variables indicates the percentage of variance of that variable that is accounted for by the factor.

¹¹Factor loadings give us the correlation between the original variables and the factors, and the key to understanding the nature of a particular factor. Squared factor loadings indicate what percent of the variance in a original variable is explained by a factor.

Table 8.5¹²: DIMENSIONS (21 items)

	DIMENSIONS						
	A	B	C	D	E	F	G
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
var.							
II_48	,75898	-,02569	,11905	,04560	,01388	,03183	,05040
II_49	,84899	-,09605	,03642	-,00504	-,00327	,09235	,04116
II_50	,85372	-,01223	,05751	,02887	-,01370	,03731	,08318
II_52	,70106	,03149	-,10876	,07589	,14493	,17461	,15336
II_53	,84557	,02349	,04438	,01548	,13525	,12549	,04143
II_54	,73318	,09750	,07464	,08222	,19715	,13584	-,03538
II_55	,18301	,06022	,05151	,05176	-,01617	,87711	-,06647
II_56	,26654	-,04057	-,04307	,01216	,20119	,79208	,10989
II_57	,07420	-,00366	,04696	,88736	,12901	,02619	,04521
II_58	,07071	,05570	,01966	,87206	,19327	,02467	-,03209
II_59	,12088	,09056	,11715	,27589	,73777	,04761	-,05118
II_60	,18913	,10585	,02553	,08203	,78469	,11372	,13890
II_63	,09100	,12033	-,06170	-,03933	,04572	-,06119	,86845
II_64	,22816	-,12427	,31146	,00001	,23920	,13617	,48719
II_65	,05374	,05720	,37015	,36809	-,23907	,09187	,47338
II_67	-,10024	,81120	,11144	,04348	,10354	,04170	,02588
II_68	,02799	,80084	,09599	-,08979	,24324	-,11899	-,03516
II_72	,05546	,78734	,09611	,09926	-,12665	,11292	,06496
II_73	,06863	,43069	,59698	,02308	,02442	-,16790	,19136
II_74	,01621	,30134	,69565	,09118	,22998	,03069	,18452
II_75	,08532	-,00430	,84045	,00501	-,01377	,04903	-,11077
Eigenvalue:	4.90	2.94	1.79	1.48	1.24	1.12	1.07
% of variance explained:	23.4	14.0	8.5	7.1	5.9	5.3	5.1
Total Variance explained = 69.3 % Cronbach's alpha (std) = 0.8148							
A – Manufacturers' Promotion D - GP Colleagues G - Non-Commercial Sources of B – Health Authorities Bulletins E - Opinion Leaders drug information C - H. A. Prescription Profile F - Manufacturers' Influence on Prescribing							
TOTAL NUMBER OF VARIABLES: 21							

¹² **Note:** although we have been using decimal points in a different context, their use in this table represent the SPSS output.

Table 8.6 : Dimensions, Communalities and Loadings

DIMENSION	LABEL	ITEMS	COMMUN.	LOADINGS
1	Pharmaceutical Industry's Promotional Activities	II_50 - Scientific Credibility	.74163	.85372
		II_49 - Pharma Role	.74160	.84899
		II_53 - Reps Importance	.75351	.84557
		II_48- Product Literatures	.59670	.75898
		II_54 - Reps Skills	.61796	.73318
		II_52 - Meetings	.58508	.70106
2	Health Authorities' Drug Information Bulletins	II_67 - Therapeutic Bulletin	.69553	.81120
		II_68 - Scientific Credibility	.73397	.80084
		II_72 - INFARMED	.67508	.78734
3	Health Authorities' Prescription Profile	II_75 - Doctor-Industry	.72855	.84045
		II_74 - Brand-Name Drugs	.67119	.69565
		II_73 - Usefulness	.61252	.59698
4	GP Colleagues	II_57 - Formal Meetings	.80450	.88736
		II_58 - Informal Meetings	.80797	.87206
5	Opinion Leaders	II_60 - National	.70231	.78469
		II_59 - Regional	.66184	.73777
6	Manufacturer's Influence on Prescribing	II_55 - Reps Differentiation	.81645	.87711
		II_56 - Triology (M;P;R)	.75463	.79208
7	Non-Commercial Sources of Drug Information	II_63 - Medical Journals	.78816	.86845
		II_64 - UPDATE	.47762	.48719
		II_65 - Pharmacology Text Books	.56834	.47338

As pointed out earlier, loadings in the rows of a factor matrix can be squared and summed. The sum of the squares for each row indicates the proportion of variance in each variable which the factors can explain. This is known as the communality. The higher the communality the more the particular set of factors explain the variance. Given the importance of this statistic, the amount of variance that each variable shares with all other variables included in the analysis (communalities) is also presented. With the information derived both from dimensions' communalities and loadings, it is possible to evaluate the nature of the seven dimensions that were identified by the principal component analysis:

“As a first step in interpreting the results, it is useful to look at the proportion of variance for each variable which is accounted for by the retained factors” (Hutcheson and Sofroniou, 1999: 230).

Comparing the results in table 8.5 with the factor loadings and communalities shown in table 8.6, it is possible to say that all items encapsulated within each factor could be identified with only one dimension, which reinforces the reliability of the dimensions.

8.2.4.3 Dimensions Interpretation

Seven latent factors with eigenvalues greater than 1.0 explained a cumulative variance of 69.3 % .

Table 8.7: Factors, Eigenvalues and Variance

Dimension Factor	Eigenvalue	% of Variance	Cumulative %
1	4.90548	23.4	23.4
2	2.94240	14.0	37.4
3	1.78841	8.5	45.9
4	1.48122	7.1	52.9
5	1.24070	5.9	58.8
6	1.11976	5.3	64.2
7	1.06717	5.1	69.3

According to these results, the most important factor, labelled "*Pharmaceutical Industry's Promotional Activities*", explains 23.4 % of the variance, while factor 2, labelled "*Health Authorities' Drug Information Bulletins*" is responsible for 14.0 % of the variance. The third factor, labelled "*Doctors' Prescription Profile*", only captures 8.5 % of the variance. Therefore, the three most important factors obtained 45.9 % of the total variance and the other four dimensions encapsulate the remaining 23.4 %. This means that these four factors variance have low scores, ranging from 7.1 % to 5.1 %, which indicates that GPs vary in their attitudes towards different sources of drug information.

Although the preceding evaluation suggests that there are in fact two major underlying dimensions or factors which summarise much of the variation between respondents, it must be said that the cumulative percentage of these factors is not very high (37.4%). This means that the portion of variation among respondents to the statements relating to both the *pharmaceutical industry* and *health authorities'* drug information sources is not highly significant. However, it is possible to argue that the variation among respondents to these two factors suggests different "political" attitudes towards the prescribing influence of both pharmaceutical companies'

promotional activities and health authorities' bulletins (i.e., medical guidelines). The third factor which rates GPs' attitudes towards their prescription profile information reinforces this conviction. That is, some doctors are in favour, and some are against, these two most powerful organisations in terms of their drug information supply.

Interpretation of a factor solution focuses on the identification of dimensions that underlie the observed variables:

- **Factor 1** was labelled *Pharmaceutical Industry's Promotion Activities* and includes six variables, all showing very high factor loadings, which explained 23.4% of the variance in the factor model. The perception of the *scientific credibility* of "global information" produced by pharmaceutical companies about their products, has a strong influence on this factor's variance, as is confirmed by the most robust loading (0.85372). On the other hand, the perception that the *pharmaceutical industry* as a whole acts as an important information medium, (in the transmission of information regarding antihypertensive therapeutic approaches) has the second highest loading (0.84899). The same conclusion is true for the perceived role of the *sales representatives* of these companies which has the third most important loading value (0.84557).

The perceived importance of *pharmaceutical manufacturers' literature* as a reliable source of information in scientific and pedagogic terms, along with the capabilities and technical background that sales representatives have when they present new antihypertensive drug benefits also have high loadings: 0.75898 and 0.73318 respectively. Finally, the perception of meetings organised by pharmaceutical companies regarding updates on prescribing, has a loading value of 0.70106.

- **Factor 2** was named *Health Authorities' Drug Information Bulletins* and includes three major study variables that explain 14,0% of the total variance. The most important loadings relate to the updating of therapeutic approaches provided via the Pharmacy and Therapy Commission (0.81120) and the perception by GPs that this same Bulletin is a credible, independent and necessary source of pharmacological updated information (0.80084). Finally, and also showing a high Factor loading, is the variable which encapsulates the fact that GPs regularly receive and read the drug information that has been sent by the Portuguese Institute of Pharmacy and Medicines (INFARMED bulletin) (0.78734).

- **Factor 3** contains three major research variables that are responsible for 8.5% of the variance, and was named *Doctors' Prescription Profile Information*. The most important Factor loading is derived from the importance attached to the prescription profile information (0.84045). The two other Factor loadings refer to GPs' perceptions about the usefulness of the information delivered by regional Health Authorities related to the "Prescription Profile" (0.69565) and about whether this same information source gives them a more realistic notion of the brand-name drugs that they have been prescribing (0.59698).
- **Factor 4** explains 7.1% of the variance, and was labelled *GP Colleagues*. It contains two major study variables, both presenting high Factor loadings: GPs' regularly exchange drug treatment views with all colleagues (0.88736) and informal exchange of drug information with some colleagues whose professional relationships are more close (0.87206).
- **Factor 5**, which is responsible for 5.9% of the variance, was *labelled Opinion Leaders* and includes three major study variables. The two most important Factor loadings are related to the fact that GPs seek the leadership opinion of specialist peers when attending congresses or medical conventions (0.78469) and also that they seek the opinion of other specialist colleagues working in the same geographical region (0.73777).

- **Factor 6** includes two study variables that represent 5.3% of the total variance, and was named *Pharmaceutical Manufacturers' Influence on Prescribing*. The two most relevant ones are related to the level of importance GPs attach to the role of the sales representative in the differentiation of brand-name drugs when they have perceived parity in terms of therapeutic quality (0.87711), as well as their attitudes towards the trilogy manufacturers' scientific credibility, therapeutic quality of the drug and sales representative's performance, in terms of their resulting prescribing behaviour (0.79208).
- Finally, **Factor 7** contains three major variables that explain only 5.1% of the variance in sources of drug information, and has been called *Non-Commercial Sources of Drug Information*. The most important variable relates to the statement about the extent to which GPs use the reading of published articles in prestigious medical journals as an important source of drug information (0.86845). The second variable tries to identify the importance of one of these prestigious medical journals (0.48719). The third study variable loading in this factor analyses the importance of Pharmacology text books for GPs when they are trying to update their knowledge about the different antihypertensive therapeutic approaches (0.47338).

8.2.5 Findings and Implications

The overall purpose of this *exploratory factor analysis* was to determine specific factors to be introduced as explanatory variables on logistic regression analysis.

More specifically, we wanted to determine whether the most important factors for explaining the variance that can be found in doctors' attitudes toward sources of drug information are also reliable for categorising doctors.

Following previous research in this area (Gaither et al., 1996; 1994a; b; Williams and Hensel, 1991a; b) eight frequently used drug information sources were investigated:

- pharmaceutical industry;
- health authorities;
- medical journals;
- medical textbooks;
- GP colleagues;
- pharmacists;
- opinion leaders; and
- GP' desk reference.

For each drug information source, doctors were asked to express their emotional feelings/attitudes on seven-point semantic differential scales, most of them with a

negative (never)/positive (always) feeling format. Conclusions were drawn following a comprehensive examination of the final 21 items which relate to the use of sources of drug information. Results from the exploratory factor analysis suggest that GPs' response variance on attitudes towards different sources of information is mainly related to both the pharmaceutical industry and the health authorities' influence on prescribing, which explain 51.2% of the total variance. The former is responsible for 28.7% of the total variance while the latter explained 22.5% of the variance in the factor model. It is important to point out that both the pharmaceutical industry and health authority' sources of drug information were split into two major dimensions each: the former includes *Pharmaceutical Industry's Promotion Activities* (factor 1) and *Pharmaceutical Manufacturer's Influence on Prescribing* (factor 6), while the later distinguishes between *Health Authorities' Drug Information bulletins* (factor 2) and *doctors' prescription profile* (factor 3).

The remaining three factors, GP colleagues (factor 4), opinion leaders (factor 5) and other non-commercial sources of drug information (factor 7), were found to have made only 18,1% of a contribution to the total variance.

The results from this study indicate that GPs use, to a large extent, non-commercial sources of drug information to support their drug choice. These

“classic” sources of drug information such as medical journals, opinion leaders, and even medical textbooks, were viewed more positively than those promoted by the pharmaceutical industry and health authorities. This finding is of particular importance given the fact that these “traditional” sources may represent the “filter” through which doctors analyse drug information from other sources, particularly from the pharmaceutical industry. However, it is not easy to maintain clear boundary between commercial and non-commercial sources of drug information. For example, because drug manufacturers develop new drugs, they are the major source of information on the safety, efficacy, and undesirable effects of product innovation (Freeman et al., 1993). The continued licensing of a drug often means that the industry has to participate in post-marketing surveillance programmes, in which it needs to involve professional medical and pharmaceutical bodies or individuals. Therefore, some doctors are invited to participate in these post-marketing surveillance programmes because they are considered to be national, regional, or local opinion leaders. As the adoption of an innovation is likely to be an involving decision, a great deal of information on new drugs is accumulated and disseminated through these opinions leaders by the pharmaceutical manufacturers. As some of these opinion leaders are invited by the pharmaceutical industry to present their findings to their peers (Haaijer-

Ruskamp and Hemminki, 1993), it is possible to say that manufacturers' influences on "classic" sources of drug information is a reality. Thus, the pharmaceutical industry has an important role to play both in making accurate information available and in assisting GPs to organise medical education programmes, conferences, and even therapeutic meetings. Therefore, the influence of the pharmaceutical industry on "classic" sources of drug information is a reality which has been stressed by other researchers (Orlowski and Wasteka, 1992; Avorn et al., 1982). Given this reality, Portuguese health authorities have been imposing tough therapeutic rules and medical guidelines on doctors attached to the NHS (INFARMED, 1996). Consequently, it is not surprising that carefully produced, impartial drug review bulletins (i.e., independent of the pharmaceutical industry), have been recommended to improve Portuguese GPs' rational prescribing. This is of particular interest because the findings from the factor analysis suggest that:

In today's Portuguese NHS, GPs' variance on the use of different sources of drug information to support the therapeutic approach is mainly related to the influence that both pharmaceutical industry and health authorities have on their prescribing behaviour.

As we have already noted, the pharmaceutical industry and health authorities are useful allies for GPs in the dissemination of therapeutic information. The interest

of drug manufacturers and health authorities are usually completely identical, but may sometimes diverge, because manufacturers have a vested interest in selling their products and in maximising their profits (Smith, 1986). Thus, the former needs GPs' continued support for new drugs success, while the latter wants to improve the rationality of drug prescribing, through educational programmes, trying to reduce treatment costs (McBride, 1995; Ryan and Yule, 1993; Moser et al., 1991). However, research results suggest that doctors view pharmaceutical manufacturers' promotional activities and health authorities' therapeutic suggestions differently from other sources of drug information.

8.2.5.1 Manufacturers' Promotional Activities

Our results reveal a paradox that is difficult to accept. The pharmaceutical manufacturers' representatives exert a marked influence on doctors' drug choice. This is a well known fact that has been reported in recent studies (Himmel et al., 1997; Orłowski and Wateska, 1992). However, most respondents felt that pharmaceutical manufacturers' representatives were not good sources of prescribing information.

Specifically, it seems that Portuguese GPs view pharmaceutical manufacturers' representatives as an unreliable source of information, although they recognise the importance of their work. We found that the extent to which GPs believe that

the pharmaceutical industry concerns itself with the scientific quality of its promotional activities, influences their impressions of pharmaceutical sales reps' actions. This result reinforces the conclusion that detailing has declined significantly as a source of information about pharmaceuticals. This finding has been supported by recent research which highlighted this problem (Williams and Hensel, 1991a; b). It has been revealed that some reps have misrepresented the quality of drugs to GPs by making unsubstantiated claims about the superior efficacy or safety of new products. To overcome this paradox, it is possible to argue that pharmaceutical manufacturers' representatives are assumed to be a "stimulant" to the doctors' memory whose therapeutic information is "filtered" by the reading of other non-commercial sources of drug information. Accordingly, information produced by these pharmaceutical manufacturers is carefully appraised by doctors who supplemented their therapeutic knowledge by "classic" and eventually "independent" sources of drug-related problems. These findings have several implications for promotional strategies developed by pharmaceutical manufacturers:

1. Pharmaceutical literature and promotional meetings need to be improved in terms of their scientific and pedagogic quality, otherwise manufacturers may experience little return on such promotional investments. In light of these

findings, which reinforce the conclusions of previous research in this area (Cryer and Hrsistodoulakis 1998; Gaither et al., 1996; 1994; Williams and Hensel, 1991a; b), if they want their materials to be more extensively used, pharmaceutical manufacturers should examine the effectiveness of the promotional mixes they use for communicating with doctors.

2. The attitude expressed by respondents concerning reps' influence on prescribing is not uniform across doctors. Since individual sales reps and their firms can alter doctors' emotional feelings as a whole, it is important for individual firms to monitor and improve the quality, educational level, and training of pharmaceutical representatives.
3. The respondents' heterogeneity of attitudes towards pharmaceutical literature, meetings and representatives suggests that there are doctors who refuse to acknowledge commercial pressure in prescribing. That is, there are doctors who prefer a more scientific approach to therapeutic decision-making, for whom only medical journals or other scientific sources of drug information are reliable and acceptable. As a result, pharmaceutical marketing managers should re-examine and redefine the scientific credibility of their promotional activities, to attempt to better balance the bridge between commercial and non-commercial sources of drug information.

8.2.5.2 Health Authorities' Therapeutic Bulletins

Doctors also have different emotional feelings toward health authorities' drug information sources. In many cases, significant differences were found concerning therapeutic bulletins and prescription profiles. Scores obtained from the measurement instrument were in opposing values of the scale. This may indicate that Portuguese GPs are not particularly satisfied with the drug information they have been receiving, or with its source, i.e., from pharmacists. This conclusion is supported by the scale mean and standard deviation of pharmacists (II_62) as a reliable source of drug information (see footnote 3), which was found to be the lowest of all 29 initial variables (**mean: 1.3821** and **standard deviation: 0.8637**). This surprising result has been pointed out in other studies: "*Pharmacists have not changed as an unimportant source of pharmaceutical information. Because of pharmacists' training and education in pharmacology, this result is somewhat puzzling and illustrates the need for further research into the interaction between physicians and pharmacists in the health care system*" (Williams and Hensel 1991a: 58).

Although recent studies suggest that GPs are beginning to realise that pharmacists are an important source of drug information (Williams et al., 2000; Bond et al., 2000), Portuguese GPs expressed a clear cut rejection of the professional prescribing advice offered by pharmacists.

In the past, far too many health education campaigns have been developed with little sense of doctors' opinion on pharmacists' acceptance as a source of drug information, and even less concern about how doctors see the health authorities' therapeutic bulletins (Denig et al., 1990; Plumridge and Berbatis, 1989). To overcome this problem, health authorities may organise therapeutic meetings among GPs and some of them may be invited to talk about their drug choice experience. Face-to-face contacts allow room for discussion and interaction, an advantage that reading a therapeutic bulletin does not provide. The organisation of meetings enables drug information to be presented and discussed in a flexible manner and as it relates to the needs of the participants, "experts" and "novices" alike. During such meetings, it is important that information should not simply be presented but that it should be critically discussed. Health centre meetings may enable community doctors to review local problems, such as prescribed drug use.

8.2.5.3 Non-Commercial Sources of Drug Information

Information about antihypertensive drugs may be imparted through a variety of other media, including the classic non-commercial sources of drug information such as medical journals, opinion leaders, and even medical textbooks have an important role on GPs' drug decision-making. Doctors tended to look for information on drug choice in these "traditional" sources because they believe in

their scientific credibility. That is, GPs believe that their prescribing behaviour is mainly the result of a long process of learning, based on non-commercial sources of drug information, rather than the consequence of several commercial pressures on drug choice developed by pharmaceutical manufacturers. Medical journal articles remain the most preferred source of drug information. However, other “traditional”, non-commercial sources of drug information that have been reported in previous studies (Himmel et al., 1997; Gaither et al., 1994; Williams and Hensel 1991a; 1991b; Peay and Peay 1990; 1988; 1984; Lilja, 1976), particularly **doctors’ colleagues**, were found to be unimportant in our research. This means that **drug choice is an individualised decision, which is kept confidential by Portuguese GPs who are not very keen to discuss it on a formal or even informal basis with their peers.** This finding is completely different from the conclusion obtained by Himmel et al. (1997) who reported that “*continuing medical education and advice obtained from colleagues and journals ranked highest as information sources of drug selection*” (Himmel et al., 1997: 166). In a similar vein, Williams and Hensel (1991a) argued that doctors’ “*colleagues have significantly increased in importance as a source of information about pharmaceuticals for physicians*” (Williams and Hensel, 1991a: 57).

The main implication derived from “*prescribing confidentiality*” is that *marketing communication strategies based on word-of-mouth advertising and discussion among Portuguese GPs is not feasible*. This two-step model of communication to influence doctors has to be organised on the basis of national opinion leaders, or local “opinion-formers” as consultants, through conventions, meetings, or conferences, rather than on GPs’ colleagues. This approach was recently suggested by other researchers who reported that the “*mention of a consultant as influencing a particular change in behaviour was often followed by a description of that particular consultant as “trusted” or “respected” or having a “good reputation”*” (Armstrong et al., 1996: 950).

Differences that have been found in GPs’ use of drug information sources suggest that doctors may be categorised in different groups according to their emotional feelings toward the use of those drug information sources. To reinforce this conviction, the larger amount of variance that was found with the sources of drug information derived from the two main factors (i.e., pharmaceutical industry and health authorities) may have a discriminant power. As a result, the dimensions that represent this reality, as well as the remaining dimensions that represent GPs’ sources of drug information, were added to the working file as new variables for entry into the regression model.

8.3 Doctors' Practice Characteristics

Gaither et al. (1996) pointed out that *the number of other doctors* at the practice site and *the number of patients seen daily* are two factors that “*moderate physicians' patterns of usage of drug information sources, and therefore influence drug prescribing*” (Gaither et al., 1996: 1291).

In a similar vein, other researchers proposed that the rationality of drug prescribing was related to the *number of doctors per practice*, arguing that those who develop their clinical work in group practices consult other colleagues more often than solo practitioners (Becker et al., 1972; Stolley et al., 1972).

For example, Stolley and Lasagna (1969) argued that

“*prescribing patterns vary greatly among physicians according to their place and type of practice and community in which they prescribe*” (Stolley and Lasagna, 1979: 403).

Recently, other studies have shown that

“*GPs working in practices with either high or low prescribing costs had different views on a number of statements concerning substitution with comparable but cheaper drugs*” (Avery et al., 2000: 104).

Some researchers argue that “*the size of the practice, the number of patients and historical drug costs*” (Buckley and Allen, 1995: 23) are important indicators on prescribing’ budget definition. In line with this reasoning, five different discriminators in terms of doctors’ practice characteristics were chosen to be introduced into the logistic regression analysis in order to categorise Portuguese GPs:

- 1. Health Centre Environment;**
- 2. Number of GPs by Health Centre;**
- 3. Daily Clinical Activity;**
- 4. Number of Patients on the Doctor’s Clinical Record; and**
- 5. Number of Patients with Hypertension.**

Although these discriminators were found unimportant in terms of the categorisation process of Portuguese GPs, it is appropriate to reiterate some of those characteristics:

Table 8.8: Practice Characteristics

<i>PRACTICE CHARACTERISTICS</i>	<i>PERCENTAGE</i>
Health Centres in Rural or Urban in Rural Environment	60.5
Medium Health Centres (5 up to 20 Doctors)	60.5
Number of Patients Seen Daily by Doctors (16 up to 30)	80.3
Doctors' Number of Patients on Record (1500 up to 2000)	70.6
Doctors' Number of Patients with Hypertension (100 up to 200)	60.5

- For 60.5 % of GPs, the daily clinical work has been developed in a rural or urban environment, within medium-sized health centres, and where the number of hypertensive patients on their records range from 100 up to 200.
- For 80.3 % of GPs, the number of patients seen daily varies between 16 and 30.
- For 70.6 % of GPs, the number of patients on record ranges from 1500 up to 2000.

8.4 Doctors' Demographic Characteristics

Doctors' demographic characteristics have been at the centre of dialectic reflection on drug choice. A small number of recent studies have reported their importance on doctors' prescribing behaviour, particularly *clinical experience*: “*One of the most authoritative sources of influences was the general practitioner's personal experience of a drug or illness* (Armstrong et al., 1996: 950). This clinical experience is a source of prescribing stability: “*what is perhaps most impressive about these accounts is the picture of stability, of non-change, that they afford. Despite daily contact with potential change agents such as journal articles, consultants' letters, and postgraduate and practice meetings, the general practitioners in this study recalled making very few changes in their prescribing in the period under review*” (ibid: 951). As a result, GPs' prescribing habits are not easily altered once established (Maxwell and Howie, 1995; Taylor and Bond, 1991; Harris et al., 1985; 1984). Therefore, “*educational strategies may be more effective if they incorporate physicians' personal experiences with a particular drug product*” (Freeman et al., 1993: 38).

Portuguese GPs have a long *clinical experience*. Thus, it is of great importance to remember that 72.2 % of respondents have between 11 and 20 years of *clinical experience* and 24.6 % of those respondents have been

practising medicine for more than 20 years. That is, 96.8 % of Portuguese GPs who returned the questionnaire had at least 11 years of clinical practice.

Doctors' age is another potential demographic characteristic to be introduced into the logistic regression analysis for categorising GPs. In accordance with the above description on doctors' clinical experience, it is understandable that most GPs (75.7 %) are between 41 and 50 years old. Only 18.4 % are younger than their peers.

Doctors' Gender is also an important demographic characteristic. Although females were found to be in larger number, the difference was not significant (52.1 % and 47.9 % respectively).

Doctors' modern medical education is a lifelong learning process (Harris, 1996; Fry, 1993; Norton and Smith 1994; Pendleton et al., 1984). However, **medical schools** at which doctors undertake their undergraduate studies have a paramount importance on their therapeutic knowledge, given that medical students learn the scientific basis of drugs in pharmacology, typically during their third year. During the subsequent years of medical training, the student's knowledge of the behaviour of drugs in a clinical situation (as opposed to the behaviour in the laboratory) reinforces their therapeutic expertise.

The impact of many specialists, particularly the clinical pharmacologist and the clinical pharmacist, in the development of improved patterns of drug utilisation in hospital models the student's "therapeutic modus operandi". The medical educational system therefore, is a means of ensuring that students graduate or obtain a licence to practise medicine only if they have acquired the necessary skills and abilities. Consequently, the medical school with its traditional pattern in medical education seems to be an important, influencing factor in the undergraduate curriculum on prescribing behaviour.

All Portuguese medical schools were represented in this study due to the large number of respondents, which also represented the relative importance of the schools. Lisbon, the capital of Portugal, has two medical schools (32.4 % and 15.9% of respondents respectively), while the north of the country is represented by 27.2% of respondents who studied in Oporto, the second largest city. Coimbra, the third largest city in Portugal and the oldest, most prestigious medical school in this study, is represented by 21.4% of respondents. Although under-graduate medical schools are supposed to teach the same subjects, "*general practice lacks accepted standards of appropriate prescribing*" (Buetow et al., 1996: 1371). Thus, we believe that GPs' school of graduation is an important demographic characteristic that should be

introduced into the logistic regression analysis in order to categorise Portuguese GPs.

Formal educational programmes, however, are not the only sources of information from which medical students and doctors learn about the use of antihypertensive drugs and behavioural alternatives to drug therapy. The *Health Region Administration* (HRA), with its *therapeutic bulletin*, is increasingly becoming involved in providing information and advice about medicines and prescribing. Its influence on prescribing has been analysed through an exploratory factor analysis dimension labelled *Health Authorities' Drug Information Bulletins*. GPs develop their medical services in accordance with the rules developed by these HRAs. If these rules, in terms of advice about medicines and prescribing, differ between HRAs then they may be considered discriminant characteristics of prescribing behaviour. However, therapeutic bulletins from these HRAs present the same clinical information. Furthermore, the distribution of respondents by HRA (Lisbon and Taggus Valley: 36.3 % ; North: 27.8 % ; and Centre: 23.3 %) suggests a strong correlation between GPs' medical school of graduation and HRA, thus multicollinearity analysis demanded that HRAs were not included in the logistic regression analysis.

8.5 Attitude Towards Product Innovation

A classification of adopters by time of adoption of a product innovation was developed by Rogers (1962) who concluded that there are five categories of adopters: (1) innovators, (2) early adopters, (3) the early majority, (4) the late majority, and (5) laggards. Rogers's classification deals with adopters categories, not nonadopters, who may have a personality profile that reject innovations. As a result, doctors' personality profiles towards therapeutic innovations are a relevant characteristic with strong discriminatory power.

In the treatment of hypertensive patients, the angiotensin II antagonists (AIIA) is the most recent therapeutic category. The pioneer brand of this therapeutic category, Cozaar (losartan) was launched in the Portuguese pharmaceutical market in 1996. Its first competitor, Diovan (valsartan) was launched two years later in April 1998.

As a result of the thalidomide disaster, doctors are very conscious about pharmaceutical product innovations. Rao and Yamada (1988) suggest that the adoption of a new drug by doctors depends on their perceptions of:

- product innovation relative to substitute products
- effectiveness

- risk to the patient
- range of ailments for which appropriate
- seriousness of condition for which prescribed
- frequency of prescription

Perceptions about all these items determine doctors' attitudes and intentions to prescribe the new therapeutic category of angiotensin II antagonists (AIIA). That is, perceptions about the new therapeutic category of AIIA are directly related to doctors' prescribing behaviour because they have been defined with the therapeutic class in mind. As a result, attitudes towards product innovation are a critical descriptor for categorising GPs because it is possible to identify an adopter group and simply compare adopters to nonadopters.

Following Rao and Yamada's (1988) assumptions, a scale was developed to measure doctors' perceptions, attitudes, and intentions towards the new therapeutic category of angiotensin II antagonists (AIIA). The scale describes the pharmacokinetic/pharmacodynamic¹³ profiles, safety, and tolerability of the angiotensin II receptor blockers.

¹³Pharmacokinetics/pharmacodynamics examine the absorption, distribution, metabolism, and excretion, as well as the dose response effect and duration of angiotensin II receptor blockers.

Table 8.9: Angiotensin II Antagonists (AIIA)

SCALE Mean and Standard Deviation by Variable					
<i>Reliability (Global Scale): 0.7496 (std)</i>					
Var n°	Variable	Attribute	Mode	Mean	Std Dev.
1	II_77	AIIA Therapeutic Innovation	6	5,0647	1,3778
2	II_78	Intention to prescribe AIIA	5	4.8091	1.5952
3	II_81	AIIA Experience	2	3,1165	1,4140
4	II_82	AIIA Absorption	4	4,1456	1,7455
5	II_83	AIIA Efficiency	1	3,0421	1,7530
6	II_84	AIIA Side-Effects	7	6,0291	1,2467

Grand Mean: 4.9763

Cronbach's Alpha: 0.7470

- Angiotensin II antagonists (AIIAs) have been identified as an important therapeutic innovation to treat hypertensive patients.
- Most doctors are planning to prescribe AIIA in the future.
- The clinical experience with AIIA in patients with hypertension is not homogeneous.
- Differentiation of AIIAs according to absorption is not easy.
- When compared to ACE inhibitors, doctors' perceptions of the efficiency of angiotensin II receptor blockers versus ACE inhibitors in hypertensive patients are dispersed.
- There is a clear perception that AIIAs have fewer side-effects than ACE inhibitors, particularly as regards coughs. Coughs have been reported as an adverse event by between 15% to 20% of patients following the ACE inhibitor regimen. That is, the safety and tolerability of the angiotensin II receptor blockers (AIIAs) are greater than ACE inhibitors. Most doctors recognise this excellent tolerability profile from the AIIAs, which have been found to produce a lower incidence of adverse events (including cough), and safety parameters (abnormal laboratory results), than ACE inhibitors.

8.6 Results from the Multiple Logistic Regression Model (MLRM)

8.6.1 Introduction

In recent years *the model building approach* has been extended to categorical data, with the development of logistic regression and loglinear models (Petrie and Sabin, 2000; Hutcheson and Sofroniou, 1999). As we have already noted, “*This move away from the simplistic hypothesis testing framework that has come to characterize much of social science research, with its binary conception of ‘scientific truth’, can only be for the better, allowing the researcher to focus on the practical importance of a given variable in their particular domain of interest*” (Hutcheson and Sofroniou, 1999: xi). As stressed in Chapter Seven, the multiple logistic regression analysis has been largely used on both drug analysis and patient’s pathology severity: “*Logistic regression analysis is especially useful in comparing functions across groups. For example, assume the dosage of a drug (X) has been varied to determine its effectiveness, e.g., whether or not patients improve*” (Nunnally and Bernstein, 1994: 676). However, we use logistic regression “*when we have a binary dependent variable (e.g. the presence/absence of a symptom, or an individual who does/does not have a disease) and a number of explanatory variables...We start by creating a binary variable to represent the two outcomes of the dependent variable (e.g., $y = 1$ designates ‘has disease’, $y = 0$ designates ‘does not have disease’). As this variable is binary, the assumptions underlying linear regression are not met*” (Petrie and Sabin, 2000: 78).

8.6.2 *Recoding the Response/Predictor Variable*

As pointed out above, logistic regression models can be built for a binary response variable using any number of explanatory variables. However, the response variable was initially a *politomous* nominal variable (II_13) with five categories that represent the *first-line drug therapy*:

- Diuretics
- Ace Inhibitor
- Calcium Chanel Antagonists
- Beta Blocker
- Angiotensin II Antagonists

That is, several classes of drugs can be recommended as *first-line drug treatment* of mild sustained hypertension. *Diuretics* and *beta blockers* are supposed to represent the *Stepped-Care* approach while the *other therapeutic categories* are attached to the *Liberal* approach.

The 309 respondents to the questionnaire defined the following preference for the *first-line drug treatment*:

Table 8.10: First-Line Drug Treatment

<i>Value Label</i>	<i>Value</i>	<i>Frequency</i>	<i>Percent (%)</i>	<i>Valid %</i>	<i>Cum. %</i>
Diuretic	1	116	37,5	37,5	37,5
Ace Inhibitor	2	164	53,1	53,1	90,6
Calcium Channel Blocker	3	7	2,3	2,3	92,9
Beta Blocker	4	14	4,5	4,5	97,4
Angiotensin II Antagagonists	5	8	2,6	2,6	100,0
Total		309	100,0	100,0	

According to these results, the *first-line drug therapy* for hypertension is mainly related to *diuretics* or *ace inhibitors* in more than 90 % of the responses.

Diuretics (37.5%) and *beta blockers* (4.5%) have **42%** of the followers, while *ace inhibitors* (53,1%), *calcium antagonists* (2.3%) and *angiotensine II antagonists* (2.6%) have **58%** of the followers. As a result, a *recode* of the

predictor variable from *multi-item* variable *II_13* to this new *binary*¹⁴ response variable *RII_13 - First Line Drug Therapy* was developed. This recode is in line with the guidelines for the management of hypertension (WHO-ISO, 1999; 1993; Veterans Health Administration, 1996; WHO, 1996).

In accordance with the recoding process, the response variable was changed from 4 degrees of freedom to 1 degree of freedom: “*the predictor employs 1 df rather than k - 1 degrees of freedom* (Nunnally and Bernstein, 1994). That is, *diuretics* and *beta blockers* were attached to category 1 (*Stepped-Care* approach) while *ace inhibitors*, *calcium channel antagonists*, and *angiotensin II antagonists* were attached to category 2 (*Liberal* approach). Consequently,

¹⁴ It is necessary to distinguish between two crude classifications of random variables. *Continuous* variables consist of an infinite number of equidistant points on a number scale. *Discrete* variables differ because they consist of a relatively small number of discrete scale categories. Discrete measures then provide the number of observations that are in the scale categories. Therefore, we must be able to determine the probability of an observed distribution of sample members across the categories of a discrete scale. The binomial probability distribution is used to assess the probability of discrete outcomes. The binary response variable is characterised by a binomial distribution. The binomial distribution describes the probabilities associated with discrete random variables but, in order for the model to be applicable, the binary response variable must satisfy certain conditions (Silver, 1992). The conditions that must be met in order to use the binomial model are:

1 The variable must be *dichotomous*, that is, it can have one of only two possible outcomes, such as liberal or conservative. The outcomes are labelled *p* and *q*, where *p* equals one outcome and *q* the other. In some contexts *p* is referred to as “success” and *q* as “failure” where success represents some favoured outcome.

2 The probabilities associated with the two outcomes must be the same for each trial in the experiment. If the probability of a doctor being classified as liberal is 1/2 on the first trial, then it must be 1/2 on all successive trials. Moreover, the sum of the probabilities for *p* and *q* must equal 1.00

3 The trials must be *independent*, so that drawing a liberal on the first trial does not affect the probabilities of the outcomes on succeeding trials.

4 The trials must be identical in that the procedures used for each trial must be the same.

Given that these four conditions are met, the binomial model is appropriate for determining the probability associated with the outcome of a particular experiment.

logistic regression analysis was chosen because this statistical technique is recommended for estimating the direct prediction of group membership for a *binary* response variable using any number of explanatory variables (Petrie and Sabin, 2000; Hutcheson and Sofroniou, 1999; Agresti, 1996; Norusis, 1994; Nunally and Bernstein, 1994; Hosmer and Lemeshow, 1989).

As described earlier in this section, the response variable assumed two different values which were encoding for the logistic regression analysis. The cases for which the event has occurred (i.e., doctors who follow the *Liberal* approach) were encoding with the value 1.

Dependent Variable Encoding:

Original Value	Internal Value
1,00	0
2,00	1

In accordance with this encoding process, the statistic parameters derived from the logistic regression equation were organised in line with the *first-line drug therapy* of *Liberal* followers.

8.6.3 Number of Cases Included in the Logistic Regression Analysis

The recoding of the variable II_13 - *First-Line Drug Therapy* gave the opportunity “to observe” all the respondents.

- Total number of cases: 309 (Unweighted)
- Number of selected cases: 309
- Number of unselected cases: 0

Although all the respondents were selected, 8,7% of cases were rejected because of missing data. Initial data analysis was also concerned with examining the data to identify if there were any extreme values or outliers¹⁵. Great care was also placed in the examination of missing data, which was found not related to particular questions. As the sample data set was very large, it was not necessary to repeat the analysis with and without the estimated missing values: “*The problems caused by having a few randomly missing data points are usually not important and many statistical packages delete cases with missing values, by default*” (Hutcheson and Sofroniou, 1999: 18). The final number of cases included in the logistic regression analysis was 282.

- Number of selected cases: 309
- Number rejected because of missing data: 27
- Number of cases included in the analysis: 282

¹⁵ “*When extreme values occur on one variable or a combination of variables, these data points are termed outliers*” (Hutcheson and Sofroniou, 1999: 19).

8.6.4 *The Explanatory Variables*

A number of explanatory variables were considered for entry into the Multiple Logistic Regression Model (MLRM). As “*Good research is theory-driven*” (Silver, 1992: 26), these explanatory variables were chosen in accordance with the patient typology model described in Chapter Six. However, variables attached to “*Attitude Towards Product Innovation*” were found unimportant in terms of the explanatory power of the model. Consequently, these variables were eliminated from the model: “*As with OLS regression, the amount of deviance in the model (as measured by $-2LL$) can be minimized by including as many explanatory variables as possible. Maximizing the explanatory power of the model in this way is not always beneficial as the inclusion of irrelevant variables may add a little to the explanatory power, but may increase the standard errors associated with the prediction and thereby have an adverse effect on the model fit*” (Hutcheson and Sofroniou, 1999: 145).

The model-building approach started with the description of the *Initial Log Likelihood Function*, which includes only the constant. The coefficient for the constant (α) shows the value of logit (p) when all explanatory variables have a value of zero.

Dependent Variable.. RII_13: First-Line Drug Therapy

Beginning Block Number 0. Initial Log Likelihood Function

-2 Log Likelihood 383,39783

*** Constant is included in the model.**

In total, the MLRM have embraced **38 *explanatory variables*** representing the ***four constructs*** of the patient typology model as described below:

Beginning Block Number 1. Method: Backward Stepwise (LR)

Variable(s) Entered on Step Number 1

1. Contextual Environment

- ***Sources of Drug Information***

FAC1_1	REGR factor score	1 for analysis	1
FAC2_1	REGR factor score	2 for analysis	1
FAC3_1	REGR factor score	3 for analysis	1
FAC4_1	REGR factor score	4 for analysis	1
FAC5_1	REGR factor score	5 for analysis	1
FAC6_1	REGR factor score	6 for analysis	1
FAC7_1	REGR factor score	7 for analysis	1

2. Problem Recognition

- ***Doctors' Practice Characteristics***

I_1	Health Centre
I_2	Number of Family Doctors
I_3	Daily Appointments
I_4	Number of patients
I_5	Number of patients with AHT

- *Doctors' Demographic Characteristics*

II_96GEN Gender

II_98FAC GP Graduation

II_99PRA Years of Clinical Practice

3. *Problem Solving*

- *Patient Typologies*

II_20.A Young Adult

II_20.B Adult

II_20.C Elderly

II_24A Not Obese

II_24B Obese and Diabetic

II_24C Obese with Dyslipidemia

II_24D Obese with Anxiety - Depression

II_30A Diabetes Mellitus

II_30B Dyslipidemia

II_30C Angina

II_30D Congestive Heart Failure

II_30E Cerebrovascular Disease

II_30F Chronic Renal Insufficiency

4. *Medical Guidelines*

II_27 (use of diuretic); II_32 (use of beta blocker); II_33 (beta blocker risk);

II_37 (use of ace inhibitor); II_43 (treatment cost); II_44 (treatment cost);

II_86 (therapeutic change); II_87 (ace inhibitor/calcium antagonist use);

II_91 (therapeutic change); II_92 (classic therapeutic approach).

An investigation into the relationship between the explanatory variables that were incorporated into the MLRM revealed that all “tolerance”¹⁶ and “variance inflation factor” (VIF)¹⁷ values were within acceptable limits. No significant outliers were detected and there were no under or over-dispersion of the data. The inclusion of all these *explanatory variables* into the MLRM increases its categorisation power as the model Chi-Square figure indicates. This Chi-Square figure results from the subtraction between the initial Log Likelihood Function (i.e., when only the constant is included in the model) and the Log Likelihood Function¹⁸ with all the explanatory variables:

-2 Log Likelihood 127,396

Goodness of Fit 7967,944

Chi-Square df¹⁹ Significance

Model Chi-Square 256,002 104 ,0000

Improvement 256,002 104 ,0000

(-2 Log Likelihood 383,39783) - (-2 Log Likelihood 127,396) = 256,00183

¹⁶Tolerance (β_i) = $1 - R^2_i$, where (β_i) is the regression coefficient for variable i , and R^2_i is the squared multiple correlation coefficient between χ_i and the other explanatory variables.

¹⁷VIF (β_i) = $1/\text{Tolerance}$.

¹⁸The amount by which $-2LL$ (-2 Log Likelihood) decreases when additional variables are added to the model indicates the size of the effect that these variables have (Hutcheson and Sofroniou, 1999).

¹⁹The significance of the change in $-2LL$ is determined by the χ^2 test with degrees-of-freedom equal to the difference in the number of terms between the two models (Hutcheson and Sofroniou, 1999).

The MLRM with all the explanatory variables has an overall categorisation power of 93,26%, with 89,83% of GPs who follow the *Stepped-Care* approach, and 95,73% of GPs who follow the *Liberal* approach.

Table 8.11 - Classification Table for RII 13 – First-Line Drug Therapy

		Predicted		
		1,00	2,00	
		1	2	
Observed	+-----+-----+			Percent Correct
1,00	1	106	12	89,83%
		+-----+-----+		
2,00	2	7	157	95,73%
		+-----+-----+		
Overall 93,26%				

8.6.4.1 External Environment - Drug Information Sources

The statistical parameters for the four different constructs and their explanatory variables that were included in the logistic regression equation are described below:

- First Construct: **External Environment - Drug Information Sources**

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
FAC1_1	-,3927	,4717	,6931	1	,4051	,0000	,6752
FAC2_1	-,8958	,4369	4,2040	1	,0403	-,0758	,4083
FAC3_1	-1,8401	,5427	11,4945	1	,0007	-,1574	,1588
FAC4_1	,2353	,3286	,5126	1	,4740	,0000	1,2653
FAC5_1	,1003	,4541	,0488	1	,8252	,0000	1,1055
FAC6_1	-,2974	,4054	,5383	1	,4632	,0000	,7427
FAC7_1	,2324	,4000	,3377	1	,5612	,0000	1,2616

Apart from these seven factors derived from the factor analysis of *drug information sources*, a number of other variables were considered for inclusion in the model.

8.6.4.2 *Problem Recognition*

As described earlier, the construct of “*Problem Recognition*”, which includes doctor and practice characteristics, was measured by eight categorical variables. Multiple-category categorical explanatory variables, such as practice characteristics and doctors’ demographic characteristics are discontinuous data which have to be transformed into a form suitable for entry into the logistic regression model. This process of transformation is called *dummy* coding. By using the values of 0 and 1 *dummy* coding merely describes the presence or absence of a particular attribute, rather than defines its level. That is, categorical variables can be included in a model, provided that they are appropriately coded as dummy variables. A number of dummy variable coding schemes can be used. *Indicator coding* was used in the present research because it allows a direct comparison with a reference category (Hutcheson and Sofroniou, 1999; Norusis, 1994). All the explanatory variables below have used the *last* category as the *reference* category²⁰.

