# THESIS

on

# OBSERVATIONS ON BLOOD PRESSURE IN SOME FORMS OF MENTAL DISEASE

presented by

ROBERT DONALD, M.B.Ch.B. (Glas.)

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ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

# OBSERVATIONS ON BLOOD PRESSURE IN SOME FORMS OF MENTAL DISEASE.

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The work which has been done recently on this subject, and the great field of investigation which it opens up, with regard to the connection between Etiology and treatment of mental diseases and variations in Blood Pressure, suggested to me the idea of the further inquiry into the subject, the addition of my observations to those already recorded and the interpretation, as far as possible, of the significance of those observations.

In the sane individual, especially in neurotic subjects and in those of gouty diathesis, those transient feelings of discomfort - migraine, lassitude, etc. - which follow and are symptomatic of digestive upsets, defective intestinal action, with its consequent toxic absorption, are accompanied by a rise in Blood Pressure.

Apart from the stimulating effect of certain beverages - tea, coffee, alcohol, etc. - on the brain, these substances have also the effect of increasing peripheral circulation, and thus, to some extent, will alter cerebral circulation/

circulation, probably in the direction of relieving pressure in the cranial cavity, and as these substances have the result of mitigating, and easing, at least temporarily, those moods above referred to, it stands to reason that the high Blood Pressure may, to some extent, be responsible for the transient uncomfortable feelings mentioned above.

The above considerations, focussed, not only on those every day moods, but on mental diseases, which, in some of their varied forms, taken broadly, show a resemblance, on a large scale, to those transient moods, point out that Blood Pressure may have some direct effect on those mental states, and this paper deals largely with that part of the subject.

The subject is one, of course, which, being in its infancy, does not admit of a dogmatic opinion being expressed on it, but, in my opinion, based, of course, on my investigations, the most interesting phase of mental disease in its relation to Blood Pressure, because of the possibilities that lie therein of prophylaxis and treatment, is that of Melancholia; the others, interesting enough on account of the contrast they afford, and on account of the connection between their etiology and variation in Blood Pressure; interesting enough from a physiological standpoint, are bound to take a second

place.

HISTORICAL.

Up till comparatively recent years, no work has been published on this subject.

CRAIG (1) first drew attention to the significant part played by Blood Pressure in insanity and stated the opinion, from his observations, that in depressed and melancholic conditions the Blood Pressure was high as compared with normal, and low in maniacal cases.

DUNTON (2) to a great extent, corroborated Craig's findings. Since that time, many papers have been published on the subject, some writers agreeing with Craig and Dunton, and others being entirely opposed.

TURNER (3) gives as his opinion that:-

> "There is no definite relation between pressure and exalted or depressed emotional states, but the very general occurrence of higher pressures with the first few readings on consecutive days, in any individual case, suggests that there is some nervous condition at work, which has the effect of interfering with the pressure."

CLARKE (4) bears out Turner's statements and declares that:-

> "Neither in mania nor in melancholia, did I find

any/

any characteristic change in the average Blood Pressure, nor was there any constant alteration with recovery, unless it was accompanied with a marked improvement in the general bodily health."

Such wide variations in opinion on the subject, from men of such standing, cannot be ignored, but in my opinion the variations in results can, to some extent be accounted for, when the wide range of the subject is taken into account, when the functional insanities are differentiated from the more chronic forms, with organic lesions, and when individual idiosyncrasies of patients are considered. From my observations I have formed the opinion that only in the more acute functional upsets, does Blood Pressure play an active part, and that, in the more chronic cases, the mental disease is accompanied by more or less organic changes in the brain, due, of course, to prolonged functional upset, and in those the Blood Pressure does not show any distinctive alteration or variation from that in mental health, except as regards the general bodily health of the patient.

I purpose arranging my paper under the following heads:-

1. Apparatus used and precautions employed to obtain accurate/

accurate observations and deductions.

2. Physiological variations in Blood Pressure in the sane individual, especially those of nervous or emotional origin.

3. Blood pressure in its relation to the more acute functional disturbances.

   (a) Melancholia.
   (b) Mania.
   (c) Dementia Praecox.

4. Blood pressure in the more chronic, organised (and somatic) conditions.

5. Indications, based on Blood Pressure, as to treatment of those functional disturbances.

6. Conclusions, with charts of cases.

## 1. APPARATUS USED AND PRECAUTIONS EMPLOYED TO OBTAIN ACCURATE OBSERVATIONS AND DEDUCTIONS.

I will not go deeply into the subject as to whether or not readings obtained by instruments are reliable.

RUSSELL (5) states, from experiments on dead arteries, that the Blood Pressure cannot be correctly estimated by instruments, as the resistance, due to the vessel wall, varies from 100 to upwards of 150 millimetres Hg., and so outbalances changes in readings. Other observers who share his opinion, and who also experimented on dead arteries are HERRINGHAM and WOMACK (6), but experiments on dead arteries do not outbalance the experiments of MUMMERY (7), and his observations on dogs of varying ages in which he found that the Blood Pressure in both femoral arteries, one pressure taken by means of a Sphygmomanometer, and the other, simultaneously, by direct connection of femoral artery with a mercurial Manometer; and in which he found the pressures exactly the same, carry much more conviction with them.

My investigations have been carried out with Dr. Martin's modification of the Riva-Rocci Sphygmomanometer which consists of a leather armlet having affixed on its inside a thin rubber bag; and a Manometer (mercurial), these two parts being connected by a piece of rubber tubing which has connected a valve and a rubber ball. The armlet/

armlet is fixed round the arm and the parts connected, the pressure is raised inside the rubber bag until the pulse is obliterated and the reading noted by the height at which the mercury Manometer stands, in millimetres.

The valve is opened by turning a screw and air allowed to escape until the radial pulse is just perceptible and the reading again noted.

The mean of these two readings was taken as the patient's average Blood Pressure.

The investigations were carried out morning and evening between 9-30 and 11 a.m., and 6-30 and 8 p.m., individual patient's pressures being taken as near to the same hour, as on former occasions, as possible; the pressure taken on the left arm and at a level with the heart; all with a view to obtaining as accurate comparative results as possible. In those cases examined in bed, the same precautions were observed.

Patients before having their Blood Pressures taken, if engaged in any active occupation, rested one hour before the record was made.

All through, precautions were taken to make the records as reliable, thorough, and exact as possible, to save the conflicting of changes due to meals, work, etc., with those arising merely from the mental phase

the patient happened to be in.

