CONTINUOUS POSITIVE AIRWAY PRESSURE THERAPY, COMPLIANCE AND PERSONAL RELATIONSHIPS: A PRELIMINARY INVESTIGATION

AND RESEARCH PORTFOLIO

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(SUPPLEMENTARY VOLUME)

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APPENDICES

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Clinical Psychology Within A Psychiatric Ward

Prepared in accordance with guidelines for submission to "Health Bulletin" (Appendix 1.1).

Clinical Psychology Within A Psychiatric Ward

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ABSTRACT

Objectives: To examine the function and need for clinical psychology within an in-patient psychiatric setting and consequent future implications. **Design:** Survey of 20 health professionals and assessment of 10 in-patients on two psychiatric wards, one of which received clinical psychology input and one that did not. Questionnaires established information regarding which of five health professions was most appropriate to complete and which profession was actually responsible for each of 24 key activities. Projections were elicited for staffing requirements over the next 5 years. Patients were assessed for identified factors relevant to predicting violence or self harm. **Setting:** Two in-patient psychiatric wards at a central Scotland psychiatric hospital. **Results:** Where clinical psychology services were provided, 7 of 24 activities were seen as appropriate for clinical psychologists to complete. However only 2 activities were actually completed by clinical psychologists. Where there was no clinical psychology provision, staff views of what clinical psychology could provide was limited, e.g. IQ assessment. Staff on both wards predicted a need for a large increase in the provision of clinical psychology. Patient participants on both wards displayed symptomatology within a range that indicated psychological intervention. **Conclusions:** Staff questionnaires and assessment of patients identified a deficit in services, both in terms of meeting patient needs and in providing a more comprehensive clinical psychology service. It is unlikely that this deficit will be remedied quickly with the current difficulties in recruiting psychologists and the apparently limited knowledge of other health professionals and purchasers regarding what clinical psychologists can provide.

INTRODUCTION

The low level of clinical psychology staffing in in-patient psychiatric settings is surprising for several reasons. These include the importance of psychological input and assessment in deciding who is suitable for admission or discharge, and the potential contributions of behavioural medicine and clinical therapy to effective client management and rehabilitation.

At the psychiatric hospital where this study was based, there was very little clinical psychology input to in-patient psychiatric wards, with the majority of the service being invested in primary care. However, what this indicated, confusion regarding the psychologist's role or lack of knowledge about what clinical psychology can provide, was conjecture without further investigation.

In examining the function and definition of any role there are several important characteristics that should be considered: The organisation within which the role is based, the actual discipline itself and the client characteristics. Survey data from health professionals employed on the wards would enable us to look at the role of clinical psychology within the context of the hospital. In addition, evidence may be obtained from assessment of patient characteristics, as a psychologists role will change according to the needs of the patient population.

One of the most important patient characteristics (McGovern, 1996) that could respond to psychological intervention on in-patient psychiatric wards, is the likelihood

of patients committing self harm or harm to others. This is of particular significance with the present government policy of returning individuals to live in the community (HMSO, 1975, 1989a & 1989b) where they may subsequently present a risk to themselves or others.

However, research at predicting this risk is at an early stage. There is conflicting evidence of the accuracy of clinicians ability to predict violence in patients, so it is vital that clinicians are aware of the most promising key areas. With regard to the harming of others, research has found associations between anger and physical aggression (Kay et al. 1988), physical assault (Novaco, 1994) and dangerousness to others (Segal et al. 1988).

The importance of impulsiveness in predicting risk of harm to others has also been investigated (Barratt, 1994). Looking at adults, students, offenders and psychiatric in-patients, Barratt found that psychiatric in-patients scored highest on "non planning impulsiveness" (i.e. lack of concern for the future). He hypothesised that this was part of a personality trait significantly related to aggression.

Research evidence for predicting risk of self harm is also available. Beck et al. (1985) reported that patients who committed suicide had significantly higher scores on the Beck Hopelessness Scale than non-suicidal patients when assessed during hospitalisation. The Beck Hopelessness Scale also has proven predictive value for identifying eventual suicides (Beck et al. 1985). Finally, Appleby (1992) reported the

importance of features of affective disorders, particularly hopelessness, in suicide by psychiatric patients.

Using scales that measure anger, hopelessness and impulsiveness it may be possible to ascertain the degree to which patients are at risk of interpersonal violence or self harm, and then to consider this in reference to the role and functioning of clinical psychology services.

To conclude, the aims of this study were:

I To identify which professional group(s) was believed to be the most appropriate to complete certain roles on the wards.

II To identify which professional group(s) was actually completing the above mentioned roles.

III To identify what future pattern of growth was predicted in the requirement for and actual provision of clinical psychology services over the next five years.

IV To identify a patient profile in the following personality factors:

a. Anger

b. Impulsiveness

c. Hopelessness

SAMPLE

Hospital

This study was comprised of 2 in-patient wards. Ward A was a 20 bedded locked intensive psychiatric care ward. It did not receive any contracted clinical psychology services. Ward B was a 35 bedded acute admission ward. It received one contracted session of clinical psychology per week.

Staff

Forty seven questionnaires were delivered to health professionals on Wards A and B. All health care staff (41 nurses, 5 psychiatrists and 1 occupational therapist) providing a regular clinical service were invited to complete the study questionnaire.

Patients

Patients were selected at random by nursing staff. Only five were willing to participate from Ward A, so a corresponding number were invited to participate from Ward B, making a total of ten participants. Details of the participant sample are given in Table 1.

Insert Table 1 here

Participant diagnoses on Ward A included schizophrenic psychoses, personality disorder and manic depression. Ward B participant admission diagnoses included alcohol dependence syndrome, depressive disorder and schizophrenic psychosis.

METHOD

Staff

Forty seven assessment packs were sent to respondents by internal mail, enclosing an addressed envelope for their return. A twenty item questionnaire was taken from Remenyi et al. (1981). The questionnaire was then modified by the author for this study, including the addition of four extra items, to make it more appropriate to the current client group. The visual analogue scales were designed by the current author.

Respondents had to indicate on:

Questionnaire 1:

Which professional grouping(s) (Clinical psychologist, Nurse, Psychiatrist, Occupational Therapist (OT), Physician), where applicable, *was most appropriate to have primary responsibility* for each of 24 different professional activities on their ward (Appendix 1.2).

Questionnaire 2:

Which professional grouping(s) where applicable, *actually had primary responsibility* for the same activities on their ward (Appendix 1.3).

Ratings for other professions were obtained for comparison and so that respondents were not biased towards clinical psychology.

Visual Analogue Scale

Ratings were made on a visual analogue scale of 1-100. Estimates were made of *what staffing would be needed* in all health disciplines over the next five years. Estimates were also made of *what staffing would actually be provided* in all health disciplines over the next five years (Appendix 1.4).

Patients

The following self report scales were used:

Brief Anger Aggression Questionnaire (BAAQ) (Maiuro et al. 1987).

A brief six item self report measure for the screening and assessment of overt anger and aggression levels in individuals who are prone to violence.

Barratt Impulsiveness Scale (BIS) (Barratt, 1994).

A thirty item self report scale which measures three distinct domains of impulsiveness.

Beck Hopelessness Scale (BHS) (Beck and Steer, 1993).

A twenty item self-report questionnaire designed to measure hopelessness and suicidal risk.

RESULTS

Of the 47 questionnaires distributed, 20 were returned giving a response rate of 43%. Professions of respondents are detailed in Table 2. All were returned anonymously.

Insert Table 2 here

It can be seen from Table 3 that assessing IQ was the only activity rated by staff as the most appropriate to be completed by a clinical psychologist on Ward A. Respondents from Ward B, which had psychological provision, identified seven activities as most appropriately completed by a clinical psychologist, including assessing IQ. This meant there was a marked difference of 6 activities that clinical psychologists were rated as appropriate to complete between Ward A and Ward B.

Insert Table 3 here

Table 4 describes the full list of activities that were viewed as most appropriately completed by other health professionals, instead of clinical psychology.

Insert Table 4 here

Nursing staff were rated as being the most appropriate to complete the majority of key activities on Ward A (63%) and Ward B (42%) (Table 5). In contrast clinical psychology was rated as being the most appropriate to complete only 4% of activities on Ward A and 29% of activities on Ward B.

Clinical psychologists were identified as actually completing only 2 of 24 key activities (assessing IQ and therapeutic work with patient's families) on Ward B (Table 6). Table 7 describes roles that were not completed by clinical psychologists on Ward B. Data is not provided for Ward A because it did not actually receive any psychological service. On both wards nursing staff were rated as actually completing the bulk of activities (Table 8).

Insert Tables 5,6,7 & 8 here

Table 9 shows that respondents predicted a need to increase clinical psychology services: a high rating of 85 on the scale of 1-100. This projected need was the greatest for any of the disciplines. Staff predicted that the actual increase in the provision of clinical psychology would be smaller though, rated 64 on the scale of 1-100.

Insert Table 9 here

This study also reviewed whether patients were exhibiting symptomatology that required psychological intervention and whether this need was being met, even where there was clinical psychology provision.

Insert Table 10 here

Table 10 illustrates that both Ward A and Ward B were accommodating patients within the severe range on all measures. Inferential statistics were not performed because of the small sample size.

DISCUSSION

Perceived Role of clinical Psychology

Several issues were highlighted by this examination of clinical services. The first is regarding the perceived role of clinical psychologists within the NHS. It would seem that the perception of the traditional role of the clinical psychologist as IQ assessor is still prevalent. This was evidenced by the popularity of the IQ assessment item, although respondents from Ward B indicated a slight widening of role perspective by allocating 29% of all roles on the questionnaire as appropriate for clinical psychologists to complete.

IQ assessment was the only role rated as most appropriate to be completed by a clinical psychologist on Ward A. This may reflect a lack of knowledge about what

clinical psychology can offer, or it may be that clinical psychologists are still perceived in the traditional role of IQ assessors and lacking the requisite skills to undertake other activities.

Actual Role of Clinical Psychology

With regard to ward B where 7 activities (29%) were identified as most appropriately completed by clinical psychologists, only two of these roles were actually completed by a clinical psychologist. This was possibly because of the limited time that clinical psychologists have on the ward. It may also be because of the failure of clinical psychologists to educate other professional staff and purchasers regarding their skills and thus the service they can provide. This meant that other staff, predominately nurses, were completing activities of a psychological nature, for which they may not have received any specialist training. For example, implementation of anger management programmes and education of nurses in aggression management.

There is evidence that this may have implications for the role of clinical psychology. The Scottish Health Advisory Service (SHAS, 1996) in a recent review of this NHS Trust identified that staff on Ward A had not had recent training in aggression management and recommended that all staff should be trained in aggression management. A training strategy is now being developed to educate nurses as trainers in the management of aggression, but currently there is no clinical psychology input. Clinical psychology could have a role to play, in the analysis of problem situations and involvement in individual and group programmes of anger management, as well as developing operational policies.

Predicted Need and Provision For Clinical Psychology

Respondents indicated that they thought there was a significant need to increase the actual provision of psychological services on both wards. Indeed SHAS (1996) noted that the "in-patient clinical psychology service for the severally mentally ill is inadequate and only present in some units, though there are no complaints regarding the quality of the service where it is provided". Although staff predicted that clinical psychology services would increase, the estimation of an actual increase of 64% may have been a rather generous estimate, as no extra clinical psychology staffing is likely to become available on Ward A in the near future.

It is unlikely that such an increase in staffing will occur, partly due to staffing policies and funding constraints, but also due to the fact that nation-wide there are not enough clinical psychologists to fill current vacancies, never mind future ones. Indeed without dramatic changes to clinical training to provide more clinical psychologists this is unlikely to change.

Rather than relying on increases in funding, a more cost effective use of clinical psychology resources appears to lie in the "consultancy model" (MPAG, 1990). This involves utilising level III skills (MAS, 1989) in teaching, training and supervision, and putting psychological skills at the disposal of other professions to increase the level of psychological skills on the wards as a whole. This could provide the most cost effective way of cascading psychological skills to all levels for the benefit of patients and staff alike.

Patient Assessments

The results of assessing patients using the BHS, BAAQ and BIS indicated clinical levels of symptomatology that could be amenable to psychological intervention. Assessment on the BHS indicated that both wards had at least one patient who scored in the severe range, exhibiting extremely negative values about the future and who may be a future suicide risk. Six patients assessed on the BAAQ, scored within the range that can be interpreted as indicating a fair likelihood of poor anger control, which may find expression in physical violence. Highly impulsive subjects as measured by the BIS (50% of assessed patients) are reported as more 'present' orientated and are characterised by a 'hair trigger' temper (Barratt, 1994). It was notable that even on ward B where there was a psychological service, patients were still demonstrating severe symptomatology which may reflect the reality of the limited service which psychology could provide.

However these scores do indicate possible areas for psychological intervention on both wards. Where hopelessness was indicated, appropriate psychological risk management may be to offer the patient therapy i.e. cognitive therapy, utilising the BHS as a tool to suggest areas for intervention. The BHS as a repeat assessment measure may also be utilised to predict risk of suicide (Beck and Steer, 1993). Where aggression and impulsiveness were indicated, appropriate measures may involve education of nurses in aggression management as well as possible individual therapy or anger management training for patients.

Methodological Issues

The confidence with which these finding can be interpreted is limited by reservations such as bias from retrospective self-report and the relative weighting clinicians can give to specific predictors of risk. Further, elements of evidence which support these variables as important in predicting risk are based on correlation data, rather than casual relationships.

Recommendations

Introducing psychological assessment and psychological therapy to the wards may enable patients to focus on gaining confidence in managing their symptoms and could help resolve problems prior to discharge and enable some form of effective risk management to occur, whilst providing a valuable database for future studies.

It is suggested that there is a need for further evaluation research regarding risk management at this hospital. Assessment of patients in this study was limited largely by the number of volunteers, but a more extensive survey and profile of relevant wards could be facilitated by the use of case note data and the recently introduced violent incident recording system. This would enable identification of needs and provide a template for future service development.

It is also recommended that the use of pre-, post- and follow up measures of anger, impulsiveness and hopelessness are taken from patients, to build individual vulnerability profiles to complement existing clinical assessments of risk already in place on the wards. For the clinical psychologist who may carry these out, these

formal measures will provide an assessment of risk, as well as providing sound empirical data for future research and possibly more appropriate utilisation of psychological resources.

Conclusions

Clinical psychology compared to most other professions is relatively small and in a large body such as the NHS, small professions are often forgotten or neglected. However clinical psychology is a discipline with a solid body of research demonstrating the clinical efficacy of its approaches to a wide range of problems. There is also evidence to show brief psychological interventions can reduce the cost of other health services, making savings which are greater than the cost of providing psychological services (MAS, 1989). Clinical psychologists need to educate service purchasers of the benefits achievable through increasing clinical psychology provision. They also need to help other clinical staff develop their knowledge of psychological approaches. Coupled with the specialist and consultancy roles of clinical psychologists, this could bring immense benefits to staff and patients alike.

TABLES

	Male	Female	Age range	Transfer from State Hospital	Patient with criminal record
Ward A	5	0	26-47	2	5
Ward B	4	1	29-40	0	0

Table 1: *Details of Participant Sample.*

	Nurse		Psychiatrist		Psychologist		OT	
	D	**R**	**D**	**R**	**D**	**R**	**D**	**R**
Ward A	27	7	3	2	0	0	0	0
Ward B	14	8	2	2	0	0	1	1

Table 2: *Professions of Questionnaire Respondents.*

D= Questionnaires distributed.

R= Questionnaires actually returned.

OT= Occupational Therapist (works on both wards).

Ward A	Number of health professionals completing rating	Percentage of health professionals rating this activity (%)
Assessing IQ	4	44%
Ward B	Number of health professionals completing rating	Percentage of health professionals rating this activity (%)
Assessing IQ	6	54%
Assessing personality	4	36%
Consulting with staff on aggression management	4	36%
Education of nurses re. aggression	4	36%
Therapeutic work with patient's families	4	36%
Devising and implementation of anger management programme	4	36%
Completing appropriate research	5	45%

Table 3: *Activities Rated as Most Appropriate to be Completed by a Clinical Psychologist.*

Tasks viewed as appropriate for other professions to complete
Assessing for brain damage
Facilitating communication between staff and patients
Assessment of psychotic symptomology
Therapeutic work with suicidal risk patients
Assessing client motivation & compliance
Making home visits
Interviewing families
Conducting team building in-service days
Implementing behavioural change programmes
Assessment of patients for rehab
Providing group therapy training i.e. social skills
Assessment of likelihood of harming others
Monitoring of aggression levels on the ward
Assessing suitability for admission/discharge
Acting as patient advocate
Conducting one to one therapy with a patient
Chairing case conferences

Table 4: *Tasks Viewed as Appropriate for Other Professions to Complete.*

Ward A	Number of activities perceived as most appropriate to complete	Percentage of activities perceived as most appropriate to complete
Nursing	15	63%
Psychiatry	7	29%
Psychology	1	4%
OT	1	4%
Ward B	Number of activities perceived as most appropriate to complete	Percentage of activities perceived as most appropriate to complete
Nursing	10	42%
Psychiatry	7	29%
Psychology	7	29%
OT	1	4%

Table 5: *Number of Activities each Profession is Perceived as Most Appropriate to Complete.*

OT= Occupational Therapy.

Ward B	Number of health professionals completing rating	Percentage of health professionals rating this activity (%)
Assessing IQ	4	36%
Therapeutic work with patient's families	3	27%

Table 6: *Activities Actually Completed by a Clinical Psychologist on Ward B.*

Tasks which are not completed by clinical psychologists on Ward B
Assessing for brain damage
Facilitating communication between staff and patients
Assessment of psychotic symptomology
Therapeutic work with suicidal risk patients
Assessing client motivation and compliance
Making home visits
Interviewing families
Educating nurses re. aggression
Conducting team building in-service days
Undertaking appropriate research
Assessing personality
Assessing patients for rehab
Providing group therapy training i.e. social skills
Assessment of likelihood of harming others
Monitoring aggression levels on the ward
Assessing suitability for admission/discharge
Acting as patient advocate
Chairing case conferences
Devising and implementing anger management programmes
Consulting with staff members on aggression management
Conducting one to one therapy with patients
Implementing behavioural change programmes

Table 7: *Tasks Which Are Not Completed by Clinical Psychologists on Ward B.*

Ward A	Number of activities completing	Percentage of activities completing
Nursing	19	79%
Psychiatry	4	17%
Psychology	0	0%
OT	1	4%
Ward B	Number of activities completing	Percentage of activities completing
Nursing	17	71%
Psychiatry	4	17%
Psychology	2	8%
OT	1	4%

Table 8: *Number of activities each profession is rated as actually completing.*

Profession	Mean projection of increase in staffing needed rated on a scale of 1-100	Mean projection of actual staffing provision expected rated on a scale of 1-100
Psychology	85%	64%
Psychiatry	77%	74%
Nursing	57%	58%
OT	48%	59%

Table 9: *Staffing Projections of Ward A and B Combined: Projections of Need and Projections for Actual Involvement for each Profession over the Next 5 Years.*

	Number of individuals scoring above cut-off	
Assessment measure	Ward A n=5	Ward B n=5
BIS	3	2
BHS	1	1
BAAQ	3	2
Total meeting cut-off in any category	3	2

Table 10: *Individuals Scoring within High Risk Range on Assessment Measures.*

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Major Research Project Literature Review

Continuous Positive Airway Pressure Therapy, Compliance and Personal Relationships: A Review

Prepared in accordance with guidelines for submission to "Sleep" (Appendix 2.1)

Continuous Positive Airway Pressure Therapy, Compliance and Personal Relationships: A Review

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ABSTRACT

Continuous Positive Airway Pressure (CPAP) is the most effective treatment for obstructive sleep apnoea. It has been shown to be highly effective in eliminating sleep apnoeas and reducing daytime sleepiness. However, it can be cumbersome and intrusive, and as a result compliance is often below clinically effective levels. Consequently the issue of compliance has become one of crucial importance. Multiple factors have been investigated as possible variables in CPAP compliance and this review discusses the literature to date.