²⁰The dummy variables which are omitted are called the reference category, which is the category against which other dummy variables are compared.

• Second Construct: *Problem Recognition*

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
I_1			3,0377	3	,3859	,0000	
I_1(1)	-,0715	1,4842	,0023	1	,9616	,0000	,9310
I_1(2)	-1,0739	1,3477	,6349	1	,4256	,0000	,3417
I_1(3)	-2,0945	1,4093	2,2089	1	,1372	-,0233	,1231
I_2			4,0732	4	,3962	,0000	
I_2(1)	1,4320	1,7930	,6378	1	,4245	,0000	4,1871
I_2(2)	,4615	1,4935	,0955	1	,7573	,0000	1,5864
I_2(3)	-,4975	1,4453	,1185	1	,7307	,0000	,6080
I_2(4)	-1,4526	1,6465	,7783	1	,3777	,0000	,2340
I_3			6,3050	4	,1775	,0000	
I_3(1)	-10,7464	99,7033	,0116	1	,9142	,0000	,0000
I_3(2)	,3288	2,0169	,0266	1	,8705	,0000	1,3893
I_3(3)	-3,5613	2,1699	2,6936	1	,1008	-,0425	,0284
I_3(4)	-2,0860	1,9326	1,1650	1	,2804	,0000	,1242
I_4			4,3533	3	,2258	,0000	
I_4(1)	-2,7240	1,6245	2,8116	1	,0936	-,0460	,0656
I_4(2)	-,3926	1,2582	,0974	1	,7550	,0000	,6753
I_4(3)	-,0410	1,5268	,0007	1	,9786	,0000	,9598
I_5			7,3860	4	,1168	,0000	
I_5(1)	3,5913	2,0261	3,1419	1	,0763	,0546	36,2824
I_5(2)	2,6315	1,3078	4,0489	1	,0442	,0731	13,8951
I_5(3)	1,1745	1,2413	,8952	1	,3441	,0000	3,2364
I_5(4)	-,6164	1,5949	,1494	1	,6991	,0000	,5399

Besides practice characteristics, the construct of “*Problem Recognition*” includes other nominal variables that identify doctors’ demographic profile in terms of gender, medical school and clinical experience.

With the exception of “medical school” (II_98FAC), which used the *first* category as the *reference* category, the other two explanatory variables below have used the *last* category as the *reference* category.

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
II_96GEN(1)	2,1370	1,0486	4,1531	1	,0416	,0749	8,4739
II_98FAC			11,1409	3	,0110	,1158	
II_98FAC(1)	2,9723	1,2439	5,7097	1	,0169	,0984	19,5376
II_98FAC(2)	-,9239	1,2845	,5174	1	,4720	,0000	,3970
II_98FAC(3)	-1,9128	1,2621	2,2967	1	,1296	-,0278	,1477
II_99PRA			8,2402	2	,0162	,1052	
II_99PRA(1)	7,2000	3,1210	5,3222	1	,0211	,0931	1339,454
II_99PRA(2)	2,0418	,8515	5,7500	1	,0165	,0989	7,7046

8.6.4.3 Patient Typology

Thirteen categorical variables representing the construct of “*patient typology*” were included in the multiple logistic regression model. All the 13 patient typologies are nominal variables with six different categories, which represent the therapeutic categories. In logistic regression, when we have categorical independent variables with more than two categories, it is necessary to create new variables to represent those categories. For example, the elderly patient typology (variable II_20.C), is subdivided according to the therapeutic categories that are used to treat this typology.

The number of new variables that are required to represent a nominal variable is one less than the number of categories. Using the “Indicator-Variable Coding Scheme” (Hutcheson and Sofroniou, 1999; Norusis, 1994) we decided to use the therapeutic category of diuretics as the reference category. That is, the *first* category procedure was selected as the *reference* category. This means that the other categories will be compared to the diuretic reference category, which has a coefficient of “0”, since it does not differ from itself. Consequently, the coefficients for the other therapeutic categories represent the effect of each category compared to the reference category of Diuretics.

Turning to the *elderly* patient typology example, we have only four new variables (e.g., 4 degrees of freedom) and not five as with the typologies 20.A (Young Adult) or 20.B (Adult). This occurs because GPs do not prescribe beta blockers to treat elderly hypertensive patients. That is, the 282 GPs that were included in the analysis expected to prescribe five different therapeutic categories to reduce the blood pressure of hypertensive elderly patients:

20.c-diuretics/*reference category*;

20c(1)-ace inhibitors;

20c (2)-calcium antagonists;

20c (3) - association between the diuretic and ace inhibitor; and

20c (4)-angiotensine II antagonists.

• Third Construct: *Patient Typology*

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
II_20.A			6,9255	5	,2262	,0000	
II_20.A(1)	3,5170	2,2595	2,4228	1	,1196	,0332	33,6833
II_20.A(2)	5,0873	2,4433	4,3352	1	,0373	,0780	161,9476
II_20.A(3)	,5233	3,2770	,0255	1	,8731	,0000	1,6877
II_20.A(4)	-4,1173	60,3340	,0047	1	,9456	,0000	,0163
II_20.A(5)	7,5162	43,3463	,0301	1	,8623	,0000	1837,487

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
II_20.B			10,8794	5	,0538	,0479	
II_20.B(1)	-5,7873	5,8393	,9823	1	,3216	,0000	,0031
II_20.B(2)	4,3910	1,6019	7,5134	1	,0061	,1199	80,7229
II_20.B(3)	2,1219	1,8438	1,3244	1	,2498	,0000	8,3471
II_20.B(4)	1,3026	1,9689	,4377	1	,5082	,0000	3,6788
II_20.B(5)	-,2458	2,5225	,0095	1	,9224	,0000	,7821
II_20.C			4,6078	4	,3300	,0000	
II_20.C(1)	,9661	1,3011	,5513	1	,4578	,0000	2,6276
II_20.C(2)	1,9152	1,2865	2,2164	1	,1366	,0238	6,7886
II_20.C(3)	2,0246	1,1112	3,3197	1	,0685	,0587	7,5732
II_20.C(4)	,3083	2,0004	,0238	1	,8775	,0000	1,3611
II_24A			11,6764	5	,0395	,0661	
II_24A(1)	-,0568	1,3372	,0018	1	,9661	,0000	,9448
II_24A(2)	3,2847	1,2349	7,0753	1	,0078	,1151	26,7022
II_24A(3)	1,0968	1,3865	,6257	1	,4289	,0000	2,9944
II_24A(4)	4,3610	99,7514	,0019	1	,9651	,0000	78,3339
II_24A(5)	3,9718	2,3031	2,9741	1	,0846	,0504	53,0783

----- Variables in the Equation -----

II_24B			2,1445	5	,8288	,0000	
II_24B(1)	2,8196	9,2761	,0924	1	,7612	,0000	16,7705
II_24B(2)	5,5485	8,7933	,3981	1	,5281	,0000	256,8425
II_24B(3)	4,7000	9,1965	,2612	1	,6093	,0000	109,9486
II_24B(4)	4,2482	8,7599	,2352	1	,6277	,0000	69,9796
II_24B(5)	3,7959	9,2713	,1676	1	,6822	,0000	44,5174
II_24C			8,6107	5	,1256	,0000	
II_24C(1)	-3,2974	14,9821	,0484	1	,8258	,0000	,0370
II_24C(2)	2,2871	9,4344	,0588	1	,8085	,0000	9,8464
II_24C(3)	5,4710	9,5553	,3278	1	,5669	,0000	237,6945
II_24C(4)	1,2680	9,4396	,0180	1	,8931	,0000	3,5538
II_24C(5)	5,5329	9,3828	,3477	1	,5554	,0000	252,8786
II_24D			6,2109	5	,2862	,0000	
II_24D(1)	1,9430	1,5468	1,5780	1	,2091	,0000	6,9798
II_24D(2)	1,7905	1,5275	1,3739	1	,2411	,0000	5,9922
II_24D(3)	3,2288	2,1578	2,2391	1	,1346	,0250	25,2491
II_24D(4)	4,5576	2,3533	3,7507	1	,0528	,0676	95,3590
II_24D(5)	4,5778	2,3988	3,6419	1	,0563	,0654	97,3003
II_30A			2,6405	5	,7552	,0000	
II_30A(1)	1,9202	101,0180	,0004	1	,9848	,0000	6,8220
II_30A(2)	1,6292	9,3937	,0301	1	,8623	,0000	5,0997
II_30A(3)	2,3614	9,5273	,0614	1	,8042	,0000	10,6054
II_30A(4)	3,4533	9,5610	,1305	1	,7180	,0000	31,6046
II_30A(5)	5,0360	9,6990	,2696	1	,6036	,0000	153,8461

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
II_30B			4,5334	5	,4754	,0000	
II_30B(1)	15,0871	21,9477	,4725	1	,4918	,0000	3566434
II_30B(2)	4,9631	20,2069	,0603	1	,8060	,0000	143,0387
II_30B(3)	3,6255	20,2490	,0321	1	,8579	,0000	37,5439
II_30B(4)	2,8345	20,2823	,0195	1	,8889	,0000	17,0223
II_30B(5)	2,1325	20,2888	,0110	1	,9163	,0000	8,4359
II_30C			1,2453	4	,8706	,0000	
II_30C(1)	-1,4321	1,7132	,6987	1	,4032	,0000	,2388
II_30C(2)	-1,1365	1,6207	,4917	1	,4832	,0000	,3209
II_30C(3)	-2,3229	2,6210	,7854	1	,3755	,0000	,0980
II_30C(4)	3,3989	9,3364	,1325	1	,7158	,0000	29,9303
II_30D			8,9480	5	,1112	,0000	
II_30D(1)	-3,0923	99,7053	,0010	1	,9753	,0000	,0454
II_30D(2)	-,4474	1,6534	,0732	1	,7867	,0000	,6393
II_30D(3)	8,2761	3,0603	7,3133	1	,0068	,1177	3928,859
II_30D(4)	,6948	1,5649	,1971	1	,6570	,0000	2,0033
II_30D(5)	3,9437	6,2909	,3930	1	,5307	,0000	51,6091
II_30E			3,0110	5	,6983	,0000	
II_30E(1)	2,1119	3,4196	,3814	1	,5369	,0000	8,2635
II_30E(2)	1,6296	1,8637	,7646	1	,3819	,0000	5,1018
II_30E(3)	1,0209	1,8669	,2991	1	,5845	,0000	2,7757
II_30E(4)	3,4540	2,5378	1,8523	1	,1735	,0000	31,6267
II_30E(5)	3,0050	3,0810	,9513	1	,3294	,0000	20,1859

----- Variables in the Equation -----							
Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
II_30F			10,1104	5	,0722	,0170	
II_30F(1)	-2,4170	3,2593	,5499	1	,4584	,0000	,0892
II_30F(2)	-1,5841	1,4769	1,1505	1	,2834	,0000	,2051
II_30F(3)	-,4367	1,7283	,0639	1	,8005	,0000	,6461
II_30F(4)	1,1238	1,8340	,3755	1	,5400	,0000	3,0766
II_30F(5)	-3,5742	1,6727	4,5658	1	,0326	-,0818	,0280

8.6.4.4 Medical Guidelines - Philosophy of Prescribing

Finally, ten items, represented by ordinal variables in a Likert format, were also included in the multiple logistic regression model. In line with Agresti's (1996) advice that, "*It often makes sense to include certain variables of special interest in a model and report their estimated effects even if they are not statistically significant at some level*" (ibidem: 129), all ten items were used to differentiate the therapeutic categories that represent the *stepped-care approach* and the *liberal approach*.

Fourth Construct: *Medical Guidelines - Philosophy of Prescribing*

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
II_27	-,9467	,2685	12,4345	1	,0004	-,1650	,3880
II_37	-1,1447	,4217	7,3693	1	,0066	-,1183	,3183
II_43	,0702	,2104	,1114	1	,7386	,0000	1,0727
II_44	,2088	,2059	1,0281	1	,3106	,0000	1,2322
II_32	,0594	,3292	,0326	1	,8567	,0000	1,0612
II_33	,4253	,2751	2,3895	1	,1222	,0319	1,5300
II_86	,7163	,4593	2,4327	1	,1188	,0336	2,0469
II_87	,0201	,5674	,0013	1	,9717	,0000	1,0203
II_91	-,2434	,2763	,7762	1	,3783	,0000	,7839
II_92	-,6964	,2831	6,0489	1	,0139	-,1028	,4984
Constant	-23,2397	24,8803	,8725	1	,3503		

8.7 Assessing the ‘Goodness of Fit’ of the Initial MLRM

The Multiple Logistic Regression Model (MLRM) with all the explanatory variables, was able to classify correctly the majority of GPs, as described in Table 8.11. However, this *classification table* does not reveal the distribution of estimated probabilities for each of the groups. Therefore, another way of *assessing the goodness of fit of the model* is to examine how the two groups are clustered in a histogram of estimated probabilities (Norusis, 1994).

By looking at the histogram of predicted probabilities (Figure 8.1), we were able *to assess the goodness of fit of the model*, because it is possible to see how well the model classifies the observed data:

“If you have a model that successfully distinguishes the two groups, the cases for which the event has occurred should be to the right of 0.5, while the cases for which the event has not occurred should be to the left of 0.5. The more the two groups cluster at their respective ends of the plot, the better” (Norusis, 1994: 8).

Doctors who follow the *stepped-care* approach are to the *left* of 0.5 while doctors who are engaged on a *liberal* approach are to the *right* of 0.5. The two groups were clustered at their respective ends of the plot, which indicates that the model successfully distinguishes the two groups.

8.8 The Backward Elimination Technique

In order to obtain a more useful model for explanatory purposes, we need to remove from the model those variables which do not play a significant role in predicting the *Liberal* approach. Analysis of the multiple logistic regression model in terms of *initial* and *final* model is supposed to remove those explanatory variables which do not play a significant role in predicting GPs *stepped-care* or *liberal approach*.

All these explanatory variables were entered and terms were then removed from the initial multiple logistic regression model through a *backward elimination technique* of model-building:

“The backward elimination technique of model building is very similar to forward selection except that the starting model is one where all the explanatory variables are entered and terms are then removed from the model sequentially. At each step in the process, the term which, if removed, results in the smallest significant change in the value of F (as denoted by the partial-F or t statistics), is removed from the model - provide that it has reached a “removal criterion” (in backward elimination the removal criterion is usually set at $P=0.1$). After each term is removed, the regression equation is recalculated and those terms left in the model are re-examined to see if any contribute less than the criterion level (as determined by partial- F). This process continues until all terms have been removed from the model, or until no more reach the criterion for removal” (Hutcheson and Sofroniou, 1999: 97).

8.9 The Final MLRM

From the *Initial Log Likelihood Function*, the backward elimination technique of model-building dropped out several variables that were irrelevant to the categorisation process:

Step	Improv.			Model			Correct	
	Chi-Sq.	df	sig	Chi-Sq.	df	sig	Class %	Variable
2	-,001	1	,972	256,001	103	,000	93,26	OUT: II_87
3	-,031	1	,860	255,970	102	,000	93,26	OUT: II_32
4	-2,227	5	,817	253,743	97	,000	92,91	OUT: II_24B
5	-,008	1	,929	253,735	96	,000	92,91	OUT: II_43
6	-,074	1	,786	253,661	95	,000	92,91	OUT: FAC5_1
7	-2,458	5	,783	251,203	90	,000	91,49	OUT: II_30A
8	-1,239	4	,872	249,965	86	,000	91,49	OUT: II_30C
9	-1,755	5	,882	248,209	81	,000	92,20	OUT: II_30E
10	-,022	1	,882	248,187	80	,000	91,84	OUT: FAC4_1
11	-,036	1	,849	248,151	79	,000	91,84	OUT: FAC1_1
12	-,162	1	,687	247,988	78	,000	91,84	OUT: FAC6_1
13	-,214	1	,643	247,774	77	,000	91,13	OUT: II_44
14	-,468	1	,494	247,306	76	,000	90,43	OUT: FAC7_1

15	-6,110	5	,296	241,196	71	,000	90,07	OUT: II_24D
16	-2,428	3	,488	238,768	68	,000	89,01	OUT: I_1
17	-6,580	5	,254	232,188	63	,000	88,65	OUT: II_30B
18	-,205	1	,651	231,984	62	,000	88,65	OUT: II_96GEN
19	-6,229	4	,183	225,754	58	,000	88,65	OUT: I_5
20	-4,792	4	,309	220,962	54	,000	87,94	OUT: I_2
21	-5,429	3	,143	215,533	51	,000	87,23	OUT: I_4
22	-1,901	1	,168	213,632	50	,000	86,88	OUT: II_91
23	-2,228	1	,136	211,403	49	,000	87,94	OUT: II_86

No more variables can be deleted or added.

The backward elimination technique of model-building dropped out 22 explanatory variables.

As the purpose of the regression model is to predict the response variable, the explanatory variables in the model which were not important for prediction were dropped out. We had included 22 explanatory variables in the model which were not necessarily important for prediction. Removing relatively unimportant variables from the model improved the overall model fit and reduce the width of the confidence intervals (Silver, 1992). In line with this procedure, the final model selected using the backward elimination technique of model building contains just 16 variables and shows a significant model Chi-Square ($\chi^2 = 211,403$; $df = 49$; $Sig = 0,0000$).

The model Chi-Square shows the goodness-of-fit statistic for the final model compared to the null model:

$$(-2 \text{ Log Likelihood } 383,39783) - (-2 \text{ Log Likelihood } 171,994) = 211,40383 \text{ (Chi-Square)}$$

The $-2LL_{diff}$ shows the change in $-2LL$ from the previous model with all the explanatory variables. The difference between the degrees of freedom²¹ (df) is also advanced.

$$-2LL_{diff} = 127,396 - 171,994 = -44,598$$

$$df = 104 - 49 = 55$$

-2 Log Likelihood **171,994**

Goodness of Fit **441,490**

	Chi-Square	df	Significance
Model Chi-Square	211,403	49	,0000
Improvement	-2,228	1	,1355

Note: *A negative Chi-Square value indicates that this statistic has decreased from the previous step.*

²¹The degrees of freedom for the model chi-square are the difference between the number of parameters in the two models.

The reduction of 211,403 in the $-2LL$ indicates that *the final MLRM with the selected explanatory variables is a better fit than the model which does not have those variables* (i.e., there is less deviance). This change is significant as was determined by the chi-square test:

$$\chi^2 = 211,403; df = 49; P < 0,00005$$

It is important to bear in mind that the chi-square tests the null hypothesis that the coefficients for all the terms in the current multiple logistic regression model, except the constant, are 0. Therefore, **the model chi-square of 211,403 rejects the null hypothesis.**

In a similar vein, the entry labelled *Improvement* is the change in $-2LL$ between successive steps of building a model. It tests the null hypothesis that the coefficients for the variables dropped out at last step are 0. As pointed out earlier, the number of degrees of freedom has a direct link with the explanatory variables that were selected.

Some indication of the goodness-of-fit was also provided by the classification table, which gives the predictive efficiency of the model (see Table 8.12).

TABLE 8.12 - Classification Table for RII 13 (predicted and correct observations)

		<i>Predicted</i>		
		Stepped-Care	Liberal	
		1		2
<i>Observed</i>		+-----+-----+		<i>Percent Correct</i>
Stepped-Care	1	98		20 83,05%
Liberal	2	14		150 91,46%
		+-----+-----+		
				<i>Overall 87,94%</i>

By looking at the histogram of predicted probabilities (Figure 8.2) and the table of predicted and correct observations (Table 8.12), it is possible to ascertain whether the logistic regression analysis might be useful for assigning cases to groups. The final multiple logistic regression equation is able to correctly classify the majority of GPs: **83.05 %** of doctors who follow the *stepped-care* approach and **91.46 %** of doctors who are engaged in a *liberal* approach. An overall value of **87.94 %** was obtained. This value convinced us that the model successfully distinguishes between the two groups, which cluster at their respective ends of the plot. Furthermore, both the final values for -2 Log Likelihood (171.994) and for the Goodness of Fit (441,490) as well as the Model Chi-Square ($\chi^2 = 211,403$; $df = 49$; Sig. 0,0000) reinforced the conviction of the goodness of fit of the model.

8.10 Interpreting MLRM Parameters

The final step to obtain the most powerful model in terms of interpretability, parsimony, and ease of variable interpretation is related with the analysis of the estimated coefficients (under column heading **B**) and related statistics from the final multiple logistic regression model. Figure 8.3 shows a number of different statistics which are typically provided by software as part of the multiple logistic regression analysis.

Figure 8.3 - Parameters Estimates for the Logistic Regression Model

Variables in the Equation							
Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
FAC2_1	-,4720	,2300	4,2105	1	,0402*	-,0759	,6238
FAC3_1	-,7672	,2658	8,3343	1	,0039**	-,1285	,4643
I_3			7,4902	4	,1121	,0000	
I_3(1)	-6,3535	60,4516	,0110	1	,9163	,0000	,0017
I_3(2)	,4639	1,2269	,1430	1	,7053	,0000	1,5903
I_3(3)	-1,5439	1,0914	2,0009	1	,1572	-,0016	,2136
I_3(4)	-1,1231	1,0571	1,1287	1	,2881	,0000	,3253
II_98FAC			9,6329	3	,0220	,0973	
II_98FAC(1)	1,2403	,6689	3,4386	1	,0637	,0613	3,4567
II_98FAC(2)	-,3473	,5869	,3503	1	,5540	,0000	,7066
II_98FAC(3)	-1,0335	,6320	2,6742	1	,1020	-,0419	,3558
II_99PRA			13,0963	2	,0014	,1540	
II_99PRA(1)	6,1971	1,9850	9,7464	1	,0018**	,1421	491,2996
II_99PRA(2)	1,3232	,4922	7,2269	1	,0072**	,1168	3,7554
II_20.A			6,3149	5	,2768	,0000	
II_20.A(1)	2,7661	1,4271	3,7569	1	,0526	,0677	15,8961
II_20.A(2)	3,6456	1,5240	5,7219	1	,0168 *	,0985	38,3056
II_20.A(3)	3,0799	1,8333	2,8221	1	,0930	,0463	21,7555
II_20.A(4)	-6,0127	42,7520	,0198	1	,8882	,0000	,0024
II_20.A(5)	7,2976	26,8162	,0741	1	,7855	,0000	1476,750

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
II_20.B			15,6629	5	,0079	,1215	
II_20.B(1)	-3,2648	2,5990	1,5779	1	,2091	,0000	,0382
II_20.B(2)	2,8411	,9914	8,2127	1	,0042 **	,1273	17,1346
II_20.B(3)	1,7473	1,1211	2,4294	1	,1191	,0335	5,7394
II_20.B(4)	2,4346	1,3668	3,1729	1	,0749	,0553	11,4114
II_20.B(5)	,3346	1,4175	,0557	1	,8134	,0000	1,3974
II_20.C			7,4562	4	,1137	,0000	
II_20.C(1)	,8236	,6606	1,5542	1	,2125	,0000	2,2787
II_20.C(2)	1,1461	,6302	3,3070	1	,0690	,0584	3,1458
II_20.C(3)	1,6285	,6650	5,9977	1	,0143*	,1021	5,0964
II_20.C(4)	,1105	1,1628	,0090	1	,9243	,0000	1,1168
II_24A			12,5906	5	,0275	,0822	
II_24A(1)	,7513	,7255	1,0724	1	,3004	,0000	2,1197
II_24A(2)	2,2445	,7539	8,8643	1	,0029**	,1338	9,4358
II_24A(3)	1,3547	,8619	2,4706	1	,1160	,0350	3,8755
II_24A(4)	,0939	60,4728	,0000	1	,9988	,0000	1,0985
II_24A(5)	2,9212	1,4495	4,0617	1	,0439*	,0733	18,5634
II_24C			7,6193	5	,1785	,0000	
II_24C(1)	1,3627	5,8396	,0545	1	,8155	,0000	3,9068
II_24C(2)	4,3432	3,4752	1,5620	1	,2114	,0000	76,9557
II_24C(3)	5,6235	3,5365	2,5285	1	,1118	,0371	276,8585
II_24C(4)	3,5019	3,5124	,9940	1	,3188	,0000	33,1797
II_24C(5)	5,2627	3,4695	2,3008	1	,1293	,0280	192,9985

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
II_30D			6,2376	5	,2838	,0000	
II_30D(1)	-7,8342	60,4491	,0168	1	,8969	,0000	,0004
II_30D(2)	-,7561	,8839	,7317	1	,3923	,0000	,4695
II_30D(3)	3,9968	2,6938	2,2013	1	,1379	,0229	54,4255
II_30D(4)	-,1095	,7850	,0195	1	,8890	,0000	,8963
II_30D(5)	2,9036	1,8256	2,5296	1	,1117	,0372	18,2390
II_30F			13,5262	5	,0189	,0959	
II_30F(1)	-2,1580	1,6444	1,7222	1	,1894	,0000	,1156
II_30F(2)	-,7116	,7486	,9036	1	,3418	,0000	,4909
II_30F(3)	,6301	,9090	,4805	1	,4882	,0000	1,8778
II_30F(4)	1,1829	,9443	1,5693	1	,2103	,0000	3,2639
II_30F(5)	-2,0663	,8539	5,8560	1	,0155*	-,1003	,1267

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
II_27	-,6125	,1307	21,9570	1	,0000***	-,2282	,5420
II_37	-,7448	,2318	10,3251	1	,0013**	-,1474	,4748
II_33	,4215	,1801	5,4791	1	,0192*	,0953	1,5242
II_92	-,4513	,1411	10,2314	1	,0014**	-,1465	,6368
Constant	-6,13	3,9343	2,4338	1	,1187		

*** Sig at <= .001

** Sig at <= .01

* Sig at <= .05

The multiple logistic regression model estimated the parameters of a final linear model (e.g., parameters relating to logit (p)) for the *16* explanatory variables cited above. To organise its interpretation, a brief introductory explanation is required for the most important parameters:

β coefficients:

The first statistic that is presented is the β coefficients. They present important information regarding the size and direction of the effect that the β coefficients of the individual explanatory variables have on *log odds*:

“The logistic coefficients can be interpreted as the change in the log odds associated with one-unit change in the independent variable” (Norusis 1994: 6).

For example, the coefficient for FAC2_1 -Health Authorities' Drug Information Bulletins is -0,4720. As the coefficient is negative, when this explanatory variable changes from 0 to 1 and the values of the other independent variables remain the same, the *log odds* of a doctor being classified as having a Liberal approach to hypertension decrease by 0,4720. The same reasoning is appropriate for FAC3_1 - Doctor's Prescription Profile Information.

Wald statistic:

The *Wald statistic* tests the null hypothesis that the regression coefficient for the explanatory variable is zero (e.g., the explanatory variable has no effect on the response variable). The *Wald statistic* is the square of the ratio of the beta coefficient to its standard error (the standard errors for the logistic regression coefficients are shown in the column labelled *S.E.* in Figure 8.3):

$$\text{Wald statistic} = (-0,4720/0,2300)^2 = 4,2114, \text{ or about } 4,2105.$$

The significance level for the Wald²² statistic is shown in the column labeled *Sig.* The significance level for the variable FAC2_1 is 0,0402, which means that its coefficient is significantly different from 0, using a significance level of 0.05.

R statistic:

A statistic that is used to look at the partial correlation between the response variable and each of the explanatory variables is the *R* statistic. However, the contribution of each explanatory variable depends on the other variables in the logistic model. *R* can range in value from -1 to +1 and it assumes the sign of the corresponding coefficient.

²²For large sample sizes, the test that a coefficient is 0 can be based on the Wald statistic, which has a chi-square distribution. When a variable has a single degree of freedom, the Wald statistic is just the square of the ratio of the coefficient to its standard error. For categorical variables, the Wald statistic has degrees of freedom equal to one less than the number of categories.

A positive value indicates that as the variable increases in value, so does the likelihood of the event occurring. If R is negative, the opposite is true. Small values for R indicate that the variable has a small partial contribution to the model (Norusis, 1994). For example, the R coefficient for FAC2_1 is -0,0759, which indicates that although not very strong, its partial contribution to the model is important. When the R coefficient is negative, as the variable increases in value, the likelihood of a doctor to be categorised as a Liberal follower decreases.

Odds Ratios ($Exp(B)$):

The odds ratios (under column heading $Exp(B)$) have a direct relationship with the beta coefficients. That is, if the beta coefficient is positive, the odds ratio will be greater than 1, which means that the odds are increased. If the beta coefficient is negative, the opposite is true. An odds ratio of 1 indicates a relationship of 1:1, or no change. In other words, the $Exp(B)$ provides information about the factor by which the odds change when the i th explanatory variable increases from 0 to 1. For example, the odds ratio for FAC2_1 is 0,6238. For each unit increase in the therapeutic bulletin's variables within this factor (i.e., as the score the GP provide on the questionnaire goes up by one) the probability of the doctor been categorised as a Liberal follower is reduced to 0,6238 of the previous value.

Similarly, an odds ratio greater than 1 indicates that an increase in those variables leads to an increase in the odds of the GP being categorised as a Liberal follower.

A final point to note here is that the statistics that were just described are interrelated. Therefore, their interpretation has to be done from a global perspective. That is, it does not make sense to reinforce the importance of the *Wald* statistic individually. Its interpretation has to be done in the light of both its corresponding beta coefficient and the level of significance. As a result, only those explanatory variables whose level of significance for the Wald statistic is significantly different from 0, using a significance level of 0.05, 0.01, or 0.001, are really important for understanding the categorisation process.

8.11 Interpreting the Importance of the Explanatory Variables

The final Multiple Logistic Regression Model selected *16* explanatory variables to classify Portuguese GPs according to their first-line drug therapy. Their interpretation was organised construct by construct in order to reinforce the importance of the patient typology model:

2 Sources of Information:

- Factor 2 - Health Authorities' Drug Information Bulletins
- Factor 3 - Health Authorities' Prescription Profile

Of the seven factors related to drug information sources that were introduced into the logistic regression model, only two have discriminant power. However, it is important to point out that the negative Beta coefficients (B) of these variables indicate that the log odds of doctors being classified as Liberal followers will be reduced according to the value of the logistic coefficient. As both FAC2_1 and FAC3_1 have negative beta coefficients, the odds ratio ($Exp(B)$) are below 1. As pointed out earlier, as the score the GP provides on the questionnaire goes up by one, the probability of the doctor being categorised as a Liberal follower diminishes in accordance with the value of the $Exp(B)$ statistic. Particularly important within this construct is the explanatory variable FAC3_1 - Health Authorities' Prescription Profile, as indicated by its Wald statistic (8,3343) and a level of significance of 0,0039. What seems to emerge from an initial examination of the different statistics for these two explanatory variables is that the Portuguese doctors have a controversial vision in terms of *health authorities' therapeutic bulletins* and *doctors' prescription profiles*. In accordance with previous considerations, it is possible to speculate that the Liberal followers refuse to accept the new sources of drug information and the "control role" of health authorities.

3 Variables for Doctor Profile:

- II_3 - Daily Activity in terms of Patient Encounters
- II_98 - Medical School
- II_99 - Clinical Experience

Most of the explanatory variables were measured on scales that consist of a set of discrete categories, as is the case with the nominal scales representing the construct of *problem recognition*, which depends on the doctor's profile, and the construct of *patient typology*. Therefore, their statistical parameters require a careful analysis.

Although three explanatory variables representing the construct of *doctor profile* were accepted by the final model, their level of significance indicates that only *GPs' clinical experience* is relevant for the categorisation process. As the last indicator category was used, more experienced GPs were compared with their peers. II_99PRA - Clinical Experience was found to be an interesting discriminator between the *Stepped-Care* and the *Liberal* approaches. Only two categories were defined because none of the respondents have less than 5 years of clinical experience.

The discriminatory power was found stronger on young doctors who have 5 to 10 years of clinical experience II_99PRA(1) (Wald Statistic: 9,7464 and Sig. 0,0018). This difference was found not to be so strong between doctors who have 11 to 20 years of clinical experience II_99PRA(2)/Wald Statistic: 7,2269 and Sig. 0,0072) and doctors who have more than 20 years of clinical experience (reference category). Not surprisingly, older doctors (more clinical experience means older doctors) are more familiar with diuretics, which were launched in 1957, than their younger peers who prefer the ace inhibitors that appeared on the market in 1981.

The category II_99PRA(1) - *doctors who have 5 to 10 years of clinical experience* - has a large *Exp(B)* (491,2996). Such a value has to be analysed carefully because the number of doctors who have more than twenty years of clinical experience is much greater (n=76) than those doctors who have only between 5 to 10 years of clinical practice (n=10). In summary, Beta coefficients, Wald statistic and odds ratio indicate that younger doctors were found to be particularly attached to the *Liberal* approach. As has been noted, there is also evidence that some of their middle-aged peers have an identical first-line drug option.

7 Hypertensive Patient Typologies:

- II_24A/ Hypertensive Woman in Perimenopausal Period, Not Obese
- II_20B/Middle-Aged
- II_20C/Elderly
- II_20A/Young Adult
- 24C/ Adult Woman Obese, with Dyslipidaemia;
- 30D/Elderly with Congestive Heart Failure; and
- 30F/Elderly with Renal Insufficiency.

In terms of patient typologies and their capacity to distinguish between the Stepped-Care followers and the Liberal followers, hypertensive woman in perimenopausal period (II_24A) are of paramount importance. Although five therapeutic categories were indicated to treat this group, only two therapeutic categories were found to be relevant when categorising Portuguese GPs. These two indicator categories, II_24(2) - *ace inhibitors* and II_24(5) - *angiotensin II antagonists*, have significant Wald statistics. The former is 8,8643 while the latter is 4,0617 (levels of significance of $\leq 0,01$ and $\leq 0,05$ respectively). Both the beta coefficients for the category II_24(2) - *ace inhibitors* (2,2445) and

the category II_24(5) - *angiotensin II antagonists* (2,9212) are positive, which means that the *Exp (B)* is greater than 1. Consequently, the odds of a GP being categorised as a *Liberal* follower increases in function of the factor 9,4358 and 18,5634 respectively. That is, by increasing the value of this typology from 0 to 1, the odds will increase by a factor of 9,4358 (*Exp (B)*). In other words, doctors who prefer the ace inhibitor for treating hypertensive woman in perimenopausal period are 9,4358 times more likely (an increased probability of 844%) than their peers to adopt a *Liberal* approach. An identical result is obtained for the indicator category II_24(5) - hypertensive woman in perimenopausal period/*Angiotensin II antagonist*. In this case, we have a beta coefficient of 2,9212, and the level of significance for the Wald statistic is 0,0439, with 18,5634 for the odds (*Exp (B)*). Again, doctors who prefer the *angiotensin II antagonists* to treat this group of women are 18,5634 times more likely to take a *Liberal* approach (an increased probability of 1756%) than their peers who prefer the *Stepped-Care* approach. When considered in light of results obtained from the doctor's profile, these findings suggest that *Liberal* followers are not only *younger*, but are also *more innovative* in terms of adopting new therapeutic categories for the treatment of the hypertensive woman in perimenopausal period.

The middle-aged hypertensive patient (II_20B) is a further typology, and one with a strong discriminant power in terms of *Stepped-Care* approach and *Liberal* approach. Again, the indicator category II_20B(2) - *ace inhibitor* is the only one for which the Wald statistic (8,2127) is significant at $\leq 0,01$. Its beta coefficient (2,8411) suggests that when compared with the reference category 'diuretic', doctors who prescribe *ace inhibitors* for the treatment of *middle-aged* hypertensive patients are 17,1346 times more likely (an increased probability of 1613%) to adopt a *Liberal* approach than their peers who prefer the *Stepped-Care* approach.

As pointed out earlier, the *elderly* hypertensive patient has only 4 degrees of freedom and not 5 as for the typologies 20.A (Young Adult) and 20.B (Adult). This occurs because Portuguese doctors do not prescribe beta blockers for *elderly* hypertensive patients with no comorbidity. Therefore, the patient typology II_20C(3) - *elderly* hypertensive patient presents only 4 indicator categories representing the therapeutic classes of ace inhibitors, calcium antagonists, association between diuretic and ace inhibitor and angiotensin II antagonists. However, only the Wald statistic (5,9977) for the indicator category of II_20C(3) - *elderly* hypertensive patient - *association between the diuretic and ace inhibitor* is significant at $\leq 0,05$.

Doctors who intend to prescribe the *diuretic* and *ace inhibitor* in a *fixed dose* to *elderly* hypertensive patients, are 5,0964 times more likely to take a *Liberal* approach than their peers (an increased probability of 409%) who prefer the *Stepped-Care* approach. The beta coefficient of 1,6285 reinforces this conclusion. This interesting finding confirms that doctors who follow the *Liberal* approach *do not use diuretics alone*, even in their classic indication for *elderly* hypertensive patients. In this case, doctors maintain their loyalty to *ace inhibitors*, although do so in *association with fixed doses of diuretics*.

The loyalty to *ace inhibitors* is also present with the typology *Young Adult*. The indicator category II_20A(2) - *Young Adult - ace inhibitor* has a beta coefficient (3,6456), and a Wald statistic that is significant at $\leq 0,05$. Therefore, the odds (*Exp (B)*) of a doctor who prescribes ace inhibitors to *Young Adult* hypertensive patients being classified as a *Liberal* follower are 38,3056 (an increased probability of 3731% - rounded up). Curiously, *in contrast to all the medical guidelines* for the management of hypertension in *Young Adult* patients (WHO-ISO, 1999; 1993; WHO, 1996), doctors who follow the *Liberal* approach prefer *ace inhibitors* to *beta blockers*. The use of *beta blockers* to treat the hypertension in *Young Adult* patients is in line with the most recent medical guidelines on hypertension treatment that have been advanced by Portuguese

health authorities. Therefore, it is possible to argue that *Stepped-Care* followers are more WHO-ISO oriented in terms of medical guidelines for the management of hypertension (i.e., health authorities' drug treatment advice) than their peers who follow the *Liberal* approach.

Although the multiple logistic regression model yielded some interesting findings concerning the patient typology *Young Adult*, care must be taken when interpreting these data otherwise the statistical parameters can be misleading. As we can see in the Figure 8.3, the II_20.A(4)- *young adults - calcium antagonists* category has the highest beta coefficient (albeit it is a negative quantity). This indicates a clear non-preference for *calcium antagonist* based therapy when compared to the reference category of diuretics. The value of the beta coefficient in this case is -6.0127. The odds ratio *Exp (B)* is, therefore, below 1. In other words, when compared to the reference category of *diuretics*, *Liberal* followers who use *calcium antagonists* are not representative in terms of the prescribing behaviour of Portuguese GPs. This conclusion can be verified by the level of significance (0.8882) for the Wald statistic (0.198) and by the partial correlation (*R*). Furthermore, it is clear that the Standard Error statistic (S.E.) is very high (42,7520) which indicates a large variance between respondents. This derives from the reduced number of doctors who prefer the therapeutic class of *calcium*

antagonists for treating *Young Adults*. The same is true with other patient typologies that present identical values for the statistical parameters. As outlined at the beginning of this section, analysis of the statistical parameters in the final equation for the different explanatory variables must be made with all them because the variables are inter-related. Furthermore, “*An initial examination of the data should begin with a look at the range of the variables, using summary statistics such as the mean and standard deviation*” (Hutcheson and Sofroniou, 1999: 17). With these basic statistics it is possible to understand unexpected outputs such as those described for II_20.A(4)- *young adults - calcium antagonists*.

Another important finding is related to the typology *elderly* hypertensive patient with *renal insufficiency* (30F(5)). The beta coefficient for this indicator category is -2,0663, and the interpretation of this regression coefficient is straightforward. Since the coefficient is negative, it represents a decrease in log odds in terms of the likelihood of a doctor being classified as a *Liberal* follower. If we use the *Exp (B)* statistic to explain the relationship between the reference category of diuretics and the indicator category II_30F(5) - *elderly* hypertensive patient with *renal insufficiency - angiotensin II antagonists* we may say that by increasing the value of *angiotensin II antagonists* from 0 to 1, the odds of a doctor being classified as a *Liberal* follower decreases by a factor of 0,1267. This means that

Liberal followers are 0,1267 times less likely to prescribe *angiotensin II antagonists* for the treatment of *elderly* hypertensive patients with *renal insufficiency* than their peers are. In other words, the statistical parameters suggest that *Stepped-Care* followers are planning to use the new therapeutic category of angiotensin II antagonists *only* for treating *elderly* hypertensive patients with *renal insufficiency*. Surprisingly, *Stepped-Care* followers prefer *angiotensin II antagonists* rather than *ace inhibitors* as indicated by medical guidelines for the management of *elderly* hypertensive patients with renal insufficiency (WHO-ISO, 1999; 1993; WHO, 1996). However, this may indicate, as recent Portuguese medical guidelines for the management of hypertension (Therapeutic Bulletin, 1998) suggest, that *ace inhibitors* and *angiotensin II antagonists* have the same therapeutic indications.

The remaining typologies (a) *obese*, hypertensive *woman in perimenopausal period*, with *dyslipidaemia*, and (b) *elderly* hypertensive patient with *congestive heart failure*, although important in terms of the multiple logistic regression model do not offer sufficient levels of significance for the Wald statistic. In line with this reasoning, they are assumed to be less relevant to the categorisation process and as a result no statistical explanation is proposed.

Why these typologies were not deleted from the model is due to the fact that “*The contribution of each variable depends on the other variables in the model*” (Norusis, 1994: 5). Initially, the MLRM included as many explanatory variables as possible in order to minimise the amount of variance in the model (as measured by $-2LL^{23}$). To remove variables from the model, the Backward Stepwise (LR)²⁴ compares its significance level to the cut-off value (by default 0.1). Neither of the explanatory variables (a) *obese, hypertensive woman in perimenopausal period, with dyslipidaemia*, and (b) *elderly hypertensive patient with congestive heart failure* exceeded the chosen cut-off value (by default 0.1) of the Backward Stepwise (LR) selection. These two typologies were, therefore, not eligible for removal from the model.

As most doctors who follow both the *Liberal* approach and the *Stepped-Care* approach use *ace inhibitors* to treat (a) *obese, hypertensive woman in perimenopausal period*, with *dyslipidaemia*, and (b) *elderly hypertensive patients with congestive heart failure*, the multiple logistic regression model was

²³ “*The likelihood-ratio test for the null hypothesis that the coefficient of the explanatory variables removed are “0” is obtained by dividing the likelihood for the reduced model by the likelihood for the full model. If the null hypothesis is true and the sample size is sufficiently large, the quantity -2 times the log of the likelihood-ratio statistic has a chi-square distribution with r degrees of freedom, where r is the difference between the number of terms in the full model and the reduced model. (The model chi-square and the improvement chi-square are both likelihood-ratio tests)*” (Norusis, 1994: 15-16).

²⁴The likelihood-ratio (LR) test is used to remove variables from the model. This involves estimating the model with each variable eliminated in turn and looking at the change in the log likelihood when each variable is deleted (Norusis, 1994).

used to find out other therapeutic categories for which the partial correlation (*R* statistic) was different from zero. For example, the partial correlation (*R*) statistics for II_24C - *obese*, hypertensive *woman in perimenopausal period*, with *dyslipidaemia* indicates that only two therapeutic categories of II_24C(3) - *calcium antagonists* (0,0371) or II_24C(5) - *angiotensin II antagonists* (0,0280) were not equal to zero. That is, only these two indicator categories have discriminant power to distinguish the *Liberal* followers from the *Stepped-Care* followers. As their beta coefficients (5,6235 and 5,2627 respectively) are positive, the *R* statistics for II_24C(3) - *calcium antagonists* (0,0371) or II_24C(5) - *angiotensin II antagonists* (0,0280) are also positive. Therefore, when the variable increases in value, so does the likelihood of the event occurring (i.e., a GP been categorised as *Liberal* follower). However, the number of *Liberal* doctors who prescribe *calcium antagonists* or *angiotensin II antagonists* for the treatment of *obese*, hypertensive *woman in perimenopausal period*, with *dyslipidaemia* is very low. Two consequences can be derived from these findings:

1. An increase in the Standard Errors (S. E.) and the value for the odds ratio *Exp (B)* became very large (276,8585 and 192,9985 respectively); and

2. The Wald statistics (2,5285 and 2,3008 respectively) were non-significant since the 95% confidence intervals for the Wald statistic indicated 0,1118 and 0,1293 respectively.

Nevertheless, it is important to be aware that for the treatment of the typology II_24C - *obese, hypertensive woman in perimenopausal period, with dyslipidaemia*, some *Liberal* followers preferred *calcium antagonists* or *angiotensin II antagonists*.

4 Variables for the Prescribing Philosophy:

- II_27/Use of Diuretics as First-Line Drug Therapy;
- II_37/ACE inhibitors' Preventive Action on Left Ventricular Hypertrophy;
- II_33/Side-Effects of Beta-Blokers; and
- II_92/Fidelity to the Classic Approach;

Based on both the laddering results and now on the logistic regression results, this study offers mounting evidence that attitudes towards the use of *diuretics* as a first-line drug therapy (II_27) should be taken into account when defining doctors' prescribing philosophies. All the statistical parameters from the logistic regression suggest a strong influence from this therapeutic category in the categorisation process of *Liberal* followers and *Stepped-Care* followers.