All lesions of the heart, affections of the arteries, etc. were taken into account when comparing figures, and when comparisons were made in different diseases, every effort was made to select cases for comparison of as near the same state of bodily health and development as possible.

## 2. PHYSIOLOGICAL VARIATIONS IN BLOOD PRESSURE IN THE SANE INDIVIDUAL ESPECIALLY THOSE OF NERVOUS OR EMOTIONAL ORIGIN.

Blood Pressure in health is by no means uniform. It varies in the same individual, and in different individuals, the variations being often as much as 50 or 60 mm. Hg., but the average pressure generally lies about 120 mm. Hg. in a normal individual without bodily disease, under normal conditions and in normal circumstances.

Various exciting causes and stimuli (apart from those causes purely pathological) have an effect on the Blood Pressure.

OLIVER (8) gives, amongst other physiological causes of variation in Blood Pressure, the following:-

(1) Gravitation.
(2) Posture.
(3) Muscular Exercise.
(4) Fatigue.
(5) Digestion.
(6) Mental Exercise and Emotional Excitement.

My object, in the precautions detailed above, was to avoid the recording of changes due to Gravitation, Posture, Muscular Exercise, Fatigue and Digestion, and to let the record be a guide to Mental and Emotional Changes on the individual patient.

The action of these factors, detailed above is easily understood/

understood.

Gravity alters the Blood Pressure so that the record shows higher reading in those parts most dependent; Posture affects Blood Pressure in the relative frequency of the heart's action in recumbent and standing postures, and induces also variations in muscular contraction and vaso-motor tone.

Exercise increases the cardiac output and the frequency of the heart's action and so raises the Blood Pressure, but after a time the pressure may fall below normal. This is what OLIVER calls the secondary effect and is due to Fatigue. The physiological cause which I wish to lay most stress on, however, and which is more important than the others, (variations, due to which, were to a great extent eliminated in the investigation of the subject under consideration), is -
Mental Exercise and Emotional Excitement.

The Blood Pressure is undoubtedly raised by mental effort and by emotional disturbances, often to the amount of 15 mm. Hg. or more, and this in the sane individual produces nothing but the morbid moody effects mentioned previously, but, the more neurotic the subject the greater the rise in Blood Pressure. According to JANEWAY (9), "The more excitable and neurotic individuals show a greater rise in Blood Pressure than phlegmatic, from the same/

same psychical cause."

The upset in the Blood Pressure, is, as a rule, quite a passing affair and the pressure falls, more or less in a short time, even without the exhibition of drugs (when the pressure falls much more quickly with corresponding relief).

A Blood Pressure variation of this kind, however, acting on a brain already functionally upset, or naturally predisposed, produces a much more marked effect and engenders reactions and pathological processes, which aggravate each other.

## BLOOD PRESSURE IN ITS RELATION TO THE MORE ACUTE FUNCTIONAL DISTURBANCES.

The primary essential cause of those functional disturbances is undoubtedly a toxaemia - the poison varying according to the form of mental disorder produced - that of Melancholia affecting to a greater or less extent the sensations, peripheral or visceral, aggravating existing mal-sensations and inducing others of a morbid type, the intellect remaining more or less undisturbed or unimparied; that of Mania cutting off the higher centres and decreasing inhibition; the poisons seemingly having a selective property, depending on the initial cause of production, and the nature of the toxin.

The effect of those poisons, as in all cases of toxaemia - whether toxaemia arising in the case of Bright's Disease, Gout, etc., or due to those processes under consideration - the toxaemia say, of defective intestinal action - is a raising of the Blood Pressure by constriction of the smaller arterioles, making the resistance to the blood flow/

flow greater than normal, and necessarily involving greater strain on the heart, with consequent stronger action of that organ which sustains the already existing conditions of high Blood Pressure.

(a) MELANCHOLIA

Obersvations on the Blood Pressure in cases under this heading led me to the definite conclusion that in acute cases, especially young cases, between the ages of 18 and 35, the Blood Pressure was invariably higher than normal. In older cases of Melancholia, the disease was usually accompanied with some arteritis or atheroma, and due more to definite organised changes in the brain with defective nutrition of the brain cells, and in those cases the pressure was generally low compared with the average normal, although taking observations on the same case into account, a small though appreciable fall was always present whenever the mental symptoms of the patient were less severe and he was in a more rational and contented frame of mind.

In those younger cases this high Blood Pressure was occasionally very marked, reaching in some cases to 200 mm. Hg.

In/

In those recoveries, which will be commented on later, the pressure when taken in health, showed often a fall of 50 or 60 mm. Hg., and in other cases a fall of 10 to 20 mm. Hg., the degree of Melancholia in different patients not being in any way dependent on the comparative rise in Blood Pressure, but seemingly being controlled by individual idiosyncrasy and mental constitution. In the same case however, this was markedly so, the extent of the rise varying with the degree of Melancholia.

In some cases, a fact which struck me as very remarkable, was the great mental change produced by even a slight increase in pressure. One case especially is worthy of mention and this was the case of a youth whose Blood Pressure varied between 110 and 130 mm. Hg., and never exceeded these limits. At a Blood Pressure of 110 mm. Hg., the patient was happy, contented, and occasionally joyous, while with a pressure of 120 mm. Hg., the same patient was in a state of profound Melancholia, with most distressing delusions, quite apathetic and indifferent to his surroundings; and on the three occasions when it reached 130 mm. Hg., the patient became a determined suicide and once or twice attempted to do away with himself. Why such a slight rise as 10 mm. Hg., should

make/

make such a marked change in the mental condition of a patient is undoubtedly interesting and this case was also very interesting in view of the fact that the pressure formed a very accurate index to the patient's mental state and to the possibility of attempts at suicide.
The mental improvement, also, which took place in this case, neither preceded nor followed a fall in Blood Pressure, but seemed to be quite coincident with it. On several occasions, I have examined his Blood Pressure, three or four times within an hour, because from signs I had observed previously in his case, the assumption that increased Blood Pressure might have a determining influence on the Melancholia struck me as very probable, and on two occasions I found a fall of Blood Pressure from 120 mm. Hg., to 110 mm. Hg., along with a marked improvement in his mental state within ¼ hour. This short time elapsing between the mental phases does not, in my opinion, explain the phenomenon away totally by supposing that the melancholic symptoms were due to a profound toxaemia with concurrent constriction of arterioles and high Blood Pressure, but strengthened a growing conviction in my mind that the increased Blood Pressure, in itself, quite apart from the toxaemic effects, was,

at/

at least, a potent factor in the production of the Melancholia. The action of this high Blood Pressure, in causing morbid sensations to arise, or increasing their severity, if already present, could easily be accounted for by a rise of Blood Pressure in the brain, aggravated by the arrangement of the blood vessels (the end artery formation and the absence of capillary anastomosis serving to aggravate the already high pressure); or by increased pressure in splanchnic areas and about the vital organs, to some extent impeding their free action, acting reflexly on the brain, producing Melancholic symptoms.

