I wish to state that the work has been done and the Thesis composed entirely by me.
Thesis presented by
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THE EFFORT SYNDROME

The truth that 'history repeats itself' is applicable to medical, no less than to political events. Soon after mobilisation in September 1914 it became evident that the condition of Effort Syndrome was once again to attract the interest of medical officers in the Forces, and to tax their ability both to diagnose and dispose.

In the War of 1914-18 it created a problem of considerable difficulty. By 1918, 70,000 soldiers had been diagnosed cardiovascular and 85% of them labelled Effort Syndrome given to 44,000. The problem does not threaten to reach such alarming proportions during the present conflict but medical officers continue to encounter these cases, and it has been found necessary to set aside special hospitals for their treatment.

This suggests that war is the main etiological factor, an impression which is strengthened by

a survey of the literature on the subject. With a few exceptions research into the condition has been carried out in time of war, while during peace there is a strange dearth of studies. One would suggest that between war the ascertainment suffers one of four possible fates. It may decline in incidence of cases altogether, it may graduate itself in clinico-epidemiology and be disregarded under another name, or it may go 'censored and assumed.'

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INTRODUCTION

The truism that 'History repeats itself' is applicable to medical no less than to political events. Soon after mobilisation in September 1939 it became evident that the condition of Effort Syndrome was once again to attract the interest of medical officers in H.M. Forces, and to tax their ability both to diagnose and dispose.

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There is incontrovertible evidence that the latter is
the true explanation. We now know that in fully 50% of these patients symptoms commenced long before enlistment. From such studies as those of White and Jones (1928) and Craig and White (1934) we have learned that modern civilian cardiological practice is fully acquainted with the condition, and indeed, that it preponderates in women.

Why is it that the condition suffers an apparent eclipse from general medical knowledge in peace, and immediately on the outbreak of war again obtrudes as a serious problem and a considerable wastage of man power and efficiency?

The answer to the first question will only be forthcoming when the nature of the condition is fully understood. There is nothing dramatic about the patient or his illness and his disability is variable and vague. Symptoms are many, signs are few. Then too, there has been great difference of opinion as to what constitutes the condition and just when it should be diagnosed. From 'Heart Strain' to 'Conversion Hysteria' symptoms have wandered in search of a diagnosis and it is only very recently that a composite picture has been outlined and an objective approach attempted.

The answer to the second part of the question is easier. Military training and service do not act as a direct causal factor but serve to precipitate an existing weakness or unmask a latent difficulty.

Mobilisation is a sudden and to most men a distasteful change in their mode of living. Primarily
It means a disruption of an accustomed and selfchosen existence and the necessity of much re-adaptation. It may mean the breaking up of the home, financial readjustments and difficulties, domestic and sexual worries, foreign service, danger and all the unfortunate strains and anxieties which are part of a modern war. Men are not equal either in their physical, mental or emotional endowments and the result of this change will depend on the requirements of service and the potentialities of the soldier. To some the change from civil life is an easy one and the adjustment to a new life achieved without difficulty. Some, poorly equipped by nature, will fail from physical causes while others will reach a satisfactory equilibrium only after considerable conflict and a period of strain and self discipline. Finally, to a few the task will be too great and the demands made on their limited powers of adaptability too severe; in these sooner or later signs of breakdown will occur.

Early in the War provision had to be made for the discharge of the mentally defective from the Army. Psychiatrists found that in many the intellectual defect was marked yet their histories showed that they had remained in steady employment, had earned fair wages and lived happy and useful lives. They had adjusted themselves to a limited existence. Suddenly removed from this optimism environment and bereft of the support of family and friends, their hardly gained and slenderly
held stability was insufficient to meet the new demands and they broke down. In like manner the Effort Syndrome. Emotional equilibrium and a measure of health were possible in civil life where symptoms regulated activity and discomfort was the brake on effort. Exposed to the discipline and physical strain of the impersonal army machine, symptoms, formerly bearable, became more severe and sometimes incapacitating.

The term 'Effort Syndrome' was introduced during the last war by Sir Thomas Lewis to describe a group of symptoms formerly variously termed 'Disordered Action of the Heart,' 'Soldiers Heart' and 'Irritable Heart.' These latter terms he considered unsatisfactory because they implied Cardiac dysfunction as the cause of symptoms. By the new term he meant, not a disease, but a series of symptoms. These, he held, are normally experienced by a healthy man after excessive exercise and to them he gave the name "the physiological syndrome of effort."