From the Figure 8.3 is possible to identify that the variable II_27 (use of diuretics as first-line drug therapy) has the highest Wald statistic (21,9570), which is significant at $\leq 0,001$ (0,0000). Its Standard Error (S.E.) (0,1307) is the lowest of all the explanatory variables. It is therefore not surprising that the explanatory variable II_27 also presents the highest partial correlation (R statistic = - 0,2282). The logistic coefficient for this explanatory variable is negative (- 0,6125). As the variable is reverse scored, this negative value tells us that as the score the doctor provides on the questionnaire goes up by one, and the values of the other explanatory variables remain the same, the log odds of the doctor being classified as an *Liberal* prescriber are reduced by the value of the logistic coefficient (- 0,6125). Accordingly, the odds of the doctor being classified as a *Liberal* prescriber will be reduced by the factor 0,5420 ($Exp(B)$). These statistics demonstrate the importance of the variable II_27 (use of diuretics as first-line drug therapy) in the categorisation process.

In line with the results of all the statistical parameters for the explanatory variable II_27 (use of diuretics as first-line drug therapy), it is reasonable to propose that *Liberal* followers refuse to accept the following medical guidelines:

1. *“Several classes of drugs can be recommended as first-line treatment of mild sustained hypertension. They may be listed, in order of proven benefit based on mortality and morbidity studies: first, diuretics; secondly, β -blocking drugs; thirdly, ACE inhibitors, calcium antagonists and α -adrenoceptor blocking drugs” (WHO-ISO, 1993: 914).*
2. *“There are also important differences between classes in the amount of evidence available from randomised controlled trials on the effects of treatment on morbidity and mortality. While there is a large body of data demonstrating the benefits of the older agents such as diuretics and β -blockers, there are fewer data available about calcium antagonists and ACE inhibitors, and no reliable data available about α -blockers or the most recent classes of agents such as angiotensin II antagonists (WHO-ISO, 1999: 166).*
3. *“At present, for most hypertensive patients who require therapy (including patients with type 2 diabetes), drugs other than diuretics or β -blockers should be selected infrequently (Cutler, 1999: 605).*

The explanatory variable **II_37 - ACE Inhibitors' Preventive Action on Left Ventricular Hypertrophy** is another important explanatory variable as its Wald statistic (10,3251) indicates. The Wald statistic is significant at $\leq 0,01$ (0,0013), and its standard error (S. E.) is 0,2318.

Again, as the variable is reverse scored and the beta coefficient is negative (- 0,7488), it is possible to say that as the score the doctor provides on the questionnaire goes up by one, and the values of the other explanatory variables remain the same, the log odds of the doctor being classified as a *Liberal* prescriber are reduced by the value of the logistic coefficient (- 0,7448). If we analyse the odds ratio ($Exp(B)$), 0,4748 will be the factor by which the odds of a doctor being categorised as a *Liberal* follower will be reduced. The partial correlation of the variable Π_{37} - *ACE Inhibitors' Preventive Action on Left Ventricular Hypertrophy* is - 0,1474. This negative value, in accordance with the signal of its beta coefficient, indicates that this explanatory variable is one of the most important of the MLRM.

The explanatory variable Π_{33} - *beta blocker/interference on sexual activity* is significant at 0,05 (0,0192). Although not as important as the previous explanatory variables (Wald statistic = 5,4791), its *B* coefficient (0,4215) indicates that most *Liberal* followers did not recognise “*interference on sexual activity*” as an important side-effect associated with the use of beta blockers. Consequently, whenever the score the doctor provides on the questionnaire goes up by one, and the values of the other explanatory variables remain the same, the

odds of the doctor being classified as a *Liberal* prescriber are increased by a factor of 1,5242 (an increased probability of 52,4% - rounded down).

Finally, II_92 - *loyalty to the classic therapeutic approach* (i.e., Stepped-Care) was also found to be a very good discriminator between the two philosophies of prescribing. Its Wald statistic (10,2314), its significance level (0,0014), its beta coefficient (-0,4513) and its odds ratio (0,6368) all suggest that there has been a change in doctors' prescribing behaviour in the last 10 years. That is, we are 99% confident (Sig.=0,0014) that doctors who follow the *Liberal* approach have changed their prescribing behaviour from diuretic/beta blocker to ace inhibitors, calcium antagonists or angiotensin II antagonists in terms of first-line drug treatment. To reinforce this reasoning, the negative beta coefficient (-0,4513) indicates that the log odds of a doctor being classified as a *Liberal* follower diminish by that specific value whenever the score the doctor provides on the questionnaire goes up by one, and the values of the other explanatory variables remain the same. Such a conclusion is significant at $\leq 0,001$. In other words, the significance level of 0,0014 guarantees that if we took 100 samples from the same population (i.e., GPs) and calculated the confidence intervals for each sample, we could expect about 99 of these 100 intervals to contain the same results as have been found for this variable (II_92) in this study.

8.12 Conclusions

Several important conclusions can be derived from the previous statistical analysis:

1. Doctors' *demographic profile* was relevant to the categorisation of Portuguese GPs as *Liberal* followers or *Stepped-Care* followers. Portuguese GPs who follow the *Liberal* approach are *younger* and therefore have *less clinical experience*. They also tend to be *more innovative* in terms of *new therapeutic categories adoption*.
2. Four main typologies were found to play an important role in this categorisation process: *Young Adult* (II_20A), *Adult* (II_20B), *Elderly* (II_20C), and *Adult Woman in Perimenopausal Period* (II_24A). Although it was possible to find some variance in terms of the treatment of *hypertensive patients with concomitant diseases*, represented by the other nine *typologies*, they appeared not to be useful for predicting *Liberal* followers or *Stepped-Care* followers.
3. Doctors who follow the *Liberal* approach were found to indicate both the category II_24(2) - *ace inhibitors* and the category II_24(5) - *angiotensin II antagonists* for the treatment of *hypertensive woman in perimenopausal*

period. This finding is extremely relevant for the new therapeutic category of **angiotensin II antagonists** in terms of new product introduction and business development: “*In the pharmaceutical industry it is currently estimated that around 10,000 substances have to be investigated for every successful new product introduction. Second, management have to recognise that not all successful new products are “breakthroughs”. Instead, many are the small product improvements and line extensions which, while apparently unremarkable, over time are crucial to keeping the business moving forward*” (Doyle, 1994: 203). The same is true for segmentation strategies since:

“*Markets can often be divided on the basis of the usage situation in conjunction with individual differences of consumers*” (Peter and Olson, 1987: 481).

4. The **Stepped-Care** followers are planning to use the new therapeutic category of **angiotensin II antagonists** only for the treatment of **elderly** hypertensive patients with **renal insufficiency**.
5. **Liberal** followers **refuse to accept the influence of health authorities in terms of new sources of drug information**. Particularly relevant in this context is the fact that **Liberal** followers **are not** implementing **medical guidelines** for the management of hypertension advanced by Portuguese health authorities (Therapeutic Bulletin 1998; 1997).

6. In terms of the prescribing philosophy, the use of *diuretics* as a first-line drug therapy is the strongest discriminator between *Stepped-Care* followers and *Liberal* followers. Portuguese GPs who follow the *Liberal* approach *do not use diuretics alone* even in their classic indication for *elderly* patients.
7. Most factors concerning drug information sources are not important discriminators in terms of *Stepped-Care* or *Liberal* approaches. Only **Factor 2 - Health Authorities' Drug Information Bulletins**, and **Factor 3 - Health Authorities' Prescription Profile** were included in the final logistic regression model. This may indicate that the use of various sources of drug information do not differ substantially from GP to GP. In contrast with the assumption that "*Doctors in a practice will tend to prescribe the same medicines*" (Doyle, 1994: 244), Factors 2 and 3 suggest that drug choice is a "*political*" decision associated with being "*in favour of*" or "*against*" medical guidelines for the management of hypertension such as those advanced by Portuguese health authorities. As a result, it is possible to argue that in the Portuguese clinical context, GPs' colleagues, pharmacists, patients and even pharmaceutical manufacturers' representatives or other sources of drug information are not relevant indicators for distinguishing between *Liberal* and *Stepped-Care* followers.

8. Surprisingly, none of the variables *II_43 - When I Prescribe I Do Not Think on the Cost Treatment* and *II_44 - Hypertension is a Chronic Disease that Requires the Prescription of the Cheapest Drugs* were accepted by the backward stepwise variable selection to discriminate between the two groups of doctors.
9. In accordance with the previous statement, it is possible to reinforce that *Cost treatment* is not relevant for distinguishing between *Liberal* followers or *Stepped-Care* followers. This finding *is not* in line with the opinion that “*clinical decision making in primary care is strongly influenced by social factors*” (Bradley, 1991: 285).
10. Even for the *elderly* hypertensive patient, Portuguese GPs who follow the *Liberal* approach do not prescribe *diuretics* in monotherapy. Although *diuretics* have been recognised by *medical guidelines* as the *less expensive* drug treatment, *Liberal* followers prefer other therapeutic solutions. In this case, *Liberal* followers maintain their loyalty to *ace inhibitors* in monotherapy or in *association in fixed dose* with *diuretics*.
11. All the statistical parameters from the multiple logistic regression model suggest that *first-line drug therapy* is based mainly on the *clinical* and *demographic* characteristics of *hypertensive patients*. Their combination determines hypertensive *patient typologies* which guide the drug choice.

However, the *doctor's profile* in terms of *demographic characteristics* and other medical-professional elements such as *clinical experience* may also influence the decision-making process. This cognitive macro-structure organises *first-line drug therapy* in terms of therapeutic categories, which are selected in accordance with a "*philosophy of prescribing*".

Above all, the main findings from both the *factor analysis* and *logistic regression analysis* illuminate the relevance of these statistical methods to the underlying conceptual basis of this study. The **PTM**, with its **theoretical/ conceptual** basis, derived from the **MEC** model. This *exploratory approach* was found critical for the understanding of GPs' prescribing-relevant cognitive structure, i.e., of the way prescribing-relevant knowledge is stored and organised in doctors memory. For example, *four main typologies were found to play an important role in the categorisation process of Portuguese GPs* (see point 2 of this section).

Throughout the Chapters Four and Seven and the present Chapter (see also **Chapter II – Figure 2.2: Study Overview**) we have sought to demonstrate the underlying unity between the *qualitative* and *quantitative* methods for data collection. This unity provides a more coherent framework for both *cognitive structure* (see Chapter Five) and *cognitive process* issues (see Chapters Six and Nine).

This study attempted to fill this important gap in the prescribing decision-making literature by using the MEC model and the PTM. Through the development of a model building approach (see Chapter Seven and the present Chapter) to analysing data, there was a move towards considering *substantive* significance, rather than just the simple criterion of *statistical* significance used in previous studies on doctors' prescribing behaviour. The main findings from both the *factor analysis* and *logistic regression analysis* and the 11 conclusions of this section provide interesting links with the theoretical/conceptual basis of the research in terms of GPs' cognitive processes that should be explored further. This will be done in the final Chapter.

8.13 Summary

The purpose of this research was to categorise Portuguese GPs in accordance with their *first-line drug therapy* for the management of hypertension. To obtain this goal, *the patient typology model* was used. Previously, in Chapter Six, we developed the patient typology model, *a theoretical framework to guide the introduction of variables into the multiple logistic regression model*. These explanatory variables were considered good predictors of the *Stepped-Care* approach and *Liberal* approach.

Specifically, the *GP's demographic profile* was examined in order to determine its contribution to the categorisation process of Portuguese GPs, in accordance with the *Stepped-Care* and *Liberal* approaches for the management of hypertension. Furthermore, we tested both the discriminatory power of different *sources of medical information* and several *patient typologies* for categorising doctors according to the two main “*philosophies of prescribing*” that have been put forward to treat those patients. In addition, the discriminatory power of major therapeutic categories’ attributes in terms of “*philosophies of prescribing*” was also evaluated. All the 38 explanatory variables representing the four constructs of *the patient typology model* were introduced into the multiple logistic regression model. We included 22 explanatory variables in the model which are not necessarily important for prediction. By removing these variables from the model we improved the overall model fit and reduced the width of the confidence intervals. The final multiple logistic regression equation encapsulates 16 explanatory variables representing the four constructs of the *patient typology model*. An initial examination of the statistics parameters (Figure 8.3) guarantees the interest of the multiple logistic regression in modelling a *binary response variable as first-line drug therapy*.

By looking at the histogram of predicted probabilities (Figure 8.2) and table of predicted and correct observations (Table 8.12), it is possible to realise that the multiple logistic regression equation is able to classify correctly **83.05 %** of doctors who follow the ***Stepped-Care*** approach and **91.46 %** of doctors who are engaged in a ***Liberal*** approach. An overall value of **87.94 %** was obtained.

In summary, it would be possible to argue that ***the patient typology model*** appears to be an interesting tool to categorise Portuguese GPs in accordance with their ***first-line drug therapy***.

9 Chapter Nine Main Findings and Managerial Implications

9.1 Introduction

In this final chapter we begin by presenting the benefits that have been gained from the use of the two research methods (i.e., the MEC model and the PTM) followed by key findings in terms of the two Portuguese main schools of thought on hypertension treatment. Some new insights into doctors' prescribing behaviour are presented and linked with the main findings and the managerial implications which have been developed. We therefore reiterate that *the patient typology model (the PTM)* proved useful when investigating why GPs differ in their prescribing behaviour and we use the dichotomised first-line drug therapy in terms of stepped-care and liberal approaches to define marketing strategies.

The strong association between therapeutic classes and patient typologies, reinforced by the influence of the GPs' profile, as well as the importance of the GPs' perceptions of those therapeutic categories, are presented throughout Chapter Nine and are integrated with salient marketing material that highlights new approaches for marketing strategists.

Chapter Nine and the thesis are concluded in a discussion of the limitations of the study and by identifying directions for future research.

9.2 The Theoretical/Conceptual Basis of Previous Research

In accordance with the review of the literature on doctors' prescribing behaviour (see Chapter III), an extensive amount of research in decision making has focused attention on understanding the cognitive processes underlying clinical problem solving and drug choice. Most of the proposed cognitive models were generally based on the *expectancy-value theory* that stated that a doctor's drug choice is a function of the subjective beliefs that certain outcomes will occur from various drug choices and the values attached to those outcomes.

The *expectancy-value framework* assumes that physicians use linear compensatory decision-making processes in which all relevant drug attributes or outcomes are considered, tradeoffs among attribute values are made, and an overall evaluation is formed independently on each alternative and the alternative with the highest overall evaluation values is chosen. However, Rosenberg and Webster's (1984) study provided evidence showing that "*well educated, cognitively sophisticated decision makers (physicians) varied in the degree to which they employed all information available (compensatory decision rules) to make decisions on a relatively high involvement product class*" (ibid: 221). Furthermore, their study suggests "*a need to recognize that individual decision makers may be flexible in their decision strategies and may change the way in*

which they use attribute information depending upon the specific information available. For example, doctors in study II appeared to be more willing to make trade-offs on a greater number of attributes when the most important attribute (cardiovascular side effects) was not presented" (ibid: 211-212).

Most of the previous models on doctor drug choice have used the *compositional method* in dealing with attitudes or preferences (Knapp and Oeltjen, 1972; Harrell and Bennett (1974); Lilja, 1976; Segal and Hepler, 1982; 1985; Chinburapa et al., 1987). Denig et al. (1988) have also utilised a cognitive model to attempt to explain the drug prescribing process.

In the same vein, Chinburapa and Larson (1988) and later Chinburapa et al. (1993) found that there is not a single and context-free decision-making process. For example, the latter study indicated that doctors shifted from using *compensatory* to *noncompensatory* decision-making processes when task complexity increased. Thus, studies based on expectancy-value theory have produced equivocal findings. This hypothetic-deductive approach, "*is a formal, explicit model constructed to aid decision makers under conditions of uncertainty. By structuring the clinical situation in the form of a decision tree, with the clinical events, the probabilities of their occurrence, and the importance of these outcomes (utilities), a clinician can determine the optimal treatment choice*" (Mancuso and Rose, 1987: 1284).

9.3 The Theoretical/Conceptual Basis of the Present Research

9.3.1 Theoretical Contribution

As pointed out above, we have included an extensive coverage of a variety of prescribing models and their theoretical frameworks, particularly the Theory of Reasoned Action (TORA). This model of social behaviour embraces measures that did not specify patient characteristics. As a result, researcher attention was focused on developing theoretical frameworks capable of identifying the relationships between patient characteristics and drug choice. Taken together, the findings reported in this research provide strong support for the proposed theoretical framework.

In contrast with the TORA, the MEC theoretical framework highlight that the assumption of an exhaustive list of salient beliefs is inappropriate based on current elicitation and measurement practices in expectancy-value attitude research.

Bagozzi and Dholakia (1999), in addition to making a distinction between expectancy-value models in terms of complexity and integration rule, discussed the multiple implications associated with the level of abstraction, or aggregation, at which behavioural, normative and belief-products are modelled. Conceptually, these implications extend to our understanding of

the cognitive relationships between the patient characteristics and GPs' prescribing behaviour, while methodologically, different levels of abstraction and conceptualisation (i.e., clinical values, product attributes and therapeutic consequences) offer substantial gains in terms of the ability to assess the cognitive relationships mentioned earlier. That is, choice of therapeutic class is believed to be initiated by clinical values (e.g., age, sex, and comorbidity), which represent the necessary clinical criteria or medical cues for selecting a specific therapeutic class. Attributes about each of a set of therapeutic classes then are evaluated to arrive at desired therapeutic consequences or benefits.

9.3.2 Conceptual Contribution

In line with the reasoning that has been advanced, it is possible to argue that *the theoretical framework* of this research *avoids some limitations* found on previous drug studies on drug choice based on expectancy-value theory. The first two are *conceptual* and stem from the simplicity of the approach, which is in one sense its Achille's heel.

1. it does not specify an underlying *structure* for the cognitive elements in its formulation (i.e., for the target behaviour and outcomes and their expectancies).

Instead, expectancy-value models assume that the cognitive elements (weighted by valences) are aggregated into a summary representation: a single number equal to the sum of products of expectancies and valences.

To the extent that *knowledge* is represented in hierarchies or complex patterns, *the classic expectancy-value model may overlook how specific components of medical knowledge affect drug choice* in terms of the *processes* drug decision makers go through.

The traditional Fishbein and Ajzen summated model has been criticised for assuming that each belief-product makes an equal contribution to a simple uni-dimensional, or complex multi-dimensional, expectancy-value attitude (Bagozzi and Dholakia, 1999). If this assumption is violated, sub-optimality is likely to be introduced into the measurement and prediction of attitude. In contrast, means-end chain models, where no aggregation onto summary measures is undertaken, avoids the problems associated with aggregation in those theoretical frameworks by using different concepts of cognitive representation. This approach allows the assumption that each concept of cognitive representation carries equal weight in predicting the final choice.

2. it does not take into account or represent *relationships* among the cognitive elements entering the model

Cognitive-based theories of behaviour postulate that a person's cognitions (conscious knowledge, beliefs, and assumptions) intervene between stimulus and the person's behaviour in response to the stimulus. In other words, prescribing behaviour is the result of active, conscious problem solving. According to cognitive theory, a prescriber's drug choice results from the interaction of (1) his beliefs about the recognised outcomes of various drug choices for a specific patient and (2) the valences (values) (s)he attaches to those outcomes. All the models described in Chapter III directly or indirectly support a view of prescribing as an active problem-solving process directed at achieving outcomes consciously foreseen by the prescriber. However, to the degree that knowledge units (e.g., expectancies, outcomes, behaviour options) are related in causal, inferential, or functional ways, and these relationships or their effects influence preference or choice formation, expectancy-value models may fall short of providing valid explanations and managerial guidelines. The use of the concepts derived from the means-end chain theoretical framework *links* different *cognitive knowledge structures* in terms of prescribing behaviour.

9.4 Benefits Gained from the Use of MEC and Logistic Regression

Bagozzi and Dholakia (1999) pointed out that the two conceptual problems described in the previous Section, may be extended to value theory. That is, means-end approaches such as VALS or LOV are not free from some problems concerning how information is processed and organised: “*Their primary disadvantage rests in the limited way they accomplish explanation and understanding of consumer behaviour. Other than postulating that beliefs and evaluations combine as multiplicative sums in the theory of reasoned action and values function as additive predictors in the VALS and LOV models, the approaches are silent about how information is processed and organized. Related to this is their neglect of the underlying structure of information and whether beliefs or values are related in hierarchical, functional, or inferential manners*” (ibid: 22).

In terms of *theoretical and conceptual contributions*, the present research was able to establish a link between cognitive structures and cognitive processes. Prescribing behaviour, as a professional part of human behaviour, is the result of an interaction of those cognitive structures: “*Human behaviour is the result of an interaction of cognitive structures and cognitive processes*” (Grunert and Grunert, 1995: 212). In the present research, using the **MEC theoretical framework**, we were able to specify how, in a clinical situation, parts of the cognitive structure are retrieved and used to guide prescribing behaviour.

That is, we were able to define *an aggregate map of doctors' cognitive structure that establishes the links between concrete product attributes and salient choice criteria:*

“In the typical laddering task, the researcher attempts to restrict the generation of concrete product attributes to salient choice criteria, which increases the likelihood of their relevance for buying behaviour” (ibid, 211).

Grunert and Grunert suggest that these *cognitive knowledge structures* may be changed due to *new information from the contextual environment*. In terms of drug decision-making, this is done by *cognitive processes* which are also necessary for retrieving *clinical values* from the cognitive structures. This cognitive material are used to direct prescribing behaviour. That is, *cognitive structures depend on new information from the clinical contextual environment*. As a result, any model that is supposed to predict drug choice has to be able to *integrate cognitive structures and cognitive processes* and *new information from the clinical contextual environment*. Initially, in the *exploratory phase* of this research, our efforts were clearly in the *means-end chain tradition*, directed at *GPs' prescribing-relevant cognitive structures*. However, the findings from the **exploratory phase** of this research suggest that drug choice depends on *clinical values*, which in turn may be changed by *new information from the clinical contextual environment*.

Subsequently, in the **quantitative phase** of this research, relevant excerpts from the cognitive structure were used for categorizing Portuguese GPs' prescribing behaviour. However, to develop this **categorization process** it would be necessary to establish a strong relationship between **cognitive structures** and **cognitive processes**. This would not be possible without the use of both the MEC model and the logistic regression model. In other words, the **logistic regression model** deals with the links between GPs' cognitive structures and GPs' cognitive processes when they have to choose a drug. Such reasoning strengthens the argument that the **MEC model** was able to identify GPs' prescribing-relevant cognitive structures, while **the logistic regression model** was able to establish the links between GPs' prescribing-relevant cognitive structures and GPs' prescribing cognitive processes. Thus, the **PTM** was used to guide the introduction of variables into the multiple logistic regression model. Grunert et al. (1995) recognised that the MEC approach cannot be used to predict consumer behaviour. They proposed the development of theory combining MEC with a model of processes for analysis of situational input and formulation of output. Our research strategy overcomes this problem because the **PTM** combines GPs' prescribing-relevant cognitive structures and GPs' prescribing cognitive processes (see **Chapter Two – Flow Chart/Figure 2.2: Study Overview**).

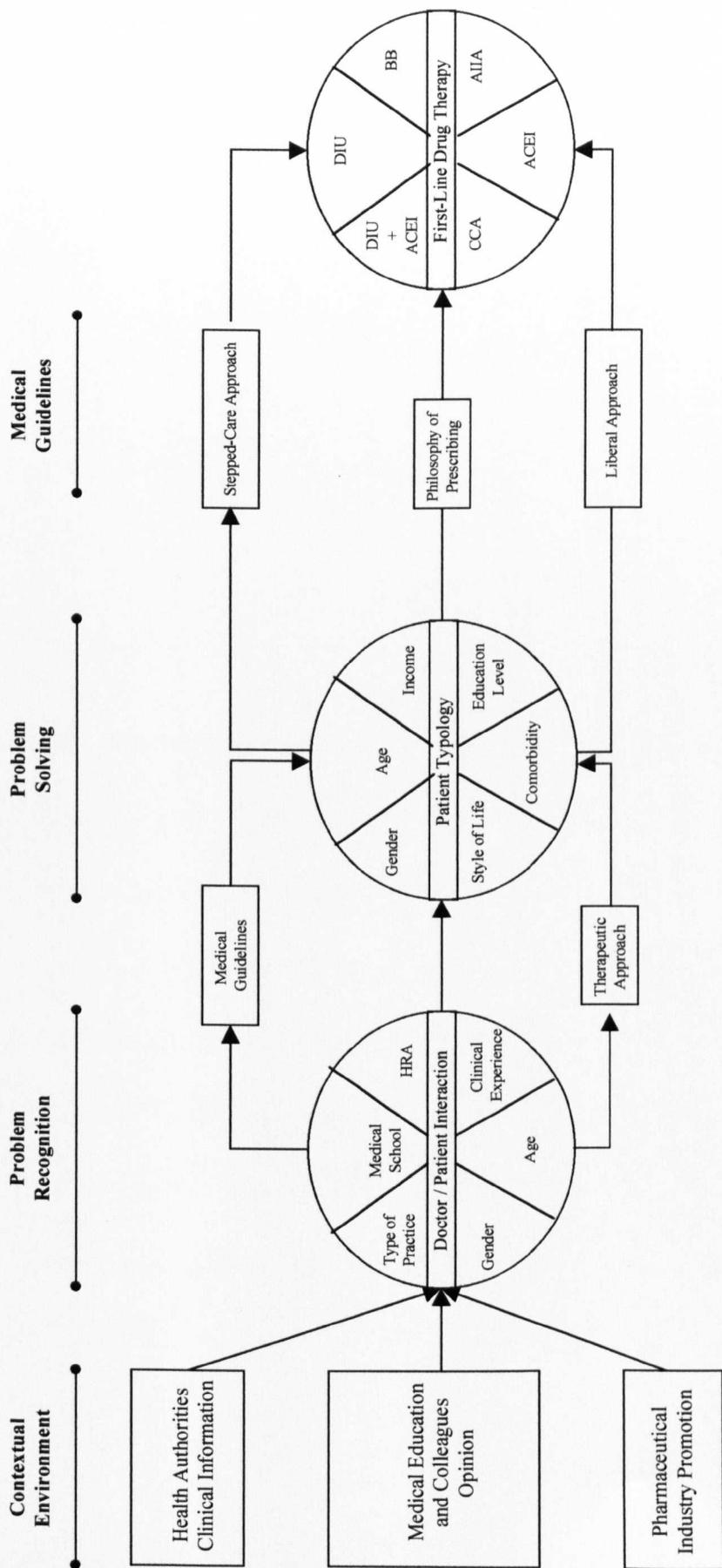
As mentioned at the beginning of Chapter Four, there is a strong relationship between the theoretical framework and the methodological approach. Our research approach was based on a “means-end” chains which reinforced the importance of clinical values on GPS’ prescribing behaviour. The PTM, assuming a problem-solving clinical context, was used to guide the introduction of variables into the multiple logistic regression model. This move way from the simplistic measures of expectancies and valences allowing the researcher to focus on the practical importance of a given explanatory variable within the PTM. Like any statistical model building and refinement, the choice of explanatory variables to include has tremendous importance in logistic regression analysis (Hutcheson and Sofroniou, 1999). For example, care should be taken to resist “overfitting” the model. Beyond the theoretical/conceptual reasons, the choice of variables to include as predictors in the logistic regression was driven primarily by the mathematical consequence that as the value of the number of explanatory variables increases, so too does the variance for the estimated coefficients, especially when there exists colinearity between predictors. Therefore, any increase of a model’s explanatory power by the inclusion of a given explanatory variable was evaluated against the resulting inflation of the variance of the logistic regression estimates (see Chapter Eight).

Another benefit gained from the use of two research frameworks (i.e., the MEC model and the PTM) is attached to methodological considerations. Previous research on doctors' prescribing behaviour used *hypothetical patient scenarios*. For example, in Mancuso and Rose's (1987) study, the goal was to identify focal points employed by doctors as they choose among treatment alternatives for *hypothetical patients* with coronary artery disease. However, their findings may be obscured by the use of *hypothetical patient scenarios*. This methodology is somewhat inconsistent with the *information processing theory*. This approach requires *the adaptation to the problem to be solved* in order to model the way prescribing-relevant knowledge is stored and organized in doctors' memory (Elstein et al., 1978). *The PTM avoids such methodological problem because it uses real hypertensive typologies derived from the Portuguese GPs' prescribing-relevant cognitive structures.* As a result, the PTM follows Mancuso and Rose's vision on doctors' cognitive processes when making therapeutic decisions, but uses a different methodology. This clearly shows that theoretical/conceptual frameworks and methodological approaches are strongly interrelated (Moller and Ranta, 1993). Inspired by *medical information-processing research*, the PTM, *a new vision on doctors' prescribing behaviour*, assumes *drug choice* as a *clinical problem-solving*.

9.5 The PTM: A Clinical Problem Solving Approach

The current theory of *clinical problem solving*, proposed by researchers studying prescribing decisions (see Chapter III), is the model of hypothetico-deductive analysis. The **exploratory phase** of this study, however, suggests that GPs do not use the hypothetico-deductive method in arriving at therapeutic decisions. GPs were not seen to generate hypotheses regarding optimal treatment nor did they search a single number equal to the sum of products of expectancies and valences to support treatment choices. In contrast, Portuguese GPs were found to develop meaningful connections between clinical values and therapeutic classes in order to obtain the desired therapeutic consequences (see Chapter Five). In a similar vein, Mancuso and Rose's (1987) study on doctors' diagnostic reasoning procedures and therapeutic approach has shown that doctors are guided by *clinical focal points*. These *clinical criteria* simplify the way doctors deal with a large amount of clinical information. That is, doctors "guided by their own set of clinical heuristics chose factors they considered most important" (ibid: 1284). By building on the work of Mancuso and Rose, together with dimensions of "contextual environment", "problem solver" and "clinical task", we present the PTM, a new problem-solving framework to guide the introduction of variables into the multiple logistic regression model.

Figure 9.1: The Patient Typology Model (PTM)



Given the complexity of prescribing, and adopting its theoretical development as a *clinical problem solving*, drug choice should be viewed as the interaction between a *problem solver* and a *task* in *the context of an environment* (Kinderman and Humphris, 1995; Kahney, 1993; Doran, 1984; Simon, 1978). That is, the **PTM** embraces three separate dimensions:

1- *the contextual environment* (i.e., the sources of medical information)

2 - *the problem solver* (i.e., the doctor),

3 - *the task* (i.e., the clinical problem); and

1 - the contextual environment

The contextual environment includes the resources (i.e., the sources of medical information) that are available for clinical problem solving. The *contextual environment* affects both the **problem solver** and the **clinical task**. It affects the **problem solver** by constraining *the information cognitive processes* that can be used and by influencing which parts of *the cognitive structure* are retrieved and used to guide prescribing behaviour. The contextual environment affects the **clinical task** by offering additional medical information, particularly medical guidelines, constraining which therapeutic classes may be used.

In most cases the GP provides medical care by prescribing drugs in accordance with different patient characteristics such as age, gender and type of disease.

From a pharmaceutical marketing perspective more needs to be done to demonstrate how these patient characteristics stored and organized in the doctor's memory are translated into drug choices.

In line with the reasoning that has been advanced, drug choice should be understood as a cognitive reality that results from:

- (a) the bifurcation of the doctor's medical education and clinical experience into a pre-behavioural and behavioural dimension;
- (b) the use of pathological entities (i.e., diseases) and demographic characteristics of patients for selecting possible therapeutic solutions from the pre-behavioural dimension; and
- (c) the use of clinical criteria as causally effective antecedents in explaining prescribing behaviour (i.e., behavioural dimension).

2 - the problem solver (i.e., *the doctor*)

Our understanding of the doctor's drug choice derives from the findings described later. In line with these findings, it is possible to argue that drug choice results both from undergraduate/postgraduate medical education and clinical experience: "*All doctors are taught to take a medical history and to make initial decisions about the aetiology of a problem. Similarly, all doctors are instructed in the use of drugs and are familiar with other therapies. It might be expected, therefore, that the task which deal with these matters will be attempted in most consultations*" (Pendleton et al., 1996: 99).

Undergraduate and postgraduate medical education teaches doctors how to take a medical history and to ensure that all doctors use clinical criteria (depicting diseases and patient characteristics) in the same way. These clinical criteria can be found in different medical guidelines promoted both by international organizations (WHO-ISO, 1999; WHO, 1996; WHO-ISO, 1993) and national organizations (Therapeutic Bulletin, 1998; 1997).

During their clinical life, doctors have different clinical experiences. Nevertheless, doctors' *clinical problem solving* activity is typically viewed as a series of similar clinical operations susceptible to either verbal characterisation or restatement in a computer simulation program. This decision making approach involves the processing of information to make

drug choice. Such process encompasses not only what doctors have learned through past clinical experience, but also their conjectures and forecasts based on acquired information. In other words, clinical information is stored within the *long-term memory* and it subsumes different *patient typologies* common to daily clinical problems. When necessary, doctors' *short-term memory* (or temporary, working¹) memory interacts with the *permanent memory* (i.e., long-term memory) to reduce the cognitive dissonance produced by some novel internalised clinical information.

The *short-term memory* uses all this stored medical information to produce the therapeutic response output.

The intimate connection between *short-term memory* and *long-term memory* suggests that clinical criteria are encapsulated within cognitive schemas (i.e., *patient typologies*) that are useful for clinical task development in terms of the therapeutic approach. The transition of a specific cognitive schema from *long-term memory* to *working memory* is constraint by the problem solver's memory content and information processing, and by the sources of medical information that are available to the solver.

¹ "*Working memory* refers to the cognitive processes involved in the temporary storage of information while an individual is simultaneously processing incoming information or retrieving information from long-term storage" (Chiappe, Hasher and Siegel, 2000: 8).

3 - the clinical task (i.e., *the clinical problem*)

The clinical task has two different phases:

(a) **Problem-Recognition**

The medical problem solving approach stresses the view that the doctor moves through a series of sequential and reiterative stages or procedures in reaching or not reaching a prescribing decision (Elstein et al., 1978).

Problem recognition is the first stage on medical problem solving. This initial stage of a prescribing decision is generally accepted as influencing the later informational requirements and the choice criteria used to evaluate and discriminate between alternative products, and, as such, is of major importance to pharmaceutical marketers. In the Engel, Kollat and Blackwell model (1978), **problem recognition** is defined as “*a perceived difference between the ideal state of affairs and the actual situation sufficient to arouse and activate the decision process*”. The same is true in the medical field. There is a stage where clinical ambiguity occurs through lack of clarity in the stimulus object (i.e., patient complains). Patients describe their experiences and doctors develop a **problem-recognition activity**: “*Problem recognition would presumably take place when the ambiguity leads to sufficient uncertainty to arouse the individual to gather further information to clarify the situation*” (Fletcher, 1988: 59).

As a result, ***problem recognition*** is the first step within a diagnostic process. However, the diagnostic process illuminates only the clinical problem. From diagnosis (for example, hypertension) doctors agglutinate the relevant patient' clinical criteria for obtaining a patient typology.

Focus on the relative homogeneity of cognitive schemas or typologies provides an emphasis on order, as contrasted with the emphasis on diversity and complexity that is paramount in the ***problem-recognition*** activity. Thus, the supreme merit of the typology's use as a heuristic tool is to highlight the relevant clinical criteria that guide drug choice. These patient typologies are constructed primarily to redefine and solve clinical problems presented initially in common-sense terms into medically relevant and manageable diagnosis: "*These medical typologies stand midway between the concrete experiences described by patients and observed clinically by physicians on the one hand, and the more abstract knowledge of medical science on the other*" (Schneider and Conrad, 1981: 212). As a result, *a sound typology forms a firm foundation and provides direction for both diagnosis and clinical management habits.*

In line with the reasoning that has been advanced, it is possible to argue that ***problem recognition*** is the first and most relevant step within a diagnostic process because it embraces all the relevant clinical criteria to develop a patient typology.

(b) Problem-Solving

The major clinical task for the GP, beyond diagnosis itself, is to manage and control (commonly by drugs) the patient's seizures: "*Whilst most of what has been said is related to problem-solving and diagnosis it is also of paramount importance for students to acquire sound management habits. Sound management may well proceed according to the guidelines illuminated by the diagnostic process*" (Doran, 1984: 403). Patient typologies are appropriate and useful for this **problem-solving** activity. That is, the patient typology bridges the diagnosis process and the decision-making process: "*Diagnosis, in the usual sense of the term, is a categorizing process. Its end point is a probabilistic statement about what is wrong with the patient. A decision, on the other hand, cannot be probabilistic...Management decisions have to be either/or. When he makes such a decision, the clinician takes the probabilistic statement and integrates it with a large number of variables, many of them unique to the patient*" (McWhinney, 1979: 1476-7). Doctors intentionally construct and use formal typologies as an essential part of their **problem-solving activity** because of the press of time and urgency typical of medical work (*there is always too much important work to be done in too little time*). This reasoning requires that the **problem-solving activity** to which doctors are exposed match or overlap sufficiently with existing categories in memory, a typology will be activated and a specific prescribing behaviour will be started.

Portuguese GPs, as their counterparts in other European Union countries, use an armamentarium² of different antihypertensive therapeutic categories to treat alternative patient typologies.

The findings from the MLRM confirm that this armamentaria is not static but grows in size as the number of identified hypertensive patient typologies rises. However, the results from the MLRM suggest that the variance of the intended first-line drug therapy increases whenever the patient typology has no associated comorbidity. That is, some patient typologies such as hypertensive *woman in perimenopausal period, middle-aged, elderly* and *young* hypertensive patients are stronger discriminators of doctors' prescribing behaviour. When comorbidity is present, only the typology *elderly* hypertensive patient with *congestive heart failure* and *elderly* hypertensive patient with *renal insufficiency* are relevant when categorising Portuguese GPs. Most of these patient typologies have been identified by international medical organisations such as WHO-ISO (1999; 1993) and WHO (1996) which, along with other sources of drug information, have presented opposing therapeutic approaches on hypertension treatment.

² Doctors' portfolio size has been termed "armamentaria" by the medical profession (Stern, 1997).

The patient typologies described above are the final result of the diagnostic process. This cognitive task is influenced by “*learned, internalized patterns of thought-feeling that mediate both the interpretation of on-going experience and the reconstruction of memories*” (Strauss, 1992: 3).

The patient typologies described earlier confirm that GPs take into account for prescribing decisions several clinical values which were previously encapsulated within their long-term memory:

- the diagnosis of the patient’s main problem;
- other clinical problems he may have;
- the socio-demographic characteristics of the patient; and
- the risks and benefits of the therapeutic decision alternatives.

Those patient typologies go beyond the diagnosis of the patient’s main problem and include most of the above clinical criteria. Whereas diagnosis is a reductive, generalizing process, a patient typology is a synthesizing, individualizing process. *A patient typology is, therefore, a cluster of clinical criteria which provides a kind of order that serves subsequently as the basis for the therapeutic approach.* During the diagnostic process, doctors try to establish a strong connection between the patient typology and the therapeutic approach:

“These connections between medical work and medical typologies increase the probability that once agreed upon within the medical community, such categories become like cherished road-maps of medical terrain: they identify the major points of both practical and intellectual interest and offer sometimes diverse routes (treatments) from one point (e.g. diagnosis) to another (e.g. “cure” or improvement)” (Schneider and Conrad, 1981: 213).

In line with the reasoning that has been advanced, it is possible to argue that GPs, guided by their own set of clinical heuristics, analyse information obtained from the clinical contextual environment and initiate a problem-recognition activity which is useful for developing a patient typology. It follows, then, that this cognitive schema represents a problem solving step towards the drug choice. **Medical guidelines** were found to influence the therapeutic approach. As a result, a study of doctors’ cognitive schemas is not a study of what patient typologies exist, but, more importantly, a study of how doctors assemble those patient typologies according to medical guidelines. In line with the findings described in Chapter Eight, and following a clinical problem-solving approach based on the **PTM**, we suggest that Portuguese GPs’ prescribing behaviour may be categorised in accordance with the two different philosophies of prescribing that derive from those medical guidelines:

1. Portuguese GPs may be categorised as *Liberal* followers and *Stepped-Care* followers. The former prefers *ace inhibitors*, *calcium antagonists* and *angiotensin II antagonists* for first-line drug therapy while the latter uses the therapeutic categories of diuretics and beta blockers.
2. The *Liberal* approach or the *Stepped-Care* approach are philosophies of prescribing that derive from GPs' clinical values.
3. GPs' clinical values are excerpts from the cognitive structure that links each patient typology with a first-line drug therapy. However, these clinical values are developed in accordance with medical guidelines that have been advanced by different medical sources of drug information.
4. The categorisation of Portuguese GPs as *Liberal* or *Stepped-Care* followers is influenced not only by medical guidelines, but also by both doctors' *clinical experience* and doctors' "*political*" attitudes towards *health authorities' new control role*. All these factors are relevant in moulding doctors' pharmacological perceptions of the different therapeutic classes.
5. In Portugal, as in other European Union countries, a substantial number of patients with hypertension have been receiving *ace inhibitors* as their first-line drug treatment. However, *diuretics* have also a high prescribing rate.

Although Portuguese *health authorities' medical guidelines* for the management of hypertension recommend the *Stepped-Care* philosophy of prescribing as the best solution for first-line drug therapy, the results are not as favourable as desired to this *cost-oriented* approach: 116 (37,5%) respondents preferred *diuretics* and 164 (53,1%) preferred *ace inhibitors*. If we consider these responses in terms of *Liberal* followers and *Stepped-Care* followers, the former represents **58%**, while the latter embraces the remaining **42%**. These results reinforce the conclusions of a recent study which pointed out *the low level of compliance with medical guidelines* for the management of hypertension advanced by Australian health authorities for their primary-care physicians (McAlister, 1997).

Typically, researchers have been preoccupied to test a model of social behaviour known as the Theory of Reasoned Action (TORA): “*general measures of physician attitudes, subjective norms, and intentions (i.e., measures that did not specify diagnosis or other patient characteristics) could predict a general measure of prescribing behavior...General measures of attitude and prescribing behaviour are easier to collect than patient-specific measures, especially given the current state of most prescription drug information systems*” (Lambert et al., 1997:1769). However, our study suggests that perhaps more attention should be paid to *patient typologies*.

9.6 Managerial Implications

The previous findings provide some new insights into *GPs' prescribing behaviour* which have significant managerial implications for formulating marketing strategies. For product managers, our findings suggest the use of different strategies for products depending on their position in the marketplace. Managers who have a better understanding of these relationships will be better able to respond to market forces. In accordance with *the PTM*, it is possible to advocate the following strategic activities:

9.6.1 To Move Fast in the Main Markets

In Portugal, Merck Sharp Dohme was the pioneer company in terms of the commercialisation of the new therapeutic category of angiotensin II antagonists for the management of hypertension. However, as Doyle (1994) points out, being the market leader is insufficient in and of itself, to this, a firm must add the capability of increasing time-to-market of its new product developments: “*First, the pioneer needs to move fast into the main markets in order to exploit the innovation*” (Doyle, 1994: 145). To move fast to pre-empt competition, Merck Sharp Dohme has to identify the *Liberal* followers because they appear to be the *innovators* and *early adopters* who guarantee rapid market growth.

9.6.2 The Selection of Target - Markets

Not only has the innovator to move fast to pre-empt competition, but it also has to move in the right direction. That is, the marketing strategy has to define quite precisely their target-markets in terms of *innovators* and *early adopters*. Identifying *Liberal* followers is not difficult because they are *younger* and they are used to prescribing *ace inhibitors* for most *patient typologies*. Both these factors, doctors' *age* and *first-line drug therapy* are types of information that is readily available to marketing managers³. However, both *Liberal* followers and *Stepped-Care* followers believe that the choice of drug should be tailored to the individual patient. The multiple logistic regression model used here has identified four relevant hypertensive typologies:

- ***Adult Hypertensive Woman in Perimenopausal Period***
- ***Elderly Hypertensive Patients***
- ***Adult Hypertensive Patients***
- ***Young-Adult Hypertensive Patients***

The *importance/prevalence* of these four hypertensive patient typologies is different.

³Ethical drug manufacturers' representatives are used to discuss doctors prescribing behaviour with local pharmacists in order to identify the more innovative GPs.

9.6.2.1 The Relative Prevalence of Hypertensive Patient Typologies

It is not possible to develop the selection of target-markets without knowing how the market is organised in terms of the relative *importance/prevalence* of these four hypertensive patient typologies. To do this calculation, the first step is to identify the number of Portuguese patients with hypertension and one of the explanatory variables encapsulated within the logistic regression model can be used to initiate this process. According to the explanatory variable *II_5 - Number of Patients with Hypertension*, GPs all over the country have a different number of hypertensive patients. We analysed how those hypertensive patients were distributed among the respondents.

Table 9.1: Number of Patients with Hypertension (II_5)

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	0	3	1,0	1,0	1,0
Fewer than 100	1	41	13,3	13,3	14,2
100 to 150	2	110	35,6	35,6	49,8
151 to 200	3	77	24,9	24,9	74,8
201 to 250	4	40	12,9	12,9	87,7
More than 250	5	38	12,3	12,3	100,0
Total		309	100,0	100,0	

Note: *the variance in syntax in terms of decimal points derives from the SPSS output.*

Based on their records, 13.3% of Portuguese GPs reported having fewer than 100 patients with HTA, 35.6 % of doctors had between 100 and 150, and 25% between 151 and 200. However 12.9% of the respondents reported having between 201 and 250 hypertensive patients and 12.3% had more than 250 patients with HTA.

If we assume the interval mean of the number of patients with hypertension, the percentage for each interval, and the number of GPs (6402), it is possible to estimate the *total number of detected Portuguese patients with hypertension*:

$$0.133*75*6,402+ 0.356*125*6,402+0.25*175*6,402+0.129*225*6,402 + \\ +0.123*275*6,402 = 1,031,202 \text{ (one million thirty one thousands and two hundred and two).}$$

The value of 1,031,202 (*one million thirty one thousand and two hundred and two*) represents almost 10% of the Portuguese population. However, the adult population in Portugal (i.e., those over 45 years old) represents 40% of the total population. As a result, 1,031,202 hypertensive patients indicates a serious epidemiological problem, in that almost 25% of the adult population in Portugal has hypertension.