Either of these might have something to do with it, and acting conjointly would do much to induce a miserable moody state. This is also borne out by the improvement produced immediately pressure falls, as under the influence of a drug for reducing Blood Pressure, say, Erythrol Tetranitrate. In my experience the drug shows its effects, in from one half to one hour following administration, and the time elapsing is too short to allow of alleviation of mental symptoms by increased elimination of toxic products. This, however, would tend, by such elimination by the skin and kidneys, towards the prevention of a recurrence. This view of the Blood Pressure, being/

being directly to a certain extent, responsible for the Melancholia, is more fully discussed later.

The alleviation of the mental symptoms which follows reduction of Blood Pressure, cannot therefore be said to be due to increased elimination, for reasons detailed above, nor to decreased absorption of toxin, which goes on as formerly, and the fact remains that the high Blood Pressure is responsible, to some extent, for the Melancholic symptoms.

In the following table are given some figures relating to some Melancholic cases I have Examined, and which illustrate the above remarks:-

TABLE No. I

MELANCHOLIA

| | mm.Hg. | mm.Hg. | mm.Hg. | mm.Hg. | mm.Hg. |
|---|---|---|---|---|---|
| Pressure when most profoundly depressed. | 130 | 140 | 180 | 130 | 200 |
| Pressure when well. | 110 | 100 | 120 | 110 | 140 |
| Variation. | 20 | 40 | 60 | 20 | 60 |

The case, above referred to, was also interesting, in comparison with other cases, and showed the effect of the normal/

normal mental constitution on the subject under consideration. The youth is a little irresponsible - his moods vary, he is very easily upset, and quite as easily soothed. The contrast between this case and another case of Melancholia where the pressure fell 60 mm.Hg. is undoubtedly striking. The other pressure was reduced by millimetres with the consequent very slight, although progressive, improvement in the mental state, and the mental constitution on recovery was seen to be fairly well balanced, a mind which did not go into raptures or despair at the smallest cause, but preserved an even equilibrium, once the pressure was reduced.

This is not intended to convey, however, that the Blood Pressure is primarily the cause, as it must of course be dependent upon the toxic absorption, and although Blood Pressure can be reduced and the mental condition improved by certain methods of procedure, still the initial cause remains, and will evidence itself as soon as the effects of the pressure reducer pass away. This subject will be more fully discussed later, however, in the part relating to Indications as to Treatment".

(b) MANIA

My results under this heading have not been so uniform and/

and do not show enough uniformly to enable one to say that the rule is -decrease- or -increase- in Maniacal conditions.

Some observers have stated that Blood Pressure shows a marked fall in Mania. In cases of acute Mania which I have examined, my results do not justify my agreeing with this, as in some of those cases, in the initial stages, the pressure was undoubtedly raised; in others which were a little more advanced, the Blood Pressure was either normal or a little lowered. (Those terms are used in comparison to pressures when well).

In some of those cases above referred to as having high Blood Pressures, if the attack was long continued, the pressure began to come down until it was hypo-normal.

The conclusion I have come to with regard to acute Mania is this :- that in its initial stages the pressure is increased to a certain degree, and the reduction in after stages is due to physical exhaustion, with feeble heart's action, than to any special influence or factor that may determine the Mania. A point that might be raised is this - why, if the pressure is increased, does it not induce morbid symptoms, as in Melancholia ? The reason, in my opinion, is that the rise in pressure is not high enough and is easily brought down; that the absorption of/

of toxins and the toxicity of the blood is not so great as in Melancholia on account of the toxins being more easily wrought off or katalysed by the constant restless movement of patient. This explains the subject from the Blood Pressure point of view, but the variety of toxin, quite apart from the amount seems to be the main determining factor.

The toxin may even be said to have a selective property. The following table gives some figures indicating Blood Pressures in Maniacal cases. As will be seem, I include two cases showing the initial rise in Blood Pressure.

TABLE No. 2

MANIA

| | mm.Hg. | mm.Hg. | mm.Hg. | mm.Hg. | mm.Hg. |
|---|---|---|---|---|---|
| Pressure at initial examination. | 135 | 130 | 100 | 90 | 100 |
| Pressure when disease had advanced and patient very acutely maniacal. | 75 | 95 | 90 | 80 | 90 |
| Pressure when well. | 120 | 120 | 110. | 120 | 120. |
| Variation | 45 | 25 | 20 | 40 | 30 |

Mania may be considered a fatigue, or exhaustion re-action and the consequent toxins of fatigue acting on the already over wrought brain centres, throw these out of action, causing a certain amount of inhibition to be lost, consequently allowing the brain to practically run riot - ideas coursing with lightning rapidity through the brain with accompanying changes in expression; with much restlessness, excitement, etc. These poisons are essentially different from those exhibited in Melancholia which are more of toxins or ptomaines absorbed from the alimentary canal, giving rise even in the same individual to those morbid miserable feelings which, if very marked and long continued, in a person of unstable mind may cause melancholic symptoms and allow a brain, never of the healthiest to give birth to imaginary feelings or to magnify some personal feeling or past incident in its career until it assumes enormous proportions.

Both show an increased Blood Pressure in the initial stages, the poison in the first case, being of a different variety however, and as inhibition is lost, and as the patient becomes more restless, this poison is more easily wrought off, katalysed or eliminated, which may to some extent be included with physical exhaustion in the explanation of the/

the causation of the subsequent fall.
The poison in the second case is accumlative on account of the increased apathetic and indifferent condition - bordering on the Katatonic phase, which is often present - gradually increasing the Blood Pressure, the two factors then working on and aggravating each other.
This also may to some extent explain the great difference in the effects of opium preparations in Mania and Melancholia respectively.