Recent work has suggested that CPAP treatment may have a beneficial effect upon personal relationships for partners of CPAP patients, but no study has investigated the impact that the relationship an individual has with their bed partner may have upon subsequent compliance. The absence of research in this area is discussed with suggestions for future investigation.

Keywords: Obstructive sleep apnoea; continuous positive airway pressure; compliance; marital relationships.

INTRODUCTION

Obstructive Sleep Apnoea

Obstructive sleep apnoea (OSA) is a common disorder affecting more than 4% of the general adult population (1) and more than 25% of the elderly (2). It is defined as repetitive episodes of complete (apnoea) or partial (hypopnoea) upper airway obstruction during sleep, which result in episodic asphyxia and interruption of the normal sleep pattern (3). The chief clinical consequences are excessive daytime sleepiness, habitual snoring, nocturnal choking, unrefreshing sleep, nocturnal enuresis, inability to concentrate and decreased alertness (4). Polysomnography, which usually is required to confirm the presence of OSA or to assess its severity, demonstrates the apnoeic events, arterial oxygen desaturation and disturbed sleep architecture of this syndrome (5). Neuropsychiatric symptoms have been reported as a consequence of OSA (6-9), as have cognitive impairments (10-14), although a clear pattern of deficits has not emerged. Clinically relevant consequences of the symptoms of OSA include decreased work efficiency, impairment in quality of life and increased risk of automobile accidents (15).

CPAP Treatment

The introduction of continuous positive airway pressure (CPAP) administered through a nasal mask in 1981 (16) represented an important step in the treatment of

OSA, tracheostomy having been the previous treatment of choice (17, 18). Acting as a pneumatic splint, nasal CPAP secures the patency of anatomically narrowed and collapsible airways, restoring unobstructed breathing during sleep. CPAP treatment has been shown to be highly effective in eliminating sleep apnoeas and hypopnoeas, normalising sleep patterns and reducing daytime sleepiness (19-21). Originally it was thought that occasional "treatment holidays" could be taken without too deleterious an effect. Subsequent research however, has confirmed the importance of continual nightly CPAP use, and that missing one night of CPAP treatment can abruptly lower the objective level of daytime alertness even in the absence of subjective worsening (22, 23). Thus, the necessity of regular nightly use of CPAP has made the issue of treatment compliance one of primary importance. Moreover, not only does non compliance have serious implications for individuals (residual daytime somnolence and cardiovascular morbidity), it also has serious implications for systems (finance used in supporting collective misuse of expensive equipment and staff time) (24).

CPAP is also a "symptomatic" treatment, prescribed for an undetermined period of time, and unlikely to result in a cure. Treatment compliance has been shown to be compromised where such a lifestyle change is required (25), and where a condition (such as sleep apnoea) is chronic, non life threatening and involves long term treatment (26). Such failure to comply with the initiation or maintenance of a prescribed regimen, especially one of a preventative nature (such as CPAP), is characterised as one of today's major unsolved health problems (27) and is beginning to be acknowledged as the most prominent reason for failed therapy (28).

Consequently this review will examine the literature regarding the nature of compliance to CPAP, possible influential factors and areas for future research.

CPAP COMPLIANCE

It is worth noting that reporting within the CPAP literature is compounded by the lack of a standard definition of 'compliance', making comparison between studies difficult. Krieger and colleagues (29) identified three types of compliance (of which the latter two are the most commonly utilised); primary acceptance of CPAP at the stage of initial prescription, secondary acceptance of CPAP, measured by the number of patients who continue with CPAP after starting and finally the rate at which the people who continue with CPAP treatment actually use it.

Subjective assessment of CPAP compliance

Initial studies of compliance with CPAP were based on self report questionnaires and showed quite high levels of use (30-36), where compliance was defined as patients who accepted CPAP after initial prescription and continued with treatment. Sanders and colleagues (30) analysed the number of nights per week and the fraction of nightly sleep time during which the device was used and found an impressive long-term compliance rate of 75%. Retrospective analysis by Waldhorn (34) indicated that 76% of patients who had accepted the initial prescription of CPAP were still using CPAP at

the time of follow-up. This was supported by a prospective study done by Waldhorn & Wood in 1993 (37), where using similar parameters, compliance was noted as being 76%. Since this earlier work various studies have attempted to analyse the compliance of patients with treatment and the factors affecting long term use of nocturnal ventilation.

Objective Assessment of CPAP Compliance

To circumvent the difficulties inherent in patients self report studies (social desirability, influence of expectation and the limitations of memory), subsequent studies investigated compliance by measuring the total time that power is turned on to a CPAP unit. These studies (38-40) found compliance rates similar to that in the literature reporting subjective use, but this was most likely because patients were aware of the time counters, and in some instances patients were asked to report the readings from these counters. Subsequently, the first study covertly monitored "mask on" time (41). Patients were given CPAP machines that contained a microprocessor and monitor that measured actual pressure at the mask (there is an increase in mask pressure when the mask is put on). Monitor output was compared to self report at follow up. The majority of patients (66%) overestimated their actual use of the CPAP machine by 69 $\pm$ 110 minutes. Since then subsequent studies have confirmed the discrepancy between objective and subjective reporting of CPAP use, averaging around one hours difference between the two (15, 42-44, 39), although one study has

reported that subjective reports of CPAP compliance correlate significantly with objective compliance measures (30).

Objective evaluation of CPAP use within the literature is now standard. Research has indicated that the mean duration of CPAP use in a night is 5.23 hours (range 3.2-6.9 hours) (15, 41, 45-48). However research has shown that effective time is about 10% less than running time (41). Adjusting average machine "on times" to reflect mask "on time" means that the average duration of nightly CPAP use is 4.85 hours (15, 41, 45-48).

Long term compliance

Long term studies assessing chronically treated patients have generally supported higher compliance rates. Krieger and colleagues (29) reported a compliance rate of over 85% after seven years (where compliance was defined as patients continuing with treatment after initial prescription). A further study (24) reported that patients used their CPAP machine for 94% of the monitored period (2 years) at a mean effective daily rate of use of 6.9 hours. Subsequent studies have confirmed these relatively high rates of use over longer periods of time ($\geq$ one year) (32, 43, 44, 49, 50). Though these figures are impressive, it must be remembered that studies over a longer period of time are measuring compliance in a self selecting population, as those who have abandoned treatment are not included in the results percentages. Thus these studies are documenting treatment compliance in a population who by definition

are accepting of CPAP as a treatment. This is supported by evidence that rejection of CPAP occurs very early in treatment, generally within the first three months of treatment (34-36, 39, 46) or even within the first week of therapy (53, 55).

Short term compliance

As a result of most CPAP non compliance commencing within the first three months of treatment, studies assessing compliance over a shorter period of time tend to report slightly lower and possibly more realistic rates, as they reflect patient drop out from treatment. Indeed effective use of CPAP during periods of up to three months may be as poor as 50% (51). Kribbs and colleagues (23) reported a mean duration of use of 4.9 hours (±1.9 hours) and that only 46% of patients met the criteria for regular use (using CPAP 4 hours a day on 70% of the days). Other studies (39, 41, 45) have supported these findings of poor compliance with short term use of CPAP therapy.

FACTORS THAT INFLUENCE COMPLIANCE

As the therapeutic success rate of CPAP treatment relies on patient acceptance of the device, it is consequently of paramount importance to evaluate factors that contribute to or undermine compliance. A wide range of variables has been investigated within the literature. These have included demographic variables (31, 33, 41, 47) and physiological variables such as disease severity (46), body mass index (31, 36, 39, 41,

42, 45, 52, 53), mean sleep latency time (time it takes an individual to get to sleep) (33, 41, 45, 52, 53, 54), respiratory disturbance index (RDI - number of apnoeas and hypopnoeas per hour of sleep) (15, 41, 45, 53, 54) and nocturnal oxygen saturations (41, 52, 54). Despite this volume of research no single physiological parameter has consistently emerged as a predictive factor.

The impact of the CPAP machine itself on compliance has also been investigated (36, 57) as problems with the machine predominate in reports of non-compliance (15, 30, 32, 34, 40, 41, 45, 47). Difficulties include mechanical characteristics of the device, such as its weight, dimensions, type of CPAP machine (automatic vs. standard CPAP (58), claustrophobia (23), noise level and portability (15, 36, 53, 59) and mask discomfort (30, 31, 34, 41). Engleman (15) has categorised these problems into three areas: nuisance factors (frequent awakening, noise, sore eyes), mask problems (leaky mask, mask rubbing) and side effects (dry throat, nasal stuffiness). Subjective CPAP use was negatively correlated with nuisance factors and positively related to mask problems. A variety of devices have been added to conventional CPAP machines and alleged to lead to improved compliance. These include heat/humidification, ramp CPAP pressure, bi level CPAP and self adjusting CPAP (57).

Psychological Factors and Compliance

Psychological factors have been minimally investigated and to date there is only one study that has investigated the importance of psychological factors in CPAP

compliance. Edinger and colleagues (60) in a non-randomised prospective study of 38 men, found that eventual compliers scored lower on the Minnesota Multiphasic Personality Inventory (MMPI) Hopelessness and Depression scales prior to treatment than did non-compliers. They postulated that non-compliers' higher MMPI Depression scale scores reflected greater negativism which may have underlain their non-acceptance of CPAP therapy. By default, Rosenthal and colleagues (55) suggested personality characteristics might be the pre-treatment factors that were instrumental in determining CPAP compliance after being unable to associate CPAP use with any indicators of disease severity.

The lack of examination of psychological factors is surprising considering the amount of literature that documents the importance of psychological factors in other chronic illnesses which require long term prophylactic treatment. For example many HIV patients, despite being relatively asymptomatic, are required to adhere to therapeutic regimens for prolonged, often indefinite periods of time. Non compliance in HIV patients has been associated with greater depression (61, 62), greater psychological distress, emotional disturbance and poor adaptive coping (63). Treatment for diabetes is also long term and depends on assumption of responsibility by the patient. Low self esteem (64), high anxiety (65), interpersonal conflicts (66) and psychiatric illness (67) have all been negatively associated with treatment compliance. Family dysfunction (68) and psychological variables (69) have also been implicated in compliance with asthmatic therapeutic regimens.

These data would suggest that psychological variables may have implications for patients' motivation to use CPAP and that investigation of these variables may provide avenues to promote CPAP compliance.

Personal relationships and compliance

There has been no study to date of the impact that the psychological health of a couple's relationship may have on CPAP compliance. This is surprising, as an individual's initial presentation for treatment is often at the prompting of a bed partner who has been kept awake by snoring, choking and/or restless sleep (70). Furthermore, although there are joint benefits to CPAP such as the alleviation of snoring, there are also costs. Once treatment has commenced, both partners have to tolerate the machine and all its physical disadvantages such as noise and obtrusiveness (15). CPAP may also separate partners for sleep and impact heavily upon intimate and sexual time together (70). As an individuals bed partner is likely to be one of the most influential in a persons life their perception of and adjustment to CPAP is possibly an important component of patients' compliance to treatment. Therefore, the impact of CPAP therapy on a partner's sleep and the relationship with that person would seem to be an important component of the assessment of CPAP efficacy and subsequent compliance.

This neglect of marital variables is all the more surprising considering research indicates that higher marital satisfaction and strong social relationships appear to be

predictors of compliance and positive health outcomes in a variety of chronic illnesses (71, 72) similar to OSA, that require long term prophylactic treatment. Research as early as 1967 (73) has found that higher marital satisfaction and good familial support systems are positively associated with compliance to a medical treatment regimen. In HIV research, lower treatment compliance has been associated with poor relationships with partners (74), whereas in comparison, positive relationships have been reported to have a beneficial effect on HIV treatment compliance (75). There is also a plethora of studies in the diabetic literature describing the positive relationship between marital satisfaction and compliance (76-81) and reports that negative or upsetting interactions between couples can have severe detrimental effects for treatment compliance (82). This has led researchers within the wider health literature to suggest that research into compliance issues should shift it's focus from the patient alone to include assessment of the marital relationship and the psychological well-being of the spouse (76).

CHRONIC ILLNESS AND RELATIONSHIPS

As poor health decreases an individual's ability to fulfil one's family role, marital relationships are likely to face potential stress and alteration. Hafstrom and Schram (83) demonstrated that marital satisfaction was significantly lower for wives with chronically ill husbands. This has been widely supported within the health literature for both spouses in a variety of chronic illnesses (84-87).

However, while the consequences of OSA for the patient are well documented e.g. excessive daytime somnolence, snoring, decreased libido, poor concentration, impaired memory and fatigue (89); the implications that these symptoms may have for patients' relationships is not. Only 2 studies to date have documented the impact of OSA upon relationships and families, although these appear to be consistent with the broader health literature. Gall and colleagues (90) have reported that those with OSA had poorer family relationships, including marital relationships. Prior to this, Cartwright and Knight (91) in a non-randomised study, established the impact of OSA upon the marriages of patients. They noted that not only does sleep apnoea separate marriage partners for sleep time, but it also severely limits their shared social time due to the patient's inability to sustain evening wakefulness. Reported marital satisfaction, of partners was poor, as measured by the Marital Satisfaction Inventory (92), which led the authors to conclude that untreated OSA is a source of friction in marriages.

This study highlighted that those who treat OSA patients should be aware that partners may also need support or direct help. They may need to be educated about the disorder and made part of the treatment team since many of the treatments for these patients involve the partner's participation (e.g. weight control, alcohol reduction). In doing so, perhaps some of the strain on a couple's relationship may be alleviated. It also suggests that if symptoms of OSA are impacting on both marital partners, then so may the treatment, indicating that perhaps to focus only on how this condition affects the patient is somewhat limited.

Impact of CPAP on relationships

Little attention has been paid to the effects of CPAP treatment itself upon couples' relationships and only one study to date has investigated this. Kiely and McNicholas (70) concluded that bed partners of patients treated by CPAP experienced improvements in sleep quality, daytime alertness, mood and quality of life as measured by qualitative questions. Through the same measures they also found an improvement in couples' relationships following institution of CPAP therapy, thus indirectly supporting the view that untreated OSA is a cause of friction in many relationships, (91), and that OSA may be an important factor in motivating the bed partner to initially bring the patient to medical attention. However this study was retrospective in that patients and bed partners compared subjective impressions of previous status (pre CPAP) to their current status (receiving CPAP). Furthermore the assessment measures they used were not formally standardised or validated and were composed simply of 9 qualitative questions devised by the authors. Further clarification of the impact of CPAP on relationships would be desirable by a prospective study utilising reliable, validated measures to assess marital satisfaction (93). Support for the argument that improvements in marital satisfaction may be attributable to CPAP treatment could be provided by the supplementary validated, measurement of known outcome variables in CPAP treatment, such as daytime sleepiness (94), subjective health status (95) and daily functioning (96).

CONCLUSIONS

Since the original description of CPAP administered via a nasal air mask for the treatment of OSA, it has become the non surgical choice as the most effective treatment for this disorder. Treatment with CPAP is highly successful in reducing apnoeic episodes during sleep and subsequently improves or resolves clinical symptoms of sleep apnoea, but as therapy in almost half of those prescribed CPAP is less than optimal, CPAP compliance must received continued emphasis. To date, there does not seem to be a singular disease-related or demographic variable that has consistently been identified as affecting compliance with CPAP therapy. However, there are factors within the wider health literature, such as marital satisfaction, that have been shown to be important in treatment compliance in other chronic illnesses which have not been investigated with regard to CPAP treatment. Furthermore, there is evidence that marital relationships are important in OSA; patients often present at a doctors at the partner's request due to disturbed sleep and untreated OSA has been shown to be a cause of friction between couples. This suggests that marital relationships and partners may be influential in CPAP non-compliance, but validated research is needed to confirm or disprove it. The fact that positive relationships have a positive effect on treatment compliance and poor relationships have a negative effect in other chronic illnesses would certainly seem to suggest this. Psychological factors may also play an important part in CPAP therapy, as although they have been identified in OSA patients, their possible impact on compliance has not as yet been fully assessed.

The sharp decline in CPAP use by those who eventually abandon treatment suggests that the explanation for non-compliance to treatment may be antecedent to therapy. The application of conceptual models of motivation for health behaviours could provide a framework for the identification of characteristics (such as marital satisfaction, psychological variables) of those less compliant with CPAP. Without understanding of these characteristics of non-compliers, it is unlikely that future intervention strategies will be successful.

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Major Research Project Proposal

Continuous Positive Airway Pressure Therapy, Compliance and Personal Relationships: A Preliminary Investigation

Continuous Positive Airway Pressure Therapy, Compliance and Personal Relationships: A Preliminary Investigation

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SUMMARY

Continuous Positive Airway Pressure (CPAP), administered through a nasal mask is the current treatment of choice for obstructive sleep apnoea (OSA). CPAP treatment is very effective, but it's intrusive nature often results in poor compliance. Multiple factors have been investigated as possible variables in CPAP compliance, but there has been no published study to date evaluating the influence of the psychological health of the marital unit upon CPAP compliance. This is surprising considering that once treatment is started, both partners have to tolerate the machine and all it's disadvantages for an undetermined period of time. This study will be the first evaluation of the relationship between the psychological health of the marital unit and CPAP compliance. Individuals (diagnosed as suffering from sleep apnoea) and their partners will be assessed with regard to marital satisfaction, sleepiness, daily functioning and subjective health status prior to CPAP treatment. Measures will be repeated one, three and six months after the commencement of treatment. The study will be completed at the National Sleep Laboratory in the Royal Infirmary of Edinburgh.