The essential difference, as he saw it, between a healthy soldier and a patient suffering from Effort Syndrome was one of degree only. The term, in other words, implies not a disease process but an altered response to effort. Modern opinion is inclining to the view that these symptoms are really somatic emotional manifestations. What was apparently physical is now believed to be emotionally determined.

This paper is mainly devoted to an assessment of this view and is based on eighteen months experience at
a Military Hospital in a Home Command. Personal experience of a large number of cases has been gained and records of 50 will be appended.

**HISTORY**

It follows from the introductory remarks that the history of Effort Syndrome can be considered conveniently in relation to periods of war.

The American Civil War is associated with the name of Da Costa who published in 1871, the first comprehensive account of the condition. Earlier references however had been made by Harthorne (1864) in the American Journal of Medical Science and in the report of a Royal Commission which sat from 1864-68 to investigate the condition in Imperial Troops. A physical basis for the symptoms was sought. They were ascribed to the tight tunic and to the constricting effect of the soldiers equipment on his chest. The clinical description was, 'An extreme sensibility of the heart with some but not great enlargement. During rest a heart of this kind beats easily, but on the least exertion its action becomes irregular and the man becomes breathless.' These views on the aetiology and nature of the condition were supported by Arthur Myers (1870) and other writers until the end of the century when medical interest seems to have waned.

Lewis dominates the scene in the second war period, 1914-18. Discarding all the former diagnoses
as unsatisfactory and misleading he coined the term 'Effort Syndrome' which has remained in use in this country until to-day. In association with Parkinson he had special rehabilitation centres established for soldiers suffering from the condition. Structural change in the heart was no longer held responsible for Effort Syndrome: the basis of symptom formation was an altered response to effort. Treatment therefore was directed to improving the general health of the patient by graduated exercises, and his attitude towards his illness by reassurance and encouragement.

Equally dissatisfied with the old diagnoses and their insistence on the heart but unwilling to acknowledge effort as the main causal factor, Oppenheimer (1918) introduced the term 'neurocirculatory asthenia.' He considered this a more accurate description because it, at once, referred to the circulatory symptoms which are prominent and to the unsatisfactory mental and physical background against which they appear. The term has remained the accepted designation in the United States of America. The third notable contribution was that of Grant in the 5 years after the war. He followed up over 600 cases of Effort Syndrome with reference to the general prognosis and the development of Valvular Disease of the Heart, Hypertension and Thyrotoxicosis. One case only developed Valvular disease while permanent invalidism was the fate of 56%.

For the next twenty years little was added to our knowledge. The contributions of Craig and White (1934), White (1937) and others showed that the
condition existed in civilian practice but little attention was directed to it until the outbreak of the present war.

The new interest has been lively and well directed. For the first time since its recognition in 1864 the condition is being investigated in an exhaustive and objective manner. The importance of effort, except as a precipitating factor is no longer stressed; indeed recent work suggests that in the case of some symptoms the assumption that they can be produced by effort is erroneous. (Wood 1914). The suggestion of a purely physiological origin was put forward by Soley and Shock (1938). They found that voluntary hyperventilation produced many of the symptoms and considered that this might be the causal factor. The view gained prominence for a time but was denied by clinical workers who found few cases who exhibited hyperventilation. Recent work has shown that while certain symptoms, e.g. dyspnoea, produced by other causes may be perpetuated by hyperventilation it is not in itself the cause. More important are the psychological factors stressed by Spillane (1940) and other workers. A. Lewis (1941) WittKower et al (1941) have carried out detailed personality studies in cases of the syndrome and find significant correlation between symptom formation and previous mental build. Symptoms, formerly accepted unreservedly have been investigated and an explanation sought - inframammary pain (Wood 1941) breathlessness (Maxwell Jones and Scarisbrick 1941, Sargent 1940). A meeting of the Psychiatric and
medical sections of the Royal Society of Medicine has been devoted to the subject and the results are to be published. Finally, the War Office, appreciating the importance of early, correct diagnosis and the dangers of prolonged hospitalisation have prepared a resume of the acknowledged facts for distribution to officers of the Army Medical Corps.