Melancholia being really mental pain or Psychalgia is much relieved by opium, whereas in Mania, where it might be expected, on first impressions, to produce good effects, its efforts are disappointing, probably due to the fact that it has been forestalled, that the higher centres have already been cut off, with consequent lack of inhibition by the action of the generated toxins.
Some of the cases under examination would begin with a pressure of 120 mm.Hg., would remain at such for a period of perhaps a week or a fortnight, falling gradually until a pressure of about 70 or 80 mm.Hg. was recorded. In cases where the patient died, the pressure gradually fell until that time, the physical exhaustion culminating; while in those who recovered, the Blood Pressure/

Pressure gradually rose until it reached about 110 mm. Hg. (always lower to a slight extent than initial pressure) but a fact which struck me forcibly was that the patient's mental condition was not influenced by a rise in pressure, as in Melancholia, except in so far as the health benefited, but rather the mental condition was often fairly good when the pressure was about its lowest, and the patient remained in the same state of mental health, all through the rise in Blood Pressure (due of course to the recuperation of patient's strength) except for the instability which was always present, until patient regained normal health and strength. The part that I would wish to emphasise is that contrary to Melancholia, variation in mental condition did not correspond to variation in Blood Pressure, nor could the Blood Pressure be used as an index to the state of the patient's mental condition.

Below I give a comparative table of readings in cases of Melancholia and Mania. The readings given are those recorded when patients were most acutely depressed or most/

most acutely Maniacal.

TABLE No. 3

COMPARATIVE TABLE OF MELANCHOLIA AND MANIA

| Melancholia mm.Hg. | Mania mm. Hg. |
|---|---|
| 200 | 100 |
| 180 | 95 |
| 190 | 95 |
| 160 | 90 |
| 140 | 90 |
| 130 | 80 |
| 130 | 75 |

(c) DEMENTIA PRAECOX

The disease, in its wide sense, including as it does, such a number and variety of mental phases, when investigated, gives very differing and varying results as regards Blood Pressure observations.

In one respect, my cases have conformed to one special rule, however. They have all shown a rise in Blood Pressure in the initial stages. Most of my cases have been ushered in by an attack of acute excitement, and have also afforded evidence to support my conclusions as to Mania, viz:- that Blood Pressure in the primary stages/

stages of acute Mania is raised. While the acutely maniacal symptoms continued, the cases followed the same course as maniacal cases, showing a gradually falling pressure with the progress of physical exhaustion, the low pressure continuing for a time, even after the acute maniacal symptoms had subsided, and only rising as the patient regained bodily health and strength, the improvement in the mental state not coinciding with the rise in Blood Pressure, except as I have stated previously under Mania - that, of course, mental stability increased as bodily health improved and pressure rose - but I take this change to be due to the improvement in bodily health and not to the rise in Blood Pressure, as some of my cases of Dementia Praecox, after the subsidence of the Mania, kept in the same state of mental health, with only ordinary variations, although the increase in the Blood Pressure, in that time, was gradual from about 90 mm.Hg. to 110 or 120 mm. Hg. This bears out my statement that Blood Pressure in acute Mania is not dependent on the mental state, and is by no means a determining factor.

Cases of Dementia Praecox of the ordinary type, show a marked contrast to cases in which katatonic symptoms gradually/

gradually followed upon the quiescent period after the Mania, and the patient gradually became more listless, apathetic and in different, until he reached the cataleptic stage.

These cases followed the general rule, with initial rise, comparatively quick fall, and gradual rise to a little under normal, until the increasing stupor took the place of the mere indifference, and, during the progress of those symptoms, the Blood Pressure gradually rose until, when the patient became katatonic, it showed quite a marked rise from normal. This high pressure, however, curiously enough, did not conform to the expected and remain up as in Melancholia, but gradually fell, the patient still remaining in katatonic state. This fall is a very interesting occurrence, and reveals a fine problem, in so far as, when the stuporose condition continued the pressure should be expected to remain high, and aggravate the condition. This, however, was not the case and pressure gradually fell without improvement in the stuporose condition, probably due to the practically vegetative state of the organism, causing slow bodily processes, weak action of/

of the heart etc.

This is interesting, in that it does not conform to the rule, as in Melancholia, that increased apathy, indifference or stupor, means higher Blood Pressure. I give below two charts to show the pressure curve in those two types of cases and append a table, IV, of pressure observations.

Chart I Ordinary Case.

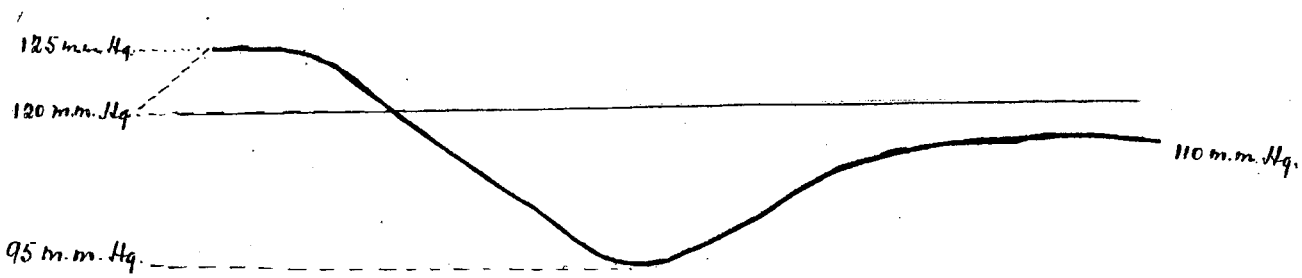


Chart II Case with Katatonic developments.

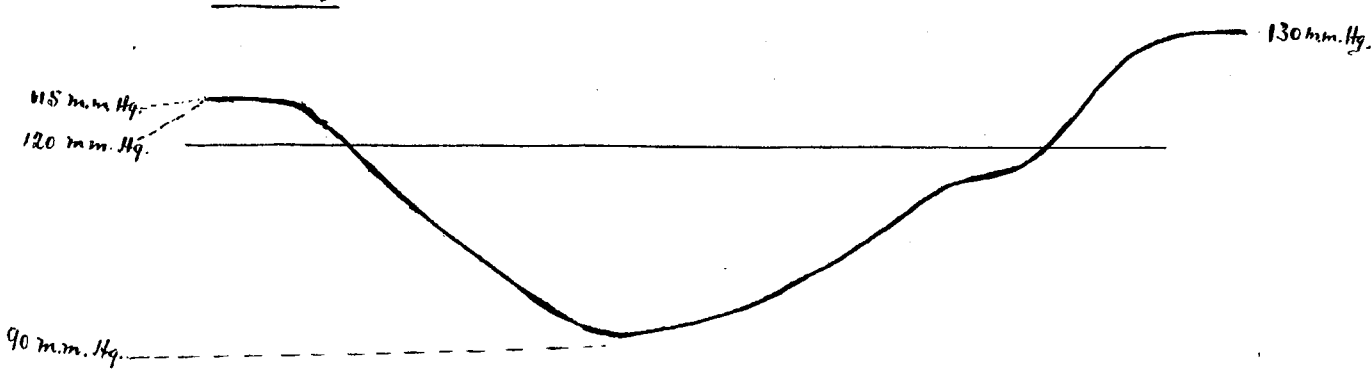

Table IV.