From the qualitative data obtained during GP interviews, we can identify hypertensive patients within particular age bands, and can disaggregate these data to show the total number of hypertensive patients by sex and age. See Table 9.2 for details.

TABLE 9.2: *Number of Hypertensive Patients by Sex and Age*

Age Group	Hypertensive Patients	HYPERTENSIVE PATIENTS BY GENDER		TOTAL PERCENTAGE
		MALE	FEMALE	M + F
Hypertension	M + F			M + F
« 15	-	-	-	-
15 - 44	51,560	45 %	55 %	5 %
45 - 64	412,481	38 %	62 %	40 %
= » 65	567,161	35 %	65 %	55 %
TOTAL	1,031,202	-----	-----	100 %

As different medical authors (Birkenhager, 1996; WHO, 1996; Ridsdale, 1995; Beevers and MacGregor, 1995; Kaplan, 1994; Hart, 1993; Houston, 1992) have pointed out, hypertension is most common among people aged 65 years or older, for whom the risk factor for cardiovascular mortality caused by hypertension is particularly high.

9.6.2.2 *The Antihypertensive Diagram of the Market*

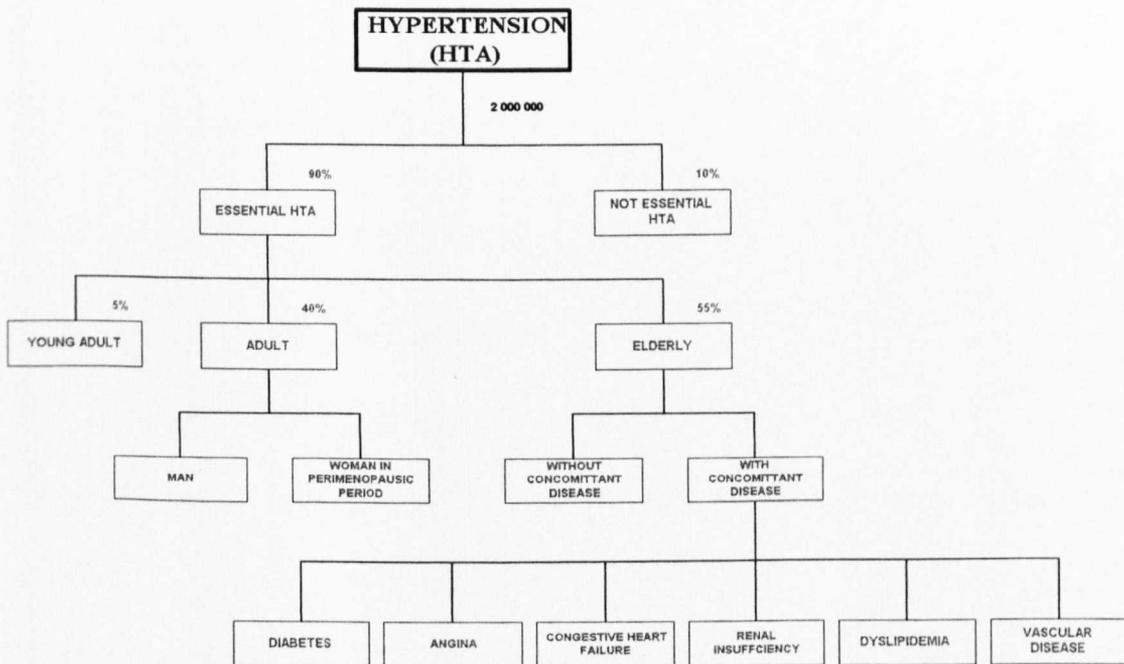
In absolute terms, the Table 9.2 indicates that hypertension is a much greater risk factor for cardiovascular events in *elderly* (55%) and *middle-aged* hypertensive patients (40%) than in *young-adult* hypertensive patients (5%).

Almost all Portuguese GPs agree that 90 % of their hypertensive patients have essential hypertension. That is, these hypertensive patients have no concomitant disease and they present mild or moderate hypertension. To treat them, most doctors initially focus on lifestyle modification, without drug therapy. However, Portuguese GPs were aware that compliance with lifestyle modification is very difficult to sustain, indeed medical guidelines suggest only a very short period of time.

When initial attempts to change a patient's life style are unsatisfactory, and first-line drug therapy is necessary, the *Liberal* approach or the *Stepped-Care* approach is implemented. This logical, therapeutic sequence in the GPs' approach provides important information for developing a quantitative disaggregation of the market in terms of the most important hypertensive patient typologies that were previously defined. In order to construct a diagram of the market, however, it is also important to know how many hypertensive patients there are in Portugal. Since official statistics were not

available on this topic, a doctoral thesis on hypertension was obtained from a well known, Portuguese opinion leader who is a cardiologist in Lisbon (Carrageta, 1985). This source of secondary data suggests that there are around two million people with HTA in Portugal. By incorporating this information, it becomes possible for any pharmaceutical company to construct a diagram of the antihypertensive market.

Figure 9.2 - Diagram of the Antihypertensive Market



More than ten years ago, a British strategists on marketing planning for the pharmaceutical industry pointed out that it is possible to develop a “*diagram of the market quantified by the number of patients in each segment. This may reveal*

interesting features, such as segments with few patients, receiving few scripts, but each script being of considerable value - indicating either the use of high-value drugs or large scripts being written for chronic treatment. Only when a market has been set out in the above manner with segments which are quantified by volume, value and possibly patient numbers which are based on the actual competition which exists in each segment, can we begin to see the real and often vital opportunities which are necessary to ensure future growth” (Lidstone, 1987: 30). After constructing such a diagram, it is then possible to use prescription audit data to identify:

- the number of prescriptions written per year;
- the cash value of each segment;
- the number of patients treated per year; and
- the competitors operating in each segment.

Thereafter, we can determine how competitors are positioned with respect to the relevant patient typologies - therapeutic categories: *“In order to select the most effective market position, the marketing manager needs to begin by identifying the structure of the market and the positions currently held by competitors”* (Evans et al., 1996: 169). That is, with a diagram of the antihypertensive market, any pharmaceutical company can understand the structure of the market in order *“to define its scope in terms of the set of product-market targets in which it wishes to develop or maintain a presence”* (Corstjens, 1991: 19).

9.6.3 A Better Understanding of GPs' Needs, Attitudes and Opinions

The third managerial implication concerns how managers might better understand the needs, attitudes and opinions of the GPs they are seeking to influence: *“Research is needed to establish not only market sizes, segments, shares, distribution channel volumes, and so on, but also the changing patterns of needs, attitudes and opinions at all levels in the market map”* (Lidstone, 1987: 34).

With the construction of the diagram of the market in terms of *patient typologies* and *first-line drug therapy*, it becomes possible to gain a better understanding of doctors' changing patterns of prescribing in order to find new markets: *“Pharmaceutical companies seek new markets for maturing brands by searching for applications in new therapeutic areas. For example, Merck's Enalapril was first approved for the treatment of hypertension and later it was allowed for use in cases of congestive heart failure”* (Doyle, 1994: 177-178).

That is, *the PTM* gives pharmaceutical companies the opportunity to understand how demand is derived ultimately from the prescriber, which is critical for planing future strategic direction⁴.

⁴ *“A strategy can be defined as a set of decisions taken by management on how the business will allocate its resources and achieve sustainable competitive advantage in its chosen markets. Strategy, therefore, sets the direction of the business in which products and markets it is going to invest its resources and efforts – and the means of getting there – how it is to create customer preference in these areas”* (Doyle, 1994: 17-18).

9.6.4 Formulating Marketing Strategies for the Market Pioneer

There are a number of implications for the formulation of appropriate marketing strategies which arise from this study. For example, by using *the PTM*, the *pioneer company* can define not only the best selection of target-market segments and the positioning strategy for the new therapeutic category of angiotensin II antagonists, but also the most convenient moment to initiate new uses for the product in accordance with the different hypertensive patient typologies:

“As the market moves into the growth stage, the marketing strategy needs to change. The strategic objective is still fast growth, but the focus moves on to developing new market segments, finding new uses for the product and building market share. The target market must change from the innovators to the more typical segments that constitute the mass market” (Doyle, 1994: 146). For example, *Stepped-Care* followers can be “invited” to use the new therapeutic category of angiotensin II antagonists for the treatment of *elderly* hypertensive patients with *renal insufficiency*.

Another potential marketing strategy for improving *the pioneer* company’s market share is to launch an *extension* of the original product:

“Discovering opportunities for product modifications., required careful and focused attention to physician and patients needs and preferences at the level of a therapeutic area” (Buzzell and Quelch, 1988: 99).

For example, in order to influence the *Liberal* followers, it is possible to launch the *association in fixed dose* of the *angiotensin II antagonist* with a *diuretic* for *elderly* patients.

In the case of the *Stepped-Care* followers, it would be possible to stress the importance of this “new” association in fixed dose between the *angiotensin II antagonist* (AIIA) and the *diuretic* for *elderly* hypertensive patients whose blood pressure (BP) is not satisfactory with the use of only the *diuretic*. In this way it is easier to satisfy the needs of *Stepped-Care* followers in terms of the treatment of the *elderly* hypertensive patients. The *pioneer* pharmaceutical company can use the association in fixed dose between the AIIA and the diuretic not only to influence the *Stepped-Care* followers but also to be one step ahead of *market challengers* when they decide to present their new AIIA: “*Improvements or modifications are achieved by redesigning, remodelling, or reformulating so that the product satisfies customer needs more fully. This strategy seeks not only to restore the health of the product, but also sometimes to help in distinguish it from those of competitors*” (Smith, 1991a: 283).

However, product modifications are also available to *market challengers* who can use *the PTM* for their own *marketing strategies*.

9.6.5 Formulating Marketing Strategies for the Market Challenger

With *the PTM* not only the market *pioneer* but also the market *challenger*⁵, or even a *niche*⁶ pharmaceutical company, has the opportunity to define the structure of the hypertension market in order to develop their marketing strategies: “*At the early stage of the market the two most effective strategies for the challenger are to seek new market segments or new attributes*” (Doyle, 1994: 150).

If the pioneer has decided to launch the new therapeutic category of the angiotensin II antagonists for hypertension in general, without defining the differences in terms of the first-line drug therapy between *Liberal* followers and *Stepped-Care* followers, then there is a window of opportunity for competitors to exploit both the structure of the market in terms of patient typologies and the duality of the philosophies of prescribing. For example, the challenger may decide to position its new angiotensin II brand for *hypertensive women*, but not only for the *elderly*, but also for *perimenopausal* patients⁷.

⁵“*A market challenger is a company that seeks to wrest the leadership of the market from the current front runner*” (Doyle, 1994: 149).

⁶“*A niche company focuses on a single, narrow market segment. While larger companies pursue multi-niche strategies, a niche company pursues a single niche*” (Doyle, 1994: 154).

⁷ The option of a gender-specific positioning strategy implies that the pharmaceutical company will decide to choose only 60% of the actual Portuguese hypertensive market: $412,481 * 0.62 + 567,161 * 0.65 = 624,393$; $624,393 / 1,031,202 = 0.6055$; $0.6055 * 100 = 60.5\%$ of the market (see Table 9.2).

According to Doyle (1994), a second strategy that can be put forward by the *challenger* that of *offering new attributes* which must differ from those provided by the leader. However, it is important to bear in mind that the selection of attributes has to be done in accordance with customers needs, otherwise pharmaceutical companies may experience adverse results if they decide to develop an attribute definition that is not in line with doctors' needs. For example, if we assume that some "Pharmaceutical companies develop drugs for hypertension which are smaller, longer lasting or faster acting" (Doyle, 1994: 153), with the exception of "*longer lasting*" drugs, the Means-End Chain approach demonstrates that the other two attributes would be irrelevant from the GPs' perspective. However, "*longer lasting*" is a critical attribute of *elderly* hypertensive patients because it determines an improvement in terms of *compliance* with the therapeutic regime, of *once a day first-line drug therapy*. Therefore, attributes such as *efficiency* with a *simple dosage* (e.g., *once a day*) that were found relevant on the *Means-End Chain* model can be used. *Less or no side-effects* can be linked with *efficient* and *simple dosage* for attribute definition because the MEC model also suggested that *less or no side-effects* improve *compliance* with the therapeutic regime.

A dialectic reflection between *the PTM* and the *Means-End Chain model* is required to select the best product attributes for the positioning of the new therapeutic category of angiotensin II antagonists. That is, the *challenger* can “*provide new attributes beyond those offered by the pioneer or market leader*” (Doyle, 1994: 150). However, those attributes have to be different from the core or primary attribute offered by the pioneer or market leader:

“ICI’s invention of beta-blockers significantly reduced the blood pressure and heart rate for patients with hypertension. However, soon many competitors were offering this primary benefit and it no longer appeared as a discriminator. Customers take it as a given for any supplier. If new attributes do not appear, then the product becomes a commodity” (Doyle, 1994: 151).

The *challenger*, following the results derived from the *Means-End Chain model*, and based on *the PTM*, has to define new attributes that make sense for *Liberal* followers and *Stepped-Care* followers. In this way, it is possible to reinforce the advantages of product attributes against competitors’ offerings. This approach not only combines the doctors’ characteristics with the clinical context, but also assesses how well the marketing strategy meets the needs of the sub-markets in comparison with competitors’ offerings (Hooley et al., 1998).

9.6.6 *Formulating Marketing Strategies for Market Niche Companies*

Most large markets evolve from niche markets (Hooley et al., 1998; McKenna, 1988), and “*A successful niche strategy is based upon offering superior value to customers in one segment of the market*” (Doyle, 1994: 154). As a result, **niche** companies have to decide whether they are able to offer a new angiotensin II antagonist of superior quality (Dalgic and Leeuw, 1994) to any of the four hypertensive patient typologies that capture 90% of the market. For example, the pharmaceutical company Glaxo decided to use a ‘*black patient approach*’ as its patient typology strategy: “*Glaxo’s labetolol found an important market niche because targeted clinical trials demonstrated unique alpha-blocking properties important in the black patient market*” (Smith, 1991a: 295). However, in the Portuguese anti-hypertensive market “race/ethnicity” is not as important as in the American market (Hui and Pasic, 1997). As a result, if Glaxo wants to improve the labetolol market share in the Portuguese anti-hypertensive market only two patient typologies are appropriate: ***young hypertensive patients*** or ***hypertensive woman in perimenopausal period***. Therefore, Glaxo, and other companies, have to identify the ***Stepped-Care*** followers as their first-priority customer target because they are more interested in this type of therapeutic category than their peers who follow the ***Liberal*** approach.

9.6.7 Product Positioning Strategy

With *the PTM*, the interaction between target-market selection and positioning⁸ can be emphasised:

“Together with the selection of target-market, the positioning decision is of crucial importance to the success of a new product launch or the revitalization of an existing product. The key aim in positioning is to offer a benefit to the target-customer that competing products cannot offer or are not offering” (Cortsjens, 1991: 63).

As new products continue to be the life blood of the research-intensive pharmaceutical industry, the new therapeutic category of angiotensin II antagonists is a good illustration of the importance of *the PTM* for the *inter-therapeutic* positioning strategy.

The PTM confirms that doctors have clinical values (i.e., each patient typology is attached to a therapeutic category) that guide their prescribing behaviour. Therefore, *inter-therapeutic* positioning must define the advantages of the new therapeutic category of angiotensin II antagonists over the other therapeutic classes.

⁸ “The term “positioning” refers to placing a brand in that part of the market where it will have a favourable reception compared to competing products” (Smith, 1991a: 295). However, approaches to a positioning strategy take many forms. Among these is “inter-therapeutic positioning”, which is a product class positioning.

In line with this reasoning, the *inter*-therapeutic positioning must emphasise the *advantages* of the new therapeutic category of *angiotensin II antagonists* over the *ace inhibitors*, particularly in terms of *side-effects*. However, *inter*-therapeutic positioning, which accords with *the PTM*, must also be linked to hypertensive patient typologies which are concrete and which are the most important. That is, in order to develop a *inter*-therapeutic positioning strategy, the market has to be represented from the perspective of the GP, i.e., in terms of their daily, clinical practice. With this information, the relationship between product-market targets and the *inter*-therapeutic positioning becomes easier because it is possible to investigate the various segments of the market in terms of:

- *the type of condition for which the product will be prescribed*
- *the type of patient for whom the product will be considered suitable*
- *the products with which it will compete most closely*

At this point, it is important to bear in mind that: “*Positioning is first and foremost a communication strategy and any failure to recognize this will undermine the whole of the marketing mix*” (Evans et al., 1996: 169). It follows that patient typologies might wisely be defined on the basis of differences in perceived clinical values, with copy and media strategy designed accordingly.

9.6.8 Communication Strategy

Results from the factor analysis presented in Chapter Eight demonstrate that doctors are not passive recipients of clinical information. GPs were found to be cognitively aware, and active processors, of different sources of drug information, particularly from pharmaceutical manufacturers and health authorities. However, the pharmaceutical manufacturers' communications strategies were found not to be very reliable. Therefore, pharmaceutical manufacturers need *to improve their credibility in terms of the drug communication process*. One first step to improve their credibility is to develop the drug communication process in accordance with GPs' daily clinical activity. In other words, the communications strategy should be organised according to the hypertensive typologies that are important to the therapeutic decision process. This factual information should be selected in accordance with the *clinical values* represented by the *Liberal* and the *Stepped-Care* approach. That is, *the PTM* should guide the definition of the components of the communications strategy. Traditionally, the pharmaceutical industry has relied on the manufacturer's sales representatives to convey its message to health care providers, and product attributes have usually been emphasised in this communication process. However, MEC results have shown that this approach is inadequate.

A new, innovative way to advertise and promote anti-hypertensive therapeutic categories should be focused on hypertensive patient typologies. This communication strategy implies that the manufacturer's sales representatives receive adequate training on *the PTM* in order to develop specific messages for *Liberal* followers and *Stepped-Care* followers. That is, in their communication process to GPs, manufacturer's sales representatives should emphasise the advantages of their therapeutic category over the other competitors' therapeutic categories. Putting across the therapeutic category, attached to specific patient typologies, in order to reinforce the clinical values of the *Liberal* or the *Stepped-Care* followers, should be the overall goal of the communication process. Such an approach focuses on fostering the appropriate use of the pharmaceutical category. The communication impact is stronger because the message is aligned with medical trends in terms of health authorities' therapeutic bulletins, which in turn derive from international medical guidelines for the management of hypertension.

If we assume that what is needed is not an adversarial but a co-operative relationship between the health authorities' drug communication strategy and the pharmaceutical industry's drug communication strategy, then the credibility of the messages will be improved as a result.

This ***medically relevant communication*** process is also the best approach not only to obtain product category acceptance but also to improve sales:

“In this way, medically relevant communication harnesses the power of good medicine to enhance product acceptance and to increase sales by focusing on a convergence of three sets of needs: those of the patient, those of the product, and those of the company. Communication around the convergence point can take place honestly and openly because everyone benefits. This communication technique works at every stage of a product’s life cycle, as long as good medicine is involved” (Cearnal, 1992: 25).

With this ***medically relevant communication*** process it is possible to develop a stronger emphasis to factual information included in advertising strategies for changing or reinforcing the ***Liberal*** and ***Stepped-Care*** followers’ antihypertensive drug choice. In line with this reasoning, drug advertisements may be seen as constructing a certain type of reality about the nature of a drug, the typical illness it is used to treat, a typical patient with the illness and typical causes of the illness. The message of the drug advertisement is not only in the written information, but also in the overall ‘image’ conveyed. That is, part of the imagery is in the types of people who are portrayed for different types of problems (e.g., *Hypertensive Woman in Perimenopausal Period*) and the way these people are portrayed.

9.6.9 Diffusion of Therapeutic Innovations

It has been pointed out that ethical pharmaceutical manufacturers employ the diffusion of innovation⁹ theory (Rogers, 1983) more often than in the past:

“Today, companies employ this diffusion of innovation theory through the use of more advisory board activities, symposia, and video conferences, as well as by more effective use of disseminated clinical investigations. All of these techniques provide more extensive information to appropriate audiences earlier in the product’s life cycle. In this way, information is available to potential users and opinion leaders much earlier than in the past” (Cearnal, 1992: 24).

However, it has been recognised that the diffusion of innovation is not the appropriate approach when we want to understand the characteristics of innovators or early adopters: *“This ex post classification has some logical advantages but is of little operational use to those interested ex ante in the characteristics of adopters of newly-launched innovations”* (Foxall, 1993: 56). As a result, the diffusion of an innovation such as the angiotensin II antagonists has to be implemented in accordance with the characteristics of GPs.

⁹ “Rogers defines innovativeness operationally by the elapsed time between the launch of an idea or product and its adoption; innovativeness varies inversely with this period. This measure permits a definition of successive groups of adopters, from the most to the least innovative on the basis of standard deviations from the mean adoption time of the entire market. The five adopter categories conceptually identified by Rogers on this retrospective basis are Innovators (who comprise 2.5 per cent of the final market), Early Adopters (13.5 per cent), the Early Majority (34 per cent), the Late Majority (34 per cent), and Laggards (16 per cent)” (quoted from Foxall, 1993: 56).

In other words, any ethical pharmaceutical manufacturer that decides to launch a new angiotensin II antagonist has to be aware that *Liberal* followers and the *Steped-Care* followers are different in terms of drug innovativeness. Although ethical drug manufacturers' representatives are used to discussing doctors' prescribing behaviour with local pharmacists (Rawlins, 1984), this approach is inadequate for identifying innovative doctors. To improve manufacturers' representatives skills in terms of the communication process, their discourse has to be organised in accordance with the clinical values of the *Liberal* followers, who were found to be the more innovative doctors. As innovators, their prescribing behaviour will be observed by other *Liberal* early adopters who tend to start prescribing the new angiotensin II antagonist in the first stage of the product's life cycle. The process may be faster if manufacturers' representatives are able to organise their discourse in terms of *medically relevant communication*. This approach emphasises the medical guidelines for the management of hypertension a requirement of which is to present the new angiotensin II antagonist attached to specific hypertensive patient typologies. The advantages of this new therapeutic category will be compared with the other "old" drugs on those specific patient typologies. This allows more innovative *Liberal* followers the opportunity to reinforce their

“independence” from the therapeutic advice put forward by health authorities’ drug bulletins (i.e., *Stepped-Care* approach). Their prescribing behaviour tends to be observed by less *Liberal* innovative peers who may recognise the advantages of the new new angiotensin II antagonist over the ace inhibitors.

Pharmaceutical manufacturers do not, however, only use their representatives for promoting their products to GPs, but also rely on a large, innovative and efficient range of public relations activities as the next section goes on to discuss.

9.6.10 The PTM: The Link Between the Marketing Department and the Medical Department

The majority of public relations activities are industry-sponsored educational programmes. As pointed out in Chapter Three, pharmaceutical industry-sponsored educational programmes range from ‘scientific’ events such as workshops, symposia, seminars, lectures, video conferences, or clinical research activities to “special dinners” with an “independent” guest speaker who is an expert in a specific therapeutic area. Since opinion leaders have been found to influence the prescribing behaviour of GPs, the Medical Department has to provide these opinion leaders with the most updated

scientific data on the new therapeutic category of angiotensin II antagonists. However, it is clear from this study that scientific information should be organised in accordance with the hypertensive patient typologies so that drug manufacturers can link the *Marketing* department and the *Medical* department to an external source of information (i.e., opinion leaders) in order to supply *problem-oriented clinical information*. Therefore, a ***patient typology*** approach has to be developed in order to place the ethical drug manufacturer's marketing activities within the wider frame of the *Medical* department.

A closer relationship between the *Marketing* department and the *Medical* department enables the pharmaceutical company to collect, evaluate, and disseminate general medical data and information in a more logical and comprehensive way. In other words, ***the PTM*** calls for an appropriate level of concentration and specialisation in communication strategy towards selected ***patient typologies*** rather than single product attributes. The model also enables not only the opinion leaders (i.e., the external source of information), but also a pharmaceutical manufacturer's representatives, to discuss and provide the GP with information in a much more systematic and realistic way. Again, the goal is *to provide information* that is in line with the *GPs' daily clinical activity* in terms of hypertensive *patient typologies*.

This approach is expected to be more effective at speeding up the diffusion of a new therapeutic category, such as the angiotensin II antagonist, than promoting prescribing through “*rewards on a breathtaking scale*” (Rawlins, 1984: 276). Moreover, *the patient typology* approach is in harmony not only with the Portuguese Pharmaceutical Industry’s code of practice, but also with the “*IFPMA Code of Pharmaceutical Marketing Practices*”, the “*European Code of Practice for the Promotion of Medicines*”, and the “*Ethical Criteria for Medicinal Drug Promotion*” of the WHO. That is, drug promotion based on *the PTM* guarantees high standards in all pharmaceutical manufacturer’s communications with the medical community, which is ultimately in the best interests of the patient. As a result, drug promotion by the pharmaceutical manufacturer may be based on both the letter and the spirit of medical education. For example, the *Liberal* followers or the *Stepped-Care* followers may receive more precise information related to their daily clinical activity in terms of drug management of hypertension according to:

- the pathophysiology of the different hypertensive patient typologies;
- their therapeutic approaches;
- the advantages and possible disadvantages of different therapeutic categories as first-line drug therapy; and
- style of life of hypertensive patients and drug therapeutic approach.

Therefore, it should be emphasised that inter-departmental activities of the *Marketing* department and the *Medical* department should apply *the PTM* as the framework within which to develop drug promotions based on medical education:

“As these techniques are combined with the more traditional ones, the classic areas of sales and promotion are moving closer to medical education. They are, in fact, beginning to overlap. This is understandable because the world of the 1990s is a much more complicated one” (Cearnal, 1992: 24).

Following a medical education perspective, *the PTM* assumes that *“if the patient is put first and the promotion is done responsibly through truth well told, maybe education and promotion can take place at the same time... Putting the patient first should be the common goal of regulatory control and those advocating the free flow of information in the pharmaceutical market place”* (Pathak et al., 1992: 4).

Also, all the external marketing communication material, which includes any written or verbal product-related communication, such as mailings to doctors and pharmacists, patient information brochures, journal advertisements, detailing aids, hand-outs, material used in exhibitions, posters, audio-visual material, and promotional gifts needs to embrace an educational approach in accordance with *the PTM*.

9.6.11 Marketing Strategy and R&D Projects

As *the PTM* follows a medical education perspective, it offers a framework for understanding the informational effects of promotion programmes from a marketing and medical perspective, which can be used to link marketing strategy and R&D projects.

Smith (1991a) has argued, persuasively, that traditional approaches to new product development and marketing in the pharmaceutical industry, perhaps as in no other industry, require the close and efficient co-operation of the research and marketing functions in the firm. That is, the interface between basic research that tries to transform a chemical entity into a successful drug product and marketing is critical:

“The success of a pharmaceutical firm is the result of more than just the efficiency of its research and development (R&D) laboratories, however, because the input of research is essentially information that is used by manufacturing and marketing to make and to sell products. For the pharmaceutical firm to be successful, these three key functions must operate in an integrated and productive manner” (Smith, 1991a: 284). However, *“In the past the pharmaceutical research process has been based on a screening approach. Thousands of compounds were investigated for their effects. This trial and error method precluded a strategic role for marketing since the clinical nature of the discovery determined the target market”* (Doyle and Monteiro, 1994: 290).

In order to reinforce the strategic role for marketing in the development of new pharmaceutical products, it is necessary to have a common basis of reflection both for the scientists who investigate the effects of compounds and for the marketing strategists. *The PTM* can be used as a formal statement of marketing interests and opportunities in various anti-hypertensive therapeutic categories attached to different patient typologies which are then presented to research scientists as a guide to research decision making in the selection of R&D programmes and projects within the hypertension market. Marketing managers and R&D scientists have a new tool to develop the foundation for a rational drug discovery, which starts with a specific *patient typology* and seeks to engineer compounds to effect it in accordance with the *Liberal approach* and the *Stepped-Care approach*. The clinical values that guide the *Liberal approach* and the *Stepped-Care approach* are vital information to research scientists who will try to develop new anti-hypertensive therapeutic categories according to doctors' needs. In line with this reasoning, marketing managers and R&D scientists have to be able to use *the PTM* as the best tool to understand the hypertension market from the point of view of their customers:

“The first step towards a strategy, as it is to building a house, is to lay the foundation.

To clearly and comprehensively understand “what is” in the market place”
(Lawson, 1997).

In addition to the strategic interactions between marketing managers and research scientists that are supposed to occur during the new product development stage, pharmaceutical companies may also use *the PTM* to reflect on a possible extension of the product life cycle of existing therapeutic categories: *“Because of the decline in the evolution of new chemical entities over the past two decades, there has been more emphasis on “defensive” projects, those aimed at prolonging the life cycle of currently marketed products”* (Smith, 1983: 157). However, these “defensive” projects require that the pharmaceutical company is able *“to position the product effectively both to the new consumer group and against current competitors. For example, Ciba-Geigy’s Voltaren was among the world’s top-selling pharmaceutical product with sales of almost £ 1 bn. Its primary use was a pain-reliever for elderly rheumatic patients. However, by the late 1980s, profits and sales were flattening out as the product’s patents expired and low-priced generics entered the field. But in the 1990s the company’s marketing strategists identified a new target – athletes and sportspeople who suffered muscle strains and bruises on the field. Voltaren was reformulated to be quicker-acting and a rub version was sold alongside the original tablet form (Doyle, 1994: 375-376).*

9.7 Research Contributions

1. Doctors do not prescribe drugs in general; they do so to solve the concrete problems of patients. As medical training is based on a problem-solving approach (Chantler, 1999; Harris and Richard, 1996), the nature of the disease and/or the condition of the patient is one of the prime factors upon which doctors base their selection and prescription of drugs. That is, doctors group hypertensive patients into different categories according to the features they emphasise most. This categorisation process takes place in every daily medical activity through an ongoing process of adaptation to patient typologies. This organisation of clinical knowledge in a doctor's memory greatly simplifies and otherwise facilitates his/her drug choice.
2. The cognitive input information that GPs use to define patient typologies is mainly related to patients' age, sex, comorbidity and/or risk factors. The combination of these factors is important for defining patient typologies which, in turn, are the prime factor upon which doctors base their selection of therapeutic classes.
3. Thirteen patient typologies were found to be particularly important to the GPs' daily clinical activity concerning hypertensive patients. Four of them are relevant to the categorisation of Portuguese GPs as *Liberal* and *Stepped-Care* followers.

4. Assuming that “*establishing the personal relevance of a product or service should be a primary objective of marketing strategy*” (Olson, 1995: 189), each anti-hypertensive therapeutic class was attached to a concrete patient typology.

5. The *Liberal* followers and the *Stepped-Care* followers organise their therapeutic approach around five main anti-hypertensive therapeutic categories. However, the former prefer to prescribe *ace inhibitors* while the latter assume that *diuretics* are the best *first-line drug therapy*.

6. Segmentation, targeting, positioning and promotional strategies were developed according to the *Liberal approach* and the *Stepped-Care approach*. These marketing strategies were defined not only for pioneers and challengers, but also for niche pharmaceutical companies.

7. Pioneers, challengers and niche pharmaceutical companies may use *the Patient Typology Model* for designing segmentation, positioning and promotional strategies in order to obtain a “*sustainable differential advantage*” (Doyle, 1990: 6) for a successful pharmaceutical brand.

8. *The Patient Typology Model* may help to establish a close relationship between the *Marketing* and the R & D departments, which, it has been suggested, does not occur within most pharmaceutical companies (Doyle and Monteiro, 1994). This is important because “*a typical pharma company spends twice its R&D budget on marketing and sales*” (Boscheck, 1996: 637).

9. *The Patient Typology Model* may prove to be a useful tool not only for guiding pharmaceutical companies in their development of successful brand innovations but also for improvements to current drugs. Thus, the risk and the extensive research and development costs of new product development in the pharmaceutical industry (Agrawal and Calantone 1996; 1995) may be reduced.

10. *The Patient Typology Model* may represent a new avenue of research that is open to medical education in terms of doctors' prescribing behaviour. Patient typologies are an interesting and new avenue of research on doctors' prescribing behaviour in primary care.

11. Ethical drug manufacturers can no longer just react to events around them; they must be proactive and develop innovative marketing strategies (Doyle, 1994). *The Patient Typology Model* may be an useful tool to develop these new strategies within the hypertension market, which may help to assure profitability in an increasingly competitive environment as well as assist them in moving into expanding markets.

9.8 Limitations/Criticisms of the Present Research

When considering the results that have been presented and the consequent findings and managerial implications, five limitations should be noted:

1. The generalizability of this study is limited to primary care. Therefore, only the first-line drug therapy of GPs for the treatment of hypertensive patients was analysed. *The findings from this clinical context and group of doctors may not reflect the decision-making process and drug choice of other medical specialities or other clinical contexts.*
2. The results of this study were based on doctors' self-reported data. As pointed out in Chapter Seven, *we can not exclude the possibility that GPs' answers represent their knowledge about the national and international medical guidelines for the management of hypertension rather than their actual prescribing behaviour.*
3. From the categorisation perspective, GPs' knowledge about therapeutic categories forms at least partially integrated (i.e., schema-like) structures in long-term memory. Such memory structures are composed, at a minimum, of similarly perceived/judged patient typologies and associated therapeutic knowledge. In evaluating alternative categorisation models it may be useful to recall that the rationale underlying this study is primarily

functional rather than representational: *by grouping patient typologies together that are alike in important clinical values, we enhance information processing efficiency as well as cognitive stability.* This implies that GPs adopt typology identification strategies that maximize the clinical information from each clinical stimulus, ensure that the patient typology will be attained with certainty, minimize errors on the way to therapeutic solution, and minimize cognitive strain. *Such typology identification “strategies” would presumably lead to formal structures knowledge in memory, and such categorical knowledge would act as input in a problem-solving clinical context to determine prescribing behaviour.*

This requires that all clinical values of a patient typology should be equally representative and that learning a patient typology consists of discovering its defining clinical values. In accordance with this *active problem-solving clinical context*, GPs are assumed to use *analytic cognitive processes*. However, Denig and Haaijer-Ruskamp’s (1992) model suggests that such an *analytic cognitive process* may be deliberate as well as *automatic* depending on clinical task and other clinical contextual aspects:

“if the drug choices are not based on active problem-solving, suboptimal choices might be the result of poor habits” (ibid: 11).

Our *active problem-solving clinical context*, in summary, *better addresses easily definable and unambiguous patient typologies and related learning clinical contexts*; as such, *it may not provide a very accurate account of the categorisation process in complex clinical settings such as cardiologists' prescribing behaviour*.

4. As pointed out above, the PTM assumes that GPs use *analytic cognitive processes* on drug choice. Thus, *nonanalytical cognitive processes* of the prescribing decision maker were not analysed. This cognitive style may be important on therapeutic decisions, particularly after many repetitions of the same clinical situation. Using the PTM, we discussed the concepts that, in a first analysis, look the most important in GPs' categorization process, *but we do not assume our analysis to be complete or exhaustive*.
5. As we pointed out previously, a weakness with the MEC model and its laddering procedure is that it stops with a description of values and *does not relate these formally to cognitive processes*. This was the main reason why we decided to develop the PTM. Nevertheless, means-end chain theory and the laddering methodology have been used recently by prestigious researchers (Bagozzi and Edwards, 1998; Bagozzi and Dabholkar, 1994). For example, Bagozzi and Dholakia (1999) reported that: "*The means-end chains derived from qualitative laddering procedures have*

been found to yield intuitive descriptions of the hierarchical values structures believed to motivate consumers to seek a product/service or brand and have provide guidance in managerial decisions such as advertising copy and strategic advertising design decisions” (ibid: 22). However, these researchers also pointed out an important disadvantages of MEC which is directly related to its validity: “the theoretical foundation for the validity of measures in a means-ends chain, from the point of view of cognitive psychology, can be challenged. The linkages among values in the hierarchy are especially open to question if we accept the argument that (1) mental processes (e.g., the presumed personal inferences underlying means-ends connections) are not open to self explication ... or (2) self-knowledge is incomplete ... but instead that the linkages constitute subjective, post hoc interpretations of previously generated responses” (ibid: 22). The findings from MEC and its laddering procedure (see Chapter Five), as well as the categorization process of Portuguese GPs according to their philosophy of prescribing (see Chapter Eight), suggest that the PTM provides new and interesting insights to pharmaceutical manufacturers in many ways. For example, clinical values derived from the laddering methodology represent a topic of immense potential for pharmaceutical marketing managers in the 21st century. If they use them, the line dividing pharmaceutical promotion and pharmaceutical education becomes less obscure.

9.9 Recommendations for Future Research

Further research should investigate the application of *the Patient Typology Model* to other therapeutic areas. As “reports indicate that anywhere from 50% - 70% of all prescriptions for psychotropic drugs used to treat panic disorder are written by primary care physicians” (Freeman et al, 1993: 34), who have different types of prescriptions (Beardsley, 1988), we would suggest this particular therapeutic area. Furthermore, doctors working in mental health clinics were found to use *typologies* to determine drug choice:

“In crowded settings such as mental health clinics or hospital emergency rooms in which over-burdened professionals provide clients with treatment services, *typifications* or *typologies* are used to determine the form and priority of treatment” (Spiggle and Sanders, 1984: 339).

There is variation in the contemporary care of different patient typologies in the Portuguese antihypertensive market. Nevertheless, Portuguese GPs’ drug choice is consistent with current literature demonstrating decreasing reliance on *diuretics* and *beta-blockers* (Nichol et al., 1997; Monane et al., 1995), and increasing reliance on *ACE inhibitors*. That is, the results suggested that the *Liberal* and the *Stepped-Care* approaches mirror the two opposing views taken by different medical guidelines that have been advanced for the management of hypertension.

Nevertheless, *these results must be considered as a starting point for future research, not an end in themselves. As a result, further studies are required to determine the reasons underlying GPs' non-compliance with the antihypertensive guidelines established by the Portuguese National Institute of Pharmacy and Medicines (Therapeutic Bulletin, 1998; 1997).*

9.10 Conclusions

Doyle and Monteiro (1994) have pointed out that *academic studies of pharmaceutical marketing have been surprisingly rare.* Issues of *data confidentiality* may explain this reality. Furthermore, the drug industry and the health authorities, with their different strategies, are trying to avoid criticism about ethical drug manufacturer's influence on doctors postgraduate education: *"Yet marketing data, most of which are rarely made available, show that such promotions do influence sales of their products. Some general practitioners have suggested that the powerful influence of drug companies may be their main source of postgraduate education"* (Smith, 1986: 906). However, with the experience and the roots of the researcher in the pharmaceutical market, it was possible to overcome the problem of data confidentiality and to obtain support both from one of the world-leading pharmaceutical companies and from the Portuguese health authorities.

With their support, the *aim* of the present research was:

- to conceptualise a new theoretical framework, *The Patient Typology Model* (PTM), in order to *categorise Portuguese GPs* in accordance with their *first-line drug therapy to hypertensive patients*.

The PTM was used to organise the entrance of the explanatory variables into the multiple logistic regression model (MLRM), in accordance with the following objectives:

- to establish which sources of drug information are used by Portuguese GPs to organise their first-line antihypertensive drug therapy;
- to identify demographic and clinical characteristics of hypertensive patients that influence Portuguese GPs' first-line antihypertensive drug therapy; and
- to analyse whether Portuguese GPs' practice and personal factors influence first-line anti-hypertensive drug therapy.

In this study we decided to combine **qualitative** and **quantitative** market research to evaluate whether patient typologies influenced GPs' drug choice. The same approach was recently adopted by the pharmaceutical manufacturer Eli Lilly and Company:

“The value we create by emphasizing the why of the findings, not just what the findings are. More open-ended questions are being added than in the past, resulting in more combined quantitative and qualitative market research studies” (Lawson, 1997: 255).

Literature on methodological aspects of field research on the use of drugs in Third World countries also suggested that:

“A questionnaire approach to acquire insight on drug use, becomes more meaningful when it is complemented by qualitative interviewing and observation” (Van Der Geest and Hardon, 1988: 155).

It has been known for a long time that the GPs differ in their prescribing behaviour. Although acknowledged as highly important, the possible causes of the differences have not been studied more thoroughly. Pharmaceutical marketing strategists have sometimes strong opinions in this regard, however these opinions have – at least in their majority – not been tested empirically.

The results from both the MLRM and the MEC approach suggest that the PTM is a useful tool to portray the cognitive structure of therapeutic classes in a manner which corresponds to the GPs' mental representations of daily clinical activity in terms of hypertensive patient typologies. Therefore, a key finding is that the *first-line drug therapy* is a function of *the patient typology*. These cognitive schemas are *“learned, internalised patterns of thought-feeling that mediate both the interpretation of on-going experience and the reconstruction of memories”* (Strauss, 1992: 3), and they have the potential of instigating action (D'Andrade, 1992). Under schema-based processing, new information is first categorised, and then a schema is activated (Fiske and Neuberg, 1990).

The perception and remembrance of information and subsequent inferences based on new information tend to be schema-consistent, although a factor such as the situational complexity may moderate this relationship (Fiske and Taylor, 1991).

In line with the reasoning that has been advanced, the categorisation process of Portuguese GPs as *Liberal* followers or *Stepped-Care* followers reinforces the constraints imposed by a given *clinical usage context* (i.e., a given patient typology) to define *first-line drug therapy*.

Previous research on the relationship between situation in use and product-market structure pointed out the importance of product category knowledge structures (Ratneshwar and Shocker, 1991; Alba and Hutchinson, 1987). Like these theoretical frameworks, the PTM essentially viewed the GP as a doctor engaged in an ongoing process of adaptation to a complex clinical environment of usage contexts and therapeutic categories. One aspect of that adaptation is the cognitive activity directed at therapeutic classes as potential means for achieving ends (i.e., terminal values); usage clinical contexts set the stage for such cognitive activity by imposing constraints on the ends (Gutman, 1982). Therefore, the PTM presumes that GPs decide their first-line drug therapy in accordance with clinical terminal values (i.e., patient typologies) which

affect cognitive tasks such as evoking therapeutic classes from memory. With this vital perceptual information it was possible to present different pharmaceutical marketing strategies for pioneer, challenger and niche companies (Turner, 1991).

The emphasis on patient typologies led us to suggest a clinical value approach to product-market structure analysis in terms of segmentation, positioning and product attribute selection.

Defining the structure of the market in terms of relevant hypertensive patient typologies, the marketing strategist is able to use the *Liberal* or *Stepped-Care* followers' clinical values to suggest a new approach to the selection of R&D programmes and projects for new anti-hypertensive product development.

According to the PTM, the *Liberal* followers and the *Stepped-Care* followers are two distinct groups of GPs who require different therapeutic solutions for hypertensive patients. Therefore, a *inter-therapeutic* positioning strategy was advanced in accordance with the clinical values defined by *Liberal* or *Stepped-Care* followers.

Attitudinal data were also used to depict how *Liberal* followers or *Stepped-Care* followers perceived a broadly defined set of pharmaceutical product alternatives for *first-line antihypertensive drug therapy*.

These therapeutic categories were attached to specific patient typologies in order to examine how those alternatives relate to specific product usage in the clinical context of *Liberal* followers and *Stepped-Care* followers.

Portuguese GPs routinely employ patient typologies to simplify and routinize their antihypertensive prescribing behaviour. They learn the cognitive schemas and the cues for placing patients into those categories, as well as pharmaceutical strategies for dealing with the different patient typologies. In terms of *theoretical implications*, these pharmaceutical strategies reinforce the need for a shift in paradigm toward the identification of the relationship between patient typologies and therapeutic categories (as **suggested by medical guidelines**) rather than brand characteristics.

By providing Portuguese GPs with information about their overall prescribing characteristics within specific therapeutic classes, and comparing it to their actual prescribing behaviour within a '*patient typology approach*', we believe that pharmaceutical companies can achieve the objective of developing partnership relations with those GPs. However, pharmaceutical companies should concentrate on those patient typologies that are viewed by the GP as important on their daily clinical activity. By providing this service, pharmaceutical companies would not have to rely on personal relationships alone to influence Portuguese GPs to consider their company's products.

Our findings confirm the observations by McAlister et al. (1997) who reported an increase on the use of ACE inhibitors on BP treatment. Inhibitors of angiotensin-converting enzyme (ACE) have gained a leading role among antihypertensive therapeutic classes, which probably reflects the fact that Portuguese GPs who follow the *Liberal* and the *Stepped-Care* approaches did not select antihypertensive patient typologies which were free from other cardiovascular diseases. That is, *Liberal* followers and *Stepped-Care* followers organise their first-line antihypertensive therapy according to different clinical factors such as:

- the presence of target-organ damage, of clinical cardiovascular disease, renal disease and diabetes; and
- the presence of other co-existing disorders that may either favour or limit the use of particular categories of antihypertensive drugs.

Previous research into antihypertensive drug prescribing provided an ambiguous picture of the relationship between clinical factors and drug choice. Using the *PTM*, the results from the logistic regression analysis provide a beginning to a more precise understanding of this relationship.

By building on the work of different researchers, together with *concepts* derived from GPs' *cognitive structures* and *cognitive processes*, we found it possible and desirable to develop different hypertensive patient typologies useful for research and practice.

The *PTM* invokes not only *the patient typology* but also different *concepts* such as *sources of drug information*, *GPs' demographic profile*, and the *philosophy of prescribing* to explain how Portuguese GPs select their *first-line drug therapy*. Since access to medical care and prescribing of drugs are to a greater or lesser extent controlled by the GP, these explanatory variables are closely linked and must be examined conjointly in addressing the issue of antihypertensive first-line drug therapy. As a result, the *PTM* encapsulates the most trusted indicators to effectively change/reinforce antihypertensive drug choice.