When this conservative authority publishes in the section headed aetiology, 'In most cases the essential basis is undoubtedly psychological' we can safely assume a general if unwilling consensus of opinion among the leaders of the medical profession.

CLINICAL PICTURE

Symptoms are multiple, variable and frequently associated with effort. The very small part that effort per se plays in the formation of symptoms has already been stressed and will be developed later. To patients it is the principal factor in the production or aggravation of their distress.

The main symptoms, breathlessness, faintness and dizziness, palpitations, fatigue and praecordial pain will be dealt with separately. The minor are even more variable, never occur except with one or more of the major symptoms and are referable to every system in the body. The commonest are headache, tremors, insomnia, nausea, cramps, dry mouth, anorexia and flushes.
BREATHLESSNESS

Some respiratory distress is found in practically all cases. In the majority it is experienced only during and immediately after exercise but in the more serious it persists at rest. Unlike cardiac dyspnoea which may appear alone, the breathlessness of Effort Syndrome is only one of a group of symptoms. Clinical examination is not helpful; the distress complained of is out of all proportion to observed signs.

The breathing is rapid, shallow and irregular in time and depth and these changes are accentuated by effort. Breath holding is poorly performed, 10-15 seconds being the limit in severe cases. Spillane (1940) supports the observations of White and Hahn (1929) of the increased tendency to sighing respirations at rest. The rise in the minute respiratory volume after exercise is greater than normal, and a longer time to return to resting volume is required (Jones and Scarisbrick 1941). The circulation time is normal (Spillane 1940). The CO₂ combining power of the blood is normal and as Wood points out 'the evidence indicates that patients feel breathlessness when the CO₂ of arterial blood is lowered to a degree which causes Apnoea in normal persons.' By experiments with cerebral vasodilators and respiratory centre stimulants he showed that the fault is not central. Lewis (1918) and Levine and Wilson (1919) found the vital capacity of the lungs in Effort Syndrome normal except in a few cases with poor thoracic development. Jones and Scarisbrick (1941) have shown however a mean vital capacity of 2,840 ccs.
compared with 4,172 ccs in normal controls but can offer no explanation.

Lewis (1940) suggests that the cause of both deficient breath holding and dyspnœa may be 'emotional' while Wood holds that the former is in some an hysterical manifestation or lack of determination. He draws attention to the effects of emotion on respiration as described by Darwin (1872) and Cannon (1929). Quoting the former's observations on the somatic accompaniments of fear or other unpleasant emotion, 'altered breathing is invariable - it is usually hurried and as fear increases to terror it becomes laboured.'

PAIN

A complaint of pain was made by 66% of cases in my series. In all it was produced or aggravated by effort, experienced in and around the apex of the heart and radiated from there in only two cases where it seemed to 'bore through' to the angle of the left Scapula. Commonly it was a dull ache with occasional stabs of greater severity. In half the cases it persisted for a short time after effort. Associated with it in a few patients where the pain was marked and formed the principal complaint were three signs not otherwise encountered - hyperalgesia of the skin over the praecordium, tenderness of the left pectoral muscles on pressure and erection of the left nipple.

The controversy whether the pain is 'genuine', dependent on noxious stimulation of sensory nerve endings or whether it is of psychogenic origin - a
mental image of pain, is not yet settled. From recent experiments Wood (1941) has concluded that this left inframammary pain arose in muscle or fibrous tissue and may be due to fatigue or strain of respiratory muscles or to the incessant trauma of an overacting heart. While such an explanation may be true of a certain number of cases - those in whom poor thoracic development with faulty respiratory rhythm and defective diaphragmatic movement predisposes to such strain, it does not appear to cover all cases. His arguments against 'imaginary' pain are inconclusive; namely, that the pain is too constant, and that medical colleagues who have suffered from it are good witnesses of its reality. On the other hand we know that the pain in a phantom limb can persist unchanged over long periods and we have no evidence to suppose that a medical training confers more insight into a personal functional illness which by its nature exists because of the lack of just that critical faculty. Finally on general grounds it would be unlikely that, as shown by Wood, all the symptoms except one, the left chest pain, were centrally determined. It would be more probably that the pain also is derived from the same source as the other symptoms; namely from a disordered psyche.