DEMENTIA PRAECOX.

| | mm.Hg. | mm.Hg. | mm.Hg. | mm.Hg. |
|---|---|---|---|---|
| Pressure at first examination. | 125 | 120 | 115 | 130 |
| Pressure when maniacal symptoms pronounced | 90 | 95 | 90 | 85 |
| Pressure when mania had subsided, and bodily health improved. | 120 | 110 | 110 | 120 |
| Pressure in those cases showing katatonic developments. | | | 130 | 140 |

The fourth case became cataleptic and his Blood Pressure gradually fell to 100 mm.Hg., without improvement in cataleptic condition.

## 4. BLOOD PRESSURE IN THE MORE CHRONIC, ORGANISED, (AND SOMATIC) MENTAL CONDITIONS.

Observations on Blood Pressure in my cases under this heading, failed to demonstrate the existence of definite correlation, and my hopes, if any, of establishing a connection between Blood Pressure and those Insanities, were doomed to disappointment. Of course, pressures varied in different individuals, some cases shewing Pressures of even 180 mm.Hg., (especially was this marked in cases of senile dementia where the Pressure was generally higher than normal) but in the same individual, if Pressure varied at all, it was to the extent of 5-10 mm.Hg. with no corresponding mental change, and the slight variations could always be explained by ordinary physiological phenomena. In Chronic Melancholics a slight rise in pressure was often seen with a corresponding slight increase in severity of Melancholic symptoms, but the slight rise could be discounted as a probable cause, per se of the increased severity of those symptoms.

Chronic Maniacal cases also, did not conduce to any opinion being passed as to any uniformity in Blood Pressure or in variations in such. Some had normal Pressures, some hyper-normal, and some hypo-normal. Blood Pressure variation seemed to have no connection whatever with severity of symptoms and manifestations of further mental trouble.

This, of course, is only to be expected in those chronic cases where the great probability was that the insanity was due to marked deterioration of brain cells in

various parts, and not to any functional disturbances, as in acute cases, although primarily, those chronic cases must have followed the same course. In recurrent maniacal cases, however, which I have had under my observation from the very onset of the attack, my findings as to Mania were corroborated, and the attack was always preceded by a rise in Blood Pressure, with a consequent fall, as bodily health deteriorated, and a corresponding rise as bodily health improved, although previously the maniacal symptoms may have abated.

Below I give a Table of Blood Pressure readings in Cases of Recurrent Mania:-

T A B L E V.

RECURRENT MANIA.

| | mm.Hg. | mm.Hg. | mm.Hg. |
|---|---|---|---|
| Pressure previous to attack | 120 | 115 | 125 |
| Pressure at onset of attack. | 125 | 125 | 130 |
| Pressure when patient had been acutely maniacal for some time | 90 | 100 | 110 |
| Pressure when acute mania subsided but patient still bodily exhausted. | 85 | 90 | 105 |
| Pressure when bodily health improved. | 120 | 110 | 120 |

GENERAL PARALYSIS. I have not had the opportunity of examining many cases under this heading, but in those I have examined, I found the Blood Pressure lowered in the first stages when the patient was restless, excited, and exalted. This lowering of Blood Pressure was, in my opinion, due to fatigue and I do not doubt that, had the Blood Pressure been examined at the earliest possible opportunity at the onset of the disease, a slight rise in Pressure would have been noticeable. In the second and third stages the Pressure gradually diminished, and fell in some cases 30 or 40 mm.Hg. from that Pressure indicated in the early stages. This I take to be due to increasing physical exhaustion. One case was interesting and is worthy of comment.

A patient had marked symptoms of General Paralysis with a Blood Pressure of about 110 mm.Hg. The disease in this patient was to a great extent temporarily arrested as a result of treatment with Arsenic, and in his case the Pressure rose and varied between 120 and 130 mm.Hg. He remained very well for about one year, and after a congestive attack the ordinary symptoms became more pronounced and Blood Pressure gradually fell with the increasing bodily weakness. This case is interesting in view of the fact that it demonstrates the Blood Pressure rise to be dependent on the better state of bodily health, and that with the arrestment of the disease and the temporary rejuvenation of patient's general health,

instead of the ordinary fall accompanied by increasing enfeeblement both mental and bodily, as is found in this disease, a distinct rise was evident. His case is shewn as the first, in the Table of readings given below.

T A B L E V I.

GENERAL PARALYSIS.

| | mm.Hg. | mm.Hg. | mm.Hg. | mm.Hg. | mm.Hg. |
|---|---|---|---|---|---|
| First Stage | 110 | 110 | 120 | 130 | 110 |
| Second Stage | 120 | 100 | 110 | 120 | 90 |
| Third Stage | 90 | 80 | 90 | 90 | 70 |

In Idiocy and Congenital defect, I found Pressure lower than normal. I do not pretend to be able to explain how this is so, as I have never investigated the matter, but the probability is, that the low Pressure is due to some bodily defect in structure of heart and arteries, and to physical causes, with perhaps defect in vaso-motor mechanism. This view is quite feasible, when the brain defect is taken into account, and the subject argued from the same basis.

Cases of Senile Dementia very often recorded high Blood Pressures, as I have mentioned previously, but the greatly increased Pressure is due, in my opinion, more to the cardiac, vascular and renal changes, common in senil-

ity/

senility and in this disease, and not to any effect the mental defect or deterioration may have upon the pressure.

Advanced Epileptics, as a rule, showed lower pressures than normal, which is only to be expected from the evident physical signs of poor circulation in those cases.