In summary, *we propose a new avenue of research on doctors' prescribing behaviour*. Typically, studies have been preoccupied with assessing the relative influence of product characteristics. However, *the strength of the association between the patient typology and the therapeutic category* in terms of the *Stepped-Care* approach and the *Liberal* approach suggests that perhaps *more attention should be paid to medical guidelines (i.e., patient typologies) since they represent clinical values from which drugs are selected*.

Our *clinical values* were derived inductively from GPs' prescribing-relevant knowledge structures. The likelihood is low that *irrelevant clinical values* were identified or *salient* ones missed.

The philosophies of prescribing found in the present study also have similarities with, and can be interpreted from the perspective of, research done on the role of philosophies of prescribing in drug choice (see **Chapter Two – Flow Chart/Figure 2.2: Study Overview**). Likewise, our research has some overlap with research done on the influence of philosophies of prescribing in drug choice. For example, our study confirms that the *patient typology* is an important determinant of whether doctors took a “*conservative*” (i.e., *stepped care approach*) or a ‘*risky*’ (i.e., *liberal approach*) approach to drug choice. This was pointed out by Rawlins (1984) who suggested that pharmaceutical companies categorise GPs as “conservatives or “risk takers” and have different marketing strategies for these two groups (see **Chapter III – Section 3.9: Doctors’ Philosophies of Prescribing**). However, neither the theoretical framework, nor the empirical research was presented by Rawlins for supporting his assumptions.

In accordance with previous considerations, this exploratory study claims to have made important advances in the *conceptualisation of the research problem* and in the *research approach* employed (see **Chapter Two – Flow Chart/Figure 2.2: Study Overview**).

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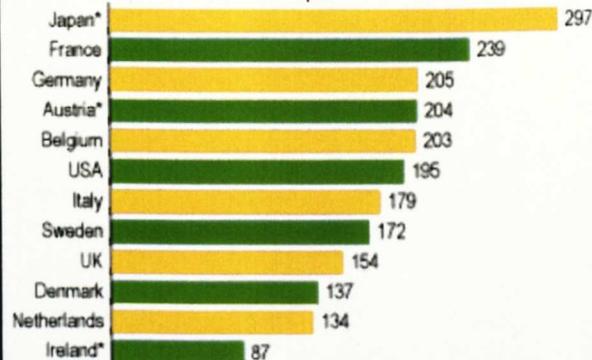
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Appendix One

Pharmaceutical Industry: A Global Industry

Pharma Facts and Figures Section 1 - A Global Industry

Pharmaceutical Consumption in various countries, 1997



Notes:

£ per person

*1996 figures

Pharmaceutical consumption includes prescription medicines,

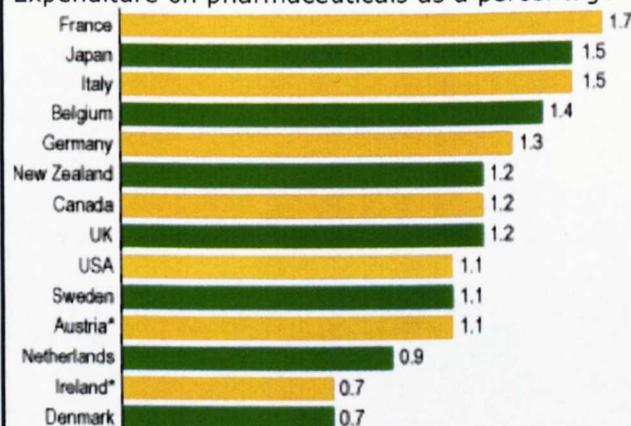
OTCs, sales tax/VAT and pharmacists' remuneration

Hospital medicines are excluded

Sources:

Health Data 1998 (OECD)

Expenditure on pharmaceuticals as a percentage of GDP in various countries, 1997



Notes:

Includes prescription medicines, OTCs, sales tax/VAT and

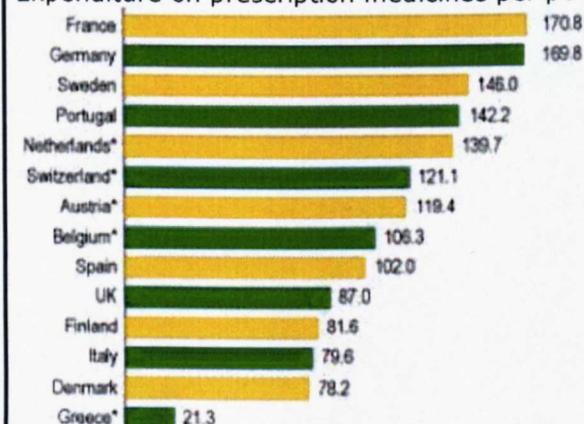
pharmacists' remuneration. Excludes hospital medicines

*1996 figures

Sources:

Health Data (OECD, 1999)

Expenditure on prescription medicines per person in various European countries, 1995/96



Notes:

£ per person

*1995 figures

Sources:

The Pharmaceutical Industry in Europe – Key Data

(EFPIA); Tal Og (MEFA)

Compendium of Health Statistics 1999 (OHE); SCRIP

Magazine; Statistics '99 (VFA); Health Data (OECD)

World trade in pharmaceuticals, 1998 (OECD countries)

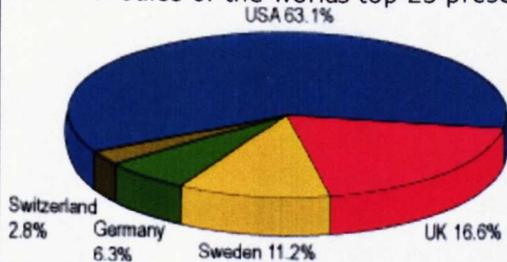
Country	Exports £ million	Imports £ million	Trade balance £ million
Germany	7,741	4,179	3,562
Switzerland	4,904	2,115	2,790
UK	5,860	3,418	2,442
Ireland	2,620	486	2,134
France	5,193	3,507	1,685
Sweden	2,142	739	1,403

Belgium	3,056	2,380	676
Denmark	620	471	150
Netherlands	1,967	2,043	-76
Austria	809	1,058	-249
Italy	2,344	2,596	-252
Finland	138	394	-255
Portugal	87	441	-358
Greece	70	600	-530
Australia	393	988	-596
Spain	743	1,572	-828
Canada	675	1,525	-850
Japan	686	1,948	-
USA	4,817	5,687	-870

Sources:

Global Trade Information Service
 Japan Tariff Association
 Eurostat
 Statistics Canada
 ONS Financial Statistics

Share of sales of the worlds top 25 prescription medicines, 1998



Source: IMS

Appendix Two

Hypertension: Causes and Treatments

Causes

Several systems go awry to produce hypertension for reasons not fully understood, which probably include genetics and environmental factors.

Treatments

More than 60 different drugs to treat hypertension are divided into six major classes, which act at different points in the cascade of events that drive up blood pressure.

IMMEDIATE CAUSES

- Excess of fluid in the circulatory system, pushing too hard on blood vessels.
- Vessels constrict or become stiff.
- Heart may beat too hard, pumping out extra blood with each beat.

UNDERLYING CAUSES

The renin-angiotensin-aldosterone system

When blood pressure falls, the kidneys release an enzyme called renin (1) into the blood stream. Renin contributes to the formation of angiotensin I (2), an inactive protein that rapidly converts into angiotensin II (3), which constricts blood vessels and increases blood pressure. Angiotensin II also stimulates the release in the adrenal gland of the hormone aldosterone (4), which makes the kidneys retain salt (sodium). The sodium causes water retention, which expands the volume of blood in the body and increases the pressure.

Sympathetic nerve system

Sympathetic nerves go from the brain to all parts of the body, including the arteries. The nerves can drive blood pressure up in response to a threat or other stimuli.

DRUGS MOST COMMONLY PRESCRIBED FOR HYPERTENSION AND HOW THEY WORK

Adrenergic inhibitors (includes alpha blockers and beta blockers)
Beta blockers slow the heart and reduce the force of its contractions; alpha blockers relax blood vessels.

Calcium channel blockers
Relax blood vessels.

ACE inhibitors
Relax blood vessels by turning off production of angiotensin II, a chemical that causes the arteries to constrict.

Angiotensin II receptor blockers
Relax blood vessels by blocking the action of angiotensin II.

Vasodilators
Cause the muscles in the walls of the blood vessels to relax, allowing the arteries to dilate.

Diuretics
Increase the excretion of water and salt through the kidneys, lowering blood volume and blood pressure. Relax blood vessels.

Juan Velasco/NYT
Photograph by Naum Kazhdan

SPHYGMOMANOMETER

CUFF

THE TEST

When the cuff is inflated, it compresses a large artery in the arm, momentarily stopping the flow of blood.

Next, air in the cuff is released, and the person measuring listens with a stethoscope. When the blood starts to pulse through the artery, it makes a sound. The systolic pressure is measured when the first sound is heard; the diastolic pressure, when last sound is heard.

WHAT THE NUMBERS MEAN

The blood pressure test measures systolic pressure (when the heart beats) and diastolic pressure (when the heart rests between beats). For example, in a typical blood pressure reading of 128/73 mm Hg. The first, larger number is the systolic pressure; the second is the diastolic pressure.

Sources: American Heart Association, Dr. Michael Alderman and the National High Blood Pressure Education Program.

Appendix Three

IMS Report

C BA ANTAGONISTAS CALCIO PUROS

3 M 12 M
1280 5026
000 2849
745 2826
737

% DO TOTAL 3 MESES 2.5 MEDICOS QUE PRESCREVERAM 3 MESES 10.7
GERAL 12 MESES 2.5 CLASSE 12 MESES 10.4

RELACAO DE DIAGNOSTICOS

	3 MESES 000	%	12 MESES 000	%
400 • DOENÇA HIPERTENSIVA	474	53.6	1894	66.5
401 • HIPERTENSÃO ESSENCIAL	472	63.3	1887	66.2
401.0 • HIPERTENSÃO ARTERIAL-NE	472	63.3	1887	66.2
402 • DOENÇA RENAL HIPERTENSIV	2	0.3	7	0.3
403 • HIPERTENSÃO CAUSA RENAL	2	0.3	7	0.3
410 • 414 CARDIOP. ISQUEMICA	231	31.0	784	27.5
410 • ENFARTE AGUDO MIOCARDIO	4	0.5	19	0.7
410.0 • ENFARTE AG MIOCARD C/HTA	3	0.4	18	0.6
411 • ENFARTE ANTIGO MIOCARDIO	6	0.8	11	0.4
411.0 • ENFARTE ANTIGO MIOCARDIO	6	0.8	11	0.4
412 • ANGINA DE PEITO	58	7.7	202	7.1
412.0 • ANGINA DE PEITO	58	7.7	202	7.1
413 • OT FORM DC ISO CRON CARD	3	0.4	10	0.3
413.0 • ARTERIOSCLER CORON S/HTA	1	0.2	1	0.0
414 • CARDIOP ISQUEM CRN C/HTA	106	14.3	372	13.0
414.0 • ARTERIOSCLER CORON C/HTA	1	0.2	1	0.0
414.1 • CARDIOP ISQUEM CRN S/HTA	52	6.9	167	5.8
414.2 • CARDIOPATIA ISQUEM S/HTA				
420 • OUTRAS DOENÇAS CARDIACAS	28	3.7	122	4.3
420.0 • OUTRAS DOENÇAS DO ENDOCARDIO	6	0.8	11	0.4
420.1 • VALVULOP MITRAL	1	0.2	4	0.1
420.2 • VALVULOP AORTICA	5	0.6	7	0.3
420.3 • CARDIOMIOPATIAS	2	0.3	12	0.4
420.4 • CARDIOMIOP HIPERTR OBSTR	2	0.3	7	0.2
420.5 • CARDIOMIOP PRIMARIA-OT	1	0.1	5	0.2
420.6 • ALTERACOES CONDUCAO	1	0.2	6	0.2
420.7 • HEMIBLOQUEIO R ESQUERDO	1	0.0	3	0.1
420.8 • ALT CONDUCAO A-VE	1	0.2	2	0.1
420.9 • ARRITMIAS CARDIACAS	7	0.9	41	1.4
420.10 • ARRITMIA CARDIACA SUPRAV	3	0.4	17	0.6
420.11 • ARRITMIA CARDIACA VENTRIC PAROX	0	0.0	1	0.1
420.12 • ARRITMIA CARDIACA VENTRIC PAROXIS-NE	1	0.1	2	0.1
420.13 • ARRITMIA CARDIACA FLUTTER AURIC	2	0.2	7	0.3
420.14 • ARRITMIA EXTRASISTOLICA	1	0.1	11	0.4
420.15 • ARRITMIAS CARDIACAS-OT	0	0.0	2	0.1
420.16 • ARRITMIA-NE	0	0.0	2	0.1
420.17 • INSUFICIENCIA CARDIACA	11	1.5	53	1.9
420.18 • INSUF CARDIACA CONGEST	2	0.3	15	0.5
420.19 • INSUF CARDIACA-NE	9	1.2	38	1.3
430 • DOENÇA CEREBROVASCULAR	5	0.7	21	0.7
430.0 • ACID CEREBRAL TRANSITORIA	0	0.0	3	0.1
430.1 • ACID ISQUEM TRANSIT C/HT	0	0.0	3	0.1
430.2 • AC CEREBROVASC AGUD NCOP	0	0.0	3	0.1
430.3 • ACID VASC CEREBRAL	3	0.4	8	0.3
430.4 • OUTRAS DC CEREBROVASCUL	0	0.0	7	0.3
430.5 • ARTERIOSCLER CEREBRAL	0	0.0	1	0.0
430.6 • HEMIPLEGIA HIPERTENSI	2	0.3	6	0.2
430.7 • SEQUELAS DC CEREBROVASC	2	0.3	6	0.2
430.8 • SEQUELAS AC VASC CEREB				
440 • 442 ALT CONDICION SAUD	1	0.1	4	0.1
440.0 • 442 ALT CONDICION SAUD	1	0.1	4	0.1
441 • PROTESE VALVULAR CARDIAC	0	0.0	1	0.0
441.0 • SUBSTITUIC VASO SANGUIN				
450 • 458 ALT NEUROT. PERSONAL	0	0.0	4	0.1
450.0 • SINDROMES/SINTOMAS NCOP	0	0.0	1	0.0
450.1 • INSOMNIA	0	0.0	1	0.0
450.2 • DEPRESSAO-NE	0	0.0	1	0.0
460 • SINTOMAS	0	0.0	3	0.1
460.0 • SINTOM AP CARDIOVASCULAR	0	0.0	3	0.1
460.1 • TAQUICARDIA-NE	0	0.0	3	0.1
470 • DC ARTER/ARTERIOL/CAPIL	0	0.0	3	0.1
470.0 • DT DC VASCULAR PERIFERIC	0	0.0	3	0.1
470.1 • SIND RAYNAUD	0	0.0	2	0.1
480 • 488 CARDIOP. REUMAT. CRON	1	0.1	3	0.1
480.0 • DOENÇA VALVULA AORTICA	1	0.1	1	0.0
480.1 • INSUF AORTICA RHEUMATIC	1	0.1	1	0.0
480.2 • VALVULOPAT MITRO-AORTICA	0	0.0	2	0.1
490 • DC ESOFAGO/ESTOMAGO/DUOD	1	0.2	2	0.1
490.0 • DC ESOFAGO	1	0.1	2	0.1
490.1 • ACALASIA/ESPASMO ESOFAG.	1	0.1	1	0.0
490.2 • GASTRITE E DUODENITE	1	0.1	1	0.0
490.3 • DUODENITE	1	0.1	1	0.0
500 • NEFRIT/S NEFROT/NEFROSE	0	0.0	2	0.1
500.0 • INSUF RENAL CRONICA	0	0.0	1	0.0
510 • DC GLANDULAS ENDOCRINAS	2	0.2	2	0.1
510.0 • DIABETES MELLITUS	1	0.2	1	0.0
510.1 • DIABETES MELLITUS S/COMP	1	0.2	1	0.0
520 • COMPLICACOES REL GRAVIDE	1	0.2	1	0.0
520.0 • PARTO PREMATURO/FALSO	1	0.2	1	0.0
520.1 • FALSO TRABALHO DE PARTO	1	0.2	1	0.0
530 • ENTORS/DISTENS ARTIC/MUS	0	0.0	1	0.0
530.0 • DT ENTORS/DISTENSAO	0	0.0	1	0.0
530.1 • ENTORS/DISTENSAO LOC-NE	0	0.0	1	0.0
DIAGNOSTICOS	1	0.1	3	0.1

IDADE E SEXO DO PACIENTE (000)

	0-1	1-4	5-11	12-19	20-29	30-39	40-54	55-64	65+	TOTAL
MASCULINO										
3M	0	1	0	0	4	6	58	96	154	319
%	0.0	0.2	0.0	0.0	0.5	0.8	7.8	12.8	20.7	42.8
12M	0	4	1	1	8	16	237	410	562	1224
%	0.0	0.1	0.0	0.0	0.3	0.6	2.8	4.4	19.7	43.0
FEMININO										
3M	0	0	0	0	3	15	56	119	232	426
%	0.0	0.0	0.0	0.1	0.4	2.1	7.6	16.0	31.1	57.2
12M	0	0	1	1	10	45	232	443	893	1624
%	0.0	0.0	0.0	0.0	0.3	1.6	8.1	15.5	31.3	57.0
TOTAL										
3M	0	1	0	1	6	21	115	214	386	745
%	0.0	0.2	0.0	0.1	0.9	2.8	5.4	28.8	51.9	100
12M	0	4	1	3	18	60	454	853	1456	2849
%	0.0	0.1	0.0	0.1	0.6	2.1	5.9	30.0	51.1	100
IDADE/SEXO NAO ESPEC.	3M	0	12M	0						

PRESCRICOES POR ESPECIALIDADES (000)

	C.G	PED	CAR	GIN OBS	PSI	OTO	GAST	ORT REU	OUT
3M	501	0	214	3	1	0	1	7	19
%	67.2	0.0	28.7	0.4	0.1	0.0	0.1	1.0	2.6
12M	1956	0	277	5	3	1	5	26	57
%	69.9	0.0	2.6	0.2	0.1	0.0	0.2	0.9	2.0
NUMERO DE PRESCRICOES POR MEDICO									
3M	51.0	0.0	283.9	2.3	0.7	0.3	2.5	8.1	7.6
12M	200.4	0.0	1046.4	4.1	3.8	1.2	13.8	28.7	22.6

TERAPEUTICA COMBINADA

	3 MESES 000	%	12 MESES 000	%
UNICA	343	46.0	1356	47.6
CO-PRESCRITA	402	54.0	1493	52.4

PRODUTOS CO-PRESCRITOS

	TOTAL	573	2099
C 1E NITRITOS E NITRATOS	101	13.6	380
C 9A INIBIDORES ECA PUROS	31	12.3	358
C 3A DIURETICOS	11	11.1	347
B 1C INIBID DA AGREG PLAQUETAR	3	9.8	247
C 7A BETABLOQUEANTES PUROS	52	7.0	165
N 2B ANALG NAO MARCOT/A/PIRET	49	6.5	131
C 1D TER CORON EXC ANT CAL/NIT	25	3.3	96
N 5C TRANQUILIZANTES	22	2.9	84
C 9B ASSOC INIBIDORES ECA	16	2.1	72
C 1A CARDIOGLICOSTIDEOS/ASS	11	1.5	42
C 7B BETABLOQUEANTES ASSOCIAC.	7	0.9	27
C 2A ANTHIP PUROS(NAO VEGET)	7	0.9	26
C 4A TERAP VASC-CEREB E PERIFE	4	0.6	23
C 8A ANTAGONISTAS CALCIO PUROS	6	0.9	19
C 1B A/ARRITMICOS CARDIACOS	3	0.4	17
B 1A ANTICOAGUL NAO INJECTAVEL	2	0.2	10
B 1B ANTICOAGULANTE INJECTAVEL	7	0.9	8
C 1X TOD. OUT. PREP-CARDIACAS	5	0.7	7
N 6D NOOTROPICOS	1	0.1	5
A12C OUT SUP MINERAIS	2	0.3	5
OUTROS PRODUTOS CO-PRESC	7	0.9	28

EFEITOS DESEJADOS

	3 MESES 000	%	12 MESES 000	%
•HIPOTENSOR	520	69.9	2100	73.7
HIPOTENSOR	350	47.0	1554	54.6
ANTHIPERTENSOR	163	21.8	519	18.2
INIBIDOR E.C.A	8	1.1	26	0.9
•VASODILAT. CORONAR.	160	21.5	512	18.0
VASODILAT-CORONAR.	135	18.1	448	15.7
BLOQUEADOR CALCIO	25	3.4	64	2.2
•OUT. ACC. CARDIOVASC	50	6.8	171	6.0
ANTIANGINOSO	48	6.4	161	5.7
VASODIL. CEREBRAL	2	0.3	9	0.3
•ANTIARRITMICO	9	1.2	53	1.9
CONTRL RITMO CARD	8	1.0	46	1.6
ANTIARRITMICO-OUTR	0	0.0	4	0.1
BETABLOQUEANTE	1	0.2	3	0.1
•ESTIMULANT CARDIAC	1	0.2	3	0.1
CARDITONICO	1	0.2	3	0.1
•PSICOLEPTICO	0	0.0	3	0.1
•TODOS OUTROS EFEITOS DESEJADOS	3	0.4	7	0.3
OUTRAS N.S.	0		0	

C 9A INIBIDORES ECA PURGS

OUT-DEZ 1995

AMOSTRA	1290	4824	% DO TOTAL	3 MESES	2.5	MEDICOS QUE PRESCREVERAM	3 MESES	11.1
TOTAL PRESCRITOS	742	2737	GERAL	12 MESES	2.4	CLASSE	12 MESES	10.9
TOTAL PACIENTES	740	2731						

RELACAO DE DIAGNOSTICOS	3 MESES	12 MESES
	000	000
400 * DOENCA HIPERTENSIVA	558	2039
401 HIPERTENSAO ESSENCIAL	556	2030
401.1 HIPERT ESSENCIAL BENIGNA	0	1
401.9 HIPERTENSAO ARTERIAL-NE	556	2029
403 DOENCA RENAL HIPERTENSIV	2	9
403.0 HIPERTENSAO CAUSA RENAL	2	9
410 * -414 CARDIOP. ISQUEMICA	85	348
410 ENFARTE AGUDO MIOCARDIO	3	19
410.0 ENFARTE AG MIOCARD C/HTA	3	19
412 ENFARTE ANTIGO MIOCARDIO	1	5
412.0 ENFARTE ANTIGO MIOCARDIO	1	5
413 ANGINA DE PEITO	4	14
413.0 ANGOR/ANGINA DE PEITO	4	14
414 OT FORM DC ISO CRON CABD	77	311
414.0 ARTERIOSCLER CORON S/HTA	1	3
414.4 CARDIOP ISQUEM CRN C/HTA	0	1
414.5 CARDIOPATIA ISQUEM C/HTA	5	264
414.9 CARDIOPATIA ISQUEM S/HTA	9	42
420 * OUTRAS DOENCAS CARDIACAS	88	310
424 DT DOENCAS DO ENDOCARDIO	8	17
424.0 VALVULOP MITRAL	6	10
424.1 VALVULOP AORTICA	2	5
424.3 VALVULOP PULMONAR	0	1
425 CARDIOMIOPATIAS	13	44
425.1 CARDIOMIOP HIPERTROF OBSTR	0	1
425.4 CARDIOMIOP PRIMARIA-DT	12	39
425.5 CARDIOMIOP ALCOOLICA	1	1
425.9 CARDIOMIOP SECUNDARIA-NE	0	2
427 ARRITMIAS CARDIACAS	1	6
427.1 TAQUICARD VENTRIC PAROX	0	1
427.3 FIBRILHAC/FLUTTER AURIC	0	1
427.6 ARRITMIA EXTRASISTOLICA	0	4
428 INSUFICIENCIA CARDIACA	18	243
428.0 INSUF CARDIACA CONGEST	3	107
428.9 INSUF CARDIACA-NE	15	135
429 ALTERACOES CARDIAC NCOP	0	1
429.0 MIOCARDITE-NE	0	1
393 * -398 CARDIOP.REUMAT.CRON	1	10
394 VALVULOPATIA MITRAL	0	4
394.0 ESTEN MITRAL REUMATICA	0	1
394.1 INSUF MITRAL REUMAT	0	2
394.2 ESTEN MITRAL C/INSUFIC	0	1
395 DOENCA VALVULA AORTICA	0	1
395.1 INSUF AORTICA REUMATICA	0	1
396 VALVULOPAT MITRO-AORTICA	1	5
430 * DOENCA CEREBROVASCULAR	2	8
435 ISQ CEREBRAL TRANSITORIA	0	1
435.0 ACID ISQUEM TRANSIT C/HT	0	1
436 DC CEREBROVASC AGUDO NCOP	1	4
436.0 ACID VASC CEREBRAL	1	4
437 OUTRAS DC CEREBROVASCUL	1	2
437.0 ARTERIOSCLER CEREBRAL	1	2
438 SEQUELAS DC CEREBROVASC	0	1
438.0 SEQUELAS AC VASC CEREB	0	1
V40 * IND C/ALT CONDICION SAUD	2	6
V43 ORGAO/TECIDO SUBST ARTIF	2	6
V43.3 PROTESE VALVULAR CARDIAC	1	4
V43.4 SUBSTITUIC VASO SANGUIN	1	1
415 * -417 DOENC.CIRCULAC.PULM	2	5
415 COR PULMONALE AGUDO	0	1
415.0 COR PULMONALE AGUDO	0	1
416 DC CARDIOPULMONAR CRONIC	2	5
416.0 HIPERT PULMONAR PRIMARIA	2	3
416.9 COR PULMONALE CRONICO	0	1
580 * NEFRIT/S NEFROT/NEFROSE	1	4
581 SINDROME NEFROTICO	0	1
581.9 SIND NEFROT-NE	0	1
585 INSUF RENAL CRONICA	1	1
586 INSUF RENAL-NE	0	2
250 * DC GLANDULAS ENDOCRINAS	1	2
250 DIABETES MELLITUS	1	2
250.0 DIABETES MELLITUS S/COMP	1	1
250.3 DIABETES C/ALT RENAIS	0	1
V60 * CONDIC SOCIO-ECONOMICAS	1	1
V67 EX CONTROLO POS TERAPEUT	1	1
V67.0 AVALIACAO POS-CIRURGIA	1	1
530 * DC ESOFAGO/ESTOMAGO/DUOD	0	1
536 ALT FUNCAO GASTRICA	0	1
536.8 DISPEPSIA	0	1
740 * -759 ANOMAL CONGENITAS	1	1
746 DT ALT CONG CORACAO	1	1
797 * 799CAUSA MORTAL/MORB.NE	1	1
797 SENILIDADE S/PSICOSE	1	1
TODOS OUT. DIAGNOSTICOS	0	1

IDADE E SEXO DO PACIENTE (000)		0-1	1-4	5-11	12-19	20-29	30-39	40-54	55-64	65+	TOTAL
MASCULINO											
3M	%	0	1	0	0	2	3	68	98	143	315
12M	%	0.0	0.1	0.0	0.0	0.3	0.4	9.1	13.2	19.3	42.5
FEMININO											
3M	%	0	1	0	0	1	7	92	102	224	427
12M	%	0.0	0.2	0.0	0.0	0.1	1.0	12.4	13.7	30.2	57.5
TOTAL											
3M	%	0	2	0	0	3	11	160	200	367	742
12M	%	0.0	0.3	0.0	0.0	0.4	1.4	21.5	26.9	49.4	100
IDADE/SEXO NAO ESPEC.		3M	0	12M	0						

PRESCRICOES POR ESPECIALIDADES (000)		C.G	PED	CAR	GIN OBS	PSI	OTO	GAST	ORT	REU	OUT
3M	%	526	1	180	0	0	1	2	4	27	
12M	%	70.9	0.2	24.3	0.0	0.0	0.1	0.3	0.6	3.6	
NUMERO DE PRESCRICOES POR MEDICO		3M	53.6	1.1	239.6	0.0	0.3	1.8	6.3	5.0	10.7
12M		199.8	2.6	851.0	0.0	0.9	5.6	18.9	23.0	38.9	

TERAPEUTICA COMBINADA		3 MESES	12 MESES
		000	000
UNICA		370	1395
CO-PRESCRITA		49.9	51.0
PRODUTOS CO-PRESCRITOS		583	2062
C 3A DIURETICOS		171	632
C 8A ANTAGONISTAS CALCIO PUROS		91	357
C 1E NITRITOS E NITRATOS		64	247
C 1C INIBID DA AGREG PLAQUETAR		51	164
C 1A CARDIOLITICOS/ASS		40	148
C 7A BETABLOQUEANTES PUROS		42	137
N 2B ANALG NAO NARCOT/A/PIRET		26	81
N 5C TRANQUILIZANTES		24	65
C 1D TER CORON EXC ANT CAL/NIT		18	51
B 1A ANTICOAGUL NAO INJECTAVEL		13	44
C 2A ANTHIP PUROS(MAO VEGET)		8	23
C 1B A/ARRITMICOS CARDIACOS		6	21
C 4A TERAP VASC-CEREB E PERIFE		2	18
C 7B BETABLOQUEANTES ASSOCIAC.		5	14
C 1X TOD.OUT.PREP-CARDIACAS		3	6
A12C OUT SUP MINERAIS		3	6
C 9A INIBIDORES ECA PUROS		1	5
A12B SUP MINER/POTASSIO		2	5
R 3B XANTINICOS		0	4
C 9B ASSOC INIBIDORES ECA		1	4
C 1C EST. CARD. EXC. GLICOSIDIOS		2	3
A11A MULTIVITAMIN. C/MINERAIS		2	3
M 4A ANTIGOTOSOS		1	3
N 6D NOOTROPICOS		1	2
C 5C ANTIVARICOSOS SISTEMICOS		1	2
A 3F GASTROPROKINETICOS		0	1
OUTROS PRODUTOS CO-PRESC		6	16

EFEITOS DESEJADOS		3 MESES	12 MESES
		000	000
*HIPOTENSOR		697	2580
HIPOTENSOR ANTIHIPERTENSOR INIBIDOR E.C.A		445	1671
*VASODILAT. CORONAR.		183	557
VASODILAT-CORONAR.		89	352
*ESTIMULANT CARDIAC		38	126
CARDIOTONICO		36	126
*DIURETICO		5	17
DIURETICO		5	15
*OUT.ACC. CARDIOVASC		1	7
VASODIL. CEREBRAL		1	7
*TODOS OUTROS EFEITOS DESEJADOS		0	2
OUTRAS N.S.		0	0

	MENSAL			ACUMULADO			CUMULATIVO			ULTIMOS 12 MESES			12 MONTHS TO DATE		
	UNIDADES UNITS + 00	VALORES VALUES +0000	%	UNIDADES UNITS + 00	+ -	VALORES VALUES +0000	+ -	UNIDADES UNITS + 00	VALORES VALUES +0000	%	+ -	%	Nº VOLS	VALORES VALUES \$+ 000	
BT PURA/ASS C/B6/B12	32,2	24,56	0,1	310,1	0,2	-12	243,97	0,1	-9	473,0	373,53	0,1	-7	84	2,079
BT PURA OU C/B6/12	32,0	24,35	0,1	308,0	0,2	-12	241,05	0,1	-10	470,0	369,78	0,1	-7	84	2,056
BT ET/B6/B12 C/OUT FARM	2	21	0,0	2,1	0,0	-5	2,82	0,0	-5	3,0	4,15	0,0	-8	83	23
MPLEXO VIT B	51,2	35,03	0,2	532,4	0,4	-1	378,75	0,2	2	773,3	545,21	0,2	-2	88	3,023
MPLEXO B PURO	26,3	12,88	0,1	263,9	0,2	-6	126,16	0,1	-5	393,5	183,44	0,1	-9	82	1,015
MPLEXO B C/VIT C	22,6	20,94	0,1	250,5	0,2	0	240,92	0,1	2	355,6	349,64	0,1	-1	89	1,544
ASS/COMPLEXO B	1,6	1,47	0,0	13,7	0,0	-999	11,67	0,0	974	14,1	12,14	0,0	661	683	65
TAMINA B12 PURA	23,8	65,20	0,2	213,2	0,1	2	413,87	0,2	10	319,1	611,51	0,2	8	97	3,384
C INC ASS C/MINER	44,5	12,88	0,1	725,2	0,5	9	252,77	0,1	12	1143,3	399,58	0,1	2	92	2,249
TAMINA C PURA	44,5	12,88	0,1	723,2	0,5	9	252,77	0,1	12	1143,3	399,58	0,1	2	92	2,249
VIT PURAS EXC K/P	10,6	3,14	0,0	97,7	0,1	17	28,24	0,0	20	142,7	40,35	0,0	13	103	223
NICOTINICO						-83			-84				-84		12
TAMINA B4	3,6	96	0,0	30,1	0,0	0	8,02	0,0	2	44,9	11,90	0,0	0	90	66
PURAS VITAMINAS PURAS	7,9	2,15	0,0	47,6	0,0	26	20,22	0,0	36	37,7	28,45	0,0	22	110	157
PLEMENTOS MINERAIS	243,5	161,88	0,3	2296,0	1,5	3	1521,77	0,8	7	3411,1	2237,68	0,8	5	95	12,374
MINER/CALCIO	128,6	72,84	0,3	1260,1	0,8	3	716,33	0,4	11	1881,0	1055,48	0,4	3	98	5,841
MINER/PTASSIO	6,0	1,50	0,0	47,9	0,0	3	12,55	0,0	2	72,2	18,91	0,0	3	92	105
SUP MINERAIS	109,0	87,49	0,4	588,0	0,7	3	732,39	0,4	5	1457,9	1163,29	0,4	2	92	6,428
PLEMENTOS DE MAGNESIO	108,6	87,24	0,4	984,5	0,6	3	789,74	0,4	5	1452,5	1159,33	0,4	3	92	6,406
SUPPLEMENT.MINERALE	3	24	0,0	3,9	0,0	-1	2,56	0,0	-15	5,4	3,96	0,0	-18	74	22
ONICOS	72,6	100,34	0,5	733,6	0,5	-5	1024,46	0,5	-3	1062,8	1484,74	0,5	-2	88	8,239
ONICOS	72,6	100,34	0,5	733,6	0,5	-5	1026,46	0,5	-3	1062,8	1484,74	0,5	-2	88	8,209
CONTENDO PROCAINA	9	2,78	0,0	6,6	0,0	-20	21,67	0,0	-19	10,3	33,40	0,0	-17	74	185
OS OUTROS TONICOS	71,8	97,56	0,4	726,9	0,5	-3	1004,80	0,5	-2	1052,6	1451,34	0,5	-2	88	8,024
OLIZANTES VIA SIST	30,9	45,63	0,2	262,4	0,2	1	387,26	0,2	7	395,9	568,78	0,2	4	94	3,146
MONAS ANABOLIZANES	6,8	4,63	0,0	63,7	0,0	-1	42,92	0,0	2	93,9	62,84	0,0	2	91	347
ANABOLIZANTES	6,8	4,63	0,0	63,7	0,0	-1	42,92	0,0	2	93,9	62,84	0,0	2	91	347
AG ANABOLIZANTES	24,1	40,99	0,2	204,7	0,1	6	344,94	0,2	8	301,9	505,94	0,2	5	94	2,798
EXIGENOS	39,1	20,23	0,1	293,3	0,2	1	152,36	0,1	6	431,4	222,79	0,1	1	91	1,232
EXIGENOS	39,1	20,23	0,1	293,3	0,2	1	152,36	0,1	6	431,4	222,79	0,1	1	91	1,232
PROD P/AP DIGEST	1,9	7,9	0,0	18,5	0,0	2	6,96	0,0	4	27,4	10,26	0,0	7	96	57
PROD NUTRIT E METABOL	1,9	7,9	0,0	18,5	0,0	2	6,96	0,0	4	27,4	10,26	0,0	7	96	57
QUE/ORG HEMATOPOET	422,3	653,27	2,9	3635,0	2,1	11	5723,41	2,9	13	5381,4	8397,83	2,8	13	101	46,430
OMOLITICOS	260,2	481,26	2,2	2208,1	1,5	14	4204,03	2,1	15	3261,8	6172,12	2,1	14	102	34,126
COAGULANTE INJECTAVEL	22,8	10,22	0,0	193,2	0,1	13	86,90	0,0	14	284,3	127,06	0,0	15	103	702
COAGULANTE INJECTAVEL	17,2	24,17	0,1	138,8	0,1	21	189,30	0,1	35	197,6	263,17	0,1	29	116	1,449
MINAS NAO FRACCIONADAS	2	11	0,0	5,3	0,0	-22	2,04	0,0	-19	9,3	3,47	0,0	2	92	19
MINAS FRACCIONADAS	17,0	24,07	0,1	133,5	0,1	24	137,25	0,1	36	188,3	259,70	0,1	29	116	1,430
EREB DA AGREG PLAQUETAR	220,2	446,86	2,0	1876,0	1,2	14	3927,89	2,0	14	2779,9	5781,90	2,0	13	103	31,975
IB./ANTIC.IN.COAG.SAN	4,4	2,76	0,0	37,8	0,0	3	23,82	0,0	13	55,9	34,50	0,0	17	109	191
IBRINOLITICOS	2,6	1,68	0,0	23,6	0,0	3	15,72	0,0	15	34,7	22,07	0,0	26	113	122
IBRINOLITICOS	2,6	1,68	0,0	23,6	0,0	3	15,72	0,0	15	34,7	22,07	0,0	26	113	122
IONISTAS (ANT ANTICO)	1	2	0,0	1,1	0,0	-71	32	0,0	759	2,2	52	0,0	999	999	3
TAMINA K	1	2	0,0	1,1	0,0	-71	32	0,0	759	1,4	40	0,0	942	935	2
PLATO PROTAMINA	1	2	0,0	1,1	0,0	-71	32	0,0	759	9	12	0,0	999	999	1
ICIDOS HEMOSTATICOS	1,7	1,06	0,0	13,1	0,0	-1	8,17	0,0	5	18,5	11,91	0,0	0	90	66
ANEMICOS	156,4	168,54	0,8	1394,0	0,3	6	1454,54	0,7	9	2046,7	2181,87	0,7	9	99	12,062
ANTIN/FERRO/TODAS ASS	70,9	74,85	0,3	597,0	0,4	10	625,19	0,3	15	876,8	909,57	0,3	13	102	5,022
PO PURO	31,3	35,18	0,2	255,8	0,2	4	290,63	0,1	23	373,9	420,25	0,1	19	107	2,318
SOCIACOES DE FERRO	39,7	39,72	0,2	344,2	0,2	7	334,98	0,2	11	503,0	489,33	0,2	8	97	2,704
HEPAT/ASS C/B12	55,0	43,80	0,2	528,4	0,3	5	639,88	0,2	3	769,4	606,54	0,2	2	92	3,355
ANEM.A.FOLIC/FOLIN	30,5	49,85	0,2	270,6	0,2	6	336,27	0,2	6	400,6	665,76	0,2	10	99	3,685
OUT.AGENT.HEMATOLOG.	1,3	70	0,0	13,1	0,0	10	7,18	0,0	13	17,0	9,33	0,0	4	94	51
ALURONIDASE	1,3	70	0,0	13,1	0,0	10	7,18	0,0	13	17,0	9,33	0,0	4	94	51
STEMA CARDIOVASCULAR	2387,0	5440,74	24,8	21172,8	14,0	3	48665,67	24,4	15	31255,2	71031,88	24,1	15	103	392,463
ROCTERAPIA	396,5	547,00	2,5	3587,4	2,4	4	4919,30	2,5	8	5384,8	7311,68	2,5	9	97	40,459
ROLOGICOS/IDEOS/ASS	58,0	17,47	0,1	541,1	0,4	-2	162,36	0,1	-0	814,2	243,08	0,1	0	90	1,347
ROLOGICOS/IDEOS PUROS	58,0	17,47	0,1	541,1	0,4	-2	162,36	0,1	-0	814,2	243,08	0,1	0	90	1,347
ARRITMICOS CARDIACOS	34,2	64,48	0,3	306,8	0,2	0	574,54	0,3	8	458,0	852,25	0,3	7	86	4,717
ST.CARD.EXC.GLIOSIDIOS	15,2	5,77	0,0	114,5	0,1	-0	45,50	0,0	5	163,3	64,54	0,0	-1	99	354
ST.CARD.EXC/AG.DOPAMIN.	15,1	5,46	0,0	112,8	0,1	0	41,44	0,0	9	160,5	57,63	0,0	2	92	317
ST.CARDIAC.DOPAMINERGIC.	1	31	0,0	1,7	0,0	-27	4,06	0,0	-25	2,8	6,72	0,0	-20	72	38
ER CORON EXC ANT CAL/INT	145,5	199,83	0,9	1336,1	0,5	10	1822,48	0,9	15	2008,1	2718,55	0,9	16	104	15,037
TRITOS E NITRATOS	136,2	216,04	1,0	1227,4	0,8	1	1929,49	1,0	8	1843,3	2349,84	1,0	7	96	15,768
OUT.PREP-CARDIACAS	7,4	43,41	0,2	61,5	0,0	-20	382,91	0,2	-10	97,9	583,61	0,2	-8	82	3,235
POTENSORES	16,4	23,22	0,1	146,4	0,1	4	204,45	0,1	11	217,0	299,20	0,1	9	98	1,654
ANTHIP PUROS(NAO VEGET)	13,5	20,28	0,1	119,2	0,1	9	177,11	0,1	15	175,2	257,49	0,1	13	101	1,423
ANTHIP PUROS ACCAO CENTR	12,5	17,60	0,1	110,3	0,1	13	153,39	0,1	20	161,7	221,01	0,1	19	107	1,221
ANTHIP PUROS ACCAO PERIF	1,0	2,69	0,0	9,0	0,0	-23	23,72	0,0	-9	14,7	36,48	0,0	-16	75	202
OS ANTHIP(NAO VEG)+DIUR	7	1,22	0,0	6,7	0,0	-8	11,13	0,0	-6	10,3	16,88	0,0	-3	87	94
ANTHIP(NAO VEG) ACCAO CEN	7	1,22	0,0	6,7	0,0	-8	11,13	0,0	-6	10,3	16,88	0,0	-3	87	94
IC RAWOLF-OUT ANTHIP VEG						-85			-85				-73		24
IC RAWOLF-OUT ANTHIP-DIUR	2,2	1,72	0,0	20,4	0,0	-13	16,21	0,0	-11	31,5	24,83	0,0	-11	80	138
URETICOS	218,5	275,26	1,3	1969,0	1,3	5	2502,94	1,							