INTRODUCTION

Obstructive Sleep Apnoea (OSA) is defined as repetitive episodes of complete (apnoea) or partial (hypopnoea) upper airway obstruction during sleep which result in episodic asphyxia and interruption of the normal sleep pattern (Guilleminault et al, 1978). The introduction of continuous positive airway pressure (CPAP) administered nightly through a nasal mask in 1981 (Sullivan et al, 1981), represented an important step in the treatment of this condition, tracheostomy having been the previous treatment of choice (Motta et al, 1978).

CPAP treatment has been shown to be highly effective for OSA eliminating sleep apnoeas and hypopnoeas, normalising sleep patterns and reducing daytime sleepiness (Guilleminault et al, 1993; Issa & Sullivan, 1986). There are problems associated with CPAP therapy however, which include claustrophobia (Hoffstein et al, 1992), nasal congestion (Sanders et al, 1986), uncomfortable masks and the noise from the machine itself (Engleman et al, 1996). In addition CPAP treatment is a 'symptomatic' treatment, prescribed for an undetermined period of time, and unlikely to result in a cure. Compliance has been shown to be compromised where such a lifestyle change is required (Kaplan, 1990) and where a condition (such as sleep apnoea) is chronic, non life threatening and involves long term treatment (Claydon & Efron, 1994).

Perhaps, in part because of these difficulties, compliance with CPAP is often incomplete. Patient drop-out can be as high as 30% (Krieger, 1992) and nightly

usage rates are often below clinically effective levels. This has serious implications for both individuals (residual daytime somnolence and cardiovascular morbidity) and systems (finance used in supporting collective misuse of expensive equipment and staff time) (Fleury, 1996).

Consequently, it is of paramount importance to evaluate factors that contribute to or undermine CPAP compliance. While physical (Rauscher et al, 1991; Rolfe et al, 1991; Sanders, 1986) and psychological (Edinger et al, 1994) factors have been identified in individuals compliance, there has been no study to date of the influence that the psychological health of a couple's relationship may have on CPAP compliance, even though this is a treatment regime that imposes on both partners.

Furthermore, while there is a comprehensive literature describing the impact of spouse illness and treatment upon marital relations (Krausz, 1988; Carter & Carter, 1994; Kester et al, 1988), and noted impairments in patients' quality of life prior to starting CPAP treatment (Flemons, 1997), little attention to date has been paid to the impact that CPAP treatment itself may have upon couples' relationships. This is surprising as although there are joint benefits to CPAP such as the alleviation of snoring, there are also costs. CPAP may separate partners for sleep time and impact heavily upon intimate and sexual time together (Kiely & McNicholas, 1997).

This study will be, to the author's knowledge, the first evaluation of the relationship between CPAP compliance and the psychological functioning of a couples' relationship.

HYPOTHESES

It is postulated that:

Hypothesis 1: There will be a positive correlation between marital satisfaction at baseline and subsequent CPAP compliance in the CPAP group.

Hypothesis 2: CPAP patients will show improvement in their marital satisfaction scores from baseline to follow-up. There will be no change in marital satisfaction scores for the control group.

Hypothesis 3: CPAP patients will show positive changes in measures of health outcome; daytime sleepiness (Epworth Sleepiness Scale), subjective health status (36 Item Short Form Health Survey Questionnaire) and daily functioning (Functional Outcomes of Sleep Questionnaire). There will be no change in the control group.

Hypothesis 4: CPAP patients will show a positive correlation between changes in marital satisfaction and other outcome measures (from baseline to follow-up) and treatment compliance.

PLAN OF INVESTIGATION

PATIENTS

Power statistics were performed to calculate the size of experimental group required.

CPAP Patients, n=44.

Control Group, n=15.

Inclusion Criteria

Individuals will be invited to participate if they meet all of the following criteria:

1. Diagnosis of OSA
2. Currently involved in a relationship whether married or unmarried of at least 1 years duration.
3. Currently living with partner.
4. Are on the waiting list to commence CPAP treatment.
5. Are able to be contacted by phone.

Exclusion Criteria

Individuals will not be invited to participate if they meet any of the following criteria:

1. Additional medical diagnoses that may confound the experimental data.
2. Co-morbid psychiatric disorder.

Recruitment and Consent of Patients

Patients currently on the waiting list for CPAP treatment at the Royal Infirmary in Edinburgh will be identified from existing case records. All patients will have been diagnosed by standard all-night clinical polysomnography as meeting the criteria for sleep apnoea of the obstructive type (Bornstein, 1982).

CPAP patients: For the experimental condition patients will be within 2 months of starting CPAP treatment. Patients will receive an introductory letter, written information about the study and a consent form (Appendices 3.1, 3.2 and 3.3 respectively). At the same time their partners will be sent an introductory letter, written information and a consent form (Appendices 3.4, 3.5 and 3.6 respectively).

Control Patients: For the control condition patients will be contacted 8 months prior to them starting CPAP treatment (to allow for 6 months of measurement whilst on the waiting list). Patients will receive an introductory letter, written information about the study (Appendices 3.7 and 3.8 respectively), and a consent form (Appendix 3.3). At the same time their partners will be sent an introductory letter, written information (Appendices 3.9 and 3.10 respectively) and a consent form (Appendix 3.6).

Patients and their partners in both groups will be informed their participation (or lack of it) will not affect treatment, that they may withdraw at any time and that all information will be treated in strictest confidence. A letter will be sent to patients' GPs on receiving both partner's consent forms (Appendix 3.11).

MEASURES

ENRICH Marital Satisfaction Scale.

The ENRICH (evaluation and nurturing relationship issues, communication and happiness) Marital Satisfaction (EMS) Scale (Fowers & Olsen, 1993) provides a brief measure of marital satisfaction suitable for research purposes. It offers a dyadic positive couple agreement (PCA) score (the percentage of items on which both partners evaluate their relationship positively), as well as an individual measure of marital satisfaction for each partner. Each of the Marital Satisfaction items represents one of the 10 most important dimensions of marital satisfaction (Fournier et al, 1983). Reliability and validity are established (Fowers & Olsen, 1993).

Functional Outcomes of Sleep Questionnaire.

The Functional Outcomes of Sleep Questionnaire (FOSQ) (Weaver et al, 1997) is a self report functional status instrument that specifically targets the ways in which sleep disorders impair daily activities. The FOSQ has been demonstrated to be sensitive to how sleep disorders affect patients' abilities to conduct normal activities and is a valid outcome measure in disorders of sleep (Weaver et al, 1997). There are five subscales on the FOSQ and one Summary Score. Good validity and test-retest reliability have been demonstrated (Weaver et al, 1997).

36 Item Short Form Health Survey Questionnaire.

The 36 Item Short Form Health Survey Questionnaire (SF 36) (Jenkinson, 1996) is a generic measure of subjective health status. It measures 8 multi-item dimensions. Two summary scores can also be calculated of physical (Physical Component Summary-PCS) and emotional well being (Mental Component Summary-MCS) which replicate the 8 dimensions, aiding interpretation and reducing the likelihood of chance findings due to multiple comparisons (Ware et al, 1993). It has been shown to have good internal consistency, construct validity and test/re-test reliability (Brazier et al, 1992; Garret et al, 1993). Furthermore, it has demonstrated efficacy as an outcome measure in sleep disorders and in treatment with CPAP (Smith & Shneerson, 1995). Normative data for an adult British population are available (Jenkinson et al, 1993).

Epworth Sleepiness Scale.

The Epworth Sleepiness Scale (ESS) (Johns, 1991) is a simple, 8 item self-administered questionnaire that is capable of distinguishing patients suffering from OSA from individuals with no sleep disorder. The ESS provides a general measurement of a patient's daytime sleepiness and has also been shown to clinically demonstrate response to treatment with CPAP in patients with OSA (Hardinge et al, 1995). Test-retest reliability, internal consistency (Johns, 1992) and validity (Hardinge et al, 1995) of the ESS have been demonstrated.

Six Qualitative Questions.

Five qualitative questions regarding patients' marital relationship will be included in the questionnaire pack. Four of the questions require that patients give a numerical

answer, the other is a simple yes or no. A sixth single question regarding CPAP use will also be included (Appendix 3.12).

Partners in both groups will be asked to complete the EMS Scale and the 6 qualitative questions only.

Compliance

Objective compliance with treatment will be assessed by use of the built-in time counter on the machine which records the total time the unit is switched on. CPAP patients will be contacted by phone and asked to report the readings from the CPAP machine themselves at three time points; 1, 3 and 6 months into CPAP therapy. Follow up appointments at the National Sleep Laboratory after 6 months will allow technicians to check the time counters and confirm readings. The mean rate of use, utilised as an index of objective compliance, is calculated by dividing the number of hours the machine is on by the number of days of use.

DESIGN & PROCEDURE

This is represented in Figure 1.

Stage 1

Following approval from Ethics, all patients shall be contacted by post prior to commencing CPAP therapy. Patients will be sent an information form explaining the study is investigating difficulties experienced from CPAP use, a consent form and questionnaire measures. The initial postal contact will also request partners participation. Questionnaire measures for their completion will also be included in the pack, along with a consent form.

Stages 2-4

CPAP patients and their partners will be contacted at 1, 3 and 6 months after the start of CPAP treatment for repeat completion of outcome measures. Control patients on the waiting list for CPAP therapy will be contacted at the same time intervals. This design will provide a measure of relationship variables and compliance at 1, 3 and 6 months into CPAP treatment.

Stage of Process	Procedure Involved
STAGE 1	Patients and their partners give consent. ESS, FOSQ, SF36, EMS & qualitative questions administered to both groups of patients. Partners contacted at the same time and complete EMS and qualitative questions. Following this CPAP therapy is commenced for the CPAP group. Control group remain on the waiting list.
↓	
STAGE 2	One month into therapy, CPAP and control patients and their partners complete all outcome measures again. CPAP patients are contacted over the phone and asked to give reading from CPAP machine.
↓	
STAGES 3-4	CPAP and control group contacted again after 3 and 6 months. Patients and partners both complete all outcome measures again. CPAP patients are contacted by phone and asked to report reading from the CPAP machine.

Figure 1: *Experimental Procedure of Study.*

SETTING

Patients will be completing questionnaires in the privacy of their own homes. Demographic data will be obtained from the National Sleep Laboratory, Royal Infirmary of Edinburgh.

DATA ANALYSIS

Experimental data and basic demographic details will be stored on a password protected database in coded form. This information will be held at Gartnavel Royal Hospital in an alarmed and locked room within the computing department.

Should the data demonstrate normal distributions and homogeneity of variance, parametric tests will be utilised in preference to non-parametric tests. Descriptive statistics will be used to determine means and the standard deviation for group data, as well as examining distribution and continuity. If parametric tests are indicated, data will be examined with two way analysis of variance (ANOVA) to control for experiment-wide error when comparing patients over multiple scores. If non-parametric tests are indicated, Mann Whitney will indicate differences in outcome measures between groups. T-tests (related) or Wilcoxin statistical tests will determine degree of change within groups. The relationship between compliance and marital satisfaction will be examined by correlational analysis (Pearson or Spearman).

PRACTICAL APPLICATIONS:

1. Identification of factors that may help to predict compliance with CPAP machines, leading to a reduction in both personal cost for individuals and economic cost for the NHS.
2. Identification of difficulties within relationships that are caused by CPAP treatment that may be remedied by psychological intervention at the appropriate stage.
3. Support for the role of the psychologist in managing a condition which currently is treated primarily by medical professionals but which would likely benefit from a clinical psychologist's intervention.

TIMESCALES

Data Collection till March 1999.

Data Analysis and write up from March 1999 till July 1999.

ETHICAL APPROVAL

Ethical approval will be sought from Lothian Research Ethics Committee.

Explanatory Statement

The following is a statement explaining the discrepancy between the research proposal and the research paper.

This study initially intended to assess patients at 3 time points, 1, 3, and 6 months into CPAP therapy. Ethics required that patients should give consent by post before partners could be contacted. When partners had also consented by post, only then could the questionnaire packs be sent out. This resulted in a much longer recruitment period than had initially been anticipated and so patients were only followed up at one time point, 3 months into therapy. Three months was chosen as an appropriate time point, as of those studies that have documented when patients have stopped using CPAP, all have found that this occurred within the first three months of treatment (Krieger, 1992; Reeves-Hoche et al, 1994).

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Major Research Project Paper

Continuous Positive Airway Pressure Therapy, Compliance and Personal Relationships: A Preliminary Investigation

Running Head: CPAP Compliance and Personal Relationships

Prepared in accordance with guidelines for submission to "American Journal of Respiratory and Critical Care Medicine" (Appendix 4.1)

Continuous Positive Airway Pressure Therapy, Compliance and Personal Relationships: A Preliminary Investigation

Running Head: CPAP Compliance and Personal Relationships

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ABSTRACT

To obtain objective evidence of the pattern of CPAP use and it's relationship with marital satisfaction, information was gathered from the National Sleep Laboratory in Edinburgh. Sixty-nine patients and their partners comprised the two groups of the study; 44 of whom were due to start CPAP within 2 months, and 25 had at least a 6 month wait. Primary outcome measures were the ENRICH Marital Satisfaction Scale, the 36-Item Short Form Health Survey Questionnaire, the Functional Outcomes of Sleep Questionnaire, the Epworth Sleepiness Scale and 6 qualitative questions. Patients completed all measures on enrolling into the study. Partners completed the ENRICH Marital Satisfaction Scale and the 6 qualitative questions. Three months later, all participants re-completed the measures again and compliance readings were taken from the CPAP machines. No significant baseline correlates of compliance were found. However, couples receiving CPAP perceived their marital satisfaction as significantly improved compared to controls. CPAP couples also demonstrated improved daytime sleepiness, subjective health status and daily functioning. Controls demonstrated decrements in marital satisfaction and all other outcome measures over the 3 month period. No significant relationship between changes in marital satisfaction over time and treatment compliance was found. Partner marital satisfaction was highlighted as a potentially important variable in treatment compliance that warrants further investigation, in accordance with the broader health literature.

Keywords: continuous positive airway pressure therapy; obstructive sleep apnoea; treatment compliance; marital satisfaction.

INTRODUCTION

The use of nasal continuous positive airway pressure (CPAP) administered through a nasal mask (1) is recognised to be the treatment of choice for obstructive sleep apnoea (OSA). Originally it was thought that occasional "treatment holidays" could be taken without too deleterious an effect. Subsequent research however has confirmed the importance of continual nightly CPAP use, and that missing one night of CPAP treatment can abruptly lower the objective level of daytime alertness even in the absence of subjective worsening (2,3). Once using CPAP however, patient drop out can be high, sometimes as much as 30% (4), nightly usage rates vary (5, 6, 7, 8, 9, 10) and are often below clinically effective levels (10). As therapeutic success rate relies on patient acceptance of the device, it is of paramount importance to evaluate factors that may contribute to or undermine compliance. Much has been made of the physical side effects of CPAP (10, 11, 12, 13, 14, 15, 16) as adversely impacting its use, but there has been no study to date of the influence that the psychological health of the marital unit may have on CPAP compliance. This is surprising, since a patient's initial presentation for assessment of symptoms indicative of OSA is often at the prompting of a bed partner (17), who has been kept awake by snoring, choking and/or restless sleep. Furthermore, once treatment has commenced, both partners have to tolerate the machine and all it's physical disadvantages. As an individual's bed partner is likely to be one of the most influential in a persons life, the quality of the relationship with this person is possibly an important component of patient compliance to CPAP. Indeed research within the wider health literature supports the importance of the marital unit in treatment compliance (18, 19, 20, 21).

While there is a comprehensive literature describing the impact of other spouse illnesses and treatment upon marital relationships (22, 23, 24, 25) there is a notable paucity of information of the effects of sleep apnoea (14) or CPAP treatment (15) upon marital relationships. Cartwright and Knight (17) described untreated OSA as a cause of friction in relationships and highlighted partners' need for support or direct help. Subsequently, a cross-sectional, retrospective study (26) reported that bed partners of OSA patients treated with CPAP experienced improvement in sleep quality, daytime alertness, mood, quality of life and subjective rating of the marital relationship. These data suggest that CPAP therapy leads to improvement in subjective perceptions of marital satisfaction, in addition to improvements that have already been noted; improved alertness (14), amelioration of sleep architecture (27) and improved subjective health (28).

The primary purpose of the present study was to determine firstly whether there was a relationship between measured marital satisfaction at initiation of treatment and subsequent CPAP compliance. Secondly, it sought to ascertain if over time there was an improvement in subjective marital satisfaction with CPAP treatment. It was intended to ascertain whether marital satisfaction is an important variable in CPAP compliance and also to clarify the utility of marital satisfaction as an outcome variable.

HYPOTHESES

The hypotheses of the study were:

Hypothesis 1: There would be a positive correlation between marital satisfaction at baseline and subsequent CPAP compliance in the CPAP group.

Hypothesis 2: CPAP patients would show improvement in their marital satisfaction scores from baseline to follow-up. There would be no change in marital satisfaction scores for the control group.

Hypothesis 3: CPAP patients would show positive changes in measures of health outcome; daytime sleepiness (Epworth Sleepiness Scale), subjective health status (36 Item Short Form Health Survey Questionnaire) and daily functioning (Functional Outcomes of Sleep Questionnaire). There would be no change in the control group.

Hypothesis 4: CPAP patients would show a positive correlation between changes in marital satisfaction and other outcome measures (from baseline to follow-up) and treatment compliance.

METHOD

Sample

A total of 149 patients from the Scottish National Sleep Laboratory, Royal Infirmary of Edinburgh requiring positive-pressure therapy for the treatment of OSA were initially contacted. Of these 104 were due to shortly start CPAP therapy, the remaining 45 had at least a 6 month wait and served as controls. Control patients on the waiting list were not untreated, conservative therapy consisted of advice on losing weight, avoiding evening alcohol etc. In total 44 of the original CPAP patients and 25 of the control patients completed both stages of the study. This gave a response rate of around 38% for the CPAP group and 55% for the control group. Reasons for exclusion are detailed in Appendix 4.2.

To participate in this study patients had to be living with their partner but not necessarily married. The protocol was approved by Lothian Research Ethics Committee and informed consent was obtained from patients and their partners. At no time was data obtained used to alter clinical care. All patients had undergone diagnostic polysomnography to confirm OSA (apnoea-hypopnoea index [AHI] >5/h) and were within 2 to 6 months of being prescribed CPAP therapy.

Outcome Measures

Upon enrolment, each patient and their partner were sent a questionnaire pack for completion. The patients' pack consisted of:

ENRICH Marital Satisfaction Scale.

The ENRICH (evaluation and nurturing relationship issues, communication and happiness) Marital Satisfaction (EMS) Scale (29) provides a brief measure of marital satisfaction suitable for research purposes. It offers a dyadic positive couple agreement (PCA) score (the percentage of items on which both partners evaluate their relationship positively) as well as an individual measure of marital satisfaction for each partner. Each of the Marital Satisfaction items (Appendix 4.3) represents one of the 10 most important dimensions of marital satisfaction (30). Reliability and validity are established (29).

Functional Outcomes of Sleep Questionnaire.