Some early cases, however, often showed variation in Blood Pressure, generally by way of a rise, before a sequence of epileptic fits, and I have mentioned previously two cases in which a greater rise than usual ushered in an acutely maniacal attack, the greater rise, of course, being due to increased toxin absorption.

## 5. INDICATIONS, BASED ON BLOOD PRESSURE, AS TO TREATMENT OF THOSE FUNCTIONAL DISTURBANCES.

The intimate relations shown from the previous findings which exist between the functional disorders and variations in Blood Pressure opens up a very interesting and encouraging field of work and investigation from the point of view of treatment.

The toxic origin however, of those functional disorders renders it imperative that the essential cause, such as the toxin producer, must be removed, and relegates the reduction of Blood Pressure by drugs to the realm of treatment of symptoms; but the alleviation of such a symptom and the consequent improvement resulting, does much to allow of nature's own forces, by having an extra weight removed, accommodating themselves once more to the toxin, which had overwhelmed them, disturbing accommodation by increased production of toxin, or decreased resistance of organism depending on the effect of some internal or external influence, and once more regaining the lost functional balance.

The elimination of toxin and the prevention of its genesis or its absorption, together with alleviation of symptoms by reducing Blood Pressure, should be expected to show, reasoning on the above lines, mental improvement in no small degree and such has been the case in my experiments/

experiments, and although not justifying my most sanguine hopes, has materially strengthened my views as to etiology of those mental states by the almost entirely uniform results obtained, as a result of such treatment.

I have mentioned previously that I look upon Melancholia as being the most interesting of the functional phases under consideration as the patient maintains the same adaptability to treatment in this way all through the disease, whereas in Mania, for instance, the real functional disturbance is indicated more at the beginning of the disease, and accordingly has to be treated then if the disturbances are intended to be demonstrated as the same processes in consequence of uniformity in treatment results.

The disease, advancing, causes increasing physical exhaustion - the disease becomes a bodily one - aggravated by action of mental condition on already exhausted physical condition, and the time for correct functional treatment is gone.

Mania, physiologically, is quite as interesting as, if not more so than, Melancholia, but the possibility of getting cases early enough into Asylums, is so slight, that an obstacle is placed in the way of proper investigation of the subject. My views on this are borne out by some early cases of acute Mania which I have investigated, by recurrent Maniacs whom I have observed closely so as to be

able/

able to get at the very commencement of the attack, and by cases of Dementia Praecox. Some cases of Epilepsy which I have also observed, corroborate this. Two of those, although very troublesome cases at all times, have had very acute maniacal outbreakes, and the Blood Pressure, although always higher than normal before a sequence of fits, in those two cases was invariably higher before the maniacal outbreak, until the increasing exhaustion consequent upon excitement brought the pressure down. Be this as it may, the treatment of Mania on the same basis as Melancholia, is undoubtedly quite possible, given the case early enough in its course, for both, primarily, because of their toxic nature, raise Blood Pressure to a degree, one pressure remaining up by reason of effect aggravating cause, the other falling by reason of changes engendered by the special toxin, acting as it does on a special part of the brain. In other words, whereas in Melancholia apathetic, indifferent conditions are induced, causing a rise in the already hypernormal Blood Pressure by reason of further absorption of toxin consequent upon slow vital processes; in Mania the inhibition is decreased, causing increased bodily activity, increased restlessness and increased excitement, producing hyponormal Blood Pressure by virtue of the physical exhaustion produced, and facilitating breaking up of toxin.

In the later cases of Mania, treatment of the symptom/

symptom Blood Pressure has to be abandoned, except in so far as it can be raised by raising the general tone of bodily health of patient, and the treatment has to consist of this, along with the removal of toxin as far as possible by keeping the excretory channels well open, preventing extra absorption, in fact, and allowing nature its own course, with as much assistance as we can give it in that direction.

In Maniacal cases, good results have often followed saline infusions. One pint Saline, injected subcutaneously into the cellular tissue of the wall of the abdomen, raised Blood Pressure 5 - 10 mm.Hg., but with such a rise although improvement in bodily health was shown, no mental improvement resulted, which again tends to show, that in Mania, the low pressure is a physical phenomenon.

The Pressure in my experience is best reduced by Erythrol Tetranitrate, as this drug has a more lasting effect than Amyl-nitrite and others of that class.

I begin with ½ grain Tabloids three times a day, increasing in three or four days to 1 grain thrice daily.

The drug shews no bad effects and the rapidity of the fall depends on the individual constitution of the patient, and in mental states, accompanied by a rise in Blood Pressure, I have always noticed an improvement in the mental condition consequent upon reduction of Blood Pressure by Erythrol. Reduction of pressure in itself, however/

however, as I have previously stated, is merely the treatment of an effect set up by some specific cause, and as such, will evidence itself again after the counteracting influence has ceased to exert itself, provided the cause remain unchanged.

The poison must be eliminated or its absorption stopped, and as good results have always followed, in my cases, clearing of the alimentary canal, it stands to reason that some of the poison at least must be arising from that source.

I have also made a careful examination of urines from cases of Melancholia with High Blood Pressure - find them generally concentrated with abundant salts of various natures - and almost invariably have found marked traces of Indigogens in the urine, showing, of course, absorption of poisonous products from the alimentary canal.

Such considerations indicate the cause of toxaemia to be poisons arising partly or perhaps wholly from the alimentary canal, and knowing that this is so to even a slight extent, we are possessed of a powerful lever by which, in conjunction with reduction of Blood Pressure (reduction of which, in itself, to a certain extent modifies the cause) we may remove the real

cause/

cause of the disease, or as much of it, at all events, as was the primarily exciting cause of the upset, and allow of nature's forces disposing of the rest, which they might be quite able to do, although this may not have followed in the preliminary stages where the full strength of the poison had to be coped with.

With regard to Melancholia, another thing I have noticed is the pretty frequent occurrence of temporary glycosuria, especially in the more neurotic subjects. This glycosuria becomes more marked as the Blood Pressure rises, and as the mental symptoms increase in severity; and gradually disappears or becomes much modified as patient recovers.

Although it occurs in many psychoses, the simultaneous occurrence of glycosuria or the increased amount glycogen excreted, and of the increased Melancholic symptoms might point to this disturbed glycogenic function as being one of the causes of toxin production in those mental phases, or possibly it may only be the result of disturbed liver function which is common in those conditions. At any rate, the fact that there is increased excretion of glycogen in the urine, in those neurotic subjects who are prone to temporary glycosuria is undoubtedly striking.