SUMARIO DAS CLASSES TERAPEUTICAS -1-
THERAPEUTIC CLASS SUMMARY TABLE -1-

PORTUGAL

46DSTO/AUGUST 1999

14 3

	MENSAI			ACUMULADO			CUMULATIVE			ULTIMOS 12 MESES			12 MONTHS TO DATE		
	UNIDADES UNITS + 00	VALORES VALUES +0000	%	UNIDADES UNITS + 00	%	VALORES VALUES +0000	%	UNIDADES UNITS + 00	VALORES VALUES +0000	%	NPEVOL	VALORES VALUES \$+ 000			
C 442 ANT.CALCIO C/ACT. CEREB.	75.7	161.60	0.7	686.8	0.5	1463.84	0.7	1041.9	2200.41	0.7	91	12.191			
C 5 ANTIVARICOSOS/ANTHEMORR.	400.7	519.45	2.4	3142.6	2.1	4142.21	2.1	4532.7	5917.78	2.0	92	32.551			
C 54 ANTIHEMORRAGIARIOS TOPIC	62.5	51.05	0.3	549.2	0.4	436.06	0.2	815.6	645.87	0.2	92	3.572			
C 541 ANTIHEM TOP CONT CORTICOI	28.9	21.72	0.1	243.0	0.2	186.31	0.1	366.1	272.23	0.1	94	1.505			
C 542 ANTIHEM TOP NAO CONT CORT	34.6	29.33	0.2	300.2	0.2	251.75	0.1	449.5	373.63	0.1	90	2.068			
C 58 ANTIVARICOSOS TOPICOS	169.2	61.20	0.3	127.9	0.8	434.72	0.2	1747.1	618.06	0.2	95	3.394			
C 50 ANTIVARICOSOS SISTEMICOS	168.9	409.20	0.3	1375.5	0.9	3269.43	1.6	1970.0	4653.85	1.6	100	25.585			
C 6 OUT.PROD.CARDIOVASCULAR	1	1	0.0	9	0.0	13	0.0	1.5	22	0.0	27	1			
C 64 OUT.PROD.CARDIOVASCULAR	1	1	0.0	9	0.0	13	0.0	1.5	22	0.0	27	1			
C 7 BETABLOQUEANTES	139.7	167.35	0.8	1268.8	0.6	1522.82	0.8	1853.8	2205.73	0.7	106	12.191			
C 7A BETABLOQUEANTES PUROS	124.8	145.71	0.7	1130.8	0.7	1325.41	0.7	1650.2	1916.56	0.7	107	10.591			
C 7B BETABLOQUEANTES ASSOCIACI	15.2	21.68	0.1	138.2	0.1	197.41	0.1	203.6	289.17	0.1	99	1.600			
C 7B1 ASS.CA/HIPERT.E/OU DIU	15.2	21.68	0.1	138.2	0.1	197.41	0.1	203.6	289.17	0.1	99	1.600			
C 8 ANTAGONISTAS CALCIO	256.3	659.38	3.0	2356.8	1.6	6057.04	3.0	3532.4	8987.22	3.0	97	49.739			
C 8A ANTAGONISTAS CALCIO PUROS	256.3	659.38	3.0	2356.8	1.6	6057.04	3.0	3532.4	8987.22	3.0	97	49.739			
C 9 F.C/AC.SIST.REN.ANGIOTE.	452.4	1820.23	8.3	4078.9	1.7	16202.70	8.1	5896.3	23538.21	8.0	107	130.044			
C 9A INIBIDORES ECA PUROS	278.9	1103.65	5.0	2570.8	2.7	10102.06	5.1	3849.2	14998.68	5.1	96	83.010			
C 9B ASSOC INIBIDORES ECA	83.9	378.19	1.7	755.2	0.5	3423.08	1.7	1099.4	4992.30	1.7	106	27.597			
C 9B1 IN.ECA,ASSOC.A/HIP.DIUR.	83.9	378.19	1.7	755.2	0.5	3423.08	1.7	1099.4	4992.30	1.7	106	27.597			
C 9C ANT.PUROS ANGIOTENSI.II	67.5	255.80	1.2	536.5	0.4	2052.40	1.0	761.2	2850.12	1.0	175	15.654			
C 9D ANT.ANGIOTENSI.II ASSOC.	22.1	82.51	0.4	756.3	0.4	2999.59	0.3	186.5	697.11	0.2	999	3.782			
C10 PREF.A-ATEROMAT/HIPLIDIE	170.0	692.14	3.1	1608.3	1.8	6501.27	3.3	2335.0	9312.89	3.2	117	51.388			
C10A PREF.REO.COLEST/TRIGLICE	170.0	692.14	3.1	1608.3	1.8	6501.27	3.3	2335.0	9312.89	3.2	117	51.388			
C10A1 INIBID-REDUCTASE HMG-COA	103.0	574.23	2.6	708.2	0.7	5347.00	2.7	1418.3	7551.46	2.6	125	41.622			
C10A2 FIBRATOS	53.7	111.39	0.5	823.9	0.2	1090.42	0.5	812.5	1666.06	0.6	91	9.238			
C10A3 ANT.PUROS PERMUTADOR.IDES	1.0	1.35	0.0	9.2	0.0	12.98	0.0	14.0	19.89	0.0	80	110			
C10A3 T.O.RED.COLESTE.TRIGLICE	6.4	5.83	0.0	60.0	0.0	30.86	0.0	89.3	75.49	0.0	95	418			
C10B PREF.A-ATEROMAT.ORIG.NAT			0.0		0.0		0.0			0.0	100				
D DERMATOLOGICOS	1322.6	878.88	4.0	10342.7	6.8	7152.36	3.6	15183.8	10454.69	3.5	92	57.773			
D 1 ANTI-FUNGICOS	188.2	143.05	0.7	1610.0	1.8	1348.94	0.7	2371.0	1978.22	0.7	89	10.933			
D 1A ANTI-FUNG. TOPICOS SISTEM.	188.2	143.05	0.7	1610.0	1.8	1348.94	0.7	2371.0	1978.22	0.7	89	10.933			
D 1A3 ANTI-FUNG TOPIC COUR. CAB	20.8	18.42	0.1	364.5	0.2	398.03	0.2	558.5	618.88	0.2	76	3.454			
D 2 EMOL/PROTECTORES DERM	63.8	28.46	0.1	662.1	0.4	283.29	0.1	990.6	419.48	0.1	85	2.324			
D 2A EMOL/PROTECTORES DERM	63.8	28.46	0.1	662.1	0.4	283.29	0.1	990.6	419.48	0.1	85	2.324			
D 3 CICATRIZANTES	159.7	76.14	0.3	1369.0	0.9	654.58	0.3	1986.9	942.36	0.3	97	5.202			
D 3A CICATRIZANTES CUTANEOS	159.7	76.14	0.3	1369.0	0.9	654.58	0.3	1986.9	942.36	0.3	97	5.202			
D 4 A/PRUR.A/HIST/ANEST/TOP	98.3	48.65	0.2	612.2	0.4	299.39	0.2	779.3	375.17	0.1	72	2.044			
D 4A A/PRUR.A/HIST/ANEST/TOP	98.3	48.65	0.2	612.2	0.4	299.39	0.2	779.3	375.17	0.1	72	2.044			
D 5 ANTIPSORIAS +PROD.SIMIL.	25.2	28.63	0.1	255.0	0.2	286.72	0.1	375.0	416.11	0.1	93	2.300			
D 5A A-PSORIAS.TOP./PROD.SIM.	24.6	24.27	0.1	248.9	0.2	243.74	0.1	366.2	351.91	0.1	93	1.945			
D 5B A-PSORIAS.DR./PROD.SIMI.	6	4.36	0.0	6.1	0.0	44.36	0.0	8.8	64.20	0.0	94	355			
D 6 A/BIOC TOP/SULF/ANTIVIRAIS	144.0	80.20	0.4	932.9	0.6	538.80	0.3	1377.9	788.85	0.3	98	4.363			
D 6A ANTI/SULF TOPICO PUROS	92.0	30.91	0.1	590.6	0.4	201.80	0.1	871.1	293.96	0.1	94	1.623			
D 6C PROD TOP P/INFECC VIRAIS	52.0	45.29	0.2	342.2	0.2	336.90	0.2	506.8	494.89	0.2	100	2.740			
D 6D ANTI-VIRAIS TOPICOS	52.0	45.29	0.2	342.2	0.2	336.90	0.2	506.8	494.89	0.2	100	2.740			
D 7 CORTICOSTEROIDES TOPICOS	323.2	220.55	1.0	2517.3	1.7	1720.83	0.9	3690.8	2508.24	0.9	93	13.845			
D 7A CORTICOIDES TOP PUROS	158.2	112.95	0.5	1275.0	0.8	512.38	0.5	1856.0	1320.58	0.4	94	7.288			
D 7B ASS CORTICOIDES TOP	164.9	107.60	0.5	1242.3	0.8	808.44	0.4	1834.9	1187.66	0.4	92	6.557			
D 7B1 CORTICOST+ANTIBACTERIANOS	87.8	44.76	0.2	665.0	0.4	342.59	0.2	584.3	504.48	0.2	91	2.787			
D 7B2 CORTICOST+ANTIMICOTICOS	23.3	22.12	0.1	176.0	0.1	165.12	0.1	257.4	240.66	0.1	94	1.326			
D 7B3 CORTIC+ANTIMIC+ANTIBACT.	53.8	40.72	0.2	401.2	0.3	300.73	0.2	593.2	442.52	0.2	92	2.444			
D 8 ANTISSEPT.E DESINFECTAN.	132.2	36.30	0.2	854.5	0.6	235.73	0.1	1303.9	356.74	0.1	86	1.974			
D 8A ANTISSEPT.E DESINFECTAN.	132.2	36.30	0.2	854.5	0.6	235.73	0.1	1303.9	356.74	0.1	86	1.974			
D10 ANTIACNEICOS	114.8	115.19	0.5	990.5	0.7	1048.82	0.5	1487.1	1573.66	0.5	100	8.729			
D10A ANTIACNEICOS TOPICOS	33.9	28.68	0.1	298.0	0.2	253.11	0.1	462.0	392.27	0.1	88	2.177			
D10B ANTIACNEICOS SISTEMICOS	80.9	86.50	0.4	692.5	0.5	795.72	0.4	1025.1	1181.39	0.4	105	6.552			
D11 OUT.PREP.DERMATOLOGICOS	73.3	101.47	0.5	539.4	0.4	733.86	0.4	821.1	1095.85	0.4	88	6.058			
D11A OUT.PREP.DERMATOLOGICOS	73.3	101.47	0.5	539.4	0.4	733.86	0.4	821.1	1095.85	0.4	88	6.058			
D SIST GENITUR/HORM/SEX	1072.9	1191.06	5.4	8875.7	5.9	10139.05	5.1	13304.6	14877.40	5.0	103	82.289			
D 1 A/INFECC GIN	123.0	72.42	0.3	1042.6	0.7	604.88	0.3	1573.2	903.36	0.3	91	5.001			
D 1A TRICOMONICIDAS	26.3	12.20	0.1	235.1	0.2	109.57	0.1	357.7	166.07	0.1	85	920			
D 1A1 TRICOMONICIDAS SISTEMIC.	18.4	8.77	0.0	163.1	0.1	78.39	0.0	247.7	118.72	0.0	83	658			
D 1A2 TRICOMONICIDAS TOPICOS	7.9	3.44	0.0	72.1	0.0	31.18	0.0	110.1	47.35	0.0	91	262			
D 1B ANTI-FUNGICOS GINECOLOGIC	58.4	40.30	0.2	460.8	0.3	318.54	0.2	689.6	474.06	0.2	93	2.623			
D 1C ANTI-SITICOS GINECOLOG.	6.0	6.71	0.0	56.9	0.0	60.53	0.0	84.2	87.07	0.0	107	481			
D 1D ANTI-SEPTICOS GINECOLOG.	32.4	13.20	0.1	283.8	0.2	116.24	0.1	441.7	176.16	0.1	85	977			
D 2 OUT GINECOLOGICOS	54.9	48.29	0.2	476.2	0.3	409.90	0.2	709.4	609.83	0.2	90	3.374			
D 2A INDUC.PARTO INCLU.OXITOC.	3.7	1.63	0.0	25.5	0.0	12.83	0.0	42.8	18.59	0.0	94	103			
D 2B CONTRACEPTIVOS TOP	8.0	4.95	0.0	57.1	0.0	35.12	0.0	85.9	52.80	0.0	76	292			
D 2D INIBIDORES PROLACTINA	9.1	9.99	0.0	80.7	0.1	88.88	0.0	119.8	131.35	0.0	90	727			
D 2E OUT.GINECOLOGICOS	2.5	2.12	0.0	23.4	0.0	33.14	0.0	41.7	32.32	0.0	87	304			
D 2F OUT.GINECOLOGICOS	7.5	12.54	0.1	97.4	0.0	95.54	0.0	98.5	145.05	0.0	82	804			

Appendix Four

Letter from Richard Bagozzi:

The Use of Means-End Chain Analysis in the Pharmaceutical Area



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May 27, 1997

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Av. Cidade de Luanda, n° 10-3° Esq.
1800 LISBOA
PORTUGAL

Dear Mr. Proenca:

It was very nice meeting you and learning about your exciting research project.

As I mentioned, means-end chain analysis (in the new manner my colleagues and I have developed) seems quite applicable to your ideas and project. Plus no one has applied this method to the area to my knowledge.

Enclosed are a couple of articles using the method, plus a few tangentially related ones in the pharmaceutical area.

If I can ever be of help, please feel free to contact me.

Best wishes and good luck with your work!

Sincerely,

A handwritten signature in cursive script that reads "Rick Bagozzi".

Richard P. Bagozzi

RPB/cm
Enclosures

Appendix Five

- **Laddering Interviews (First and Last)**
- **Verbatim Example**

LADDER EDIT SCREEN

data name = typology

Subject ID = 001 Ladder # = 1
Middle-aged hypertensive patients
E Synonym : age
Young-adult hypertensive patients
E Synonym : age
Hypertensive patients with left ventricular hypertrophy
E Synonym : comorbidity
Hypertensive woman in perimenopausal period with obesity
E Synonym : age/gender/comorbidity
Hypertensive patients with diabetes/dyslipidaemia
E Synonym : comorbidity
Hypertensive woman in perimenopausal period
E Synonym : age and gender
Progressive development of target-organ damage
E SEQUENCE Synonym : less morbidity and mortality
Greater protection against the risk of major cardiovascular events
E SEQUENCE Synonym : cardiovascular risk reduction
Improve compliance with drug regimen
E SEQUENCE Synonym : compliance
Calcium antagonists (capoten) are effective
E IBUTE Synonym : effectiveness
Screen ID =LE-2 Enter F10 to exit, F1 for help

LADDER EDIT SCREEN

data name = typology

Subject ID = 001 Ladder # = 2
Elderly hypertensive patients with peripheral vascular disease
E Synonym : age and comorbidity
Elderly hypertensive patients with cerebrovascular disease
E Synonym : age and comorbidity
Elderly hypertensive patients with angina
E Synonym : age and comorbidity
Progressive development of target-organ damage
E SEQUENCE Synonym : less morbidity and mortality
Greater protection against the risk of major cardiovascular events
E SEQUENCE Synonym : cardiovascular risk reduction
Improve compliance with drug regimen
E SEQUENCE Synonym : compliance
Exaggerated response after the first dose
E SEQUENCE Synonym : no orthostatic hypotension
Calcium antagonists (norvasc) have a smooth onset of action
E IBUTE Synonym : smooth action
Calcium antagonists (norvasc) have low incidence of side-effects
E IBUTE Synonym : low side-effects
Calcium antagonists (norvasc) are effective
E IBUTE Synonym : effectiveness
Screen ID =LE-2 Enter F10 to exit, F1 for help

LADDER EDIT SCREEN

data name = typology

Subject ID = 001 Ladder # = 3

elderly hypertensive patients with renal insufficiency

SYNONYM : age and comorbidity

elderly patients with borderline hypertension

SYNONYM : age and level of BP

less development of target-organ damage

SEQUENCE SYNONYM : less morbidity and mortality

better quality of life

SEQUENCE SYNONYM : quality of life

greater protection against the risk of major cardiovascular events

SEQUENCE SYNONYM : cardiovascular risk reduction

improve compliance with drug regimen

SEQUENCE SYNONYM : compliance

diuretics (fludex) are cheap

ATTRIBUTE SYNONYM : low cost

diuretics (fludex) are effective

ATTRIBUTE SYNONYM : effectiveness

Screen ID =LE-2

Enter F10 to exit, F1 for help

LADDER EDIT SCREEN

data name = typology

Subject ID = 001 Ladder # = 3

elderly hypertensive patients with renal insufficiency

SYNONYM : age and comorbidity

elderly patients with borderline hypertension

SYNONYM : age and level of BP

less development of target-organ damage

SEQUENCE SYNONYM : less morbidity and mortality

better quality of life

SEQUENCE SYNONYM : quality of life

greater protection against the risk of major cardiovascular events

SEQUENCE SYNONYM : cardiovascular risk reduction

improve compliance with drug regimen

SEQUENCE SYNONYM : compliance

diuretics (fludex) are cheap

ATTRIBUTE SYNONYM : low cost

diuretics (fludex) are effective

ATTRIBUTE SYNONYM : effectiveness

Screen ID =LE-2

Enter F10 to exit, F1 for help

LADDER EDIT SCREEN

data name = typology

Object ID = 001 Ladder # = 4

hypertensive woman in perimenopausal period with anxiety/depression

Synonym : age/gender/comorbidity

young-adult hypertensive woman

Synonym : age and gender

less development of target-organ damage

SEQUENCE Synonym : less morbidity and mortality

better quality of life

SEQUENCE Synonym : quality of life

better protection against the risk of major cardiovascular events

SEQUENCE Synonym : cardiovascular risk reduction

improve compliance with drug regimen

SEQUENCE Synonym : compliance

beta blockers (ineral) have low incidence of side-effects

BUTE Synonym : low side-effects

beta blockers (ineral) are cheap

BUTE Synonym : low cost

beta blockers (ineral) are effective

BUTE Synonym : effectiveness

Screen ID =LE-2

Enter F10 to exit, F1 for help

LADDER EDIT SCREEN

data name = typology

Object ID = 001 Ladder # = 5

elderly hypertensive patients whose BP requires drug combination therapy

Synonym : age and drug combination therapy

elderly hypertensive patients with congestive heart failure

Synonym : age and comorbidity

less development of target-organ damage

SEQUENCE Synonym : less morbidity and mortality

better quality of life

SEQUENCE Synonym : quality of life

better protection against the risk of major cardiovascular events

SEQUENCE Synonym : cardiovascular risk reduction

improve compliance with drug regimen

SEQUENCE Synonym : compliance

reduce adverse effects of both therapeutic categories

SEQUENCE Synonym : less side-effects

as efficacious as monotherapy in more than 50% of all patients

SEQUENCE Synonym : monotherapy

drug combination therapy (lopiuretic) reinforce additive hypotensive effect

BUTE Synonym : additive hypotensive effect

beta inhibitor + diuretic (lopiuretic) are effective

BUTE Synonym : effectiveness

Screen ID =LE-2

Enter F10 to exit, F1 for help

LADDER EDIT SCREEN

data name = typology

Subject ID = 113 Ladder # = 1
elderly patients with borderline hypertension
VALUE Synonym : age and level of BP
prevention of stroke in elderly patients with systolic hypertension
VALUE Synonym : age and preventive effect
elderly patients with systolic hypertension
VALUE Synonym : age and type of BP
elderly hypertensive patients
VALUE Synonym : age
less development of target-organ damage
CONSEQUENCE Synonym : less morbidity and mortality
better quality of life
CONSEQUENCE Synonym : quality of life
greater protection against the risk of major cardiovascular events
CONSEQUENCE Synonym : cardiovascular risk reduction
improve compliance with drug regimen
CONSEQUENCE Synonym : compliance
diuretics (lasix) are cheap
ATTRIBUTE Synonym : low cost
diuretics (lasix) are effective
ATTRIBUTE Synonym : effectiveness

Screen ID =LE-2 Enter F10 to exit, F1 for help

LADDER EDIT SCREEN

data name = typology

Subject ID = 113 Ladder # = 2
hypertensive woman in perimenopausal period
VALUE Synonym : age and gender
hypertensive woman in perimenopausal period with anxiety/depression
VALUE Synonym : age/gender/comorbidity
young-adult hypertensive patients
VALUE Synonym : age
less development of target-organ damage
CONSEQUENCE Synonym : less morbidity and mortality
better quality of life
CONSEQUENCE Synonym : quality of life
greater protection against the risk of major cardiovascular events
CONSEQUENCE Synonym : cardiovascular risk reduction
improve compliance with drug regimen
CONSEQUENCE Synonym : compliance
beta blockers (inderal) are cheap
ATTRIBUTE Synonym : low cost
beta blockers (inderal) are effective
ATTRIBUTE Synonym : effectiveness

Screen ID =LE-2 Enter F10 to exit, F1 for help

LADDER EDIT SCREEN

data name = typology

Subject ID = 113 Ladder # = 3
elderly hypertensive patients with peripheral vascular disease
VALUE Synonym : age and comorbidity
elderly hypertensive patients with cerebrovascular disease
VALUE Synonym : age and comorbidity
elderly hypertensive patients with angina
VALUE Synonym : age and comorbidity
less development of target-organ damage
CONSEQUENCE Synonym : less morbidity and mortality
better quality of life
CONSEQUENCE Synonym : quality of life
greater protection against the risk of major cardiovascular events
CONSEQUENCE Synonym : cardiovascular risk reduction
improve compliance with drug regimen
CONSEQUENCE Synonym : compliance
calcium antagonists (adalat)/good profile in concomitant diseases/problems
ATTRIBUTE Synonym : safety
calcium antagonists (adalat) are well tolerated
ATTRIBUTE Synonym : tolerability
calcium antagonists (adalat) are effective
ATTRIBUTE Synonym : effectiveness

Screen ID =LE-2 Enter F10 to exit, F1 for help

LADDER EDIT SCREEN

data name = typology

Subject ID = 113 Ladder # = 4
elderly hypertensive patients with renal insufficiency
VALUE Synonym : age and comorbidity
hypertensive woman in perimenopausal period with obesity
VALUE Synonym : age/gender/comorbidity
middle-aged hypertensive patients
VALUE Synonym : age
hypertensive patients with diabetes/dyslipidaemia
VALUE Synonym : comorbidity
less development of target-organ damage
CONSEQUENCE Synonym : less morbidity and mortality
better quality of life
CONSEQUENCE Synonym : quality of life
do not aggravate co-existing risk factors/hyperlipidaemia/glucose intolerance
CONSEQUENCE Synonym : cardiovascular risk reduction
ACE inhibitors (capoten) are metabolically neutral
ATTRIBUTE Synonym : neutral metabolism
ACE inhibitors (capoten) are effective
ATTRIBUTE Synonym : effectiveness

Screen ID =LE-2 Enter F10 to exit, F1 for help

Subject ID = 113 Ladder # = 5
elderly hypertensive patients whose BP requires drug combination therapy
VALUE Synonym : age and drug combination therapy
elderly hypertensive patients with congestive heart failure
VALUE Synonym : age and comorbidity
less development of target-organ damage
CONSEQUENCE Synonym : less morbidity and mortality
better quality of life
CONSEQUENCE Synonym : quality of life
greater protection against the risk of major cardiovascular events
CONSEQUENCE Synonym : cardiovascular risk reduction
improve compliance with drug regimen
CONSEQUENCE Synonym : compliance
reduce adverse effects of both therapeutic categories
CONSEQUENCE Synonym : less side-effects
as efficacious as monotherapy in more than 50% of all patients
CONSEQUENCE Synonym : monotherapy
drug combination therapy (loop diuretic) reinforce additive hypotensive effect
ATTRIBUTE Synonym : additive hypotensive effect
loop diuretic + diuretic (loop diuretic) are effective
ATTRIBUTE Synonym : effectiveness

Screen ID =LE-2

Enter F10 to exit, F1 for help

Verbatim Example

(Portuguese GPs' responses to the questions described below were noted in writing by the researcher and were subsequently content analysed. This example represents the 5 Ladders obtained from respondent 1/ Subject ID = 001/ see Appendix Five. There is a volume with all 113 laddering interviews that can be obtained from Prof. Luís Moutinho).

Evoking the Situational Context

Researcher:

As you know, I am not an expert on hypertension. However, I have been doing research on doctors' prescribing behaviour for a long time and I would like to understand your personal report on hypertension. Would you mind to talk about it?

Doctor:

Off course not! What do you want to know about my hypertension report?

Researcher:

*Why do you have a matrix with two different columns: **age and gender**?*

- *1st Ladder*

Doctor:

*...a distinction between **middle-aged** and **young-adult** hypertensive patients.*

Researcher:

*What do you mean by **middle-aged** and **young-adult** hypertensive patients?*

Doctor:

Middle-aged hypertensive patients: **45 to 64 years old** and ***young-adult*** hypertensive patients: **younger than 45 years old.**

Researcher:

Why is it important to distinguish the *age* of the patient in terms of *middle-aged* and *young-adult* hypertensive patients?

Doctor:

... *middle-aged*: left ventricular hypertrophy.

Researcher:

Why is *left ventricular hypertrophy* important to you?

Doctor:

...it requires a different antihypertensive therapy.

Researcher:

Which one?

Doctor:

ACE inhibitors: *effective*; *reduce left ventricular hypertrophy*.

Researcher:

And about *young-adult* hypertensive patient with *ventricular hypertrophy*?

Doctor:

...*less frequent*; *may happen*.

Researcher:

What *would be your therapeutic approach for these patients?*

Doctor:

ACE inhibitors: used in the *prevention of cardiovascular complications* such as *ventricular hypertrophy*.

Researcher:

Why *do you think that ACE inhibitors are better than other therapeutic classes?*

Doctor:

...ACE inhibitors: *favourable effects on cardiovascular risk reduction; reduces target-organ damage; greater protection against the risk of major cardiovascular events; less morbidity and mortality.*

Researcher:

And about the other therapeutic classes? *Why do you think they do not have these cardiovascular characteristics?*

Doctor:

...According to national guidelines, *first-line drug treatment* for most patients with hypertension: **diuretics and beta blockers**. However, **ACE inhibitors** : *effective* for *most hypertensive patients*.

Researcher:

Why *don't you follow those national guidelines?*

Doctor:

...therapy should be tailored to individual needs.

Researcher:

What *do you mean by that?*

Doctor:

...doctors should tailor therapy to meet the needs of individual patients.

Researcher:

Why *do you think that ACE inhibitors are the best therapeutic class to meet the needs of hypertensive patients (hp)?*

Doctor:

...ACE inhibitors: greater protective cardiovascular action than diuretics or beta blockers.

Researcher:

In your daily' clinical activity, how do you know that ACE inhibitors are better than diuretics or beta blockers?

Doctor:

...ACE inhibitors: improve the patient's compliance with the therapeutic regimen... particularly suitable for patients with diabetes/dyslipidaemia.

Researcher:

Why is it important to improve the patient's compliance with the therapeutic regimen?

Doctor:

...avoid: risk of major cardiovascular events. ACE inhibitors: very effective on cardiovascular risk reduction; improve the compliance with the therapeutic regimen.

Researcher:

Why do you think that ACE inhibitors are better than diuretics on hypertensive patients with diabetes/dyslipidaemia ?

Doctor:

...ACE inhibitors: all kind of hp; not true for diuretics.

Researcher:

Why?

Doctor:

...choice of antihypertensive drugs: age; gender. Different in middle-aged women in perimenopausal period as compared to men...drug should be tailored to the individual patient... Factors: coexisting diseases and side-effects.

Researcher:

Why the therapeutic approach is different?

Doctor:

...hypertensive women in perimenopausal period, obesity and diabetes:

ACE inhibitors.

Researcher:

Why?

Doctor:

...these women have: higher cardiovascular risk than men in the same age.

Researcher:

You mentioned that you prefer **ACE inhibitors** for most patients. So **what** is the role for the other therapeutic classes on hypertension treatment?

- *2nd Ladder*

Doctor:

...it depends on: elderly hp; with peripheral vascular disease: calcium antagonists.

Researcher:

Why?

Doctor:

...*elderly* hp with *peripheral vascular disease*, **calcium antagonists**:
effective; well tolerated; low incidence of side-effects; smooth onset of pharmacological action.

Researcher:

What *do you mean by a smooth onset of pharmacological action?*

Doctor:

...particularly suitable for *elderly* hp with *concomitant clinical problems* such as *cerebrovascular disease* and *peripheral vascular disease*.

Researcher:

Why?

Doctor:

calcium antagonists: neither *exaggerated response after the first dose*, nor *orthostatic hypotension*.

Researcher:

Why is that important?

Doctor:

...*improvement on compliance with the drug regimen*.

Researcher:

Do you have other reasons why calcium antagonists should be used in elderly hp?

Doctor:

...improve the patient's *quality of life*.

Researcher:

Why do you think that *calcium antagonists* improve the patient's *quality of life*?

Doctor:

...**calcium antagonists:** *less development of target-organ damage; greater protection against the risk of major cardiovascular events; cardiovascular risk reduction; less morbidity and mortality.*

- **3rd Ladder**

Researcher:

Why are you not so keen to use *diuretics*?

Doctor:

...**Diuretics:** *effective for elderly patients with renal insufficiency or elderly patients with borderline hypertension; diuretics are cheap.*

Researcher:

Why did you mentioned the *low cost* of diuretics?

Doctor:

...it improves *the compliance with the therapeutic regimen*: greater protection against the risk of major cardiovascular events; cardiovascular risk reduction; less morbidity and mortality because ... greater protection against the risk of major cardiovascular events. All these: **better quality of live for elderly** hp.

Researcher:

Are diuretics *the unique "low cost"* therapeutic approach?

- **4th Ladder**

Doctor:

No, **beta blockers**: "low cost".

Researcher:

Silence (researcher)¹.

Doctor:

...All classes of drugs: specific advantages and disadvantages for particular patient groups. **Beta blockers**: *hypertensive women in perimenopausal period*, with *anxiety* or *depression* ... The same is true for *young adult hypertensive woman*.

Researcher:

Why do you prescribe beta blockers for these women?

Doctor:

...**beta blockers**: *effective; cheap; low incidence of side-effects*.

¹ Silence on the part of the interviewer can be used to make the respondent keep trying to look for a more appropriate or definite answer when the respondent is not willing to think critically about the question asked.

Researcher:

What's the benefit of all these *pharmacological attributes*?

Doctor:

...compliance with the drug regimen; greater protection against the risk of major cardiovascular events; better quality of life; less morbidity and mortality.

Researcher:

*Let me see if I understand what you're saying. You are used to prescribe not only **ACE inhibitors**, but also **calcium antagonists**, **diuretics**, and even **beta blockers**. Each of this drug classes have similar pharmacological consequence/ benefits and their **attributes**, such as **effectiveness** and **low incidence of side-effects**, are also very close. **Is this true?***

Doctor:

Yes.

Researcher:

*If they are similar, **why** do you prescribe all of them?*

Doctor:

*...The rule is: four or five major therapeutic classes: taking into account individual patient characteristics... some cases: **combination therapy**.*

Researcher:

Would be possible to say that your prescribing behaviour is guided by individual patient characteristics ?

- **5th Ladder**

Doctor:

*...more careful therapeutic approach: elderly hp whose BP requires **drug combination therapy**.*

Researcher:

Why drug combination therapy?

Doctor:

*...most **elderly hp: concomitant diseases**.*

Researcher:

Such as?

Doctor:

*Such as **elderly hp with congestive heart failure**.*

Researcher:

Which drug combination will you use on elderly hp with congestive heart failure?

Doctor:

*... preparations that combine **two drugs in a single tablet or capsule: diuretic and ACE inhibitor**.*

Researcher:

Why?

Doctor:

*...drug combination therapy is **effective**.*

Researcher:

Silence.

Doctor:

*...drug combination: **diuretic** and **ACE inhibitor** reinforces the additive hypotensive effect; efficacy (monotherapy) in more than 50% of all patients; reduces adverse effects of both therapeutic categories.*

Researcher:

Why is that important?

Doctor:

...less side-effects: improvement on patient's compliance with the therapeutic regimen, greater protection against the risk of major cardiovascular events and better quality of life for the hp.

Researcher:

Silence.

Doctor:

*...drug combination: **diuretic** and **ACE inhibitor** (or any other antihypertensive therapy) ... to achieve the maximum reduction in the total risk of cardiovascular **morbidity** and **mortality** ... only possible if you **reduce the development of target-organ damage.***

Doctor:

Do you have more questions about my personal report on hypertension?

Researcher:

No, thank you very much for your collaboration in this study.

Appendix Six

Optimal Sample Size (for a dichotomous variable):

Suppose we want to find out what proportion of GPs follow a Liberal approach. In accordance with medical studies, we believe it to be slightly over half the medical population, so we assume $p = 0.6$, and we want 0.05 as the absolute precision at a 95% confidence level. Then the formula is

$$\text{Precision} = 1.96 (\sqrt{p(1-p)/n})$$

Where the symbol ' $\sqrt{}$ ' is the square root, then

$$0.05 = 1.96 (\sqrt{0.6(0.4)/n}) \text{ so}$$

$$(\sqrt{0.24/n}) = 0.05/1.96$$

$$n(0.05/1.96)^2 = 0.24$$

$$n = 0.24/0.00065$$

$$\text{and } n = 369$$

giving a required sample size of 369.

Appendix Seven

Questionnaire

Reinaldo A. G. Proença

Assistente do ISCTE

INQUÉRITO AOS MÉDICOS DE FAMÍLIA/CLÍNICA GERAL PORTUGUESES

- *A necessidade de melhor conhecer a perspectiva do Médico de Família/Clínica Geral Português sobre os múltiplos factores que estruturam a sua abordagem terapêutica levou à elaboração do presente questionário.*
- *Em média, a leitura e resposta a cada uma das afirmações em análise é feita em 10 a 15 segundos, pelo que o tempo total para preenchimento do questionário varia entre 16 a 25 minutos.*
- *Sendo o presente questionário a peça final de recolha de informação para a conclusão do meu doutoramento no Reino Unido, gostaria de sublinhar que a sua colaboração é decisiva para o sucesso da investigação em curso.*

Garante-se o carácter confidencial e anónimo de toda a informação recolhida individualmente por este questionário.

- Tipo de Centro de Saúde onde exerce a sua actividade médica:

1. Rural
2. Urbano em Meio Rural
3. Urbano em Meio Industrial
4. Grande Cidade

- Número de Médicos de Família/Clínica Geral que exercem actividade diária no seu Centro de Saúde/Extensão (se o Centro de Saúde tiver mais do que uma):

1. Menos de 5
2. 5 a 10
3. 11 a 20
4. 21 a 30
5. Mais de 30

- Indique o número médio de Consultas que faz diariamente no Centro de Saúde/Extensão:

1. Menos de 10
2. 10 a 15
3. 16 a 20
4. 21 a 30
5. Mais de 30

- Número de Utentes do seu Ficheiro:

1. Menos de 1500
2. 1500 a 1750
3. 1751 a 2000
4. Mais de 2000

- Número de Utentes do seu ficheiro com Hipertensão Arterial (HTA):

1. Menos de 100
2. 100 - 150
3. 151 - 200
4. 201 - 250
5. Mais de 250

Assinale com um círculo o algarismo que corresponde ao seu grau de concordância com as afirmações seguintes:

6 - A hipertensão arterial (HTA) é um dos problemas de Saúde Pública mais frequentes na prática clínica do Médico de Família/Clínica Geral.

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

7 - Cerca de 90% dos casos de HTA são de causa desconhecida, não apresentando a maioria sinais objetivos de lesões orgânicas (Estadio I).

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

8 - O diagnóstico da causa da HTA é fácil e raramente é necessário o recurso a exames complementares de diagnóstico.

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

9 - Os “Estilos de Vida” da população portuguesa, particularmente os hábitos alimentares e a actividade física, são correctos.

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

10 - A aderência do hipertenso à modificação de “Estilos de Vida” é muito baixa, e, em muitos casos, é temporária.

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

11 - A HTA não complicada cede facilmente à correcção de “Estilos de Vida”.

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

12 - No tratamento da HTA não complicada, para além da correcção dos “Estilos de Vida”, prescrevo simultaneamente um fármaco numa baixa dosagem.

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

13 - Como princípio geral de abordagem farmacológica da HTA essencial, sem qualquer patologia associada, prefiro (assinale apenas uma das quadriculas):

1. Diurético

2. IECA

3. Antagonista do Cálcio

4. β Bloqueante

5. Antagonista da Angiotensina II

14 - Se os valores da HTA não se encontram controlados após um período de tempo pré-definido, seleccione 3 das 5 opções abaixo referidas, escrevendo, na quadrícula correspondente, para cada uma das 3 escolhidas, a sua ordenação (1º, 2º e 3º).

- 1. Aumento a dose do fármaco prescrito
- 2. Mudo de fármaco dentro da mesma classe terapêutica
- 3. Mudo de classe terapêutica
- 4. Associo ao fármaco inicial outra substância de outra classe terapêutica
- 5. Insisto na continuação do tratamento sem alterar a prescrição anterior

15 - O tratamento farmacológico da HTA é fácil, sendo o número de hipertensos tratados praticamente idêntico ao número de hipertensos controlados.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

16 - Apesar da abordagem farmacológica e da correcção dos “Estilos de Vida”, cerca de um terço dos hipertensos permanecem não controlados.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

17 - A variação, quer do tipo de doente que aparece com HTA, quer da eventual patologia associada, e mesmo dos factores de risco cardiovasculares, é diminuta.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

18 - Na abordagem farmacológica da HTA “cada doente é um caso”.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

19 - “Não há Doenças, há Doentes”, sendo a abordagem farmacológica da HTA função não só da patologia, mas também de considerações sócio-económicas.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

20 - Na HTA, escolha apenas uma classe terapêutica para cada um dos três Grupos Etários.

	1 Diurético	2 β bloq.	3 IECA	4 Ant ^a do Cálcio	5 IECA + Diurético	6 Ant ^a da Angt ^a II	7 outro; indique qual:
35-44 anos (adulto jovem)							
45-64 anos (adulto)							
» 65 anos (idoso)							

21 - Na HTA, a opção farmacológica no Homem ou na Mulher é a mesma.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
- 5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

22 - O tratamento da HTA na mulher no período perimenopáusico é diferente da do homem no mesmo grupo etário.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
- 5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

23 - Mais de metade das mulheres hipertensas em Período Perimenopáusico têm sobrecarga ponderal/obesidade + dislipidémias.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
- 5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

24 - Na HTA da Mulher em Período Perimenopáusico, indique, com uma cruz na quadrícula correspondente, qual seria a sua opção farmacológica para as 4 situações abaixo descritas:

HTA da Mulher Período Perimenopáusico	1 Diurético	2 β bloq.	3 IECA	4 Ant ^a do Cálcio	5 IECA + Diurético	6 Ant ^a da Angt ^a II	7 outro; indique qual:
Não Obesa							
Obesa e Diabética							
Obesa c/ Dislipidémia							
Obesa com sintomas Ansio-Depressivos							

25 - Dos Homens Hipertensos, mais de metade são Obesos.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
- 5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

26 - Na abordagem farmacológica da HTA do Homem Obeso prefiro os IECAs aos diuréticos porque a maioria são dislipidémicos.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
- 5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

27 - Face às novas classes terapêuticas, só prescrevo o diurético como potenciador da acção farmacológica de outros Anti-Hipertensores.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
- 5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

28 - Quanto mais rápida for a redução dos valores tensionais, melhor o fármaco.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
- 5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

29 - Quando prescrevo um fármaco, espero normalizar os valores tensionais em duas a quatro semanas no máximo.

- 1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
- 5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

30 - Para cada uma das situações abaixo descritas de outra patologia associada à HTA do IDOSO (> 65 anos), assinale, na quadrícula correspondente, apenas uma classe terapêutica da sua opção:

HTA do Idoso com Patologia Associada +	1 Diurético	2 β bloq.	3 IECA	4 Ant ^a do Cálcio	5 IECA + Diurético	6 Ant ^a da Angt ^a II	7 outro: indique qual:
Diabetes Mellitus							
Dislipidémias							
Cardiopatia isquêmica							
Insuficiência Cardíaca Congestiva							
Doença Cérebro-Vascular							
Insuficiência Renal Crônica							

31 - A HTA essencial do Adulto Jovem (< 45 anos) aparece mais frequentemente relacionada com stress derivado do contexto sócio-profissional e/ou familiar.

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

32 - Reservo o uso de certos β bloqueantes, particularmente o propranolol, para a mulher jovem e/ou ansiosa, taquicárdica, em que a HTA é acompanhada de enxaqueca/cefaleias.

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

33 - A maioria dos β bloqueantes interfere na esfera sexual do hipertenso .

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

34 - Mesmo no Adulto Jovem, evito utilizar os β bloqueantes porque os meios auxiliares de diagnóstico, sob o ponto de vista ecocardiográfico, são diminutos.

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

35 - Na HTA do adulto jovem, ansioso e taquicárdico, mas fumador, prescrevo preferencialmente os IECAs.

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

36 - Nos hipertensos pós enfarte do miocárdio prefiro IECAs aos β bloqueantes.

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

37 - Os IECAs são a classe terapêutica com maior acção preventiva e que mais nitidamente reduzem a Hipertrofia Ventricular Esquerda (HVE).

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

38 - *A experiência baseada na opinião dos meus doentes hipertensos sobre os vários fármacos prescritos deu-me a informação suficiente para ter um esquema terapêutico que se tem mantido inalterado nos últimos anos.*

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

39 - *Procuro saber sempre a opinião do hipertenso sobre os fármacos prescritos, para avaliar o grau de adesão à terapêutica instituída.*

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

40 - *Quando o hipertenso refere efeitos secundários com um fármaco, mesmo que não sejam graves, mudo imediatamente a prescrição.*

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

41 - *Se o hipertenso refere que o fármaco prescrito é muito caro para a sua bolsa, mudo para outro mais barato.*

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

42 - *O preço do fármaco não é factor de 1ª opção, mas pode tornar-se importante, particularmente em utentes hipertensos idosos e com poucos recursos.*

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

43 - *Na esmagadora maioria das situações, quando prescrevo não penso no Preço.*

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

44 - *A cronicidade da HTA “obriga” à prescrição dos fármacos mais baratos.*

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

45 - *Desde que o preço seja menor, a INFARMED deve autorizar todos os novos anti-hipertensores, mesmo que não haja vantagens de eficácia ou tolerância.*

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

46 - *Os genéricos têm qualidade terapêutica idêntica aos fármacos de marca e são significativamente mais baratos.*

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

47 - *Na HTA, os genéricos não trazem qualquer vantagem face aos fármacos existentes.*

1 - Concordo completamente; 2 - Concordo em grande parte; 3 - Concordo pouco; 4 - Não concordo nem discordo
5 - Discordo ligeiramente; 6 - Discordo em grande parte; 7 - Discordo totalmente

Assinale com um círculo o algarismo que melhor corresponde à sua atitude face às diferentes fontes de informação disponíveis.

48 - As literaturas de informação sobre os produtos distribuídas por certos laboratórios farmacêuticos são de grande qualidade científica e pedagógica.

Nunca 1 2 3 4 5 6 7 Sempre

49 - Em termos de transmissão de informação sobre a abordagem terapêutica da HTA, a Indústria Farmacêutica tem tido um papel:

Sem importância 1 2 3 4 5 6 7 Importantíssimo

50 - A credibilidade científica da informação que a Indústria Farmacêutica transmite sobre os seus produtos é :

Nula 1 2 3 4 5 6 7 Total

51 - O marketing das empresas farmacêuticas é muito sofisticado e eficaz na indução da prescrição.

Nunca 1 2 3 4 5 6 7 Sempre

52 - As reuniões clínicas sobre HTA promovidas pelas empresas farmacêuticas são importantes para a actualização da prescrição.

Nula 1 2 3 4 5 6 7 Grande

53 - Os Delegados de Informação Médica são um veículo de informação:

Sem importância 1 2 3 4 5 6 7 Importantíssimo

54 - A capacidade e preparação técnica do Delegado de Informação Médica para expôr as vantagens de um novo fármaco face aos existentes pode suscitar interesse.

Nunca 1 2 3 4 5 6 7 Sempre

55 - Em presença de fármacos de qualidade idêntica, de laboratórios diferentes, é o Delegado de Informação Médica que faz a diferença.

Nunca 1 2 3 4 5 6 7 Sempre

56 - A triologia, Credibilidade Científica do Laboratório, Qualidade Terapêutica do Fármaco e Performance do Delegado de Informação Médica, induz prescrição.

Nunca 1 2 3 4 5 6 7 Sempre

57 - No Centro de Saúde onde exerço actividade clínica é prática corrente entre todos os colegas trocar impressões sobre novos produtos para a HTA.

Nunca 1 2 3 4 5 6 7 Sempre

58 - A actualização do esquema terapêutico da HTA tem sido feito através de conversa informal com alguns colegas do Centro de Saúde.

Nunca 1 2 3 4 5 6 7 Sempre

59 - Procuo seguir a prescrição dos meus colegas especialistas da região.

Nunca 1 2 3 4 5 6 7 Sempre

60 - Nos congressos, a opinião de alguns especialistas influencia a prescrição.

Nunca 1 2 3 4 5 6 7 Sempre

61 - Nem sempre os "Leaders de Opinião" mais conceituados das diferentes Escolas Médicas defendem a mesma abordagem farmacológica da HTA.

Discordo 1 2 3 4 5 6 7 Concordo

62 - A actualização do esquema terapêutico da HTA tem sido feita através de um diálogo regular com os colegas farmacêuticos da região.

Nunca 1 2 3 4 5 6 7 Sempre

63 - A actualização do esquema terapêutico da HTA tem sido feita através da leitura de artigos publicados em jornais/revistas médicas conceituadas.

Nunca 1 2 3 4 5 6 7 Sempre

64 - A UPDATE talvez seja a revista médica cujos artigos maior interesse têm para a realidade clínica vivida pelo Médico de Família/Clínica Geral.

Discordo 1 2 3 4 5 6 7 Concordo

65 - A actualização do esquema terapêutico da HTA é feita pela leitura regular dos manuais de farmacologia apropriados.

Nunca 1 2 3 4 5 6 7 Sempre

66 - Na reflexão sobre a opção e actualização da prescrição recorro à Medline.

Nunca 1 2 3 4 5 6 7 Sempre

67 - *A actualização do esquema terapêutico da HTA tem sido feita através do Boletim Terapêutico produzido pela Comissão de Farmácia e Terapêutica da ARS.*

Nunca 1 2 3 4 5 6 7 Sempre

68 - *O Boletim Terapêutico produzido pela Comissão de Farmácia e Terapêutica é uma fonte de actualização farmacológica credível, independente e necessária.*

Nunca 1 2 3 4 5 6 7 Sempre

69 - *A actualização do esquema terapêutico da HTA tem sido feita através de reflexão estritamente pessoal, baseada na experiência clínica concreta e diária.*

Nunca 1 2 3 4 5 6 7 Sempre

70 - *A minha experiência clínica fez-me céptico face à informação veiculada pelos laboratórios farmacêuticos no lançamento de novos produtos para a HTA.*

Nunca 1 2 3 4 5 6 7 Sempre

71 - *A experiência clínica ensinou-me a confiar mais na informação que resulta da minha relação com o utente hipertenso do que em qualquer outra fonte.*

Nunca 1 2 3 4 5 6 7 Sempre

72 - *Recebo e leio regularmente a informação dos boletins do INFARMED.*

Nunca 1 2 3 4 5 6 7 Sempre

73 - *A informação respeitante ao perfil de prescrição pode ser útil ao médico.*

Nunca 1 2 3 4 5 6 7 Sempre

74 - *A informação respeitante ao perfil de prescrição dá uma noção mais real da opção farmacológica em termos das marcas mais utilizadas na HTA.*

Nunca 1 2 3 4 5 6 7 Sempre

75 - *A informação respeitante ao perfil de prescrição ajuda a diversificar as marcas para evitar mal-entendidos na relação médico-laboratório farmacêutico.*

Nunca 1 2 3 4 5 6 7 Sempre

76 - *Recorro com frequência à informação constante no Índice Terapêutico.*

Nunca 1 2 3 4 5 6 7 Sempre

77 - No tratamento da HTA, os Antagonistas da Angiotensina II são um avanço terapêutico:

Insignificante 1 2 3 4 5 6 7 Notável

78 - É importante adquirir experiência clínica tão rápida quanto possível com os Antagonistas da Angiotensina II.