The Functional Outcomes of Sleep Questionnaire (FOSQ) (31) is a self report functional status instrument that specifically targets the ways in which sleep disorders impair daily activities. The FOSQ has been demonstrated to be sensitive to how sleep disorders affect patients' abilities to conduct normal activities and is a valid outcome measure in disorders of sleep (31). There are five subscales on the FOSQ and one summary score (Appendix 4.4). Good validity and test-retest reliability have been demonstrated (31).

36 Item Short Form Health Survey Questionnaire.

The 36 Item Short Form Health Survey Questionnaire (SF 36) (32) is a generic measure of subjective health status. It measures 8 multi-item dimensions (Appendix 4.5). Two summary scores can be calculated of physical (Physical Component Summary - PCS) and emotional well being (Mental Component Summary - MCS) which replicate the 8 dimensions, aiding interpretation and reducing the likelihood of chance findings due to multiple comparisons (33). It has been shown to have good internal consistency, construct validity and test/re-test reliability (34, 35) and has demonstrated efficacy as an outcome measure in sleep disorders and in treatment with CPAP (36). Normative data for an adult British population are now available (37).

Epworth Sleepiness Scale.

The Epworth Sleepiness Scale (ESS) is a simple, 8 item self-administered questionnaire that is capable of distinguishing patients suffering from OSA from individuals with no sleep disorder. The ESS provides a general measurement of a patient's daytime sleepiness (38) and has also been shown to clinically demonstrate response to treatment with CPAP in patients with OSA (39). Test-retest reliability, internal consistency (40) and validity (39) of the ESS have been demonstrated.

Six Qualitative Questions.

Five qualitative questions regarding patients' marital relationship were also included in the questionnaire pack. A sixth single question regarding CPAP use was also included (Appendix 4.6).

Partners were asked to complete the EMS Scale and the 6 qualitative questions only.

Objective Compliance

Objective compliance with treatment was assessed by use of the built-in time counter on the machine that accumulates the time the power is on in the unit. Follow up appointments at 3 months allowed technicians to check the time counters. In the absence of appointments, patients were contacted by phone and asked to report the readings from the machines themselves. The mean rate of use utilised as an index of objective compliance, was calculated by dividing the number of hours the machine had been on, by the number of days of use.

Analysis

All analyses were performed using SPSS/PC+ (version 7.5.1). Descriptive statistics were used to determine means and the standard deviation for group data, as well as examining distribution and continuity. Kurtosis and skewness were also calculated. Examination of data revealed relatively normal distributions for the primary measures (Appendix 4.7.1 - 4.7.7) as did the kurtosis/skewness indices. Consequently, data were examined parametrically with two way analysis of variance (ANOVA) to control for experiment-wide error when comparing patients over multiple scores. T-tests were also performed on each variable to compare the groups at baseline and at follow-up to clarify any significant results. The 6 qualitative questions were examined

using non-parametric analyses, due to their skewed distribution. A correlation analysis was performed with the Spearman coefficient, due to the non normal distribution of compliance and AHI in the sample populations. Alpha levels were set conservatively at .01 (two tailed) to prevent the occurrence of a Type 1 error.

RESULTS

Baseline Measures of CPAP and control groups

The baseline patient characteristics of both CPAP and control patients are described in Table 1. There were no significant differences between the respective clinical groups in age, AHI or gender. There was also no significant difference between groups at baseline on any of the outcome measures (Appendix 4.8). Mean rate of compliance in the CPAP group following treatment was 4.41 hours per night. This degree of CPAP compliance is similar to that found in previous studies (12).

Insert Table 1 here

Hypothesis 1: *There would be a positive correlation between marital satisfaction at baseline and subsequent CPAP compliance in the CPAP group.*

In order to examine the association between baseline marital satisfaction and AHI and compliance, a Spearman correlation matrix was computed (Table 2). AHI was included as it has been a reliable predictor of compliance in other studies (41). There were no significant baseline correlates of compliance, including marital satisfaction or AHI.

Insert Table 2 here

To further investigate the relationship between baseline marital satisfaction and compliance, CPAP patients were subdivided into three groups (low, medium and high marital satisfaction): firstly on the basis of one third of patients in each group (by number) and secondly based on the range of marital satisfaction scores (i.e. scores within one of 3 ranges; 25-45, 45-65, 65-85). One way non-parametric analysis was performed using Kruskal-Wallis ANOVA due to the small sample size and to reduce the risk of Type 1 error. The same was then repeated for the partners of the CPAP patients. Results are given in Table 3.

Insert Table 3 here

Examination of Table 3 reveals that the 3 groups were significantly different when split by number. Mann Whitney comparisons (Appendix 4.9) were conducted as post hoc tests and these confirm that it was the group reporting intermediate marital satisfaction that was reporting significantly lower compliance compared to the other two groups. It can also be seen from Table 3 that when CPAP patients were divided by marital satisfaction scores, the group reporting intermediate marital satisfaction still had lower rates of compliance than the other two groups, although this effect was not statistically significant. It is also evident from Table 3 that there was no significant difference in patient compliance for the 3 groups of partners, which is confirmed by further analyses (Appendix 4.9). Scatterplots of the distribution of patient and partner marital satisfaction scores and compliance are displayed in Figures 1 and 2 respectively.

Insert Figures 1 and 2 here

Hypothesis 2: *CPAP patients would show improvement in their marital satisfaction scores from baseline to follow-up. There would be no change in marital satisfaction scores for the control group.*

The means for the 2 groups at baseline and 3 month follow-up for the battery of outcome measures are presented in Table 4. The results from factorial ANOVA comprising between group, within time and interaction of group by time effects are also given in Table 4.

Insert Table 4 here

Significant group by time interactions were found for patient marital satisfaction, partner marital satisfaction and positive couple agreement, indicating that couples receiving CPAP perceived their marital satisfaction as significantly improved compared to the control couples (Figures 3, 4, & 5). Most of the qualitative questions showed a ceiling effect (Appendix 4.10). There was however a significant drop in the number of arguments reported by both partners (Question 4) in the CPAP group (Appendix 4.10). Further analyses (Appendix 4.11) confirmed that the CPAP group were reporting significantly less arguments than the control group.

Control group scores did not remain stable as predicted but deteriorated, showing a decrement in marital satisfaction for both partners and in positive couple agreement.

This is supported by the significant increase in the number of arguments reported by partners in this group (Appendix 4.10).

Insert Figures 3, 4 & 5 here

Figures 3, 4 and 5 suggested that the significant difference over time was due to improvements in follow-up scores for the CPAP group. Independent t-tests between groups confirmed that significant effects are accounted for by treatment differences at follow-up (range p =.000 to .003) and not at baseline (Appendix 4.12).

Hypothesis 3: *CPAP patients would show positive changes in measures of health outcome; daytime sleepiness (ESS), subjective health status (SF 36) and daily functioning (FOSQ). There would be no change in the control group.*

Examination of Table 4 also reveals significant group by time interactions were found for all health outcome measures and indicates that CPAP patients improved significantly more on health outcome measures than the control group. Mean scores on the Physical and Mental components of the SF 36 were well below the normative mean of 50 (37) for both groups at baseline, but at follow-up, the scores for the CPAP group were within normal range. Both groups also demonstrated excessive sleepiness at baseline as measured on the ESS, but at follow-up, the ESS score of the CPAP group had fallen significantly, into normal range (40). Data from the FOSQ

summary score also indicated adverse health status at baseline. Significant improvements were evident with the institution of CPAP therapy resulting in a summary score more consistent with that of normal individuals (31). Again as with the marital satisfaction scores, control group scores did not remain stable but deteriorated. This suggests that patients perceived their physical health as deteriorating more the longer they remained untreated. Figures 6 to 9 suggested that the significant difference over time was due to the CPAP group's improvement in follow-up scores. Independent t-tests between groups confirmed that significant effects were accounted for by treatment differences at follow-up (all p =.000) and not at baseline (Appendix 4.12).

Insert Figures 6, 7, 8 & 9 here

Hypothesis 4: *CPAP patients would show a positive correlation between changes in marital satisfaction and other outcome measures (from baseline to follow-up) and treatment compliance.*

In order to consider the association between changes in marital satisfaction, compliance and other outcome measures, a Spearman correlation matrix was computed between the change score of variables and compliance (Table 5).

Insert Table 5 here

First, inspection of the table suggests that the relationship between compliance and marital satisfaction score was stronger as perceived by partners, although this correlation was not statistically significant (r =0.307, p =0.043). Second, compliance was strongly associated with the FOSQ summary score (r =.570, p =.000), indicating compliance and clinical improvement related to quality of life. Compliance was also strongly associated with the Mental Component score of the SF 36 but not with the Physical Component score. This suggests that CPAP treatment was having a greater effect on the emotional domains that compose the Mental Component score, such as social functioning, emotional role, energy and vitality. Third, compliance was strongly related to improvement in ESS scores, in other words greater compliance did lead to less subjective sleepiness. Fourth, marital satisfaction also reflected health outcomes. In particular, there was a strong inverse correlation between patient (r =-.399, p =.007) and partner (r =-.617, p =.000) marital satisfaction and ESS scores, indicating that perceived marital satisfaction improved as sleepiness scores decreased. Finally, the FOSQ summary score (r =-.754, p =.000) and SF 36 Mental component score (r =-.578, p =.000) were significantly related to ESS scores, indicating that self-reported daytime sleepiness and mental health may contribute to the functional impairments associated with sleep apnoea.

DISCUSSION

Initial hypotheses will be considered with regard to results, before discussion of the implications of findings. This section will finish with a critique of the experimental method employed and suggestions for future steps in research.

The first hypothesis was that baseline measures of marital satisfaction would be related to CPAP compliance. It was initially anticipated that greater baseline marital satisfaction would be associated with greater compliance, and lower satisfaction would be associated with lower compliance. However, this first hypothesis was not strongly supported. Consideration of the scatterplot in Figures 1 and 2 revealed that there was not a linear relationship between the 2 variables. Further analyses on sub-groups of patients with higher or lower marital satisfaction, elucidated that both groups had significantly higher compliance rates than those who rated their marital satisfaction at the intermediate level. However, this did depend upon how the sub-groups were formed, as when they were split by marital satisfaction scores, there was no difference between sub-groups (although this involved a group with a very small sample size of 8). Furthermore, the pattern of difference between sub-groups was not confirmed by analyses of partner's scores. However, if this is a true effect it may mean that high marital satisfaction and by implication good marriages, provide the support necessary to maintain good compliance. Conversely, perceived low marital satisfaction, possibly as a result of difficulties caused by OSA (sleepiness, irritability), may motivate a patient to use their CPAP machine effectively, perhaps seeing it as a

solution to a problem. Individuals who report medium marital satisfaction may not be as motivated nor have such good support. Analysis with a bigger sample may clarify the ambiguity present here.

The second hypothesis of this study was that CPAP patients would show improvement in marital satisfaction scores from baseline to follow-up, whereas controls would not. The findings indicated that CPAP was more effective than conservative treatment on a waiting list, in improving marital satisfaction in patients and their partners. These data suggest that the beneficial effects of eliminating snoring and allowing both partners to get a more restful sleep and possibly reductions in excessive daytime sleepiness, outweigh any possible deleterious effect from the noise or obtrusiveness of the CPAP machine.

Contrary to expectations, the control group did not remain stable, as control patient and partner marital satisfaction actually decreased, which is confirmed by the fact that the number of arguments reported also increased. This supports research evidence that untreated OSA is a source of friction in marriages (17) and that with limited energy as a result of OSA, relationship responsibilities may take a low priority. As partner marital satisfaction also decreased for this group, this suggests that there should perhaps be more direct involvement and support of partners in the treatment of OSA, particularly since other studies have shown that OSA can also have negative implications for partners e.g. increased anxiety and depression (17).

The third hypothesis was confirmed in that CPAP treatment led to a statistically significant reduction in sleepiness and improvement in subjective health status and daily functioning compared to the control group. However, the use of statistical significance tests to evaluate treatment effects is limited (42) in that it provides no information regarding clinical significance; the extent to which functioning of the CPAP group had actually been returned to a normal range and whether it made a real practical difference in peoples' lives. With regard to the former, the initial ESS and SF 36 scores of both groups were similar to scores obtained by patients classified as suffering from "severe" OSA (40), but when treated with CPAP for 3 months, the ESS and SF 36 scores of the CPAP group fell significantly, into the normal range previously described for middle-aged non-snoring subjects (38, 43). Summary scores on the FOSQ fell to marginally outwith normal range (31). With regard to the latter, evidence of real differences in peoples' lives was provided by comments that patients gave following their 3 months of CPAP therapy:

> "If I had been told one year ago how much better my quality of life would be after I started using the machine I would never have believed it was possible".

> "Makes 100% difference".

> "The CPAP machine is very good and improved my sleep pattern".

> "I feel a lot better and far more energetic".

In addition to generating changes in areas associated with daytime hypersomnolence, it appears that CPAP has restored to sleep apnoeic patients that which is most meaningful to them; the ability to once again engage in social activities, get a good nights sleep, fulfil daily roles and be as active as their peers.

Controls in contrast, demonstrated decrement in functioning on all of the above measures in the 3 month time period. Actual waiting lists for CPAP treatment are much longer than 3 months, up to a year as a result of funding in the UK being withdrawn or severely limited (44) following a negative review (45). If the data reported in this study regarding the deterioration in controls' health status and daily functioning represents a true effect, a wait of up to 1 year may have serious implications for the psychological morbidity of patients' relationships and their health.

A relationship was found between increases in partner's marital satisfaction and intervening CPAP compliance although this was not statistically significant (CPAP has previously been associated with improvements in quality of life for partners, 26), partially supporting the fourth hypothesis. This would suggest that the more compliant an individual was with CPAP therapy, the greater the improvement in partners' marital satisfaction or vice versa. Independent data would support the former, that untreated OSA was a cause of friction in these relationships, which CPAP then resolved (26).

No relationship was found between changes in patient marital satisfaction and compliance. One possible explanation for this could be that partner marital

satisfaction may be a more important contributory variable in relation to CPAP compliance. An alternative explanation is that there was no relationship between changes in patient marital satisfaction and CPAP compliance. The fact that increases in partner marital satisfaction were correlated with compliance would suggest the former, especially since patient marital satisfaction was related to all health outcomes, (which do relate to compliance), apart from the Physical component of the SF 36. These data highlight the potential importance of partners in the treatment of OSA. They suggest that partners may be able to give useful insight into the impact of CPAP therapy on the lives of patients and their families and that it may be important to include partners in any intervention designed to improve compliance confirming research from the general health literature (21). It may also mean making changes to how patients are dealt with in sleep clinics and encouraging more active participation of partners in treatment.

CPAP compliance was however, associated with patient change scores on the FOSQ, ESS and Mental component of the SF 36, which indicated that better compliance was associated with reduced daytime sleepiness, improved subjective health and daily functioning.

Assessment of marital satisfaction with more than one marital measure would strengthen findings, allow cross validation and clarification of whether compliance is associated with marital satisfaction at baseline or throughout treatment. A behavioural element to this assessment would also eliminate some of the bias that is inherent in self reporting. Patients are normally brought in for a day of assessment

prior to commencing CPAP; requesting that both partners attend would perhaps allow behavioural observation, thus facilitating objective measurement, as well as potentially improving compliance by involving partners. Psychopathology may also have influenced marital satisfaction scores. This could be controlled for by validated measurement of variables such as anxiety and depression. Furthermore, depression has been shown to influence CPAP compliance (46) and should be accounted for by assessment in future studies.

Sampling issues are also evident in this study; unequal sample sizes and self selecting participants. To better study complex variables such as marital satisfaction and their interaction with treatment, future study should involve equal sized groups with a much larger sample size. Deterioration in control scores may have been due to demand characteristics in that the control group may have utilised this survey as an opportunity to express their dissatisfaction with waiting time, which would have been exacerbated at follow-up 3 months later. It would be desirable to control for this with either placebo treatment (44) or validated measurement of demand characteristics. Although data used was self-report, it has been suggested that the "bottom line" for the appraisal of health care delivery is the patient's perspective of how this care has affected their daily life (47). Therefore, from the patient's viewpoint, CPAP seems to be highly effective in returning them to a normal life. Furthermore objective measures, such as mean sleep latency time (MSLT) are often time consuming and cumbersome. Some compliance data was self-report, but the majority was objective, and compliance rates found herein are similar to that previously noted (12). Furthermore, reports of CPAP compliance have been found to correlate significantly

with objective compliance measures such as the counters used on the machines in this study (48).

These methodological difficulties suggest some future directions for research, namely a randomised study with more comprehensive assessment of marital quality, possibly with behavioural measures as noted earlier. The fact that a relationship has been shown to exist between marital satisfaction and CPAP compliance and other health outcome variables is enough to suggest the importance of further research in this area.

CONCLUSIONS

In summary, the findings of this study indicate CPAP is not only associated with improvement in marital satisfaction and health outcome measures over the course of treatment but actually appears to prevent deterioration in relationships. Partner marital satisfaction has been highlighted as particularly important, and there is a need to incorporate this into future research. Clinicians involved in the management of OSA may find these data of practical clinical use when advising patients with OSA on the potential impact of CPAP on their quality of life.

TABLES AND FIGURES

Characteristic	CPAP n=44		Controls n=25	
	Mean	**SD**	**Mean**	**SD**
Age (years)	49	9.5	51	10.3
AHI	45	39.9	39	15.7

	n	**%**	***n***	**%**
Female	10	23	6	24
Male	34	77	19	76

Table 1: *Characteristics of Patients Treated with CPAP Therapy and Controls.*

AHI - Apnoea Hypopnoea Index.

	AHI	Compliance	Patient MS	Partner MS	PCA	SF 36 PHY	SF 36 MENT	FOSQ Summary	ESS
AHI		.068	-.092	-.138	-.070	.041	-.037	-.003	-.023
		.662	***.554***	***.372***	***.652***	***.791***	***.810***	***.985***	***.883***
Compliance			.059	.190	.055	-.074	-.010	-.204	.174
			.704	***.217***	***.724***	***.633***	***.949***	***.185***	***.259***

Table 2: *Spearman Rank Order Correlations among Compliance, and Baseline Measures of AHI, Marital Satisfaction, Sleepiness, Daytime Functioning and Subjective Health Status. (n=44)*

p values are shown in italics and bold

MS - Marital satisfaction; PCA - Positive couple agreement; PHY - Physical component of the SF 36; MENT - Mental component of the SF 36; FOSQ Summary - Functional Outcomes of Sleep Questionnaire Summary score; ESS - Epworth Sleepiness Scale.