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The subject is only interesting in the present discussion, however, in so far as it may have an influence on the Blood Pressure, but I rather incline to the belief that the high Blood Pressure and increased glycosuria are dependent on the same causes, slow vital processes, and interference with vaso-motor mechanism.

The combination of Intestinal Antiseptics, Salines, and Blood Pressure reducers shows often marvellous results in those cases. Calomel 2 grs. in the evening followed by Magnes. Sulph. ½ oz. in the morning - every third day - along with the exhibition of Erythrol has, in my experience, the best results.

The Calomel, as an intestinal antiseptic and cholagogue stimulates those processes which in Melancholics are apt to be most sluggish while the Magnes. Sulph., in addition to clearing the alimentary canal, does so largely by excreting a quantity of fluid, so helping the Erythrol in the reduction of the Blood Pressure.

To come to the consideration of treatment of Maniacal conditions, in which I have found a rise in Blood Pressure in the primary stages of the disease, treatment of/

of Blood Pressure as a symptom cannot be looked upon as having the same importance as in the case in Melancholia, because of the difference in disturbed function and the decreased inhibition following, which renders the Blood Pressure a mere passing symptom and not in any way connected with aggravation of existing mental disorder. A sharp purge, along with the exhibition of Erythrol has had the effect of preventing or cutting short, attacks in some of my cases of recurrent Mania.

These cases have shown a high Blood Pressure at the commencement of the attack, with a corresponding fall shortly after the Erythrol was given. In those cases, however, the reduction of the Blood Pressure cannot be said to have the same effect as in Melancholia on account of the differences shown in those diseases.

Reduction of Blood Pressure, in itself, helped cases of Melancholia, as high Blood Pressure was a potent factor in aggravating the already existing disease.

In Mania the sharp purge, by clearing the alimentary canal of poisons, and perhaps to a slight extent by counter-irritation, - diverting, it may be said/

said, the energy to the alimentary canal - must be looked upon as the real useful element in the treatment, as high Blood Pressure, in this case, is only a mere co-existing symptom (being, in any case, an evanescent symptom) and does not, in my opinion, aggravate the mental condition, but is merely arising from the same cause as the mental upset, namely:- absorption of some special toxin of toxins.

In Melancholia the high Blood Pressure, (its consequent physiological effect being the same as the effect of the toxin indicated in that disease, viz:- increased inactivity) becomes a very important factor.

In Mania the high Blood Pressure symptom is not so important, as it is not brought into prominence by the help of a toxin working in a similar direction, but is to a great extent counteracted, and falls in the course of the disease, and is not nearly so important a symptom in view of etiology and treatment of the disease as it is in Melancholia.

In other words treatment of high Blood Pressure as a symptom in early acute, or in recurrent Mania, may be disregarded, and full attention paid to getting rid of the toxin causing the disease by aiding excretion, and by counter irritation, as:-

(1)/

(1) The Blood Pressure falls in any case.

(2) It is not a factor in the production or aggravation of the disease, and is only a co-existing symptom due to the toxaemia.

(3) Although reduced by drugs the mental symptoms are not alleviated as those are not at all dependent on the temporary rise in Blood Pressure.

Blood Pressure to this extent is valuable in Mania, however, that it forms an index to the occurrence of Maniacal outbreaks, which may then be treated in the ordinary way.

## 6. CONCLUSIONS, WITH CHARTS OF CASES.

From the foregoing remarks it will be seen that Blood Pressure is undoubtedly of great importance in the study of Etiology, course and treatment of mental disease.

My investigations have been carried on for fully a period of two years and all remarks and statements made, are based upon observations. Too much importance cannot be paid to Blood Pressure, as it is a subject which has been to a great extent neglected in all diseases, and this applies more strongly to mental disease.

Even if there is no direct connection between Blood Pressure variations and mental disease, which some authorities assert, but which I cannot bring myself to recognise for a moment, the subject is still of educational value and absorbing interest from a physiological point of view.

But my observations, with few exceptions, which make the subject even more interesting and absorbing, all tended to convince me that a very intimate and interesting relation existed between Blood Pressure and Mental Disease.

It is a very tempting explanation of the increased inactivity or stuporose condition, which so often occurs in/

in Insanities, to say that this is due to high Blood Pressure, and I think I do not presume when I say that the foregoing few observations may throw a little light on that point, or at least, will be interesting from the point of view of more observations on a much disputed subject.

Observations vary, of course, with different observers, as their methods of procedure and mode of Elimination of varying factors, cannot always be the same, - the personal element accounting for some varying results - but, as I have previously stated, the most striking results are obtained in connection with the more functional upsets, the chronic forms may or may not conform, depending on the progress of brain deterioration.

Mania, Melancholia, and Dementia Praecox have been taken as types of those functional disorders, as they describe better the display of variations in Blood Pressure in those functional disorders. In Alcoholic, and other gross toxic insanities, the Blood Pressure is, of course, raised, but the three varieties mentioned, are better adapted for the demonstration of the finer variations and problems in connection with Blood Pressure.

The/

The initial high pressure in Mania, of course, shows that absorption of toxin is going on, and it is quite possible that, got early enough in their progress, some of those acute maniacal attacks may be warded off by proper and energetic treatment.

This primary rise in Blood Pressure in maniacal conditions, is more in accordance also, with modern views regarding the disease, as such maniacal states must be dependent upon absorption of some form of toxin.

Regarding the question of the stuporose condition, and states of increased inactivity, I do not intend to convey the impression that Blood Pressure is purely the cause of these. They are coincident symptoms with Blood Pressure, and all are due to the toxaemia, but after a time react on each other, forming a sort of vicious cycle, in which increased Blood Pressure exaggerates the already increased inactivity, in which state vital processes are slower, more toxins are produced in the alimentary canal, and more absorbed, thus again reacting on and raising the Blood Pressure - and so on.

My results may be summed up in the folowing manner:-

1. In acute functional disorders Blood Pressure is raised preliminarily.

2. In acute functional disturbances showing stuporose conditions or abnormal inactivity the pressure remains high and becomes a factor in the aggravation of the disease.

3. In acute functional disturbances showing decreased inhibition and abnormal activity, the original rise in Blood Pressure is temporary, and the pressure falls, the rapidity of the fall depending on the rapidity of progress of physical exhaustion.

4. The extent of the rise in Blood Pressure varies with different individuals, and depends on the mental constitution.

5. The extent of the rise determines the degree of mental disorder in the same individual but not comparatively in different individuals.