Discordo 1 2 3 4 5 6 7 Concordo

79 - Os Antagonistas da Angiotensina II são idênticos aos IECAs.

Discordo 1 2 3 4 5 6 7 Concordo

80 - Os Antagonistas da Angiotensina II são uma classe terapêutica de recurso quando os IECAs não são eficazes ou têm efeitos acessórios incômodos.

Discordo 1 2 3 4 5 6 7 Concordo

81 - A minha experiência clínica com os Antagonistas da Angiotensina II é:

Nula 1 2 3 4 5 6 7 Grande

82 - Os Antagonistas da Angiotensina II Não Pró-Droga têm vantagens face aos restantes fármacos da sua classe farmacológica.

Discordo 1 2 3 4 5 6 7 Concordo

83 - No tratamento da HTA, a maior vantagem dos Antagonistas da Angiotensina II face aos IECAs é a sua maior eficácia.

Discordo 1 2 3 4 5 6 7 Concordo

84 - Contrariamente aos IECAs, os Antagonistas da Angiotensina II têm a vantagem de provocar menos efeitos acessórios, particularmente "tosse".

Discordo 1 2 3 4 5 6 7 Concordo

85 - Só prescrevo os Antagonistas da Angiotensina II quando o número dos grandes estudos for idêntico ao que foi feito com os IECAs na última década.

Discordo 1 2 3 4 5 6 7 Concordo

86 - *A abordagem farmacológica da HTA que aprendi nos bancos da faculdade é diferente do esquema terapêutico que utilizo actualmente.*

Discordo 1 2 3 4 5 6 7 Concordo

87 - *O aparecimento dos IECAs e dos Antagonistas do Cálcio nos anos oitenta veio alterar o esquema clássico de abordagem farmacológica da HTA.*

Discordo 1 2 3 4 5 6 7 Concordo

88 - *Quando prescrevo um novo fármaco, a opinião que me é transmitida pelos dois ou três primeiros utilizadores é decisiva para a sua adopção ou não.*

Discordo 1 2 3 4 5 6 7 Concordo

89 - *No tratamento da HTA, os fármacos que aparecem com novos mecanismos de acção têm geralmente menos efeitos acessórios, ou maior eficácia.*

Discordo 1 2 3 4 5 6 7 Concordo

90 - *Procuro manter-me actualizado(a) e prescrever os fármacos mais recentes.*

Discordo 1 2 3 4 5 6 7 Concordo

91 - *A inovação farmacológica tem sido tão rápida que me tem obrigado a mudanças frequentes das marcas prescritas.*

Discordo 1 2 3 4 5 6 7 Concordo

92 - *Não vou em modas, mantenho-me fiel ao esquema terapêutico clássico.*

Discordo 1 2 3 4 5 6 7 Concordo

93 - *Para controlar a esmagadora maioria das situações de HTA, é suficiente conhecer bem dois ou três fármacos de duas ou três classes terapêuticas.*

Discordo 1 2 3 4 5 6 7 Concordo

94 - *Indique o nome comercial dos dois ou três fármacos para cada uma das classes terapêuticas que utiliza mais frequentemente no tratamento da HTA.*

- 1. Diurético:;;
- 2. β Bloqueante:;;
- 3. Ant^a Cálcio:;;
- 4. IECA:;;
- 5. Ant^a Angiotensina II:;;
- 6. Outra - Indique Qual:;;

95 - Idade:

1. Menos de 30
2. 30 a 40
3. 41 a 50
4. 51 a 60
5. Mais de 60

96 - Sexo :

1. Feminino
2. Masculino

97 - ARS:

1. Norte
2. Centro
3. Lisboa e Vale do Tejo
4. Alentejo
5. Algarve
6. Ilhas (indique qual) _____

98 - Faculdade onde se licenciou:

1. Faculdade de Medicina de Lisboa
2. Faculdade de Ciências Médicas de Lisboa
3. Faculdade de Medicina do Porto
4. Faculdade de Medicina de Coimbra
5. Outra (Indique Qual) _____

99 - Anos de Prática Clínica:

1. Menos de 5
2. 5 a 10
3. 11 a 20
4. Mais de 20

No caso de querer receber o Resumo e Principais Conclusões da investigação, indique:

Morada: (diferente da sua própria morada)

Pseudónimo:

MUITO OBRIGADO PELA COLABORAÇÃO

AGORA QUE CONCLUIU O PREENCHIMENTO DO QUESTIONÁRIO, PEÇO-LHE O FAVOR DE O DOBRAR EM DOIS E METÊ-LO DENTRO DO ENVELOPE-RESPOSTA QUE O ACOMPANHA, DEPOSITANDO-O DE SEGUIDA NA CAIXA DE CORREIO MAIS PRÓXIMA. NÃO NECESSITA DE SELO POSTAL.

1 - CHARACTERISTICS OF THE INSTITUTION, THE DOCTOR'S APPOINTMENT AND THE PREVALENCE OF HBP

1 - Kind of Health Centre where you practice medicine

- 1. Rural
- 2. Urban in Rural Environment
- 3. Urban in Industrial Environment
- 4. Large City

2 - Number of Family Doctors/General Practitioners who practice daily in your Health Centre/Service (if the Health Centre has more than one)

- 1. Fewer than 5
- 2. 5 to 10
- 3. 11 to 20
- 4. 21 to 30
- 5. More than 30

3 - Average Number of Appointments daily in the Health Centre/Service

- 1. Fewer than 10
- 2. 10 to 15
- 3. 15 to 20
- 4. 20 to 30
- 5. More than 30

4 - Number of Patients on your Files

- 1. Fewer than 1500
- 2. 1500 to 1750
- 3. 1751 to 2000
- 4. More than 2000

5 - Number of Patients with Arterial Hypertension (HBP) on your files

- 1. Fewer than 100
- 2. 100 - 149
- 3. 150 - 200
- 4. 201 - 250
- 5. More than 250

2 - CHARACTERISTICS OF HYPERTENSION PATIENTS AND THE THERAPEUTIC APPROACH

Circle the number which corresponds with your level of agreement on the following statements:

6 - Arterial hypertension (HBP) is one of the most frequent Public Health problems in the clinical practice of the Family Doctor/General Practitioner.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

7 - The causes of about 90% of HBP are unknown and the majority do *not* present objective signs of organic lesions (State 1).

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

8 - It is easy to diagnose the *cause* of HBP and it is *rarely necessary* to do complete diagnostic exams.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

9 - The “*Life styles*” of the Portuguese population, particularly eating habits and physical activity, *are correct*.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

10 - The hypertension patient’s commitment to changes in “*Life styles*” is very low and, in many cases, short-lived.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

11 - *Uncomplicated* HBP quickly responds to the correction of “*Life Styles*”.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

12 - To treat *uncomplicated* HBP, I prescribe a low drug dose at the same time as correcting “*Life Styles*”.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

13 - As a *general principle* of the essential pharmacological approach of HBP, with no associated pathology, I prefer (*mark only one of the following boxes*):

1. Diuretics
2. ACE Inhibitors
3. Calcium Antagonists
4. β -Blockers
5. Angiotensin II Antagonists

14 - If the HBP values are not controlled after a pre-defined time, select 3 of the 5 choices given below, and write the order of your choice next to it (1st, 2nd e 3rd).

1. Increase the dose of the prescribed drug
2. Change the drug within the same kind of therapy
3. Change the kind of therapy
4. Add another substance from another therapeutic class to the initial drug
5. Continue with the same treatment without changing the previous prescription

15 - The *pharmacological treatment of HBP is easy*, so that the number of *hypertension patients treated* is almost identical to the number of *controlled hypertension patients*.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

16 - In spite of *the pharmacological approach and the correction of Life Styles*, about one third of hypertension patients remain *uncontrolled*.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

17 - The *variation, whether in the kind of patient with HBP, or the possible pathology associated, or even the cardiovascular risk factors*, is very small.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

18 - In the pharmacological approach to HBP "*each patient is a different case*".

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

19 - "*There are Patients, not Illnesses*", is the pharmacological approach of the HBP function for both pathological and socio-economic considerations.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

20 - Choose *just one* therapeutic class for each of the *three Age Groups*.

N°	Therapeutic Class (1st line)	Age Groups		
		35 - 45	45 - 64	» 65
		<i>young adult</i>	<i>adult</i>	<i>elderly</i>
1	Diuretic			
2	Calcium Antagonist			
3	ACE Inhibitor			
4	β Blocker			
5	Angiotensin II Antagonist			
6	other - <i>indicate which:</i>			

21 - In HBP, the *pharmacological choice* for *men* or *women* is the same.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

22 - The treatment of the female HBP patient at the time of menopause *is different* from that of a male in the same age group.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

23 - More than half of the women with hypertension in the *Perimenopause Period* have obesity and dyslipidemia.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

24 - IN HBP of *Women in the Perimenopause Period*, indicate with a cross in the corresponding square which would be your *pharmacological choice* for the 4 cases.

Nº	HBP of Perimenopause Period Woman	Diuretic	Beta Blocker	A C E	Calcium Blockers	ACE + Diuretic	Angiotensin II Antagonist	other: indicate which:
	Not Obese							
2	Obese and Diabetic							
3	Obese w/ Dyslipidemia							
4	Obese with Anxiety-Depression Symptoms							

25 - More than half of Hypertensive Males are *Obese*.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

26 - I prefer ACE inhibitors to diuretics in the pharmacological approach of HBP of *obese* males because they are mostly *dyslipidemic*.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

27 - Given the new therapeutic classes, I only prescribe the diuretic as one with potential of pharmacological action of other antihypertensive medication.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

28 - The quicker the reduction of the tension levels, the better the drug.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

29 - When I prescribe a drug, I expect to normalise the level of tension in two to four weeks at most.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

30 - For each one of the situations of another pathology associated to HBP of the ELDERLY (> 65 years old) described below, indicate just one therapeutic class of your choice

Nº	HBP of ELDERLY with Associated Pathology	Diuretic	Beta Blocker	ACE	Calcium Antagonist	ACE + Diurético	Angiotensin II	other; indicate which:
1	Diabetes Mellitus							
2	Dyslipidemia							
3	Coronary Heart Disease							
4	Congestive Heart Failure							
5	Cerebrovascular Disease							
6	Renal Disease							

31 - The essential HBP of the Young Adult(« 45 years old) seems to be more often related to stress as a result of the socio-professional and/or family situation.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

32 - I reserve the use of certain beta blockers (propranolol) for the young and/or anxious, tachycardiac woman for whom HBP is accompanied by migraine.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

33 - Most beta blockers interfere in the sexual sphere of the hypertensive patient.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

34 - I avoid using beta blockers because the diagnostic support means are very limited, from the point of view of echocardiography, even for the young adult.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

35 - I prefer to prescribe ACEs for the young adult HBP patient who is anxious, with tachycardia and who smokes.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

36 - I prefer ACEs to Beta blockers for myocardial infarction.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

37 - The ACEs have the best preventive effect and most clearly reduce HVE.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 -Strong disagreement 7 - Total disagreement

38 - The experience based on my hypertensive patients' opinions on the various drugs prescribed gave me enough information to form a plan of therapy which has remained unaltered in recent years.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

39 - I always try to find out the *opinion of the hypertensive patient* on the drugs prescribed, so as to evaluate how far the therapy applied will be followed.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

40 - I change the prescription immediately the hypertensive patient refers to side effects of a drug, even if they are not serious.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

41 - If the hypertensive patient says that he cannot afford the drug prescribed, I immediately change to a cheaper one.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

42 - The *price* of the drug is not a 1st choice factor, but can become important particularly for the elderly or badly off patient.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

43 - When prescribing I hardly ever think about *price*.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

44- Chronic HBP "obliges" doctors to prescribe the cheaper drugs.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

45 - *As long as the price is lower*, INFARMED should authorize all the new anti-hypertensive drugs, even if there are no advantages of effectiveness or tolerance.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

46 - The *generic* drugs have exactly the same therapeutic quality as brand drugs and are significantly cheaper.

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

47 - In HBP, generics bring no advantages over existing drugs .

1 - Total agreement 2 - Strong agreement 3 - Little agreement 4 - Neither agree nor disagree 5 - Partial disagreement 6 - Strong disagreement 7 - Total disagreement

3 – ATTITUDE TOWARDS THE DIFFERENT SOURCES OF DRUG INFORMATION

Circle the number which most closely corresponds to your attitude towards the different sources of information available.

48 - The information literature on products distributed by certain pharmaceutical companies is of high scientific and pedagogical quality

Never 1 2 3 4 5 6 7 *Always*

49 - The pharmaceutical industry has had an important role in the transmission of information on the therapeutic approach of HBP

No importance 1 2 3 4 5 6 7 *Great Importance*

50 - The scientific credibility of the information transmitted by the pharmaceutical industry on their products is

Nil 1 2 3 4 5 6 7 *Total*

51 - The marketing of the pharmaceutical companies is very sophisticated and effective.

Never 1 2 3 4 5 6 7 *Always*

52 - The clinical meetings on HBP promoted by pharmaceutical companies begin a memorising process of their drugs

Nil 1 2 3 4 5 6 7 *Great*

53 - The pharmaceutical manufacturers' representatives are a vehicle of information

Unimportant 1 2 3 4 5 6 7 *Very Important*

54 - The technical skills of the pharmaceutical manufacturers' representatives to explain the advantages of a new drug over the existing ones can arouse interest

Never 1 2 3 4 5 6 7 *Always*

55 - When there are drugs of the same quality, from different laboratories, it is the pharmaceutical manufacturers' representatives who makes the difference.

Never 1 2 3 4 5 6 7 *Always*

56 - Prescription is induced by the Company's Scientific Credibility, Therapeutic Quality of the Drug, and the Medical Representative's performance together.

Never 1 2 3 4 5 6 7 *Always*

57 - It is common practice to exchange impressions on new HBP products with all your *colleagues* in the Health Centre where you practice.

Never 1 2 3 4 5 6 7 *Always*

58 - The HTA therapeutic plan has been updated as a result of informal conversation with some *colleagues* in the Health Centre

Never 1 2 3 4 5 6 7 *Always*

59 - I try to prescribe the same as my *colleagues* who are regional specialists.

Never 1 2 3 4 5 6 7 *Always*

60 - At congresses, the consultants' opinions influence my prescribing behaviour

Never 1 2 3 4 5 6 7 *Always*

61 - The best recognised "*Opinion Leaders*" from the different Medical Schools do not always defend the same HBP therapeutic approach

Disagree 1 2 3 4 5 6 7 *Agree*

62 - The HBP therapeutic plan has been updated by regular conversations with regional pharmaceutical colleagues.

Never 1 2 3 4 5 6 7 *Always*

63 - The HBP therapeutic plan has been updated by the reading of articles published in recognised medical reviews/journals

Never 1 2 3 4 5 6 7 *Always*

64 - UPDATE is perhaps the review with the most interesting articles for the clinical situations experienced by Family Doctors/General Practitioners

Disagree 1 2 3 4 5 6 7 *Agree*

65 - The HBP therapeutic plan is updated by regular reading of the appropriate pharmaceutical manuals

Never 1 2 3 4 5 6 7 *Always*

66 - I turn to *Medline* when considering *prescription choices and updating*

Never 1 2 3 4 5 6 7 *Always*

67 - The HBP therapeutic plan has been updated using the *Therapeutic Bulletin* produced by the RHA Pharmacy and Therapeutic Commission

Never 1 2 3 4 5 6 7 Always

68 - The *Therapeutic Bulletin* produced by the *Pharmacy and Therapeutic Commission* is an up-to-date source of pharmaceutical information which is *credible, independent and necessary*

Never 1 2 3 4 5 6 7 Always

69 - The HBP therapeutic plan is updated according to *strictly personal reflection*, based on concrete, daily experience.

Never 1 2 3 4 5 6 7 Always

70 - My experience has made me sceptical towards information coming from Pharmaceutical companies in the launching of new HBP products

Never 1 2 3 4 5 6 7 Always

71 - *My clinical experience* has taught me to have more confidence in the information which results from my relationship with the hypertensive patient than in any other source

Never 1 2 3 4 5 6 7 Always

72 - I regularly receive and read the information from the *INFARMED* bulletins

Never 1 2 3 4 5 6 7 Always

73 - Information on the prescription profile can be useful to the doctor

Never 1 2 3 4 5 6 7 Always

74 - Information on the prescription profile can give a real notion of the pharmaceutical choice in terms of the most used HBP brands

Never 1 2 3 4 5 6 7 Always

75 - Information on the prescription profile helps diversify the brands to *avoid misunderstandings* in the doctor-pharmaceutical laboratory relationships

Never 1 2 3 4 5 6 7 Always

76 - I often turn to the information in the *Therapeutic Index*.

Never 1 2 3 4 5 6 7 Always

4 - ATTITUDE TOWARDS THERAPEUTIC INNOVATION

77 - *Angiotensin II Antagonists* are a therapeutic advance in treating HBP

Insignificant 1 2 3 4 5 6 7
Considerable

78 - It is important to get clinical experience with *Angiotensin II Antagonists* as quickly as possible

Little importance 1 2 3 4 5 6 7 *Great importance*

79 - *Angiotensin II Antagonists* are identical to ACEs

Little 1 2 3 4 5 6 7 *Much*

80 - *Angiotensin II Antagonists* are a therapy to resort to when ACEs are not effective or have unpleasant side effects

Little 1 2 3 4 5 6 7 *Much*

81 - My clinical experience with *Angiotensin II* is

Nil 1 2 3 4 5 6 7 *Great*

82 - *Angiotensin II not Pro-Drug* have advantages over the other drugs in their pharmaceutical class

Disagree 1 2 3 4 5 6 7 *Agree*

83 - The main advantage of *Angiotensin II* over ACEs when treating HBP is that it is more effective

Disagree 1 2 3 4 5 6 7 *Agree*

84 - Contrary to ACEs, *Angiotensin II Antagonists* have the advantage of being *more effective and do not cause a cough*

Disagree 1 2 3 4 5 6 7 *Agree*

85 - I will only prescribe *Angiotensin II Antagonists* when as many large studies have been done on it as for ACEs in the last decade

Disagree 1 2 3 4 5 6 7 *Agree*

86 - The HBP pharmaceutical approach which I learnt in my university hospital experience is different from that which I now use.

Disagree 1 2 3 4 5 6 7 *Agree*

87 - The appearance of ACEs and Calcium Antagonists changed the classic plan of the pharmaceutical approach to HBP.

Disagree 1 2 3 4 5 6 7 *Agree*

88 - When I prescribe a new drug, the opinion transmitted by the first two or three users is decisive in adopting it or not.

Disagree 1 2 3 4 5 6 7 *Agree*

89 - In treating HBP, drugs which appear with *new action mechanisms* usually have *fewer* side effects or *greater* effectiveness

Disagree 1 2 3 4 5 6 7 *Agree*

90 - I try to keep up to date and prescribe *the most recent* drugs.

Disagree 1 2 3 4 5 6 7 *Agree*

91 - Pharmacological innovation has been so fast that I have been obliged to *change* the brands prescribed frequently

Disagree 1 2 3 4 5 6 7 *Agree*

92 - I do not follow trends, I am faithful to the *classic* therapeutic plan

Disagree 1 2 3 4 5 6 7 *Agree*

93 - It is enough to know two or three drugs of two or three therapeutic classes to control the vast majority of HBP situations.

Disagree 1 2 3 4 5 6 7 *Agree*

94 - Indicate the *commercial name* of two or three drugs for each of the therapeutic classes which you most often use in the HBP treatment

1. Diuretics: _____; _____; _____;
2. β Blockers: _____; _____; _____;
3. Calcium Antagonists: _____; _____; _____;
4. ACE Inhibitors: _____; _____; _____;
5. Angiotensin II Antagonists: _____; _____; _____;
6. Other - Indicate which: _____; _____; _____;

5 - CHARACTERISTICS OF THE RESPONDENT

95 - Age

- Less than 30
- 30 to 40
- 41 to 50
- 51 to 60
- More than 60

96 - Sex

- Female
- Male

97 - RHA

- North
- Centre
- Lisbon and Tagus Valley
- Alentejo
- Algarve

98 - Graduated from:

- Lisbon Medical School
- Medical Sciences of Lisbon
- Oporto Medical School
- Abel Salazar Institute
- Other (Indicate Which)-----

99 - Years of Clinical Practice

- Fewer than 5
- 5 to 10
- 10 to 20
- More than 20

If you wish to receive the Summary of the Main Conclusions of the Research, please indicate

Address:

Pseudonym:

MANY THANKS FOR YOUR COLLABORATION

Appendix Eight

Cover Letter

April 1998

Dear Doctor

1) I am a teaching assistant at Higher Institute of Labour and Business Studies in Lisbon (Instituto Superior de Ciências do Trabalho e da Empresa - ISCTE), on paid leave abroad to do my PhD at the University of Glasgow Business School, in the United Kingdom. *To this end, I am being supported by the Praxis XXI Programme / BD / 5066 / 95 from the Foundation for Science and Technology (ex-JNICT).*

2) In the first phase, I had the pleasure of interviewing a significant amount of Family Doctors / General Practitioners in a number of Health Care Centres, following approval from the various RHA(Regional Health Authorities). *I would like to express my sincere gratitude to them all, both for their openness and also for the suggestions and motivation they gave me.*

3) This *questionnaire* is a result of the need to go into greater depth on some aspects of the information collected at the time.

4) *Always bearing in mind the line of research preconceived in the international bibliography*, it was decided to restrict the scope of the *questionnaire* to a concrete situation which commonly occurs in clinical practice: *Therapeutic Approach to HBP.*

5) As the *Therapeutic Approach to Arterial Hypertension(HBP)* is complex and depends on numerous factors, it was decided to sub-divide the *questionnaire* into 5 different groups:

1. *Characteristics of the Institution, the Medical Appointment and the Prevalence of HBP;*
2. *Characteristics of the Patient with Hypertension and the Therapeutic Approach;*
3. *Attitude towards different Sources of Information;*
4. *Attitude towards Therapeutic Innovation and*
5. *Characteristics of the Responding Doctor (no identity given).*

6) For ethical reasons, *we guarantee that all information provided individually in this questionnaire will be treated confidentially and anonymously.*

7) Should you wish to receive a *Summary of the Main Conclusions* of the Research in the second quarter of 1999, please fill in the last part of the questionnaire with an address (not your home address) and a pseudonym. In this way the confidential and anonymous nature of this enquiry can be maintained.

8) On completing the questionnaire, please fold it in two and put it inside the answer envelope provided, then post it in the nearest post-box. *No stamp is required.*

Thanking you in advance for your collaboration.

Kindest regards

Appendix Nine

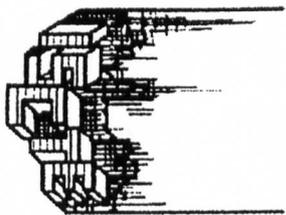
Portuguese University Stationery (ISCTE)



INSTITUTO SUPERIOR DE CIÊNCIAS DO TRABALHO E DA EMPRESA

Appendix Ten

Questionnaire's Mailing and Answer Envelops



INSTITUTO SUPERIOR DE CIÊNCIAS DO TRABALHO E DA EMPRESA

Exmo. Sr.



RSF

NÃO PRECISA DE SELO

**AUTORIZADO PELOS CTT
NO SERVIÇO NACIONAL**

**Dr. Reinaldo Proença
UNIDE - Unidade de Investigação em
Desenvolvimento Empresarial
Edifício ISCTE - Instituto Superior de
Ciências do Trabalho e da Empresa
Av. das Forças Armadas
1600 LISBOA**

Appendix Eleven

Statistical Output:

- ***Factor Analysis***
- ***Logistic Regression Analysis***

- - - - - F A C T O R A N A L Y S I S - - - - -

Analysis number 1 Replacement of missing values with the mean

Correlation Matrix:

	II_48	II_49	II_50	II_52	II_53	II_54	II_55
II_48	1,00000						
II_49	,59957	1,00000					
II_50	,63741	,70775	1,00000				
II_52	,43789	,56453	,50234	1,00000			
II_53	,53529	,66036	,64871	,65391	1,00000		
II_54	,47690	,53284	,57402	,45835	,67646	1,00000	
II_55	,17386	,19814	,21017	,26184	,27858	,27798	1,00000
II_56	,28727	,33507	,26884	,32652	,30180	,32102	,55927
II_57	,10156	,07476	,07620	,12457	,10527	,17751	,05685
II_58	,10578	,05798	,07730	,15942	,10557	,13587	,10363
II_59	,16056	,10105	,15582	,15804	,18752	,26165	,10856
II_60	,17318	,17585	,17664	,30173	,28855	,28764	,13052
II_63	,15582	,07891	,12631	,16048	,08999	,08888	-,02840
II_64	,17983	,27034	,25008	,23203	,32399	,19373	,08586
II_65	,08515	,07342	,16522	,05868	,07847	,08306	,09159
II_67	-,04596	-,12316	-,09776	-,02646	-,03006	,01886	,03031
II_68	-,00016	-,05012	,04368	-,00330	,04179	,12318	-,02747
II_72	,03188	,00403	,04812	,06881	,07334	,07285	,10876
II_73	,09141	,00044	,06366	,04749	,10094	,14311	-,05825
II_74	,11848	,04008	,08215	,04227	,06184	,14253	,08768
II_75	,15829	,10102	,08116	,01746	,11610	,10100	,08499
II_56		II_57	II_58	II_59	II_60	II_63	II_64
II_56	1,00000						
II_57	,13053	1,00000					
II_58	,07636	,68851	1,00000				
II_59	,17896	,27368	,33378	1,00000			
II_60	,26163	,20079	,21435	,46926	1,00000		
II_63	,07812	,03878	-,00220	-,00371	,14377	1,00000	
II_64	,21055	,08868	,10658	,18266	,18063	,22723	1,00000
II_65	,01602	,22622	,17468	,10637	,03145	,21692	,26454
II_67	-,01414	,02541	,12242	,14880	,13821	,06836	,07428
II_68	-,07159	-,03070	,04120	,21772	,17787	,07695	,05679
II_72	,03669	,08204	,07081	,07900	,10117	,09987	,00744
II_73	-,05678	,08420	,05286	,10774	,10961	,21086	,07113
II_74	,09325	,20101	,15747	,21069	,24506	,19514	,20726
II_75	-,01363	,04489	,06438	,08532	,05745	-,04325	,23524

- - - - - F A C T O R A N A L Y S I S - - - - -

	II_65	II_67	II_68	II_72	II_73	II_74	II_75
II_65	1,00000						
II_67	,13782	1,00000					
II_68	,01526	,64431	1,00000				
II_72	,15627	,49500	,44560	1,00000			
II_73	,22429	,29008	,30795	,37331	1,00000		
II_74	,20344	,25614	,31661	,28011	,63370	1,00000	
II_75	,24835	,15991	,10676	,10695	,30634	,39730	1,00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = ,77478

Bartlett Test of Sphericity = 2437,5946, Significance = ,00000

Anti-image Covariance Matrix:

	II_48	II_49	II_50	II_52	II_53
II_48	,50580				
II_49	-,08043	,37061			
II_50	-,13444	-,12947	,35866		
II_52	-,01461	-,07858	-,00810	,49635	
II_53	-,02689	-,06086	-,05246	-,13941	,30843
II_54	-,02400	-,02504	-,06093	,02369	-,14575
II_55	,02995	,05032	-,01187	-,03368	-,04818
II_56	-,05145	-,06075	,01551	-,03120	,03914
II_57	,00374	-,00092	,02333	,01244	-,00313
II_58	-,01976	,01044	-,00704	-,04947	,00999
II_59	-,03506	,03196	-,00921	,01376	,01258
II_60	,02302	,01352	,01870	-,07448	-,04447
II_63	-,08263	,03237	-,00247	-,07080	,03642
II_64	,05905	-,03353	-,01006	,00661	-,10090
II_65	,03778	,01131	-,09101	,01460	,03220
II_67	-,02028	,01440	,06314	-,00535	,00422
II_68	,02950	,01822	-,05525	,01660	,00409
II_72	,01094	-,01068	-,01420	-,01656	-,01522
II_73	-,00333	,03243	,01070	-,01232	-,04588
II_74	-,01040	-,01042	-,00848	,01934	,05238
II_75	-,08426	-,02853	,04136	,03773	-,01788

	II_54	II_55	II_56	II_57	II_58
II_54	,45722				
II_55	-,04321	,60288			

- - - - - F A C T O R A N A L Y S I S - - - - -

	II_54	II_55	II_56	II_57	II_58
II_56	-,03659	-,29712	,55228		
II_57	-,05285	,06896	-,05783	,47149	
II_58	,02109	-,05841	,06106	-,30805	,47563
II_59	-,05348	,00817	-,03266	-,01504	-,09390
II_60	-,02101	,04002	-,07666	-,01236	-,00970
II_63	-,00887	,05040	-,02103	,00397	,02838
II_64	,05102	,07362	-,09553	,02824	-,02181
II_65	,00989	-,07530	,06160	-,09411	,00373
II_67	,00182	-,00357	-,03249	,03786	-,06103
II_68	-,04800	,02360	,05890	,03801	,01245
II_72	,03977	-,07037	-,00342	-,04909	,02753
II_73	-,03558	,08647	,02109	,02081	,01242
II_74	,00161	-,05752	-,02704	-,06060	,00076
II_75	,00070	-,05742	,07540	,03114	-,00151

	II_59	II_60	II_63	II_64	II_65
II_59	,66565				
II_60	-,24130	,66094			
II_63	,09269	-,08091	,79737		
II_64	-,06231	,00957	-,14286	,71365	
II_65	-,03970	,04467	-,13827	-,13350	,74417
II_67	,01461	-,02069	,00658	-,03016	-,07062
II_68	-,07977	-,01724	-,01145	-,00452	,08707
II_72	,03013	,00166	-,00761	,05661	-,04576
II_73	-,00541	,04261	-,06717	,07904	-,06774
II_74	-,00982	-,08012	-,04701	-,07580	,02729
II_75	,01243	,00561	,15191	-,11921	-,12061

	II_67	II_68	II_72	II_73	II_74
II_67	,47951				
II_68	-,25732	,47884			
II_72	-,15218	-,09821	,64486		
II_73	-,02192	,00153	-,11441	,48945	
II_74	,02806	-,07363	,00134	-,25833	,46000
II_75	-,04530	,02941	,02814	-,04818	-,14796

	II_75
II_75	,71524

- - - - - F A C T O R A N A L Y S I S - - - - -

Anti-image Correlation Matrix:

	II_48	II_49	II_50	II_52	II_53	II_54	II_55
II_48	,89084						
II_49	-,18576	,88549					
II_50	-,31564	-,35511	,86041				
II_52	-,02916	-,18322	-,01919	,89164			
II_53	-,06809	-,18001	-,15772	-,35631	,84293		
II_54	-,04991	-,06082	-,15047	-,04972	-,38812	,88961	
II_55	,05423	,10644	-,02553	-,06157	-,11174	-,08229	,63494
II_56	-,09735	-,13428	,03486	-,05959	,09484	-,07281	-,51492
II_57	,00766	-,00220	,05673	,02572	-,00820	-,11383	,12934
II_58	-,04029	,02486	-,01705	-,10181	,02609	,04522	-,10908
II_59	-,06042	,06435	-,01884	,02394	,02776	-,09695	,01289
II_60	,03982	,02732	,03841	-,13004	-,09849	-,03823	,06339
II_63	-,13012	,05955	-,00461	-,11253	,07345	-,01469	,07270
II_64	,09828	-,06520	-,01988	,01110	-,21507	,08933	,11224
II_65	,06158	,02154	-,17616	,02403	,06721	,01695	-,11242
II_67	-,04118	,03416	,15226	-,01096	,01097	,00389	-,00664
II_68	,05995	,04326	-,13332	,03405	,01065	-,10258	,04392
II_72	,01915	-,02184	-,02953	-,02926	-,03413	,07324	-,11286
II_73	-,00669	,07613	,02554	-,02499	-,11809	-,07520	,15918
II_74	-,02155	-,02523	-,02088	,04047	,13906	,00352	-,10922
II_75	-,14008	-,05542	,08166	,06333	-,03807	,00122	-,08745

	II_56	II_57	II_58	II_59	II_60	II_63	II_64
II_56	,71532						
II_57	-,11333	,59892					
II_58	,11913	-,65050	,61310				
II_59	-,05386	-,02686	-,16688	,77870			
II_60	-,12689	-,02215	-,01730	-,36378	,80141		
II_63	-,03169	,00648	,04609	,12723	-,11146	,61312	
II_64	-,15217	,04869	-,03744	-,09040	,01394	-,18938	,73952
II_65	,09609	-,15887	,00626	-,05641	,06369	-,17950	-,18319
II_67	-,06313	,07962	-,12779	,02586	-,03675	,01064	-,05156
II_68	,11454	,07999	,02609	-,14129	-,03065	-,01854	-,00773
II_72	-,00573	-,08903	,04972	,04599	,00254	-,01062	,08345
II_73	,04056	,04332	,02574	-,00948	,07492	-,10752	,13374
II_74	-,05366	-,13013	,00163	-,01774	-,14530	-,07762	-,13230
II_75	,11998	,05363	-,00258	,01801	,00816	,20115	-,16685

- - - - - F A C T O R A N A L Y S I S - - - - -

	II_65	II_67	II_68	II_72	II_73	II_74	II_75
II_65	,66109						
II_67	-,11823	,68054					
II_68	,14585	-,53701	,67761				
II_72	-,06605	-,27366	-,17674	,79727			
II_73	-,11224	-,04525	,00315	-,20364	,68919		
II_74	,04665	,05975	-,15688	,00246	-,54442	,70205	
II_75	-,16531	-,07735	,05025	,04144	-,08144	-,25795	,68032

Measures of Sampling Adequacy (MSA) are printed on the diagonal.

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
II_48	1,00000	*	1	4,90548	23,4	23,4
II_49	1,00000	*	2	2,94240	14,0	37,4
II_50	1,00000	*	3	1,78841	8,5	45,9
II_52	1,00000	*	4	1,48122	7,1	52,9
II_53	1,00000	*	5	1,24070	5,9	58,8
II_54	1,00000	*	6	1,11976	5,3	64,2
II_55	1,00000	*	7	1,06717	5,1	69,3
II_56	1,00000	*	8	,95505	4,5	73,8
II_57	1,00000	*	9	,70340	3,3	77,2
II_58	1,00000	*	10	,64793	3,1	80,2
II_59	1,00000	*	11	,58945	2,8	83,1
II_60	1,00000	*	12	,55273	2,6	85,7
II_63	1,00000	*	13	,47184	2,2	87,9
II_64	1,00000	*	14	,45896	2,2	90,1
II_65	1,00000	*	15	,41301	2,0	92,1
II_67	1,00000	*	16	,36512	1,7	93,8
II_68	1,00000	*	17	,30803	1,5	95,3
II_72	1,00000	*	18	,27834	1,3	96,6
II_73	1,00000	*	19	,25684	1,2	97,8
II_74	1,00000	*	20	,23898	1,1	99,0
II_75	1,00000	*	21	,21518	1,0	100,0

PC extracted 7 factors.

- - - - - F A C T O R A N A L Y S I S - - - - -

Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
II_48	,68430	-,22846	-,16522	,10333	-,15179
II_49	,72829	-,37536	-,19087	,06615	-,12962
II_50	,74716	-,28818	-,21003	,08346	-,18218
II_52	,69516	-,24901	-,04906	-,09303	-,09534
II_53	,79793	-,25995	-,15761	-,04373	-,13552
II_54	,74243	-,13873	-,07194	-,11137	-,12512
II_55	,40543	-,11869	,10247	-,30215	,70441
II_56	,50211	-,19757	,14388	-,28226	,58942
II_57	,31304	,20521	,73757	,15818	-,15011
II_58	,31212	,23217	,74108	,05526	-,18172
II_59	,41113	,25351	,41997	-,22559	-,12952
II_60	,47623	,18343	,26523	-,27319	-,06930
II_63	,23766	,16556	-,15226	,28666	-,00387
II_64	,44261	,07855	-,00404	,31931	,18533
II_65	,26719	,29531	,09669	,50584	,19390
II_67	,11974	,69573	-,16890	-,36682	-,02175
II_68	,17609	,64209	-,27393	-,41611	-,20538
II_72	,21542	,57974	-,22904	-,27638	,02315
II_73	,26282	,63148	-,25908	,25376	-,02958
II_74	,34825	,63101	-,06053	,24186	,16019
II_75	,25260	,34676	-,13290	,40580	,24926

	Factor 6	Factor 7
II_48	-,11891	,03302
II_49	-,10267	,04639
II_50	-,08856	,09069
II_52	,09876	,09963
II_53	-,06412	-,00056
II_54	-,11565	-,02998
II_55	-,13262	,14972
II_56	,12359	,02056
II_57	-,11861	,26222
II_58	-,14655	,22336
II_59	,09611	-,41865
II_60	,32953	-,42837
II_63	,74156	,22131
II_64	,32696	-,17977
II_65	,07651	,31790
II_67	-,00040	,18331
II_68	,01466	,00965
II_72	-,07665	,39665

- - - - - F A C T O R A N A L Y S I S - - - - -

Factor 6 Factor 7

II_73	-,09079	-,06363
II_74	-,06908	-,24320
II_75	-,43816	-,32870

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
II_48	,59670	*	1	4,90548	23,4	23,4
II_49	,74160	*	2	2,94240	14,0	37,4
II_50	,74163	*	3	1,78841	8,5	45,9
II_52	,58508	*	4	1,48122	7,1	52,9
II_53	,75351	*	5	1,24070	5,9	58,8
II_54	,61796	*	6	1,11976	5,3	64,2
II_55	,81645	*	7	1,06717	5,1	69,3
II_56	,75463	*				
II_57	,81450	*				
II_58	,80797	*				
II_59	,66184	*				
II_60	,70231	*				
II_63	,78816	*				
II_64	,47762	*				
II_65	,56834	*				
II_67	,69553	*				
II_68	,73397	*				
II_72	,67508	*				
II_73	,61252	*				
II_74	,67119	*				
II_75	,72855	*				

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

VARIMAX converged in 7 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
II_48	,75898	-,02569	,11905	,04560	,01388

- - - - - F A C T O R A N A L Y S I S - - - - -

Factor 1 Factor 2 Factor 3 Factor 4 Factor 5

II_49	,84899	-,09605	,03642	-,00504	-,00327
II_50	,85372	-,01223	,05751	,02887	-,01370
II_52	,70106	,03149	-,10876	,07589	,14493
II_53	,84557	,02349	,04438	,01548	,13525
II_54	,73318	,09750	,07464	,08222	,19715
II_55	,18301	,06022	,05151	,05176	-,01617
II_56	,26654	-,04057	-,04307	,01216	,20119
II_57	,07420	-,00366	,04696	,88736	,12901
II_58	,07071	,05570	,01966	,87206	,19327
II_59	,12088	,09056	,11715	,27589	,73777
II_60	,18913	,10585	,02553	,08203	,78469
II_63	,09100	,12033	-,06170	-,03933	,04572
II_64	,22816	-,12427	,31146	,00001	,23920
II_65	,05374	,05720	,37015	,36809	-,23907
II_67	-,10024	,81120	,11144	,04348	,10354
II_68	,02799	,80084	,09599	-,08979	,24324
II_72	,05546	,78734	,09611	,09926	-,12665
II_73	,06863	,43069	,59698	,02308	,02442
II_74	,01621	,30134	,69565	,09118	,22998
II_75	,08532	-,00430	,84045	,00501	-,01377

Factor 6 Factor 7

II_48	,03183	,05040
II_49	,09235	,04116
II_50	,03731	,08318
II_52	,17461	,15336
II_53	,12549	,04143
II_54	,13584	-,03538
II_55	,87711	-,06647
II_56	,79208	,10989
II_57	,02619	,04521
II_58	,02467	-,03209
II_59	,04761	-,05118
II_60	,11372	,13890
II_63	-,06119	,86845
II_64	,13617	,48719
II_65	,09187	,47338
II_67	,04170	,02588
II_68	-,11899	-,03516
II_72	,11292	,06496
II_73	-,16790	,19136
II_74	,03069	,18452
II_75	,04903	-,11077

- - - - - F A C T O R A N A L Y S I S - - - - -

Factor Transformation Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	,82808	,15044	,23058	,21276	,28293
Factor 2	-,37357	,71238	,48415	,20935	,18155
Factor 3	-,26008	-,31332	-,15273	,80778	,35655
Factor 4	,01354	-,48789	,54921	,18470	-,35261
Factor 5	-,28111	-,12233	,28869	-,17257	-,14337
Factor 6	-,14439	-,02394	-,39138	-,19278	,34881
Factor 7	,08387	,34371	-,38853	,39666	-,70235

	Factor 6	Factor 7
Factor 1	,27312	,19641
Factor 2	-,13189	,15610
Factor 3	,15389	-,08685
Factor 4	-,33021	,43894
Factor 5	,87010	,12350
Factor 6	-,01677	,81626
Factor 7	,13389	,23519

Factor Score Coefficient Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
II_48	,22181	-,01127	,04122	,00554	-,07340
II_49	,24521	-,02698	,00213	-,02014	-,08248
II_50	,25384	,01151	-,00787	,00174	-,10265
II_52	,17194	,03964	-,13158	,01196	,01331
II_53	,22915	,01810	-,01694	-,03085	,00503
II_54	,19329	,04362	-,00085	,00212	,04459
II_55	-,06489	,04688	,03449	-,00175	-,11283
II_56	-,06153	-,01880	-,03938	-,05811	,06950
II_57	-,00911	-,02025	-,04480	,51981	-,05207
II_58	-,00643	,01074	-,06230	,50520	-,00473
II_59	-,04187	-,04941	,03022	,04329	,49723
II_60	-,04442	-,03565	-,04672	-,08688	,54928
II_63	-,03349	,03543	-,18297	-,05582	,01112
II_64	-,03003	-,15504	,14676	-,08611	,15231
II_65	-,03064	-,02223	,14309	,21737	-,27531
II_67	-,02752	,38372	-,07314	,00389	-,01477
II_68	,02964	,36895	-,07339	-,09266	,11617

- - - - - F A C T O R A N A L Y S I S - - - - -

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
II_72	,02935	,40523	-,08963	,07008	-,21928
II_73	,01759	,10712	,28049	-,03295	-,04092
II_74	-,05681	,00175	,36501	-,03796	,10941
II_75	-,00416	-,13975	,56156	-,05521	-,03610
	Factor 6	Factor 7			
II_48	-,08944	-,04059			
II_49	-,05734	-,03940			
II_50	-,09722	-,01314			
II_52	,01054	,07389			
II_53	-,04189	-,04750			
II_54	-,02358	-,11051			
II_55	,61884	-,07814			
II_56	,52620	,07228			
II_57	-,03417	-,00913			
II_58	-,03880	-,07049			
II_59	-,04684	-,09243			
II_60	-,00526	,07388			
II_63	-,05725	,69960			
II_64	,05211	,33387			
II_65	,07191	,31670			
II_67	,05048	-,02085			
II_68	-,09282	-,07652			
II_72	,09506	,00245			
II_73	-,11990	,04866			
II_74	,01484	,03402			
II_75	,03675	-,21181			

Covariance Matrix for Estimated Regression Factor Scores:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	1,00000				
Factor 2	,00000	1,00000			
Factor 3	,00000	,00000	1,00000		
Factor 4	,00000	,00000	,00000	1,00000	
Factor 5	,00000	,00000	,00000	,00000	1,00000
Factor 6	,00000	,00000	,00000	,00000	,00000
Factor 7	,00000	,00000	,00000	,00000	,00000

----- FACTOR ANALYSIS -----

	Factor 6	Factor 7
Factor 6	1,00000	
Factor 7	,00000	1,00000

7 PC EXACT factor scores will be saved.

Following factor scores will be added to the working file:

Name	Label		
FAC1_4	REGR factor score	1 for analysis	1
FAC2_4	REGR factor score	2 for analysis	1
FAC3_4	REGR factor score	3 for analysis	1
FAC4_4	REGR factor score	4 for analysis	1
FAC5_4	REGR factor score	5 for analysis	1
FAC6_4	REGR factor score	6 for analysis	1
FAC7_4	REGR factor score	7 for analysis	1

Total number of cases: 309 (Unweighted)
 Number of selected cases: 309
 Number of unselected cases: 0

Number of selected cases: 309
 Number rejected because of missing data: 27
 Number of cases included in the analysis: 282

Dependent Variable Encoding:

Original Value	Internal Value
1,00	0
2,00	1

	Value	Freq	Parameter Coding			
			(1)	(2)	(3)	(4)
II_30F						
Diuretic	1	45	,000	,000	,000	,000
Beta Blocker	2	5	1,000	,000	,000	,000
ACE Inhibitor	3	117	,000	1,000	,000	,000
Calcium Channel Bloquer	4	42	,000	,000	1,000	,000
ACE + Diuretic	5	36	,000	,000	,000	1,000
Angiotensin II Antagonist	6	37	,000	,000	,000	,000

(5)

II_30F		
Diuretic	1	,000
Beta Blocker	2	,000
ACE Inhibitor	3	,000
Calcium Channel Bloquer	4	,000
ACE + Diuretic	5	,000
Angiotensin II Antagonist	6	1,000

	Value	Freq	Parameter Coding			
			(1)	(2)	(3)	(4)
II_20.A						
Diuretic	1	13	,000	,000	,000	,000
Beta Blocker	2	180	1,000	,000	,000	,000
ACE Inhibitor	3	73	,000	1,000	,000	,000
Calcium Channel Blocker	4	10	,000	,000	1,000	,000
ACE + Diuretic	5	2	,000	,000	,000	1,000
Angiotensin II Antagonist	6	4	,000	,000	,000	,000