Split by Number						Split by Marital Satisfaction Score					
a Patient Marital satisfaction	n	Mean	Median	Chi sq	*p*	*b* Patient Marital Satisfaction	n	Mean	Median	Chi sq	*p*
		Hours of Compliance						Hours of Compliance			
Low	15	4.72	4.50			Low	8	4.91	4.35		
Medium	14	3.37	3.10	5.80	.055	Medium	24	3.97	4.20	2.625	.269
High	15	5.06	5.50			High	12	4.95	5.25		

Split by Number						Split by Marital Satisfaction Score					
a Partner Marital satisfaction	n	Mean	Median	Chi sq	*p*	*b* Partner Marital Satisfaction	n	Mean	Median	Chi sq	*p*
		Hours of Compliance						Hours of Compliance			
Low	15	3.97	3.50			Low	8	5.20	5.55		
Medium	15	4.21	4.30	2.372	.305	Medium	23	3.83	4.20	3.89	.143
High	14	5.08	5.25			High	13	4.94	5.00		

Table 3: *Differences in Hours of Compliance According to Reported Levels of Marital Satisfaction in Patients and Partners using CPAP. Analyses are Kruskal-Wallis ANOVAS.*

a Sub-groups split by number
b Sub-groups split by marital satisfaction score

variable	cpap n=44		control n=25		group	time	group x time
	Baseline	Follow-up	Baseline	Follow-up	F	F	F
ENRICH Patient marital satisfaction	56.88 (13.18)	61.94 (15.92)	54.71 (15.62)	46.53 (17.97)	6.30	.89	***16.14****
ENRICH Partner marital satisfaction	58.18 (13.69)	60.29 (16.51)	53.78 (18.33)	46.75 (18.41)	5.38	3.17	***10.75****
ENRICH Positive couple agreement	68.86 (18.32)	72.50 (15.71)	63.20 (22.86)	52.00 (27.08)	***8.43****	2.58	***9.93****
SF 36 Physical Composite	41.72 (9.86)	48.34 (9.97)	38.59 (8.83)	36.05 (8.46)	***13.40*****	3.45	***17.38*****
SF 36 Mental Composite	42.09 (8.44)	50.83 (9.12)	41.06 (9.67)	36.43 (10.51)	***14.01*****	3.67	***38.78*****
ESS	14.61 (4.02)	8.18 (5.21)	15.40 (5.03)	16.27 (4.04)	***19.17*****	***24.59*****	***42.49*****
FOSQ Summary Score	9.50 (2.16)	12.95 (2.45)	9.63 (2.94)	8.80 (2.88)	***14.18*****	***14.02*****	***37.39*****

Table 4: *Outcome Measures: Means (standard deviations) and Results of Factorial ANOVA for CPAP Patients and Controls.*

Significant scores are shown in italics and bold.
*p<.01
**p<.001
***p<.0001

	AHI	Compliance	Patient MS	Partner MS	PCA	SF 36 PHY	SF 36 MENT	FOSQ SUM	ESS
AHI		.068	-.084	.025	.028	-.327	-.071	-.213	-.464
		.662	***.586***	***.873***	***.857***	***.030***	***.649***	***.165***	***.002***
Compliance			.254	.307	-.121	.192	.484	.570	-.464
			.097	***.043***	***.433***	***.211***	***.001***	***.000***	***.002***
Patient MS				.543	.200	.352	.294	.382	-.399
				.000	***.194***	***.019***	***.053***	***.011***	***.007***
Partner MS					.113	.429	.362	.511	-.617
					.465	***.004***	***.016***	***.000***	***.000***
PCA						-.055	.078	.221	-.085
						.722	***.613***	***.149***	***.583***
SF 36 PHY							.259	.473	-.565
							.090	***.001***	***.000***
SF 36 MENT								.699	-.578
								.000	***.000***
FOSQ SUM									-.754
									.000
ESS									

Table 5: *Spearman Rank Order Correlations between Compliance, AHI and Change Scores (Baseline to Follow-up) on Outcome Measures for CPAP Patients. (n=44)*

p values are shown in italics and bold.

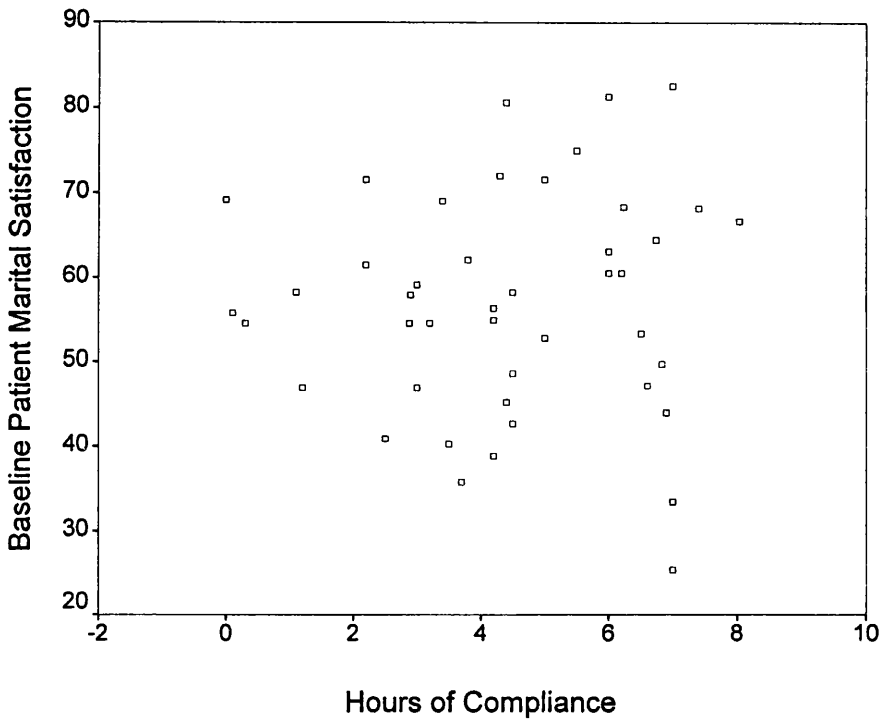

Figure 1:*Scatterplot of the Distribution of Patient Marital Satisfaction Scores.*

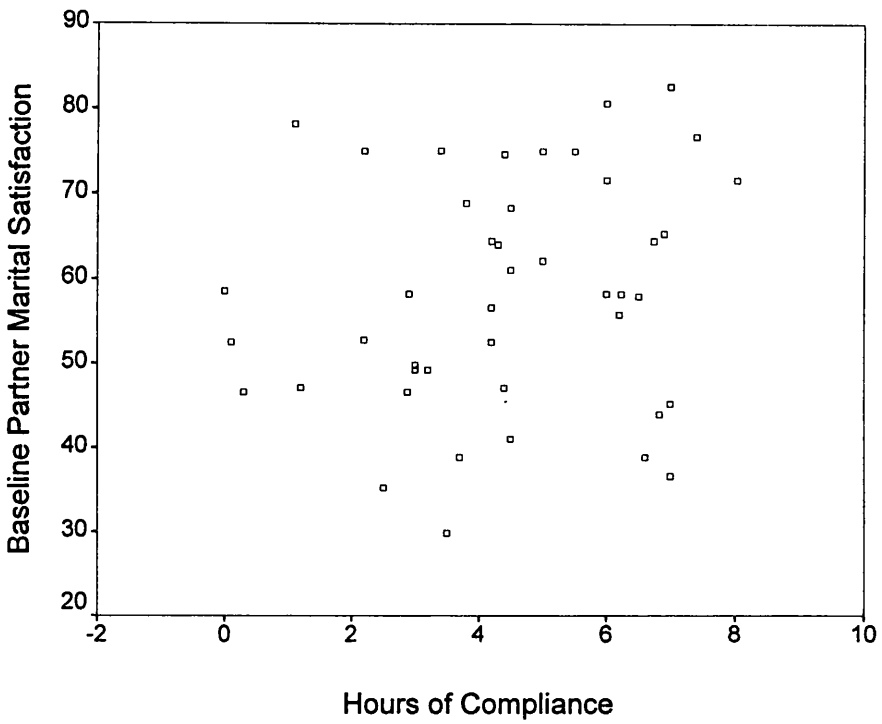

Figure 2:*Scatterplot of the Distribution of Partner Marital Satisfaction Scores.*