6. In cases where stuporose conditions are shown - those conditions are relieved when the Blood Pressure is reduced by drugs.

7. The low Blood Pressure in acute mania is dependent on the bodily exhaustion, not upon the mental disorder.

8/

8. Whereas in Melancholia the Blood Pressure forms a fairly accurate index of the patient's mental state, in mania variations in mental conditions do not correspond to variations in Blood Pressure.

9. In chronic organised insanities Blood Pressure does not play an active part and depends more on bodily health and vascular changes, except in so far as, that, in cases showing slight functional upset the pressure varies as above.

I append some Blood Pressure charts of cases of Mania, Melancholia, etc., which illustrate to some extent the points set down in my paper.

In chart 1. the record shows morning and evening readings, which I give in full as the case is so interesting.

The chart gives the progress of a case of melancholia, aet. 19, who was admitted profoundly depressed with a history of having attempted suicide. Patient twice attempted suicide in the Asylum and on those two occasions his Blood Pressure reached 130 mm.Hg. Patient's pressure was taken morning and evening for 6 months, but only 3 months readings are shown here, as pressure kept normal for three months prior to patient's discharge.

For convenience I have condensed the remaining charts, pressures being shown every second day, instead of morning and/

and evening as in Chart 1.

Chart 11. shows case of acute mania showing initial rise, rapid fall, and gradual rise in Blood Pressure.

Chart 111. illustrates a case of Dementia Praecox of the ordinary variety. Was admitted acutely maniacal and pressure followed same course as pressure in Chart 11.

Chart IV. shows a case of Dementia Praecox of the Katatonic variety. The pressure follows the same curve as in Chart III until the Katatonic symptoms take the place of the mere indifference when the pressure rises.

This patient became Cataleptic and pressure gradually fell.

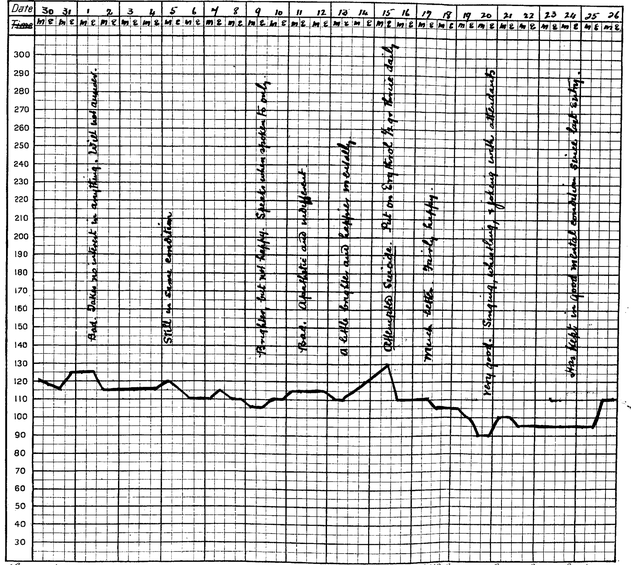
Chart V. shows a case of Recurrent Mania.

Chart VI. shows another case of Typical Melancholia.

I take this opportunity of expressing my thanks to Dr. Fraser, Medical Officer, for his kindness in permitting me to use with freedom the material and instruments at Paisley District Asylum, where the observations have been carried out.

Chart I **Melancholia**

LEWIS'S BLOOD PRESSURE AND PULSE CHART.

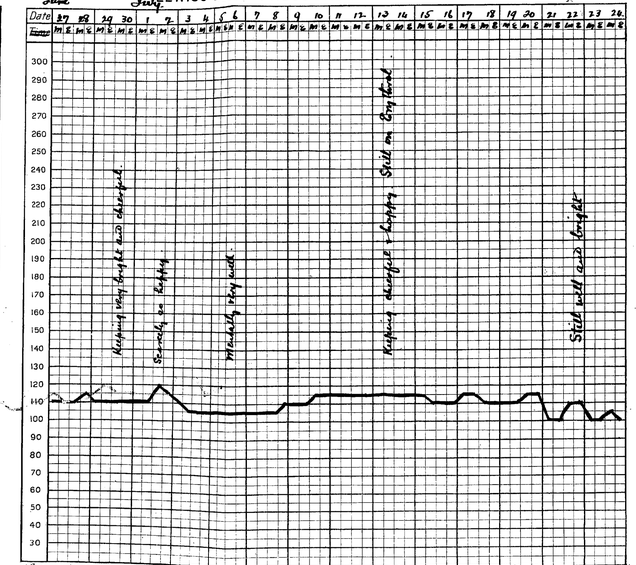





H. K. Lewis, 136, Gower Street, London, W.C.

Chart I cont^d

LEWIS'S BLOOD PRESSURE AND PULSE CHART.






H. K. Lewis, 136, Gower Street, London, W.C.

Chart I cont^d

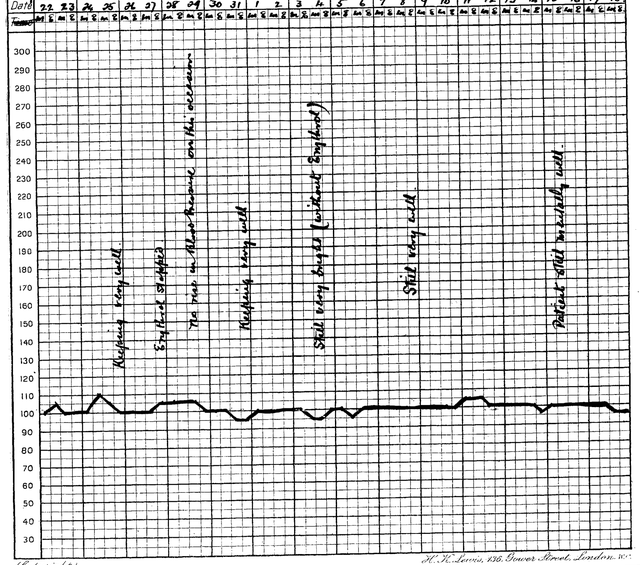
LEWIS'S BLOOD PRESSURE AND PULSE CHAR




H. K. Lewis, 136, Gower Street, London, W.C.

Chart I cont^d

LEWIS'S BLOOD PRESSURE AND PULSE CHART.






H. K. Lewis, 136, Gower Street, London, W.C.

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