(5)

II_20.A		
Diuretic	1	,000
Beta Blocker	2	,000
ACE Inhibitor	3	,000
Calcium Channel Blocker	4	,000
ACE + Diuretic	5	,000
Angiotensin II Antagonist	6	1,000

	Value	Freq	Parameter Coding			
			(1)	(2)	(3)	(4)
II_20.B						
Diuretic	1	29	,000	,000	,000	,000
Beta Blocker	2	8	1,000	,000	,000	,000
ACE inhibitor	3	178	,000	1,000	,000	,000
Calcium Channel Blocker	4	34	,000	,000	1,000	,000
ACE + Diuretic	5	18	,000	,000	,000	1,000
Angiotensin II Antagonist	6	15	,000	,000	,000	,000

(5)

II_20.B						
Diuretic	1	,000				
Beta Blocker	2	,000				
ACE inhibitor	3	,000				
Calcium Channel Blocker	4	,000				
ACE + Diuretic	5	,000				
Angiotensin II Antagonist	6	1,000				

	Value	Freq	Parameter Coding			
			(1)	(2)	(3)	(4)
II_24A						
Diuretic	1	55	,000	,000	,000	,000
Beta Blocker	2	60	1,000	,000	,000	,000
ACE Inhibitor	3	120	,000	1,000	,000	,000
Calcium Channel Blocker	4	34	,000	,000	1,000	,000
ACE + Diuretic	5	1	,000	,000	,000	1,000
Angiotensine II Antagonist	6	12	,000	,000	,000	,000

(5)

II_24A						
Diuretic	1	,000				
Beta Blocker	2	,000				
ACE Inhibitor	3	,000				
Calcium Channel Blocker	4	,000				
ACE + Diuretic	5	,000				
Angiotensine II Antagonist	6	1,000				

	Value	Freq	Parameter Coding			
			(1)	(2)	(3)	(4)
II_24B						
Diuretic	1	5	,000	,000	,000	,000
Beta Blocker	2	2	1,000	,000	,000	,000
ACE Inhibitor	3	215	,000	1,000	,000	,000
Calcium Channel Blocker	4	8	,000	,000	1,000	,000
ACE + Diuretic	5	39	,000	,000	,000	1,000
Angiotensin II Antagonist	6	13	,000	,000	,000	,000

(5)

II_24B							
Diuretic	1	,000					
Beta Blocker	2	,000					
ACE Inhibitor	3	,000					
Calcium Channel Blocker	4	,000					
ACE + Diuretic	5	,000					
Angiotensin II Antagonist	6	1,000					

	Value	Freq	Parameter Coding				
			(1)	(2)	(3)	(4)	
II_24C							
Diuretic	1	9	,000	,000	,000	,000	
Beta Blocker	2	4	1,000	,000	,000	,000	
ACE Inhibitor	3	169	,000	1,000	,000	,000	
Calcium Channel	4	31	,000	,000	1,000	,000	
ACE + Diuretic	5	33	,000	,000	,000	1,000	
Angiotensin II Antagonist	6	36	,000	,000	,000	,000	

(5)

II_24C							
Diuretic	1	,000					
Beta Blocker	2	,000					
ACE Inhibitor	3	,000					
Calcium Channel	4	,000					
ACE + Diuretic	5	,000					
Angiotensin II Antagonist	6	1,000					

	Value	Freq	Parameter Coding				
			(1)	(2)	(3)	(4)	
II_24D							
Diuretic	1	26	,000	,000	,000	,000	
Beta Blocker	2	115	1,000	,000	,000	,000	
ACE Inhibitor	3	83	,000	1,000	,000	,000	
Calcium Channel Blocker	4	19	,000	,000	1,000	,000	
ACE + Diuretic	5	26	,000	,000	,000	1,000	
Angiotensin II Antagonist	6	13	,000	,000	,000	,000	

(5)

II_24D							
Diuretic	1	,000					
Beta Blocker	2	,000					
ACE Inhibitor	3	,000					
Calcium Channel Blocker	4	,000					
ACE + Diuretic	5	,000					
Angiotensin II Antagonist	6	1,000					

	Value	Freq	Parameter Coding			
			(1)	(2)	(3)	(4)
II_30A						
Diuretic	1	4	,000	,000	,000	,000
Beta Blocker	2	1	1,000	,000	,000	,000
ACE Inhibitor	3	241	,000	1,000	,000	,000
Calcium Channel Blocker	4	15	,000	,000	1,000	,000
ACE + Diuretic	5	11	,000	,000	,000	1,000
Angiotensin II Antagonist	6	10	,000	,000	,000	,000

(5)

II_30A						
Diuretic	1	,000				
Beta Blocker	2	,000				
ACE Inhibitor	3	,000				
Calcium Channel Blocker	4	,000				
ACE + Diuretic	5	,000				
Angiotensin II Antagonist	6	1,000				

	Value	Freq	Parameter Coding			
			(1)	(2)	(3)	(4)
II_30B						
Diuretic	1	3	,000	,000	,000	,000
Beta Blocker	2	4	1,000	,000	,000	,000
ACE Inhibitor	3	202	,000	1,000	,000	,000
Calcium Channel Blocker	4	40	,000	,000	1,000	,000
ACE + Diuretic	5	11	,000	,000	,000	1,000
Angiotensin II Antagonist	6	22	,000	,000	,000	,000

(5)

II_30B						
Diuretic	1	,000				
Beta Blocker	2	,000				
ACE Inhibitor	3	,000				
Calcium Channel Blocker	4	,000				
ACE + Diuretic	5	,000				
Angiotensin II Antagonist	6	1,000				

	Value	Freq	Parameter Coding			
			(1)	(2)	(3)	(4)
II_30D						
Diuretic	1	40	,000	,000	,000	,000
Beta Blocker	2	1	1,000	,000	,000	,000
ACE Inhibitor	3	59	,000	1,000	,000	,000
Calcium Channel Blocker	4	8	,000	,000	1,000	,000
ACE + Diuretic	5	170	,000	,000	,000	1,000
Angiotensin II Antagonist	6	4	,000	,000	,000	,000

		(5)
II_30D		
Diuretic	1	,000
Beta Blocker	2	,000
ACE Inhibitor	3	,000
Calcium Channel Blocker	4	,000
ACE + Diuretic	5	,000
Angiotensin II Antagonist	6	1,000

	Value	Freq	Parameter Coding			
			(1)	(2)	(3)	(4)
II_30E						
Diuretic	1	21	,000	,000	,000	,000
Beta Blocker	2	4	1,000	,000	,000	,000
ACE Inhibitor	3	72	,000	1,000	,000	,000
Calcium Channel Blocker	4	149	,000	,000	1,000	,000
ACE + Diuretic	5	25	,000	,000	,000	1,000
Angiotensin II Antagonist	6	11	,000	,000	,000	,000

		(5)
II_30E		
Diuretic	1	,000
Beta Blocker	2	,000
ACE Inhibitor	3	,000
Calcium Channel Blocker	4	,000
ACE + Diuretic	5	,000
Angiotensin II Antagonist	6	1,000

	Value	Freq	Parameter Coding			
			(1)	(2)	(3)	(4)
I_2						
Fewer than 5	1	59	1,000	,000	,000	,000
5 to 10	2	79	,000	1,000	,000	,000
11 to 20	3	96	,000	,000	1,000	,000
21 to 30	4	32	,000	,000	,000	1,000
More than 30	5	16	,000	,000	,000	,000

I_3						
Fewer than 10	1	1	1,000	,000	,000	,000
10 to 15	2	38	,000	1,000	,000	,000
16 to 20	3	105	,000	,000	1,000	,000
21 to 30	4	119	,000	,000	,000	1,000
More than 30	5	19	,000	,000	,000	,000

I_5						
Fewer than 100	1	36	1,000	,000	,000	,000
100 to 150	2	103	,000	1,000	,000	,000
151 to 200	3	71	,000	,000	1,000	,000
201 to 250	4	36	,000	,000	,000	1,000
More than 250	5	36	,000	,000	,000	,000

II_30C						
Beta Blocker	2	21	,000	,000	,000	,000
ACE Inhibitor	3	44	1,000	,000	,000	,000
Calcium Channel Blocker	4	201	,000	1,000	,000	,000
ACE + Diuretic	5	14	,000	,000	1,000	,000
Angiotensin II Antagonist	6	2	,000	,000	,000	1,000

II_20.C						
Diuretic	1	110	,000	,000	,000	,000
ACE Inhibitor	3	54	1,000	,000	,000	,000
Calcium Channel Blocker	4	43	,000	1,000	,000	,000
ACE + Diuretic	5	65	,000	,000	1,000	,000
Angiotensin II Antagonist	6	10	,000	,000	,000	1,000

II_98FAC						
Lisbon Medicine Faculty	1	98	,000	,000	,000	
Lisbon Faculty of Medical Sciences	2	45	1,000	,000	,000	
Oporto Medicine Faculty	3	77	,000	1,000	,000	
Coimbra Medicine Faculty	4	62	,000	,000	1,000	

I_4						
Fewer than 1500	1	44	1,000	,000	,000	
1500 to 1750	2	125	,000	1,000	,000	
1751 to 2000	3	76	,000	,000	1,000	
More than 2000	4	37	,000	,000	,000	

I_1						
Rural	1	68	1,000	,000	,000	
Urban in Rural Environment	2	100	,000	1,000	,000	
Urban in Industrial Environment	3	53	,000	,000	1,000	
Large City	4	61	,000	,000	,000	

II_99PRA						
5 to 10	2	7	1,000	,000		
11 to 20	3	205	,000	1,000		
» 20	4	70	,000	,000		

Value Freq Parameter
Coding
(1)

II_96GEN			
Female	1	146	1,000
Male	2	136	,000

Dependent Variable.. RII_13

Beginning Block Number 0. Initial Log Likelihood Function

-2 Log Likelihood 383,39783

* Constant is included in the model.

Beginning Block Number 1. Method: Backward Stepwise (LR)

Variable(s) Entered on Step Number

1..	FAC1_1	REGR factor score	1 for analysis	1
	FAC2_1	REGR factor score	2 for analysis	1
	FAC3_1	REGR factor score	3 for analysis	1
	FAC4_1	REGR factor score	4 for analysis	1
	FAC5_1	REGR factor score	5 for analysis	1
	FAC6_1	REGR factor score	6 for analysis	1
	FAC7_1	REGR factor score	7 for analysis	1
	I_1	Health Centre		
	I_2	Number of Family Doctors		
	I_3	Daily Appointments		
	I_4	Number of patients		
	I_5	Number of patients with AHT		
	II_96GEN	Gender		
	II_98FAC	GP Graduation		
	II_99PRA	Years of Clinical Practice		
	II_20.A	Young Adult		
	II_20.B	Adult		
	II_20.C	Elderly		
	II_24A	Not Obese		
	II_24B	Obese and Diabetic		
	II_24C	Obese with Dyslipidemia		
	II_24D	Obese with Anxiety - Depression		
	II_30A	Diabetes Mellitus		
	II_30B	Dyslipidemia		
	II_30C	Angina		
	II_30D	Congestive Heart Failure		
	II_30E	Cerebrovascular Disease		
	II_30F	Chronic Renal Insufficiency		
	II_27			
	II_37			
	II_43			
	II_44			
	II_32			
	II_33			
	II_86			
	II_87			
	II_91			
	II_92			

Estimation terminated at iteration number 8 because
Log Likelihood decreased by less than ,01 percent.

Iteration History:

Iteration	Log Likelihood	Constant	FAC1_1	FAC2_1	FAC3_1
1	-97,457799	-5,674643	-,05411240	-,10775627	-,2985654
2	-77,021415	-10,298639	-,10447651	-,23586629	-,6223191
3	-68,202283	-14,762076	-,18143384	-,41523605	-1,0158971
4	-64,716714	-17,888402	-,27705913	-,63098966	-1,4061127
5	-63,816784	-20,266357	-,35821350	-,80842166	-1,6989358
6	-63,708874	-22,279824	-,38921443	-,88362792	-1,8206900
7	-63,700019	-23,138635	-,39258777	-,89522411	-1,8392272
8	-63,697889	-23,239745	-,39272930	-,89581164	-1,8400756

FAC4_1	FAC5_1	FAC6_1	FAC7_1	I_1(1)	I_1(2)
,00155188	,07211183	-,09311078	,01086847	-,06042513	-,0771248
,05050413	,07413142	-,14474212	,03578425	-,00027386	-,1057441
,09634175	,06539959	-,16660493	,08253739	,04815184	-,3193549
,14122112	,07429789	-,19902879	,15096338	-,07047664	-,7299577
,19657502	,09032589	-,25736286	,20754531	-,12316704	-,9993926
,22959439	,09932779	-,29123991	,22889545	-,08548833	-1,0700136
,23504993	,10031681	-,29697681	,23212433	-,07255461	-1,0741002
,23527461	,10031917	-,29743830	,23241771	-,07151784	-1,0738798

I_1(3)	I_2(1)	I_2(2)	I_2(3)	I_2(4)	I_3(1)
-,4067786	,5714879	,28566612	,16615812	,2895913	-1,502901
-,7297542	,7869415	,36130471	,02284645	,1518373	-2,656949
-1,0958412	1,0358865	,34508612	-,15197387	-,2089097	-4,086641
-1,5888132	1,2251965	,33441924	-,36285535	-,7971429	-5,740958
-1,9637832	1,3494128	,40376672	-,47518294	-1,2589217	-7,383870
-2,0842522	1,4181851	,45391553	-,49686991	-1,4292917	-8,696209
-2,0947800	1,4306364	,46086608	-,49808374	-1,4520867	-9,744397
-2,0945032	1,4320152	,46145635	-,49751973	-1,4525707	-10,746365

I_3(2)	I_3(3)	I_3(4)	I_4(1)	I_4(2)	I_4(3)
,27865940	-,2948707	-,1756617	-,7071263	-,24021855	-,27705829
,37275699	-,9373052	-,5944548	-1,1497016	-,29120544	-,37854872
,45008763	-1,7027819	-1,0358509	-1,7668586	-,38480937	-,43490588
,46050385	-2,5076363	-1,4720997	-2,2576549	-,43265169	-,30108189
,38806993	-3,1964934	-1,8662517	-2,5573271	-,41086556	-,11707264
,34041583	-3,5078940	-2,0513703	-2,7027735	-,39849720	-,05161473
,32971505	-3,5580718	-2,0836593	-2,7234719	-,39336515	-,04188063
,32877453	-3,5613026	-2,0859783	-2,7239650	-,39262203	-,04102564

I_5(1)	I_5(2)	I_5(3)	I_5(4)	II_96GEN(1)	II_98FAC(1)
,4050337	,1815767	,3048252	-,22431166	,3505134	,4163396
,9976559	,5694376	,4209284	-,36064650	,6182985	,8527636
1,8102764	1,2114117	,6266008	-,55591978	1,0108926	1,4549096
2,6911214	1,9499450	,9077700	-,62070445	1,5382659	2,1597400
3,3098622	2,4330631	1,1006015	-,60949115	1,9470324	2,7212907
3,5576209	2,6061613	1,1663142	-,61153736	2,1125576	2,9392328
3,5906908	2,6304734	1,1742487	-,61560669	2,1359454	2,9706590
3,5913331	2,6315396	1,1744586	-,61638147	2,1369880	2,9723426

II_98FAC(2)	II_98FAC(3)	II_99PRA(1)	II_99PRA(2)	II_20.A(1)
-,33700449	-,5107556	1,7230447	,4358402	1,0556008
-,54647543	-,9070504	2,8864164	,7891284	1,7551041
-,72273490	-1,2827570	4,2158314	1,2145955	2,4822980
-,79835263	-1,5733707	5,5149698	1,6508983	3,0647191
-,86793991	-1,7843960	6,5911594	1,9265546	3,3743725
-,91682133	-1,8958500	7,1078573	2,0281484	3,4977422
-,92367748	-1,9121231	7,1941130	2,0415259	3,5167371
-,92391716	-1,9127687	7,2000175	2,0418135	3,5170027

II_20.A(2)	II_20.A(3)	II_20.A(4)	II_20.A(5)	II_20.B(1)	II_20.B(2)
1,2513191	,7327650	-,8274151	1,2062426	-,5817721	,9292592
2,2286617	1,0093468	-,9653586	1,8908944	-,9976399	1,7003976
3,2623076	1,0393174	-1,0520853	2,4520498	-1,8921065	2,5814382
4,1284040	,7181771	-1,2458790	3,1708478	-3,3309419	3,4096799
4,7508061	,5190230	-1,5334094	4,2999550	-4,8180223	4,0493471
5,0392159	,5164824	-2,1742525	5,4752952	-5,6184278	4,3447303
5,0855156	,5240558	-3,1189770	6,5132370	-5,7766292	4,3891702
5,0872728	,5233414	-4,1172829	7,5161543	-5,7873465	4,3910218

II_20.B(3)	II_20.B(4)	II_20.B(5)	II_20.C(1)	II_20.C(2)	II_20.C(3)
,7683296	,8181065	-,05663693	,28691762	,5362521	,4194466
1,1636053	1,2110336	,10279545	,51072135	,7535746	,7282124
1,5581893	1,5187508	,19930934	,67430954	1,0821340	1,1380937
1,8078582	1,5264473	,05612183	,79204440	1,4475757	1,5696383
1,9822449	1,3821030	-,16176191	,90531822	1,7595114	1,8782460
2,0997279	1,3170147	-,24024094	,95817641	1,8951503	2,0053750
2,1208006	1,3040562	-,24662702	,96580051	1,9143513	2,0238251
2,1219155	1,3025930	-,24576064	,96606530	1,9152405	2,0246166

II_20.C(4)	II_24A(1)	II_24A(2)	II_24A(3)	II_24A(4)	II_24A(5)
,00588216	,24466105	1,0186193	,5256338	2,1359310	1,0441802
-,06621111	,37206807	1,6756559	,8236611	3,5604376	1,5456391
-,00675754	,32761972	2,2208685	,9747650	4,8494603	2,1280053
,15357278	,14501355	2,7218443	1,0419495	5,9779632	2,9448698
,26769647	,00544758	3,1076478	1,0836387	6,5490529	3,6575808
,30276006	-,05078921	3,2592887	1,0941686	6,2451877	3,9332629
,30745384	-,05703785	3,2830209	1,0962236	5,3557174	3,9703041
,30832275	-,05676431	3,2847445	1,0967523	4,3609798	3,9717689

II_24B(1)	II_24B(2)	II_24B(3)	II_24B(4)	II_24B(5)	II_24C(1)
,3989025	1,0995841	,4218144	,7147507	,6909978	-,3992269
,8692028	1,9457751	1,0665267	1,4002937	1,4066900	-1,2427044
1,5737942	3,0544218	2,1699947	2,2594172	2,3413988	-2,2151683
2,1551792	4,1862816	3,3899939	3,1112361	3,1169631	-3,2621768
2,4616303	4,9773883	4,2040564	3,7406920	3,4666249	-3,6442166
2,7152501	5,4178941	4,5925478	4,1250203	3,6942215	-3,4547204
2,8116062	5,5394983	4,6929868	4,2394536	3,7875103	-3,3260487
2,8196229	5,5484631	4,7000133	4,2482045	3,7958796	-3,2973572

II_24C(2)	II_24C(3)	II_24C(4)	II_24C(5)	II_24D(1)	II_24D(2)
,3794332	1,0070405	,1984276	,9504726	,3001538	,3611430
,4543403	1,6144793	,0707885	1,6085994	,6781885	,6703092
,6314625	2,4060459	,0803848	2,4446291	1,1655370	1,0705696
,9037267	3,3223687	,1878701	3,3957040	1,5936278	1,4383623
1,2976803	4,2406497	,3927831	4,3248100	1,8486391	1,6838787
1,8634906	5,0174690	,8626695	5,0860126	1,9350062	1,7793679
2,2269750	5,4097652	1,2094158	5,4725201	1,9431333	1,7901843
2,2871022	5,4709861	1,2680246	5,5329096	1,9430177	1,7904548

II_24D(3)	II_24D(4)	II_24D(5)	II_30A(1)	II_30A(2)	II_30A(3)
,3176847	,8407369	1,1694681	,0436912	-,3549465	-,0202534
,9881794	1,6986551	1,8584726	,9235788	-,0017735	,3835436
1,7920028	2,7151263	2,7016021	1,7101097	,4245311	,8553825
2,5069637	3,6094036	3,6081858	2,6498623	1,0546972	1,6529232
3,0122933	4,2540335	4,2569818	3,3250609	1,5052884	2,2023389
3,2067295	4,5217982	4,5342820	3,4192603	1,6401981	2,3689393
3,2285765	4,5565720	4,5757503	2,8576450	1,6338017	2,3656627
3,2287904	4,5576486	4,5778017	1,9201533	1,6291831	2,3613655

II_30A(4)	II_30A(5)	II_30B(1)	II_30B(2)	II_30B(3)	II_30B(4)
-,3107717	,5013933	2,766106	1,2533163	1,0458108	1,2070041
,6014454	1,2298909	5,122664	2,0864757	1,6297640	1,5914438
1,5628343	2,1817585	7,983677	2,9479437	2,2405367	1,8890207
2,5108393	3,5098243	10,783011	3,4825763	2,4781016	1,8146350
3,1970846	4,5841841	13,098799	3,9747027	2,7282766	1,9481527
3,4428821	5,0036698	14,559300	4,5937176	3,2661941	2,4725903
3,4562308	5,0384794	15,045491	4,9282707	3,5910591	2,7990359
3,4533026	5,0359530	15,087077	4,9631151	3,6255117	2,8345255

II_30B(5)	II_30C(1)	II_30C(2)	II_30C(3)	II_30C(4)	II_30D(1)
,4738915	,1575005	,3210985	,4334859	1,4184204	-1,7228532
,9727876	,1921003	,3228689	,4237108	2,2333047	-1,4982957
1,3731925	-,0587216	,0705538	-,0018173	2,6803513	-1,1407714
1,2815776	-,6373672	-,4560700	-,9280991	3,0564960	-,8369885
1,3211685	-1,1857539	-,9326837	-1,8657058	3,2526664	-,6949639
1,7824213	-1,4003699	-1,1108866	-2,2624621	3,3662751	-1,1730858
2,0983292	-1,4309277	-1,1352103	-2,3200143	3,3979571	-2,0960410
2,1324964	-1,4320790	-1,1364978	-2,3228979	3,3988705	-3,0922543

II_30D(2)	II_30D(3)	II_30D(4)	II_30D(5)	II_30E(1)	II_30E(2)
-,22476341	,9753667	-,05927472	,5802067	,1897915	,6399778
-,11274479	2,3977888	,21210640	1,1961523	,6654711	,9672369
-,12757314	4,2655656	,41551558	1,8793272	,9897877	1,1229788
-,28759541	6,2445347	,55151537	2,6539507	1,4257236	1,2538772
-,40402861	7,6737684	,65943825	3,3645812	1,8836805	1,4797455
-,44234160	8,2048118	,69266645	3,7941074	2,0789316	1,6063165
-,44777945	8,2729719	,69417120	3,9260205	2,1097379	1,6282165
-,44736637	8,2761044	,69480413	3,9436983	2,1118525	1,6295931

II_30E(3)	II_30E(4)	II_30E(5)	II_30F(1)	II_30F(2)	II_30F(3)
,2610145	,8970661	1,1741618	-,6708862	-,4653631	-,08956082
,5693351	1,7054326	1,6807675	-1,3768892	-,8763696	-,23619595
,7170771	2,3102533	2,0274609	-1,9397547	-1,2142221	-,38817065
,7778752	2,7323348	2,3789037	-2,1729870	-1,3824806	-,37021015
,9055454	3,1713212	2,7410253	-2,3301143	-1,5034604	-,38437789
1,0000141	3,4094590	2,9537910	-2,4037151	-1,5705872	-,42793372
1,0197302	3,4510379	3,0007292	-2,4160970	-1,5831423	-,43601414
1,0209172	3,4540003	3,0049822	-2,4169898	-1,5841394	-,43672644

II_30F(4)	II_30F(5)	II_37	II_37	II_43	II_44
,1346718	-,6910333	-,20060208	-,2899389	-,04331235	,07294387
,2638559	-1,4824494	-,33829649	-,4750789	-,05551188	,10623114
,5633490	-2,2440609	-,50839490	-,6868692	-,04070432	,13764226
,9100673	-2,8635687	-,71720771	-,9141622	,00033720	,16889502
1,0952800	-3,3359290	-,87757065	-1,0788309	,04597092	,19570027
1,1264338	-3,5420055	-,93810916	-1,1375970	,06698435	,20754218
1,1246327	-3,5726335	-,94632624	-1,1444850	,07013108	,20877585
1,1238128	-3,5741926	-,94669300	-1,1447280	,07019771	,20878483

II_32	II_33	II_86	II_87	II_91	II_92
-,06393477	,13627607	,07163697	,20497098	-,03586115	-,18342162
-,04694880	,21304938	,17113285	,29866260	-,07833241	-,28015919
,00721049	,27412673	,34761796	,26600069	-,13086383	-,38126967
,05741970	,34160078	,52670128	,13846075	-,18587407	-,52149038
,06773747	,39981365	,65166011	,05132299	-,22526114	-,64077959
,06169498	,42208903	,70731526	,02412855	-,24114042	-,68909695
,05951664	,42504534	,71594594	,02032436	-,24335929	-,69606863
,05942167	,42526077	,71633552	,02010356	-,24341541	-,69639445

-2 Log Likelihood 127,396
 Goodness of Fit 7967,944

	Chi-Square	df	Significance
Model Chi-Square	256,002	104	,0000
Improvement	256,002	104	,0000

Classification Table for RII_13

Observed		Predicted		Percent Correct
		1,00	2,00	
		1 "	2 "	
1,00	1	" 106 "	12 "	89,83%
2,00	2	" 7 "	157 "	95,73%
Overall				93,26%

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
FAC1_1	-,3927	,4717	,6931	1	,4051	,0000	,6752
FAC2_1	-,8958	,4369	4,2040	1	,0403	-,0758	,4083
FAC3_1	-1,8401	,5427	11,4945	1	,0007	-,1574	,1588
FAC4_1	,2353	,3286	,5126	1	,4740	,0000	1,2653
FAC5_1	,1003	,4541	,0488	1	,8252	,0000	1,1055
FAC6_1	-,2974	,4054	,5383	1	,4632	,0000	,7427
FAC7_1	,2324	,4000	,3377	1	,5612	,0000	1,2616
I_1			3,0377	3	,3859	,0000	
I_1(1)	-,0715	1,4842	,0023	1	,9616	,0000	,9310
I_1(2)	-1,0739	1,3477	,6349	1	,4256	,0000	,3417
I_1(3)	-2,0945	1,4093	2,2089	1	,1372	-,0233	,1231
I_2			4,0732	4	,3962	,0000	
I_2(1)	1,4320	1,7930	,6378	1	,4245	,0000	4,1871
I_2(2)	,4615	1,4935	,0955	1	,7573	,0000	1,5864
I_2(3)	-,4975	1,4453	,1185	1	,7307	,0000	,6080
I_2(4)	-1,4526	1,6465	,7783	1	,3777	,0000	,2340
I_3			6,3050	4	,1775	,0000	
I_3(1)	-10,7464	99,7033	,0116	1	,9142	,0000	,0000
I_3(2)	,3288	2,0169	,0266	1	,8705	,0000	1,3893
I_3(3)	-3,5613	2,1699	2,6936	1	,1008	-,0425	,0284
I_3(4)	-2,0860	1,9326	1,1650	1	,2804	,0000	,1242
I_4			4,3533	3	,2258	,0000	
I_4(1)	-2,7240	1,6245	2,8116	1	,0936	-,0460	,0656
I_4(2)	-,3926	1,2582	,0974	1	,7550	,0000	,6753
I_4(3)	-,0410	1,5268	,0007	1	,9786	,0000	,9598
I_5			7,3860	4	,1168	,0000	
I_5(1)	3,5913	2,0261	3,1419	1	,0763	,0546	36,2824
I_5(2)	2,6315	1,3078	4,0489	1	,0442	,0731	13,8951
I_5(3)	1,1745	1,2413	,8952	1	,3441	,0000	3,2364
I_5(4)	-,6164	1,5949	,1494	1	,6991	,0000	,5399
II_96GEN(1)	2,1370	1,0486	4,1531	1	,0416	,0749	8,4739
II_98FAC			11,1409	3	,0110	,1158	
II_98FAC(1)	2,9723	1,2439	5,7097	1	,0169	,0984	19,5376
II_98FAC(2)	-,9239	1,2845	,5174	1	,4720	,0000	,3970
II_98FAC(3)	-1,9128	1,2621	2,2967	1	,1296	-,0278	,1477
II_99PRA			8,2402	2	,0162	,1052	
II_99PRA(1)	7,2000	3,1210	5,3222	1	,0211	,0931	1339,454
II_99PRA(2)	2,0418	,8515	5,7500	1	,0165	,0989	7,7046
II_20.A			6,9255	5	,2262	,0000	
II_20.A(1)	3,5170	2,2595	2,4228	1	,1196	,0332	33,6833
II_20.A(2)	5,0873	2,4433	4,3352	1	,0373	,0780	161,9476
II_20.A(3)	,5233	3,2770	,0255	1	,8731	,0000	1,6877
II_20.A(4)	-4,1173	60,3340	,0047	1	,9456	,0000	,0163
II_20.A(5)	7,5162	43,3463	,0301	1	,8623	,0000	1837,487
II_20.B			10,8794	5	,0538	,0479	
II_20.B(1)	-5,7873	5,8393	,9823	1	,3216	,0000	,0031
II_20.B(2)	4,3910	1,6019	7,5134	1	,0061	,1199	80,7229
II_20.B(3)	2,1219	1,8438	1,3244	1	,2498	,0000	8,3471
II_20.B(4)	1,3026	1,9689	,4377	1	,5082	,0000	3,6788

II_20.B(5)	- ,2458	2,5225	,0095	1	,9224	,0000	,7821
II_20.C			4,6078	4	,3300	,0000	
II_20.C(1)	,9661	1,3011	,5513	1	,4578	,0000	2,6276
II_20.C(2)	1,9152	1,2865	2,2164	1	,1366	,0238	6,7886
II_20.C(3)	2,0246	1,1112	3,3197	1	,0685	,0587	7,5732
II_20.C(4)	,3083	2,0004	,0238	1	,8775	,0000	1,3611
II_24A			11,6764	5	,0395	,0661	
II_24A(1)	- ,0568	1,3372	,0018	1	,9661	,0000	,9448
II_24A(2)	3,2847	1,2349	7,0753	1	,0078	,1151	26,7022
II_24A(3)	1,0968	1,3865	,6257	1	,4289	,0000	2,9944
II_24A(4)	4,3610	99,7514	,0019	1	,9651	,0000	78,3339
II_24A(5)	3,9718	2,3031	2,9741	1	,0846	,0504	53,0783
II_24B			2,1445	5	,8288	,0000	
II_24B(1)	2,8196	9,2761	,0924	1	,7612	,0000	16,7705
II_24B(2)	5,5485	8,7933	,3981	1	,5281	,0000	256,8425
II_24B(3)	4,7000	9,1965	,2612	1	,6093	,0000	109,9486
II_24B(4)	4,2482	8,7599	,2352	1	,6277	,0000	69,9796
II_24B(5)	3,7959	9,2713	,1676	1	,6822	,0000	44,5174
II_24C			8,6107	5	,1256	,0000	
II_24C(1)	-3,2974	14,9821	,0484	1	,8258	,0000	,0370
II_24C(2)	2,2871	9,4344	,0588	1	,8085	,0000	9,8464
II_24C(3)	5,4710	9,5553	,3278	1	,5669	,0000	237,6945
II_24C(4)	1,2680	9,4396	,0180	1	,8931	,0000	3,5538
II_24C(5)	5,5329	9,3828	,3477	1	,5554	,0000	252,8786
II_24D			6,2109	5	,2862	,0000	
II_24D(1)	1,9430	1,5468	1,5780	1	,2091	,0000	6,9798
II_24D(2)	1,7905	1,5275	1,3739	1	,2411	,0000	5,9922
II_24D(3)	3,2288	2,1578	2,2391	1	,1346	,0250	25,2491
II_24D(4)	4,5576	2,3533	3,7507	1	,0528	,0676	95,3590
II_24D(5)	4,5778	2,3988	3,6419	1	,0563	,0654	97,3003
II_30A			2,6405	5	,7552	,0000	
II_30A(1)	1,9202	101,0180	,0004	1	,9848	,0000	6,8220
II_30A(2)	1,6292	9,3937	,0301	1	,8623	,0000	5,0997
II_30A(3)	2,3614	9,5273	,0614	1	,8042	,0000	10,6054
II_30A(4)	3,4533	9,5610	,1305	1	,7180	,0000	31,6046
II_30A(5)	5,0360	9,6990	,2696	1	,6036	,0000	153,8461
II_30B			4,5334	5	,4754	,0000	
II_30B(1)	15,0871	21,9477	,4725	1	,4918	,0000	3566434
II_30B(2)	4,9631	20,2069	,0603	1	,8060	,0000	143,0387
II_30B(3)	3,6255	20,2490	,0321	1	,8579	,0000	37,5439
II_30B(4)	2,8345	20,2823	,0195	1	,8889	,0000	17,0223
II_30B(5)	2,1325	20,2888	,0110	1	,9163	,0000	8,4359
II_30C			1,2453	4	,8706	,0000	
II_30C(1)	-1,4321	1,7132	,6987	1	,4032	,0000	,2388
II_30C(2)	-1,1365	1,6207	,4917	1	,4832	,0000	,3209
II_30C(3)	-2,3229	2,6210	,7854	1	,3755	,0000	,0980
II_30C(4)	3,3989	9,3364	,1325	1	,7158	,0000	29,9303
II_30D			8,9480	5	,1112	,0000	
II_30D(1)	-3,0923	99,7053	,0010	1	,9753	,0000	,0454
II_30D(2)	- ,4474	1,6534	,0732	1	,7867	,0000	,6393
II_30D(3)	8,2761	3,0603	7,3133	1	,0068	,1177	3928,859
II_30D(4)	,6948	1,5649	,1971	1	,6570	,0000	2,0033
II_30D(5)	3,9437	6,2909	,3930	1	,5307	,0000	51,6091

Step	Improv.			Model			Correct Class %	Variable
	Chi-Sq.	df	sig	Chi-Sq.	df	sig		
2	-,001	1	,972	256,001	103	,000	93,26	OUT: II_87
3	-,031	1	,860	255,970	102	,000	93,26	OUT: II_32
4	-2,227	5	,817	253,743	97	,000	92,91	OUT: II_24B
5	-,008	1	,929	253,735	96	,000	92,91	OUT: II_43
6	-,074	1	,786	253,661	95	,000	92,91	OUT: FAC5_1
7	-2,458	5	,783	251,203	90	,000	91,49	OUT: II_30A
8	-1,239	4	,872	249,965	86	,000	91,49	OUT: II_30C
9	-1,755	5	,882	248,209	81	,000	92,20	OUT: II_30E
10	-,022	1	,882	248,187	80	,000	91,84	OUT: FAC4_1
11	-,036	1	,849	248,151	79	,000	91,84	OUT: FAC1_1
12	-,162	1	,687	247,988	78	,000	91,84	OUT: FAC6_1
13	-,214	1	,643	247,774	77	,000	91,13	OUT: II_44
14	-,468	1	,494	247,306	76	,000	90,43	OUT: FAC7_1
15	-6,110	5	,296	241,196	71	,000	90,07	OUT: II_24D
16	-2,428	3	,488	238,768	68	,000	89,01	OUT: I_1
17	-6,580	5	,254	232,188	63	,000	88,65	OUT: II_30B
18	-,205	1	,651	231,984	62	,000	88,65	OUT: II_96GEN
19	-6,229	4	,183	225,754	58	,000	88,65	OUT: I_5
20	-4,792	4	,309	220,962	54	,000	87,94	OUT: I_2
21	-5,429	3	,143	215,533	51	,000	87,23	OUT: I_4
22	-1,901	1	,168	213,632	50	,000	86,88	OUT: II_91
23	-2,228	1	,136	211,403	49	,000	87,94	OUT: II_86

No more variables can be deleted or added.

End Block Number 1 PIN = ,0500 Limits reached.

Final Equation for Block 1

Estimation terminated at iteration number 7 because
Log Likelihood decreased by less than ,01 percent.

Iteration History:

Iteration	Log Likelihood	Constant	FAC2_1	FAC3_1	I_3(1)
1	-108,32850	-1,8156897	-,15967118	-,22007360	-1,2513735
2	-91,88405	-3,1596000	-,28832721	-,43538783	-1,9290507
3	-86,95305	-4,6285769	-,39864093	-,63196270	-2,5780039
4	-86,08979	-5,6351298	-,45751357	-,74067842	-3,3895209
5	-86,01528	-6,0679824	-,47125383	-,76596548	-4,3535758
6	-86,00194	-6,1363502	-,47196354	-,76723250	-5,3527672
7	-85,99717	-6,1377333	-,47196613	-,76723391	-6,3534758

I_3(2)	I_3(3)	I_3(4)	II_98FAC(1)	II_98FAC(2)	II_98FAC(3)
,02461194	-,5467975	-,4185252	,5207388	-,04620308	-,2050391
,23742258	-,9554236	-,7018463	,8574016	-,16271821	-,5203867
,44606898	-1,2733012	-,9186505	1,1009296	-,26887594	-,8127324
,47649131	-1,4792215	-1,0717471	1,2127418	-,33398084	-,9886717
,46503462	-1,5396996	-1,1192951	1,2382450	-,34757680	-1,0317058
,46393130	-1,5438385	-1,1230374	1,2402939	-,34734247	-1,0334938
,46391585	-1,5438826	-1,1230899	1,2403251	-,34731568	-1,0334873

II_99PRA(1)	II_99PRA(2)	II_20.A(1)	II_20.A(2)	II_20.A(3)	II_20.A(4)
2,1643517	,4264661	,9942822	1,2288082	1,2232826	-1,6166881
3,6360847	,7634298	1,6861740	2,2194355	2,0255340	-2,0835601
5,0257525	1,0831843	2,3758933	3,1346919	2,7317006	-2,4057122
5,9174215	1,2747689	2,7032296	3,5598087	3,0270328	-3,0733095
6,1736695	1,3206000	2,7641234	3,6421559	3,0777723	-4,0123069
6,1967003	1,3231873	2,7660926	3,6455987	3,0798621	-5,0119172
6,1970540	1,3232073	2,7660751	3,6455964	3,0798658	-6,0126758

II_20.A(5)	II_20.B(1)	II_20.B(2)	II_20.B(3)	II_20.B(4)	II_20.B(5)
,9448504	-,6529957	1,0046704	,6933495	,9979159	,24950485
2,0357867	-1,3767022	1,7922539	1,1531442	1,6852726	,43421949
3,2458170	-2,3264685	2,4333522	1,5170836	2,1589519	,44938978
4,2863154	-3,0329485	2,7593679	1,7013019	2,3794965	,35778223
5,2890671	-3,2494671	2,8360807	1,7442548	2,4311196	,33318531
6,2947081	-3,2646284	2,8410512	1,7473147	2,4345784	,33453133
7,2975988	-3,2647555	2,8411018	1,7473499	2,4346172	,33460228

II_20.C(1)	II_20.C(2)	II_20.C(3)	II_20.C(4)	II_24A(1)	II_24A(2)
,51372294	,3492552	,5831557	-,14442273	,39407805	1,1420528
,73639392	,6365135	,9581956	-,07370677	,53084067	1,6152757
,81037986	,9394109	1,3312902	,02918893	,66378114	1,9792248
,82283408	1,1073768	1,5669422	,09147869	,73457161	2,1872861
,82377375	1,1442578	1,6254761	,10788406	,75007425	2,2404637
,82359364	1,1460493	1,6285320	,11038462	,75127216	2,2444557
,82358671	1,1460555	1,6285435	,11045328	,75129325	2,2445065

II_24A(3)	II_24A(4)	II_24A(5)	II_24C(1)	II_24C(2)	II_24C(3)
,5735738	,5519032	1,2360355	,2385091	1,3257095	1,7763883
,8568391	1,5447358	1,8538589	,5298423	2,1802509	3,0635903
1,1246748	2,6335714	2,4445461	,8506761	3,0670805	4,2278188
1,3025692	2,8092382	2,8236862	1,1480423	3,8566099	5,1182197
1,3512023	2,0805745	2,9159858	1,3189653	4,2726248	5,5517484
1,3546324	1,0945756	2,9211569	1,3614640	4,3418192	5,6220785
1,3546726	,0939443	2,9211940	1,3627172	4,3432301	5,6235066

II_24C(4)	II_24C(5)	II_30D(1)	II_30D(2)	II_30D(3)	II_30D(4)
1,2185579	1,7324393	-2,2691095	-,41325430	,9887740	-,20036779
1,8418454	2,8031804	-3,1057957	-,53862286	2,0159119	-,16451249
2,4640523	3,8603002	-3,9322759	-,64709286	3,0354555	-,12718794
3,0684582	4,7516360	-4,8503694	-,72872887	3,7444636	-,11183809
3,4345923	5,1915953	-5,8326410	-,75439508	3,9789486	-,10992232
3,5005532	5,2612928	-6,8334218	-,75604732	3,9967366	-,10954802
3,5019381	5,2626824	-7,8341596	-,75606047	3,9968323	-,10953330

II_30D(5)	II_30F(1)	II_30F(2)	II_30F(3)	II_30F(4)	II_30F(5)
,8777444	-,4308227	-,22833968	,12846460	,3933220	-,6287288
1,6526674	-1,2528491	-,48258044	,28189727	,6388843	-1,2369836
2,3796204	-1,8801033	-,66122797	,45404932	,8899250	-1,7569285
2,7809016	-2,1167173	-,70603382	,59061071	1,1157626	-2,0065396
2,8905059	-2,1561492	-,71094997	,62810519	1,1802527	-2,0629890
2,9033018	-2,1579978	-,71157326	,63006890	1,1829372	-2,0662614
2,9035601	-2,1580136	-,71158545	,63008250	1,1829291	-2,0662819

II_27	II_37	II_33	II_92
-,21810032	-,31360803	,15412553	-,19898096
-,37219465	-,50018343	,25730763	-,31020613
-,50925185	-,64135436	,35176781	-,39386081
-,59049349	-,72257996	,40698404	-,43932253
-,61109665	-,74352290	,42064352	-,45056128
-,61244501	-,74480615	,42147402	-,45132391
-,61245859	-,74481696	,42148147	-,45133171

-2 Log Likelihood 171,994
 Goodness of Fit 441,490

	Chi-Square	df	Significance
Model Chi-Square	211,403	49	,0000
Improvement	-2,228	1	,1355

Note: A negative Chi-Square value indicates that the Chi-Square value has decreased from the previous step.

Classification Table for RII_13

Observed		Predicted		Percent Correct
		1,00	2,00	
		1 "	2 "	
1,00	1	" 98 "	20 "	83,05%
2,00	2	" 14 "	150 "	91,46%
Overall				87,94%

----- Variables in the Equation -----

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
FAC2_1	-,4720	,2300	4,2105	1	,0402	-,0759	,6238
FAC3_1	-,7672	,2658	8,3343	1	,0039	-,1285	,4643
I_3			7,4902	4	,1121	,0000	
I_3(1)	-6,3535	60,4516	,0110	1	,9163	,0000	,0017
I_3(2)	,4639	1,2269	,1430	1	,7053	,0000	1,5903
I_3(3)	-1,5439	1,0914	2,0009	1	,1572	-,0016	,2136
I_3(4)	-1,1231	1,0571	1,1287	1	,2881	,0000	,3253
II_98FAC			9,6329	3	,0220	,0973	
II_98FAC(1)	1,2403	,6689	3,4386	1	,0637	,0613	3,4567
II_98FAC(2)	-,3473	,5869	,3503	1	,5540	,0000	,7066
II_98FAC(3)	-1,0335	,6320	2,6742	1	,1020	-,0419	,3558
II_99PRA			13,0963	2	,0014	,1540	
II_99PRA(1)	6,1971	1,9850	9,7464	1	,0018	,1421	491,2996
II_99PRA(2)	1,3232	,4922	7,2269	1	,0072	,1168	3,7554
II_20.A			6,3149	5	,2768	,0000	
II_20.A(1)	2,7661	1,4271	3,7569	1	,0526	,0677	15,8961
II_20.A(2)	3,6456	1,5240	5,7219	1	,0168	,0985	38,3056
II_20.A(3)	3,0799	1,8333	2,8221	1	,0930	,0463	21,7555
II_20.A(4)	-6,0127	42,7520	,0198	1	,8882	,0000	,0024
II_20.A(5)	7,2976	26,8162	,0741	1	,7855	,0000	1476,750
II_20.B			15,6629	5	,0079	,1215	
II_20.B(1)	-3,2648	2,5990	1,5779	1	,2091	,0000	,0382
II_20.B(2)	2,8411	,9914	8,2127	1	,0042	,1273	17,1346
II_20.B(3)	1,7473	1,1211	2,4294	1	,1191	,0335	5,7394
II_20.B(4)	2,4346	1,3668	3,1729	1	,0749	,0553	11,4114
II_20.B(5)	,3346	1,4175	,0557	1	,8134	,0000	1,3974
II_20.C			7,4562	4	,1137	,0000	
II_20.C(1)	,8236	,6606	1,5542	1	,2125	,0000	2,2787
II_20.C(2)	1,1461	,6302	3,3070	1	,0690	,0584	3,1458
II_20.C(3)	1,6285	,6650	5,9977	1	,0143	,1021	5,0964
II_20.C(4)	,1105	1,1628	,0090	1	,9243	,0000	1,1168