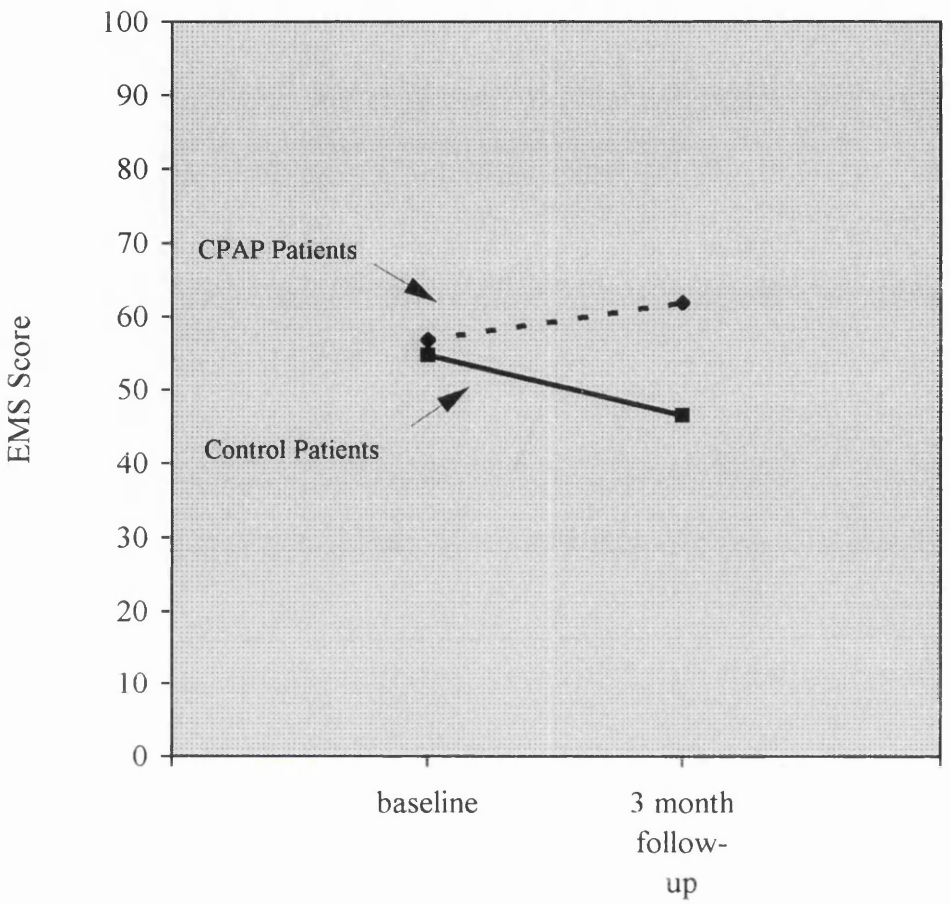

Figure 3: *Patient (Mean) Marital Satisfaction Scores Over Time.*

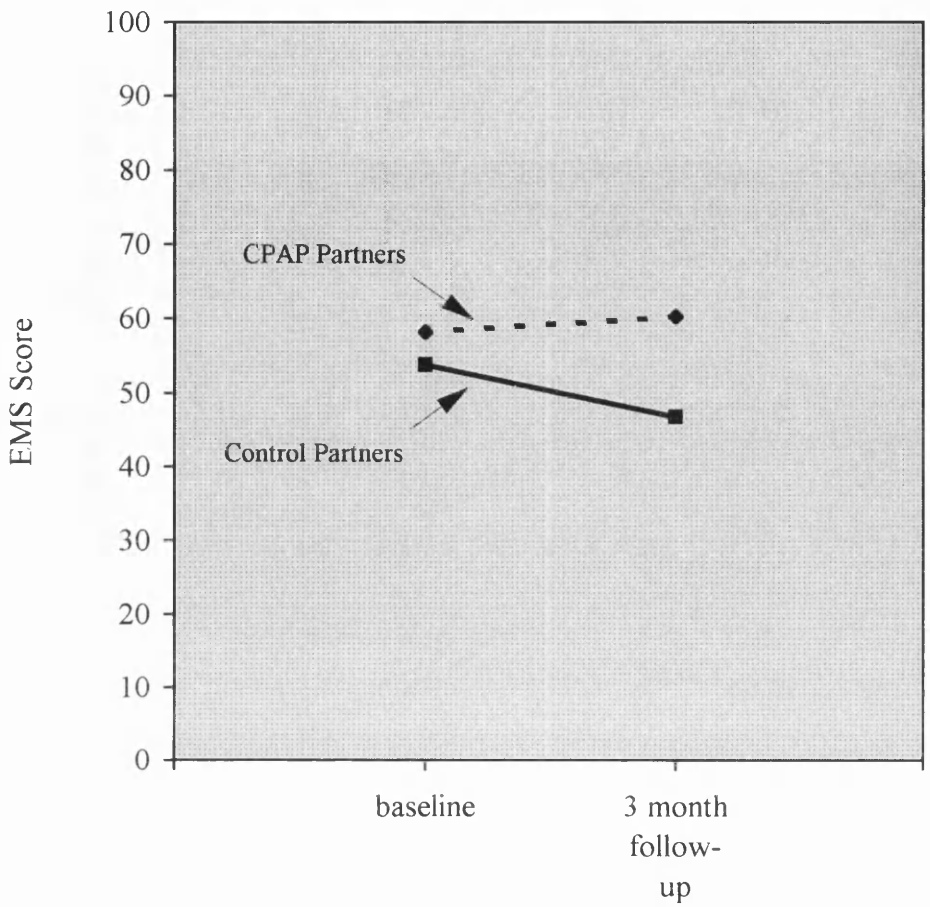

Figure 4: *Partner (Mean) Marital Satisfaction Scores Over Time.*

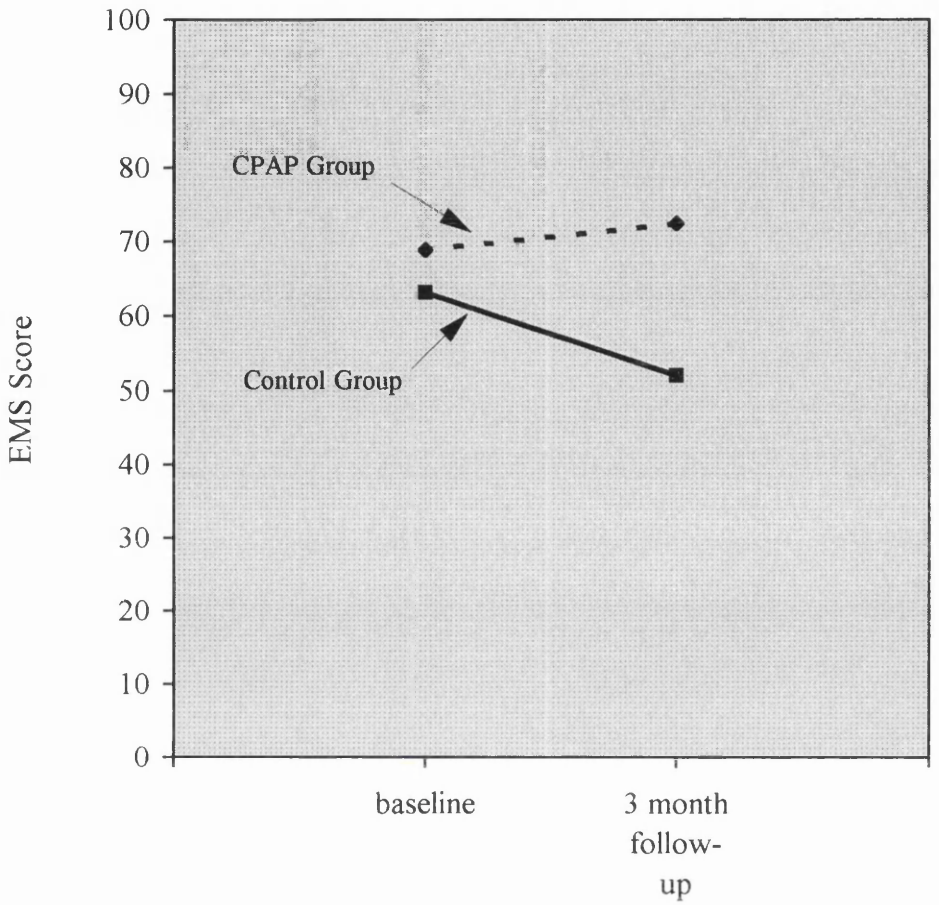

Figure 5: *Mean Positive Couple Agreement Scores Over Time.*

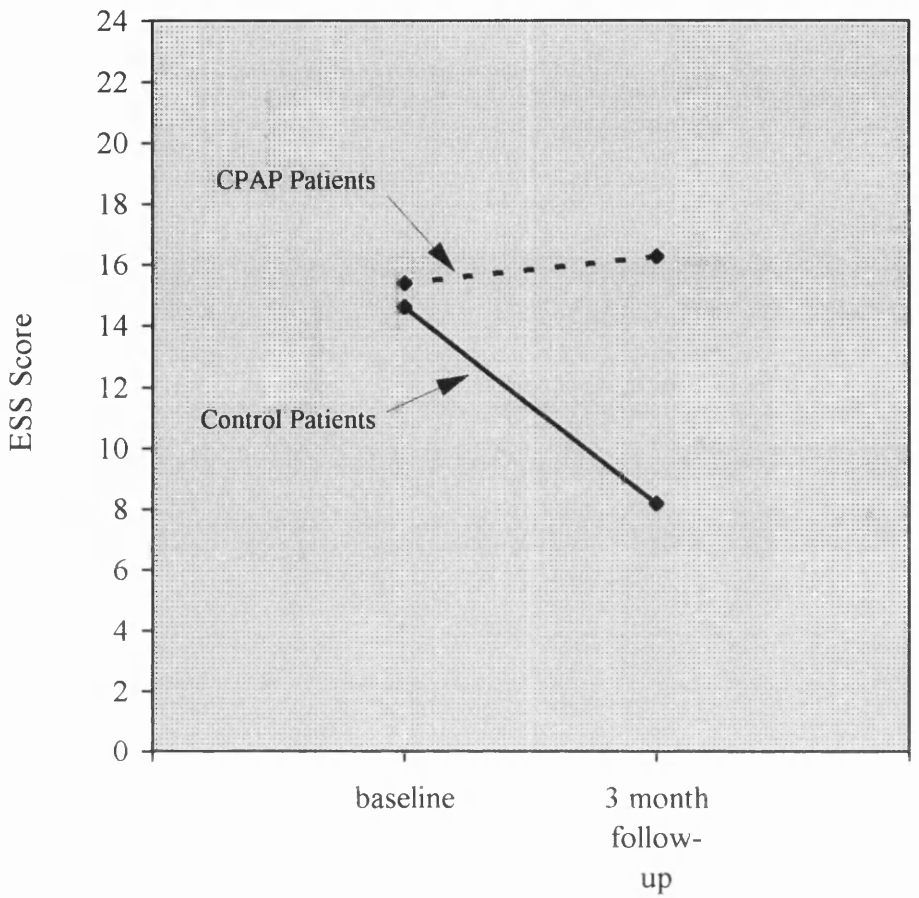

Figure 6: *Patient (Mean) ESS Scores Over Time.*

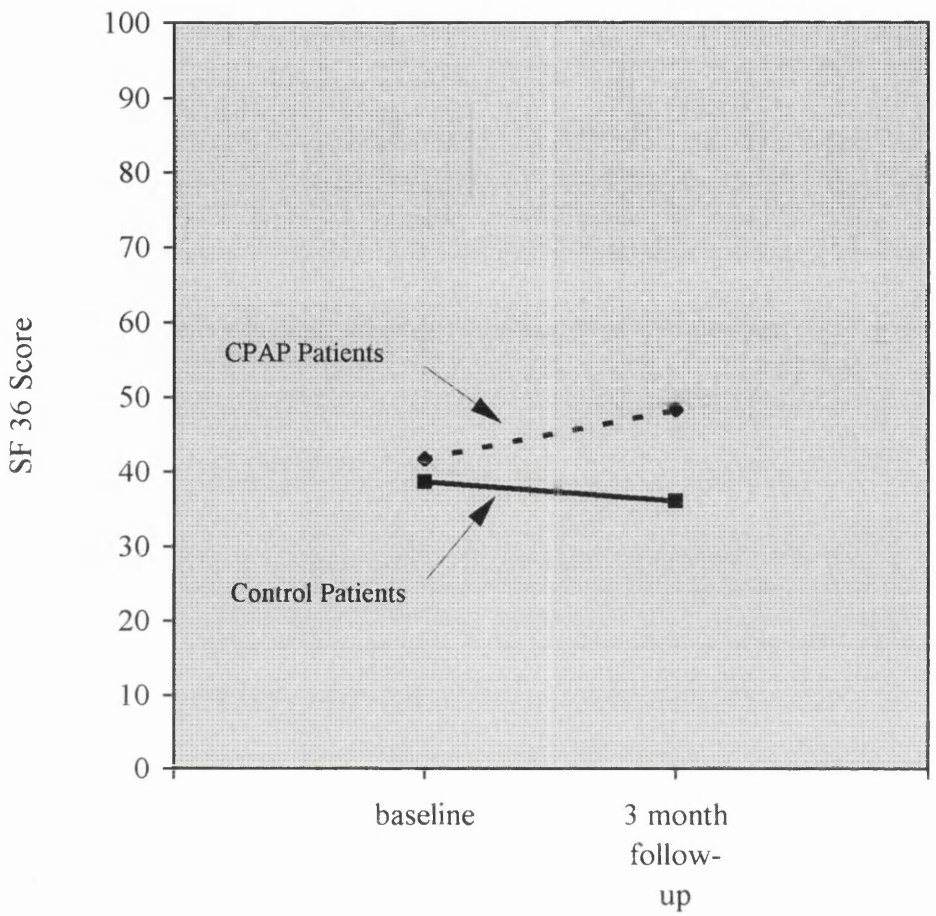

Figure 7: *Patient (Mean) SF 36 Physical Component Scores Over Time.*

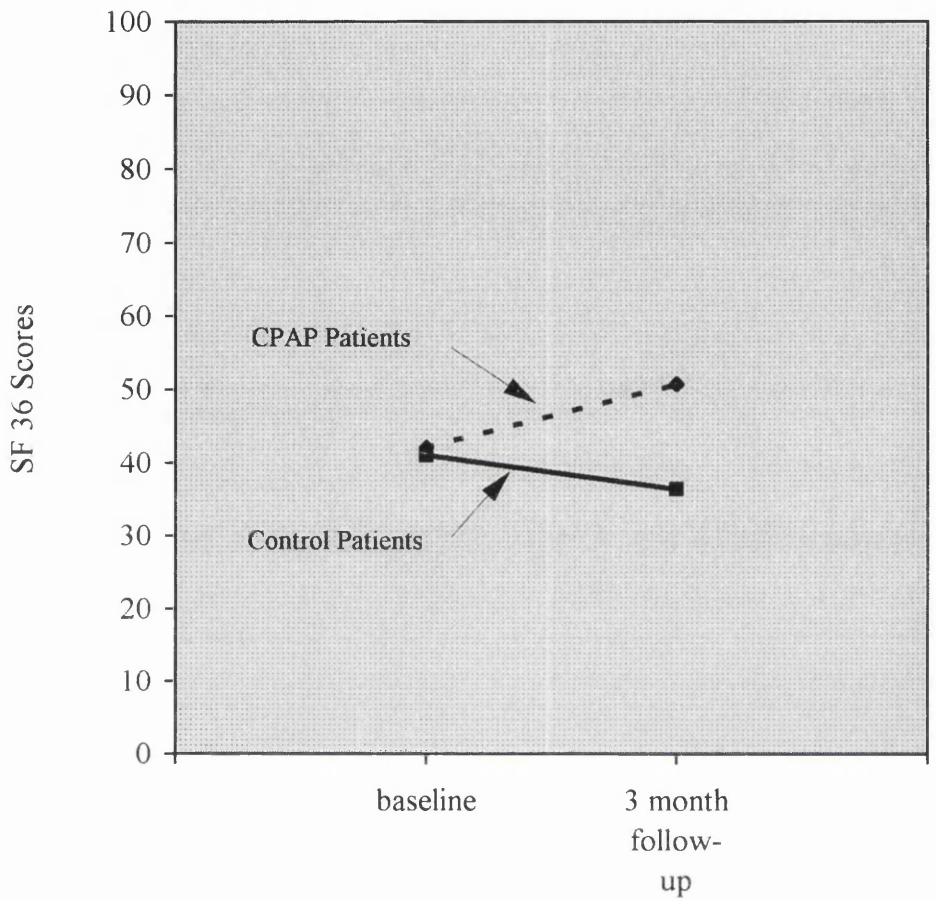

Figure 8: *Patient (Mean) SF 36 Mental Component Scores Over Time.*

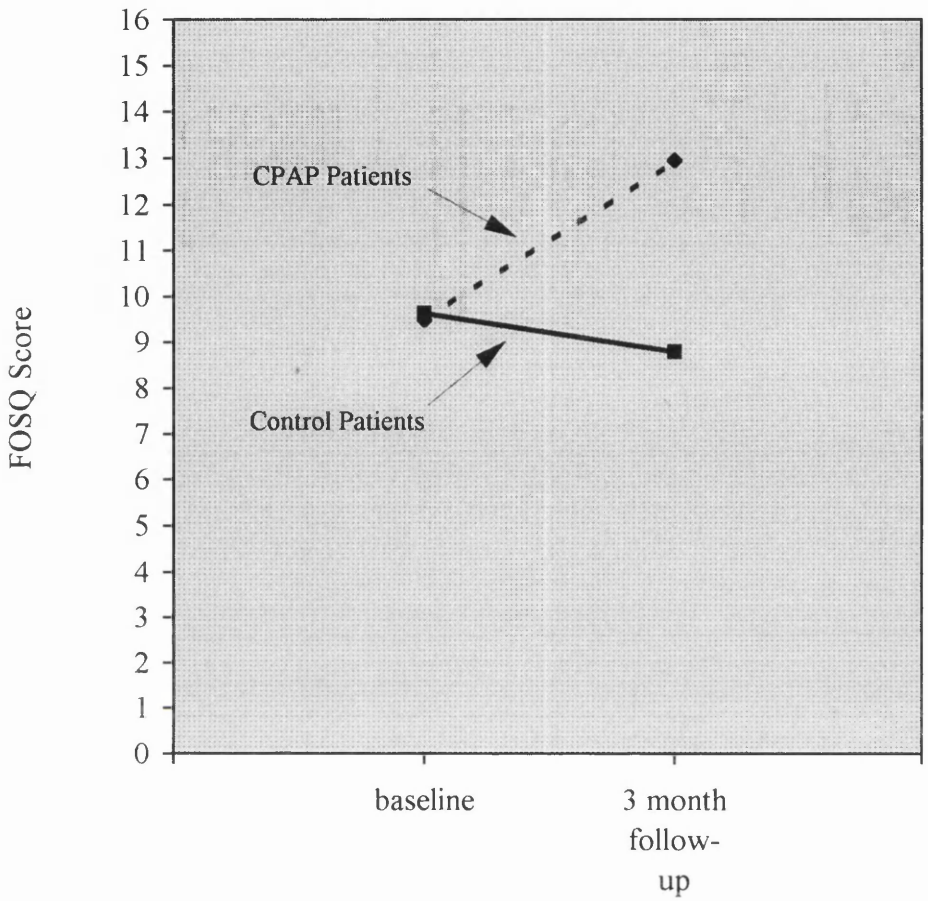

Figure 9: *Patient (Mean) FOSQ Summary Scores Over Time.*

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SINGLE CLINICAL CASE RESEARCH STUDY ABSTRACT 1

A substantial literature now exists that indicates that cognitive-behaviour therapy is effective for a wide range of psychological problems (Hawton et al. 1989). However, it is only recently that cognitive behaviour therapists have considered people with learning disabilities as suitable clients for this particular approach. The present paper explores some of the reasons for the lack of use of cognitive behaviour therapy in the field of learning disabilities and reports on it's adaptation for people with a learning disability. One case study of an individual with a mild learning disability illustrates the clinical applications. All the elements of cognitive behaviour therapy were maintained but simplified. Improvements were seen on the Zung Anxiety Inventory, the weekly frequency of panic attacks and in the daily monitoring of anxious feelings.

Keywords: Cognitive behaviour therapy; learning disability; panic disorder.

SINGLE CLINICAL CASE RESEARCH STUDY ABSTRACT 2

This single case research study presents clinical psychological intervention for a gentleman with Chronic Fatigue Syndrome. Illness attributions are believed to play a crucial role in perpetuating CFS, however, in this single case research study, causal illness attributions were challenged with only minimal beneficial clinical effect on mood or thought content. Recent evidence suggests that physical illness attributions may be less important in determining outcome in CFS than previously thought (Heijmans, 1998), and that good outcome is instead associated with change in avoidance behaviour and related beliefs (Deale et al. 1998). Hypotheses for the limited success of this case are discussed in addition to methodological criticisms of the study.

Keywords: Chronic fatigue syndrome; cognitive behaviour therapy; illness attributions.

SINGLE CLINICAL CASE RESEARCH STUDY ABSTRACT 3

Background: In the last 20 years there has been much debate about whether shallow water diving (<40m) may lead to long term neuropsychological sequelae. **Hypothesis:** The aim of the study was to investigate possible neuropsychological effects from repeated diving in a single case clinical research study. **Method:** A 42 year old man with a 17 year diving history was assessed using a neuropsychological test battery. **Results:** Neuropsychological test results indicated difficulty in auditory memory, memory for faces and retention problems. Deficits in executive functioning were also evident. Results indicated slight effects in choice reaction time. **Conclusions:** The main finding in this single case study of a non-saturation amateur diver supports deficits noted in previous studies of extensive non-saturation diving. In addition, mild deficits in executive functioning are reported for the first time. Neuroleptic medication may be a confounding variable in this case and it is suggested that further investigation is warranted.

Keywords: non-saturation diving; neuropsychological function; executive functioning.

APPENDIX 1.1

Notes for Contributors

Papers, articles and other contributions should be sent to the Editor, Health Bulletin, Scottish Office Department of Health, Room 143, St Andrew's House, Edinburgh EH1 3DE. They must be submitted exclusively for Health Bulletin. Acceptance is on the understanding that editorial revision may be necessary. All papers are reviewed by the Editor and by peer review, referees being drawn from a panel of appropriate professionals in the NHS in Scotland. No correspondence can be entered into about articles found unsuitable and returned to authors.

Material submitted for publication must be typewritten on one side of the paper only, in double spacing and with adequate margins and each page should be numbered. The top typed copy should be submitted, with four other copies. All papers should be prefaced by a structured Abstract, of about 250 words in length. It should normally contain 6 clearly headed sections entitled Objective, Design, Setting, Subjects, Results and Conclusion. The name, appointment and place of work of the authors should be supplied on a separate title page. This same page should include the full postal address of one author, to whom correspondence and reprints will be directed. There should be adequate references to any relevant previous work on the subject: these references should appear at the end of the material on a separate page or pages, using the Vancouver style, which in the case of papers in journals includes:

Surname and initials of author(s)
Title of paper
Full name of Journal
Year published
Volume number
Opening and closing page numbers

Reference to books should similarly include author's name and initials, full title, edition (if necessary), place of publication, publisher's name, year, and if required volume number, chapter number or page number.

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Reprints

One hundred reprints will be supplied free of charge. A limited extra number (for which a charge will be made) may be ordered from the Editor when the proofs are returned.

APPENDIX 1.2

Questionnaire 1

Please tick which discipline (where applicable) you think is most appropriate to carry out each activity on the ward. Please leave blank if no discipline carries out a particular role on the ward.

Activity	Psychiatrist	Nurse	Psychologist	OT
Assessing patient for brain damage				
Assessing patient for rehab				
Assessing IQ				
Assessing client motivation & compliance				
Assessing personality				
Implementing behavioural change programme				
Conducting one to one therapy with patient				
Conducting team building/ in-service days				
Providing group therapy/ training i.e social skills				
Consulting with staff members on aggression management				
Making home visits				
Interviewing families				
Assessing suitability for admissison/discharge				
Acting as patient advocate				
Chairing case conferences				
Undertaking appropriate research				
Monitoring aggression levls on the ward				
Therapeutic work with suicidal risk patients				
Assessment of likelihood of harming others				
Facilitating communication between staff and patient				
Therapeutic work with patient's families				
Devising & implementation of anger management programmes				
Assessment of psychotic symptomology				
Education of nurses re.aggression				

APPENDIX 1.3

Questionnaire 2

Please tick which discipline (where applicable) actually has primary responsibility for each activity on the ward. Please leave blank if no discipline carries out a particular role on the ward.

Activity	Psychiatrist	Nurse	Psychologist	OT
Assessing patient for brain damage				
Assessing patient for rehab				
Assessing IQ				
Assessing client motivation & compliance				
Assessing personality				
Implementing behavioural change programme				
Conducting one to one therapy with patient				
Conducting team building/ in-service days				
Providing group therapy/ training i.e social skills				
Consulting with staff members on aggression management				
Making home visits				
Interviewing families				
Assessing suitability for admissison/discharge				
Acting as patient advocate				
Chairing case conferences				
Undertaking appropriate research				
Monitoring aggression levls on the ward				
Therapeutic work with suicidal risk patients				
Assessment of likelihood of harming others				
Facilitating communication between staff and patient				
Therapeutic work with patient's families				
Devising & implementation of anger management programmes				
Assessment of psychotic symptomology				
Education of nurses re.aggression				

APPENDIX 1.4

Visual Analogue Scales

Please mark your response on the scale at what you feel to be the most appropriate point:

In the next five years how do you see the need for a **Clinical Psychologist** changing?

Large Decrease _____ Large Increase

In the next five years how do you see the actual involvement of **Clinical Psychology**?

Decreasing _____ Increasing

In the next five years how do you see the need for a **Psychiatrist** changing?

Large Decrease _____ Large Increase

In the next five years how do you see the actual involvement of **Psychiatry**?

Decreasing _____ Increasing

APPENDIX 1.4 cont..

Please mark your response on the scale at what you feel to be the most appropriate point:

In the next five years how do you see the need for an **Occupational Therapist** changing?

Large Decrease _____ Large Increase

In the next five years how do you see the actual involvement of **Occupational Therapy**?

Decreasing _____ Increasing

In the next five years how do you see the need for a **Nurse** changing?

Large Decrease _____ Large Increase

In the next five years how do you see the actual involvement of **Nurses**?

Decreasing _____ Increasing

THANKYOU FOR YOUR HELP

SLEEP

Information for Contributors

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Original manuscripts, i.e., those that have not been published elsewhere except in abstract form, on any aspect of Sleep (clinical, experimental, biochemical, etc.) will be considered. Laboratory, clinical, social, and historical notes (no more than 1,000 words and two figures), announcements of meetings and awards, and book reviews are also published.

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Four copies of each submitted manuscript should be sent to the Editor-in-Chief, Dr. Christian Guilleminault. If desired, one copy may be sent to Dr. Guilleminault and three copies sent to an Associate Editor, who will then be responsible for peer review of the manuscript. Continental subdivision (i.e. Europe and Latin America; Asia and North America) is recommended for submission to Associate Editors. All communication concerning the manuscript should be directed to the Editor-in-Chief. Communication regarding acceptance of the manuscript will come from the office of the Editor-in-Chief.

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Tables

Tables should be as few and simple as possible; they should not duplicate information given in figures.

Figures

Figures should be submitted as clear, glossy prints (three duplicate copies may be photocopies of the original art), professionally drawn and lettered, at least twice the final size and lettering large enough to be legible when reduced. The maximum final size of any figure in the printed journal will be 14 by 20 cm (5 1/2 by 8 inches). The maximum size of artwork sent should be 8 1/2 by I I inches. Ordinate and abscissa should be labeled, calibration given, and symbols and abbreviations explained in the legends. Microphotographs may be submitted in final size. A charge may be made for an excessive number of halftone plates. On the back of each figure indicate the figure number and authors' names, and indicate the top with an arrow. Authors are required to bear the cost of reproducing figures in color.

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The text of the manuscript should be in the following form: Summary- Typed on a separate sheet, the summary should be 150 to 200 words in length and suitable for use by abstracting journals. State concisely and specifically what was done, what was found, and what conclusions were reached. Whenever possible, supply translation in French. Articles submitted in French must be accompanied by an English summary. Approximately five key words for use by abstracting services should be provided at the end of the Summary. Introduction: State the object of research with reference to previous work. Methods: Describe methods in sufficient detail so that the work can be duplicated, or cite previous descriptions if they are readily available. Information must be included indicating that clinical experiments conform to the Declaration of Helsinki and animal experiments to the policy of the American Physiological Society. Editors will refuse papers in which evidence of adherence to these principles is not apparent. Differences of opinion

will be adjudicated by the Editorial Board. Results: Describe the results clearly, concisely, and in logical order. When possible give the range, standard deviation, or mean error and significance of differences between numerical values. Discussion: Interpret the results and relate them to previous work in the field. Acknowledgments: The minimum compatible with the requirements of courtesy should be typed on a separate sheet. Legends: Figure legends, numbered sequentially, are double-spaced on a separate sheet. Give the meaning of all symbols and abbreviations used in the figure.

References

References: The journal complies with the reference style given in "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" (see Ann Intern Med 1979;90:95-9 or Br Med J 1979;1:532-5). References are to be cited in the text by number and numbered in the order in which they are cited. The reference section should be typed double-spaced at the end of the text, following the sample formats given below. For abbreviations of journal names, refer to List of Journals Indexed in Index Medicus (available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, U.S.A., DHEW Publication No. (NIH) 80-267; ISSN 0093-3821). Provide all authors' names when fewer than seven; when seven or more, list the first three and add et al. Provide article titles and inclusive pages. Accuracy of reference data is the responsibility of the author.

Sample References

Article:

1.Meier-Ewert K, Matsubayashi K, Benter L. Propranolol: long-term treatment in narcolepsy-cataplexy. Sleep 1985;8:95-104.

2.Carskadon MA, Dement WC. Sleep loss in elderly volunteers. Sleep 1985;8:207-21.

Book:

3.Guilleminault C, Lugaresi E, eds. Sleep/wake disorders: natural history, epidemiology, and long-term evolution. New York: Raven Press, 1983.

Chapter of a book:

4.Coleman RM, Bliwise DL, Sajben N, et al. Epidemiology of periodic movements during sleep. In: Guilleminault C, Lugaresi E, eds. Sleep/wake disorders: natural history, epidemiology, and long-term evolution. New York: Raven Press, 1983.217-30.

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Short notes may be a maximum of 6 double-spaced, type-written pages. One figure or one table may be added, and the bibliography may have a maximum of 10 references. Letters, which may include interesting case reports. should be 11/2 double-spaced typewritten pages at most. A maximum of 5 bibliographical references is recommended.

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APPENDIX 3.1

CPAP Patient Letter

Dear

The department of Psychological Medicine, University of Glasgow, and the National Sleep Laboratory at the Royal Infirmary, Edinburgh are currently undertaking a study to investigate the effects of CPAP treatment upon patient's lives and the difficulties it may present. We would like to request you and your partners participation, which will help to improve our understanding and as a result help other individuals who suffer from this disorder.

Enclosed with this letter are:

1. An information sheet which explains what the study is about and what would be involved.
2. A consent form for you to complete should you decide to participate in this study. This consent also requests permission to contact your partner, so that they may be asked for their participation in this study.
3. A **FREEPOST** addressed envelope for you to return the completed consent form. (No stamp required)

Participation in this study is completely voluntary, your decision will in no way affect your ongoing or future treatment, and you may choose to withdraw at any time, with no implications. Full confidentiality will be maintained throughout. If you decide to participate in this study, your GP and any other physician involved in your present care will be informed to let them know what the study involves. *If you decide not to participate, could you please return the consent form stating this, otherwise if I do not hear from you, I may contact you by post again to clarify whether you wish to participate.*

We hope that you will be interested in taking part in this study.

Yours sincerely,

Theresa McFadyen
Trainee Clinical Psychologist

Professor Colin Espie
Consultant Clinical Psychologist

APPENDIX 3.2

CPAP Patient Information Sheet.

I would like to ask for your help in a study investigating the effects of sleep apnoea and Continuous Positive Airway Pressure (CPAP) treatment on patients' and their partners lives. This study is being conducted by myself, Theresa McFadyen, a psychologist in postgraduate clinical training at the University of Glasgow, under the supervision of Professor Colin Espie, Consultant Clinical Psychologist. Please take your time to read this sheet which gives an outline of the study, and feel free to contact me with any questions. **Please note that any treatment undertaken at the present time or in the future will not be influenced or changed in any way as a result of your decision. If you agree to participate in this research, you may withdraw at any time without any prejudice to your treatment.**

Using a CPAP machine is one of the most effective treatments for sleep apnoea. However making such changes to the way you sleep is very difficult, plus there are other problems such as mask discomfort, the noise of the CPAP machine etc. This study aims to look at the difficulties involved in using CPAP machines, both for you and your partner.

Your participation in this study would involve completing a very short questionnaire (about your sleep difficulties and how they affect you and your partner) which will take around 15 minutes to complete. If you do decide to participate, I will request permission to contact your partner. Participation of your partner would involve completing a similar shorter questionnaire which would take 5-10 minutes to complete. If you and your partner do decide to participate in this study, you will be contacted again in around 3 months, and asked to complete the questionnaire once more. *If you decide not to participate could you please return the consent form stating this, otherwise if I do not hear from you, I may contact you by post again to clarify whether you wish to participate.*

The results of this work will be **strictly confidential** and used only to help us establish particular difficulties for CPAP users and their partners. With a better knowledge of what the specific difficulties are and their impact upon patient's lives we can improve the treatment and support that is provided to CPAP users and their partners in the future.

If you would like to speak to me regarding any queries you may have or to discuss any issues further, you can contact me at the Department of Psychological Medicine at Gartnavel Royal Hospital on **0141 211 3920**. Alternatively if you wish to speak to someone independent of the study, you may contact Mr Paul Fleming at the same number.

Thankyou for taking the time to read this.

Theresa McFadyen
Trainee Clinical Psychologist

APPENDIX 3.3

Patient Consent Form

I agree to participate in this study

I have read this consent form and the patient information sheet

I understand that I am under no obligation to take part in this study and that a decision not to participate will not alter any treatment that I would normally receive.

I understand that I have the right to withdraw from this study at any stage and that to do so will not effect any treatment.

I understand that this is non therapeutic research from which I cannot expect to derive any benefit.

Signature of Participant

.....

Name of participant and partner (Please print in block capitals)

APPENDIX 3.4

CPAP Partner Letter

Dear

The department of Psychological Medicine, University of Glasgow, and the National Sleep Laboratory at the Royal Infirmary, Edinburgh are currently undertaking a study to investigate the effects of CPAP treatment upon patient's lives and the difficulties it may present. Your partner has already consented to participate and now we would like to request your participation in this study, which will help to improve our understanding and as a result help other individuals who suffer from sleep apnoea.

Enclosed with this letter are:

1. An information sheet which explains what the study is about and what would be involved.
2. A consent form for you to complete should you decide to participate in this study.
3. A **FREEPOST** addressed envelope for you to return the completed consent form. (No stamp required)

Participation in this study is completely voluntary, your decision will in no way effect your partner's ongoing or future treatment, and you may choose to withdraw at any time with no implications. Full confidentiality will be maintained throughout. On receipt of your consent form I will send out questionnaires to both you and your partner. *If you decide not to participate could you please return the consent form stating this, otherwise if I do not hear from you, I may contact you by post again to clarify whether you wish to participate.*

We hope that you will be interested in taking part in this study.

Yours sincerely,

Theresa McFadyen
Trainee Clinical Psychologist

Professor Colin Espie
Consultant Clinical Psychologist

APPENDIX 3.5

CPAP Partner Information Sheet

I would like to ask for your help in a study investigating the effects of sleep apnoea and Continuous Positive Airway Pressure (CPAP) treatment on patients and their partners lives. This study is being conducted by myself, Theresa McFadyen, a psychologist in postgraduate clinical training at the University of Glasgow, under the supervision of Professor Colin Espie, Consultant Clinical Psychologist. Please take your time to read this sheet which gives an outline of the study, and feel free to contact me with any questions. **Please note that any treatment undertaken by your partner at the present time or in the future will not be influenced or changed in any way as a result of your decision. If you agree to participate in this research, you may withdraw at any time without any prejudice to your partners treatment.**

Using a CPAP machine is one of the most effective treatments for sleep apnoea. However making such changes to the way you sleep is very difficult, and not just for the patient but also for their partner. This study aims to look at the difficulties involved in using CPAP machines, both for the patient and for their partner.

Your participation in this study would involve completing a very short questionnaire, which will take around 5-10 minutes to complete. If you do decide to participate, you will be contacted again in around 3 months, and asked to complete the questionnaire once more. *If you decide not to participate could you please return the consent form stating this, otherwise if I do not hear from you, I may contact you by post again to clarify whether you wish to participate.*

The results of this work will be **strictly confidential** and used only to help us establish particular difficulties for CPAP users and their partners. With a better knowledge of what the specific difficulties are and their impact upon patient's lives we can improve the treatment and support that is provided to CPAP users and their partners in the future.

If you would like to speak to me regarding any queries you may have or to discuss any issues further, you can contact me at the Department of Psychological Medicine at Gartnavel Royal Hospital on **0141 211 3920**. Alternatively if you wish to speak to someone independent of the study, you may contact Mr Paul Fleming at the same number.

Thankyou for taking the time to read this.

Theresa McFadyen
Trainee Clinical Psychologist

APPENDIX 3.6

Partner Consent Form

I agree to participate in this study

I have read this consent form and the partner information sheet

I understand that I am under no obligation to take part in this study and that a decision not to participate will not alter any treatment that my partner would normally receive.

I understand that I have the right to withdraw from this study at any stage and that to do so will not effect any treatment my partner receives.

I understand that this is non therapeutic research from which I cannot expect to derive any benefit.

Signature of Participant

.....

Name of participant and partner (Please print in block capitals)

APPENDIX 3.7

Control Patient Letter

Dear

The Department of Psychological Medicine, University of Glasgow, and the National Sleep Laboratory at the Royal Infirmary, Edinburgh are currently undertaking a study to investigate the effects of CPAP treatment upon patient's lives and the difficulties it may present. As part of this study we are assessing the effect that having to wait a long time before commencing CPAP treatment has upon couples. To do this we are contacting individuals such as yourself who have a significant wait before commencing CPAP treatment. We would like to request your participation in this study, which will help to improve our understanding and as a result help other individuals who suffer from sleep apnoea.

Enclosed with this letter are:

1. An information sheet which explains what the study is about and what would be involved.
2. A consent form for you to complete should you decide to participate in this study. This consent also requests permission to contact your partner, so that they may be asked for their participation in this study.
3. A **FREEPOST** addressed envelope for you to return the completed consent form. (No stamp required)

Participation in this study is completely voluntary, your decision will in no way effect your ongoing or future treatment, and you may choose to withdraw at any time with no implications. Full confidentiality will be maintained throughout. If you decide to participate in this study, your GP and any other physician involved in your present care will be informed to let them know what the study involves. *If you decide not to participate, could you please return the consent form stating this, otherwise if I do not hear from you, I may contact you again to clarify whether you wish to participate.*
On receipt of your consent form I will send out questionnaires to both you and your partner.

We hope that you will be interested in taking part in this study.

Yours sincerely,

Theresa McFadyen	Professor Colin Espie
Trainee Clinical Psychologist	Consultant Clinical Psychologist

APPENDIX 3.8

Control Patient Information Sheet

I would like to ask for your help in a study investigating the effects of sleep apnoea and Continuous Positive Airway Pressure (CPAP) treatment on patient's and their partners lives. This study is being conducted by myself, Theresa McFadyen, a psychologist in postgraduate clinical training at the University of Glasgow, under the supervision of Professor Colin Espie, consultant Clinical Psychologist. Please take your time to read this sheet which gives an outline of the study, and feel free to contact me with any questions. **Please note that any treatment undertaken by yourself at the present time or in the future will not be influenced or changed in any way as a result of your decision. If you agree to participate in this research, you may withdraw at any time without any prejudice to your treatment.**

We are undertaking a study to investigate the effects that CPAP treatment has upon patient's lives. *However, as you will know there is a long wait for CPAP treatment, which can have serious repercussions for some individuals, i.e. having to stop driving until you receive your CPAP machine. So as part of this study we are investigating the effect that having to wait so long for a CPAP machine has upon couples and individuals lives.*

Your participation in this study would involve completing a very short questionnaire (about your sleep difficulties and how they affect you and your partner) which will take around 15 minutes to complete. If you do decide to participate, I will request permission to contact your partner. Participation of your partner, would involve completing a similar shorter questionnaire, which would take 5-10 minutes to complete. If you and your partner do decide to participate in this study, you will be contacted again in around 3 months, and asked to complete the questionnaires once more. *If you decide not to participate could you please return the consent form stating this, otherwise if I do not hear from you, I may contact you by post again to clarify whether you wish to participate.*

The results of this work will be **strictly confidential** and used only to help us establish particular difficulties for CPAP users and their partners. With a better knowledge of what the specific difficulties are and their impact upon patient's lives we can improve the treatment and support that is provided to CPAP users and their partners in the future.

If you would like to speak to me regarding any queries you may have or to discuss any issues further, you can contact me at the Department of Psychological Medicine at Gartnavel Royal Hospital on **0141 211 3920**. Alternatively if you wish to speak to someone independent of the study, you may contact Mr Paul Fleming at the same number.

Thankyou for taking the time to read this.
Theresa McFadyen, Trainee Clinical Psychologist

APPENDIX 3.9

Control Partner Letter

Dear

The department of Psychological Medicine, University of Glasgow, and the National Sleep Laboratory at the Royal Infirmary, Edinburgh are currently undertaking a study to investigate the effects of CPAP treatment upon patient's lives and the difficulties it may present.

As part of this study we are assessing the effect that having to wait a long time before commencing CPAP treatment has upon couples. To do this we are contacting individuals such as your partner who have a significant wait before commencing CPAP treatment. Your partner has already consented to participate and now we would like to request your participation in this study, which will help to improve our understanding and as a result help other individuals who suffer from sleep apnoea.

Enclosed with this letter are:

1. An information sheet which explains what the study is about and what would be involved.
2. A consent form for you to complete should you decide to participate in this study.
3. A **FREEPOST** addressed envelope for you to return the completed consent form. **(No stamp required)**

Participation in this study is completely voluntary, your decision will in no way effect your partner's ongoing or future treatment, and you may choose to withdraw at any time with no implications. Full confidentiality will be maintained throughout. On receipt of your consent form I will send out questionnaires to both you and your partner.

We hope that you will be interested in taking part in this study.

Yours sincerely,

Theresa McFadyen
Trainee Clinical Psychologist

Professor Colin Espie
Consultant Clinical Psychologist

APPENDIX 3.10

Control Partner Information Sheet

I would like to ask for your help in a study investigating the effects of sleep apnoea and Continuous Positive Airway Pressure (CPAP) treatment on patients and their partners lives. This study is being conducted by myself, Theresa McFadyen, a psychologist in postgraduate clinical training at the University of Glasgow, under the supervision of Professor Colin Espie, consultant Clinical Psychologist. Please take your time to read this sheet which gives an outline of the study, and feel free to contact me with any questions. **Please note that any treatment undertaken by your partner at the present time or in the future will not be influenced or changed in any way as a result of your decision. If you agree to participate in this research, you may withdraw at any time without any prejudice to your partners treatment.**

As you will know there is a long wait for CPAP treatment. So as part of this study we are investigating the effect that having to wait so long for a CPAP machine has upon couples and individuals lives. Using a CPAP machine is one of the most effective treatments for sleep apnoea. However making such changes to the way you sleep is very difficult, and not just for the patient but also for their partner. This study aims to look at the difficulties involved in using CPAP machines, both for the patient using the machine and for their partner.

Your participation in this study would involve completing a very short questionnaire, which will take around 5-10 minutes to complete. If you do decide to participate, you will be contacted again in around 3 months, and asked to complete the questionnaire once more. *If you decide not to participate could you please return the consent form stating this, otherwise if I do not hear from you, I may contact you by post again to clarify whether you wish to participate.*

The results of this work will be **strictly confidential** and used only to help us establish particular difficulties for CPAP users and their partners. With a better knowledge of what the specific difficulties are and their impact upon patient's lives we can improve the treatment and support that is provided to CPAP users and their partners in the future.

If you would like to speak to me regarding any queries you may have or to discuss any issues further, you can contact me at the Department of Psychological Medicine at Gartnavel Royal Hospital on 0141 211 3920. Alternatively if you wish to speak to someone independent of the study, you may contact Mr Paul Fleming at the same number.

Thankyou for taking the time to read this.

Theresa McFadyen
Trainee Clinical Psychologist

APPENDIX 3.11

GP Letter

Dear Dr.

Re. Name

D.O.B

Address

The above named patient has agreed to take part in a research study that is being carried out in the department of Psychological Medicine, Gartnavel Royal Hospital, Glasgow in conjunction with the National Sleep Laboratory, Royal Infirmary, Edinburgh. The research is titled; **Continuous Positive Airway Pressure (CPAP) Treatment, personal relationships and compliance: A Preliminary Investigation.** I am writing to inform you of you patients involvement and what the study consists of.

The study is to investigate the impact that CPAP treatment has on patients lives, with particular reference to their marital relationships. Many studies have looked at the physical and neuropsychological effects of CPAP treatment but none have investigated the impact that this intrusive treatment may have on peoples relationships. We also hope to elucidate whether there is a relationship between continued compliance with CPAP treatment and marital quality.

Your patient and their partner will be asked to complete several validated questionnaire measures just prior to, and possibly during the first 6 months of their CPAP treatment/of their partners CPAP treatment. No side effects, distress or discomfort are likely to result from taking part in this research. The results of this work will be strictly confidential and used only to help us establish the difficulties associated with CPAP use and help us to decide how best to help patients with similar difficulties in the future.

If you would like further information regarding this project, please do not hesitate to contact me on **0141 211 3920.**

Yours sincerely

Theresa Mc Fadyen, Trainee Clinical Psychologist

APPENDIX 3.12

Qualitative Questions.

1. How many nights in the past week, including today have you slept together in the same room?

2. How many times in the past week including today did you have a cuddle/hug?

3. How many times in the past week including today have you sat down to eat you evening meal together?

4. How many times in the past week including today have you strongly disagreed with your partner?

5. How many times in the past week (your partner) used the CPAP machine for a minimum of 4 hours per night?

6. Have you ever considered separation or divorce in the past year?

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In Press

Lakatos, E., D. L. DeMets, W. B. Kannel, P. Sorlie, and P. MacNamara. 1994. Influence of cigarette smoking on lung function and COPD incidence. The Framingham study. J. Chronic Dis.

Abstracts

Louis, M., J.B. Thorens, and J.C. Chevrolet. 1993. Calcium-channel blockers testing for primary pulmonary hypertension associated with HIV infection (abstract). Am Rev. Respir. Dis. 147-A536.

Books

Snedecor, G.W., and W.G. Cochran. 1967. Statistical Methods, 6th ed. Iowa State University Press, Ames. 258-296.

Articles in Books

Rall, T. W. 1980. Central nervous system stimulants (continued): the xanthines. In A. G. Gilman, L. S. Goodman, and A. Gilman, editors. The Pharmacological Basis of Therapeutics, 6th ed. Macmillan, New York. 595-607.

Government or Association Report

U.S. Public Health Service. 1979. Smoking and Health. A Report on the Surgeon General. U.S. Government Printing Office, Washington, DC. DHEW Publication No. (PHS)79-50066.

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Appendix 4.2

Reasons for Exclusion of CPAP and Control Patients.

REASON FOR EXCLUSION	CPAP n=104	CONTROL n=45	TOTAL n=149
Patient failed to return consent form	16	4	20
Partner failed to return consent form	5	2	7
Patient declined to participate	12	5	17
Partner declined to participate	1	0	1
First set of questionnaires not returned	10	7	17
Second set of questionnaires not returned	9	2	11
Patient prescribed alternative treatment to CPAP	2	0	2
Patient no longer living with a partner	5	0	5
Final Sample	44	25	69

APPENDIX 4.3

Dimensions of the ENRICH Marital Satisfaction (EMS) Scale.

Personality Issues
Equalitarian Roles
Communication
Conflict Resolution
Financial Management
Leisure Activities
Sexual Relationship
Children & Marriage
Family & Friends
Religious Orientation

APPENDIX 4.4

Subscales of the Functional Outcomes of Sleep Questionnaire (FOSQ).

Activity Level
Vigilance
Intimacy & Sexual Relationships
General Productivity
Social Outcome
Summary Score

APPENDIX 4.5

Dimensions of the 36 Item Short Form Health Survey Questionnaire (SF 36).

Physical Composite Sub-Scales:
Physical Functioning
Role Physical
Bodily Pain
General Health Perception
Mental Composite Sub-Scales:
Energy/Vitality
Social Functioning
Role Emotional
Mental Health

APPENDIX 4.6

Qualitative Questions.

1. How many nights in the past week, including today have you slept together in the same room?

2. How many times in the past week including today did you have a cuddle/hug?

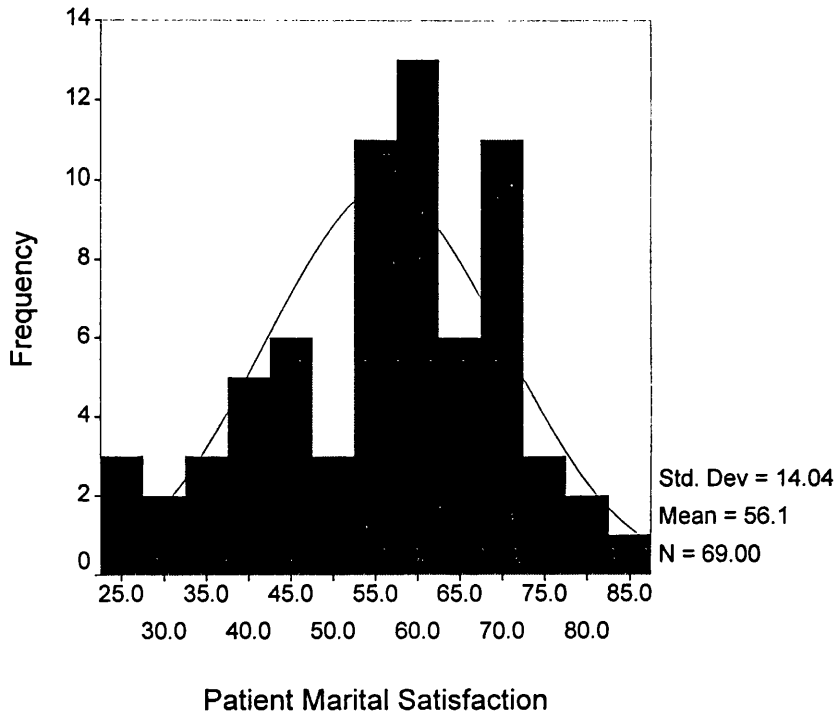
3. How many times in the past week including today have you sat down to eat you evening meal together?

4. How many times in the past week including today have you strongly disagreed with your partner?

5. How many times in the past week (your partner) used the CPAP machine for a minimum of 4 hours per night?

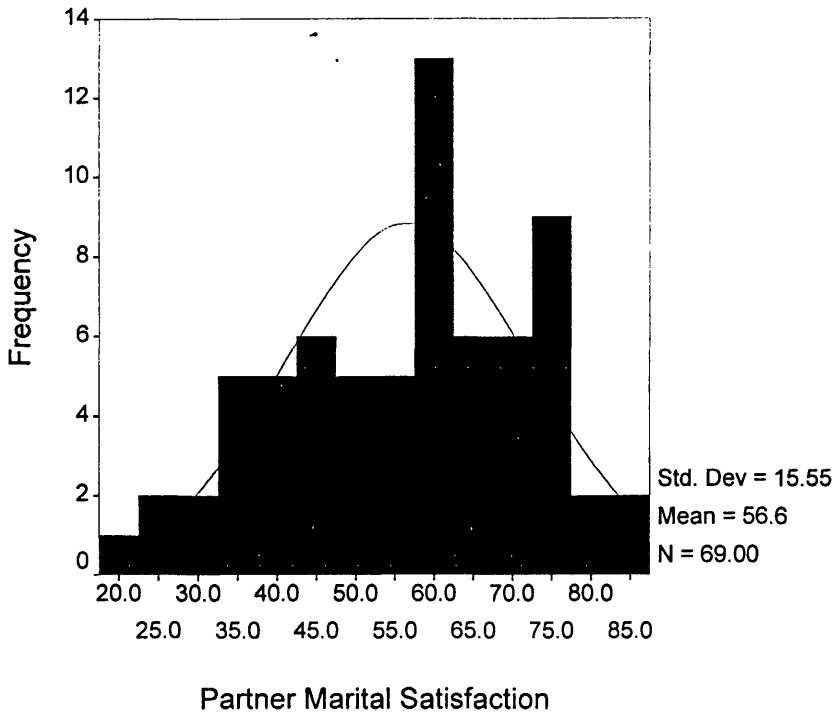
6. Have you ever considered separation or divorce in the past year?

APPENDIX 4.7.1



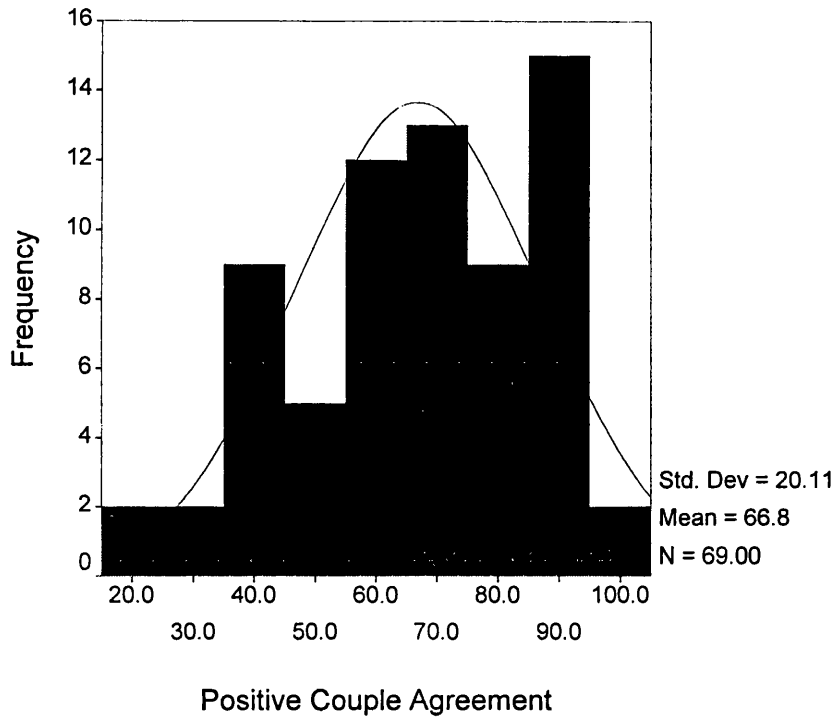
Distribution of Patient Marital Satisfaction Scores

APPENDIX 4.7.2



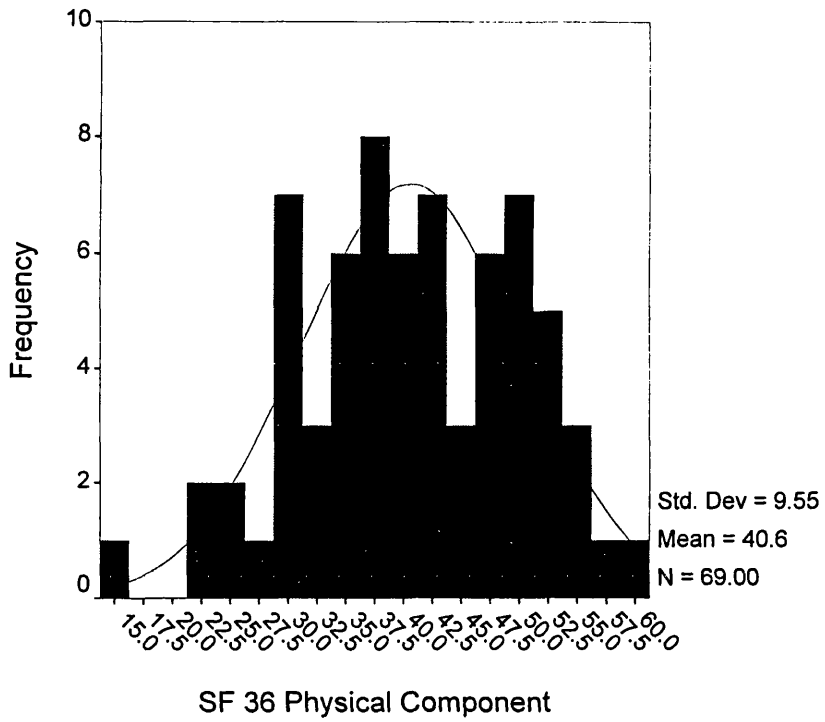
Distribution of Partner Marital Satisfaction Scores

APPENDIX 4.7.3



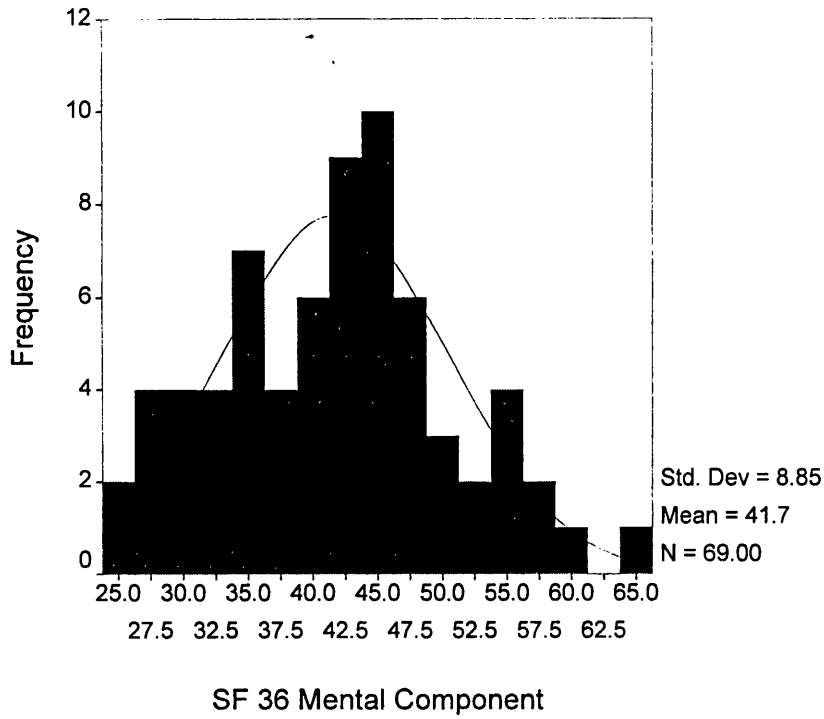
Distribution of Positive Couple Agreement Scores

APPENDIX 4.7.4



Distribution of SF 36 Physical Component Scores

APPENDIX 4.7.5



Distribution of SF 36 Mental Component Scores

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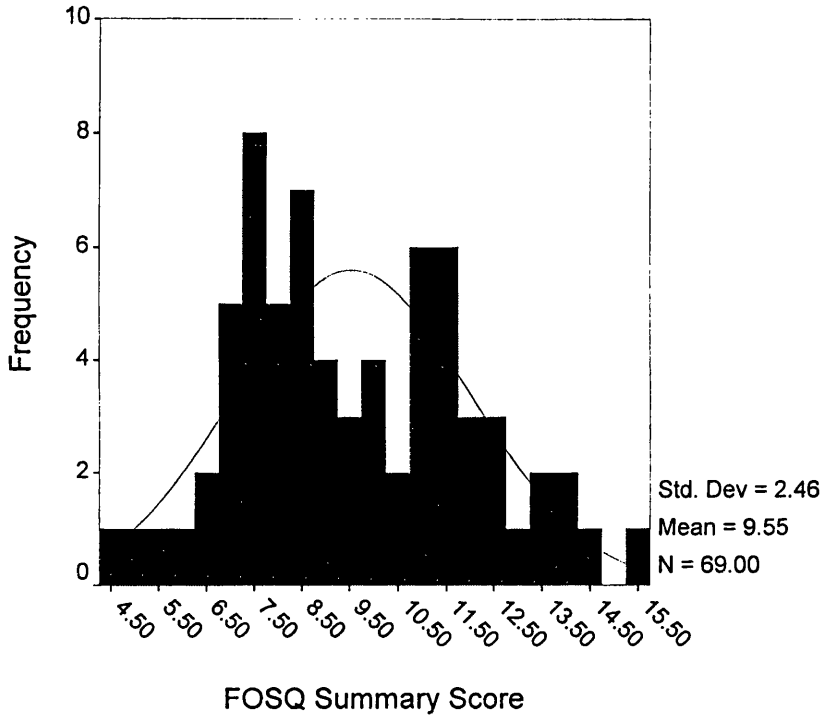
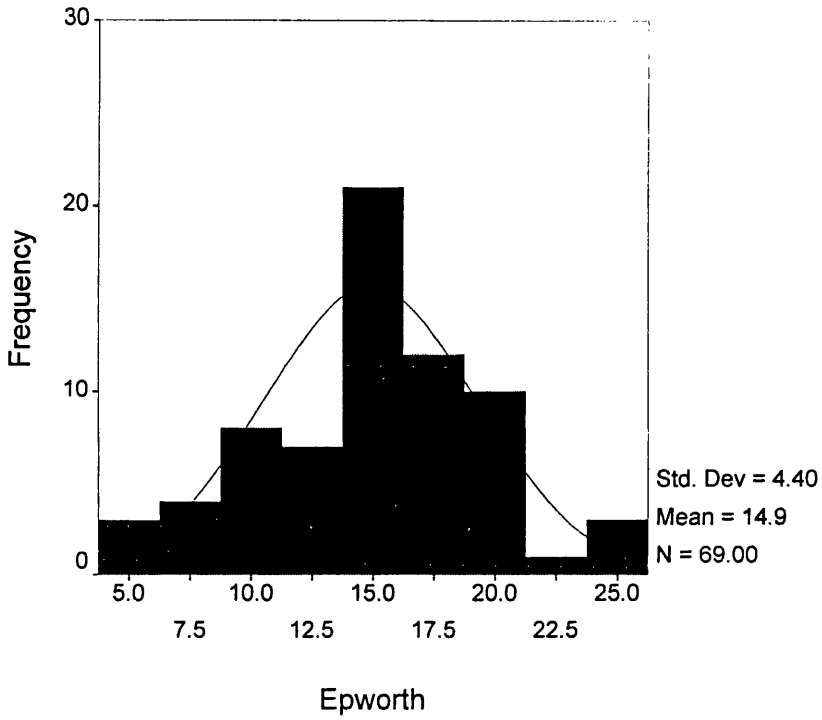


Distribution of FOSQ Summary Scores

APPENDIX 4.7.7



Distribution of Epworth Sleepiness Scale Scores

APPENDIX 4.8

Baseline Mean (Standard deviation) Scores on Outcome Measures in CPAP Patients and Controls.

	CPAP n=44		Controls n=25			
Measure	Mean	SD	Mean	SD	t	*p*
Patient MS	56.88	13.18	54.71	15.62	.616	.540
Partner MS	58.18	13.69	53.78	18.33	1.044	.303
PCA	68.86	18.33	63.20	22.86	1.127	.264
SF 36 PHY	41.72	9.85	38.59	8.83	1.313	.194
SF 36 MENT	42.09	8.44	41.06	9.67	.460	.647
FOSQ Summary	9.50	2.16	9.63	2.94	-.200	.843
ESS	14.61	4.02	15.40	5.03	-.712	.479

APPENDIX 4.9

Mann Whitney Comparisons Between Groups for Patients and Partners.

	Patients				Partners		
[a] Groups	U	Z	*p*	[a] Groups	U	Z	*p*
1 vs 2	59.50	-1.98	.047	1 vs 2	105.5	-.291	.771
2 vs 3	56.50	-2.11	.034	2 vs 3	80.50	-1.07	.284
3 vs 1	99.00	-.560	.575	3 vs 1	70.00	-1.52	.126
[b] Groups				[b] Groups			
1 vs 2	68.00	-1.22	.223	1 vs 2	54.50	-1.69	.090
2 vs 3	103.5	-1.36	.174	2 vs 3	104.0	-1.50	.134
3 vs 1	44.00	-.309	.757	3 vs 1	49.50	-.181	.856

[a] Subjects split by number
[b] Subjects split by marital satisfaction scores

APPENDIX 4.10

Wilcoxin Comparisons Within Groups (CPAP & Control) for Patients and Partners on the 6 Qualitative Questions.

	Patient n=44				**Partner** n=44			
	Question	Baseline median	Follow-up median	*p*	Question	Baseline median	Follow-up median	*p*
CPAP	1	7	7	.020	1	7	7	.022
	2	7	7	.228	2	7	7	.682
	3	7	7	.753	3	7	7	.653
	4	1	0	.001	4	1	0	.009
	5	0	7	.000	5	0	7	.000
	6	2	2	.317	6	2	2	1.00
	Patient n=25				**Partner** n=25			
	Question	Baseline median	Follow-up median	*p*	Question	Baseline median	Follow-up median	*p*
Control	1	7	7	.726	1	7	7	.914
	2	7	7	.083	2	7	7	.481
	3	7	7	.414	3	7	7	.739
	4	1	1	.026	4	0	1	.005
	5	0	0	1.00	5	0	0	1.00
	6	2	2	1.00	6	2	2	.157

APPENDIX 4.11

Mann Whitney Comparisons Between Groups for the 6 Qualitative Questions

	Question	U	Z	*p*
Patients	1	415.5	-2.06	.03
	2	403.0	-2.03	.04
	3	518.5	- .56	.57
	4	234.5	-4.02	.00
	5	50.0	-7.05	.00
	6	537.5	- .75	.45
Partners	1	415.5	-2.06	.03
	2	403.0	-2.03	.04
	3	518.5	- .56	.57
	4	234.5	-4.02	.00
	5	50.0	-7.05	.00
	6	537.5	- .75	.45

APPENDIX 4.12

Follow-up Mean (Standard deviation) Scores on Outcome Measures in CPAP Patients and Controls.

	CPAP n=44		Control n=25			
Variable	Mean	SD	Mean	SD	t	*p*
Patient MS	61.94	15.92	46.53	17.97	3.687	.000
Partner MS	60.29	16.51	46.75	18.41	3.140	.003
PCA	72.50	15.72	52.00	27.08	3.46	.001
SF 36 PHY	48.34	9.96	36.05	8.46	5.186	.000
SF 36 MENT	50.83	9.12	36.43	10.51	5.964	.000
FOSQ Summary	12.95	2.45	8.80	2.88	6.330	.000
ESS	8.18	5.21	16.27	4.04	-6.690	.000