The incessant minimum trauma of an overacting heart may well summate into pain, not by muscle strain but by the constant bombardment, by unpleasant sensory impressions, of an anxious and uncritical consciousness. Once established the pain is maintained by the factors
which produce it, both physical and mental.

Pain resulting from faulty respiratory muscles presumably can be permanent unless the mechanism is corrected. The painful stimule from a strained muscle, e.g. the pectorals injured in cranking a car, which Wood also puts forward as an occasional cause, should cease with muscle repair. He offers no evidence that in these cases pain disappears with the return of muscle health. If a purely psychological perpetuation is possible what reason is there to doubt a purely psychological inception?

PALPITATION

Consciousness of the heart's action is common in healthy people after exercise or extreme emotion and is associated usually with a rapidly acting heart. It is frequently complained of by Effort Syndrome patients but is only significant in that, on account of their heightened sensibility about their health and their general nervous state they have converted a natural feeling of distress into a pathological symptom. Preoccupation with the palpitation may be, as was pointed out earlier, a factor in the production of inframammary pain. Very few patients with organic heart disease complain of palpitation but the sufferer from cardiac neurosis is only too aware of any excessive cardiac action.
FATIGUE

The obvious causes of fatigue do not apply to effort syndrome. After excessive exercise the accumulated products of metabolism produce symptoms which might be termed 'physiological fatigue.' The important ones are physical weakness, disinclination for further effort, mental tiredness and in some cases tremors. The failure to supply sufficient energy-producing food, or the disturbed use of that food, produces the fatigue of starvation and physical illness. There is no reason to suspect a defective carbohydrate metabolism in Effort Syndrome.

The fatigue of effort syndrome, contrary to the teaching of Lewis is not the result of effort but commonly limits effort by its presence. It often appears on rising in the morning and persists all day independently of exercise. It is both a physical weakness and a mental lethargy. It is similar to that encountered in many purely psychological illnesses - depression, chronic anxiety states and in pure culture in the rare neurasthenia. It is centrally produced by a similar mechanism.

The continual readjustments of modern life, the repeated compromises necessary between endopsychic demands and external reality and the frequent conflict between personal ideals and expediency require a ceaseless flow of mental energy and resolution for their solution and for the preservation of health. Failure in these efforts bulks largely in the causation of mental and functional illness.
When resolution is lacking fatigue soon appears; when fatigue excuses the lack of self criticism it will persist and in time will replace the resolution. For the treatment of the fatigue of effort syndrome a metaphorical rather than a literal squaring of the shoulders is necessary.

**FAINTNESS AND GIDDINESS**

In most effort syndrome cases who complain of faintness and giddiness the symptom is purely subjective and no abnormality is found on examination. In these, actual fainting and unsteadiness are uncommon; a transient senation of nausea and light headedness only is experienced. The symptom is prone to exaggeration. Where the symptoms are more severe some degree of Vasomotor lability is commonly found. Acute dizziness, faintness, collapse and syncope have occurred at various times e.g. on withdrawing blood from the arm or measuring blood pressure, and with no apparent exciting cause, when the patient is waiting for medical examination or standing on parade. The situations however are similar in that in all there is a heightened sensibility and raised mental tension.

Lewis has noted an undue Systolic blood pressure fall on changing from the lying to the upright position and considers these cases related to the orthostatic albumininrias of younger people. He offers a similar explanation in these cases which occur immediately after effort.

Spillane (1940), seeking a physiological basis
for these symptoms, examined Carotid Sinus Sensitivity in view of the findings of Weiss and Baker (1933) on Hypertension. In 90% there was no abnormality except that many patients expressed more distress than normally. This he attributed to the general nervous state of these patients. In the remaining 10% he was able to induce faintness, dizziness and syncope. No correlation was thus possible between these findings and the spontaneous occurrences.

The vegetative nervous system forms the somatic pathway for emotional expression. It is to be expected that a heightened and abnormal emotional state would induce exaggerated responses in this system.

The clinical picture is completed by consideration of a few signs which have one factor in common — that they readily appear under the influence of emotion.

While, after some experience the majority of these patients can be quickly recognised by the anxious facies and unstable autonomic system, there can be no doubt that others exist in whom a correct diagnosis will only be reached after a careful examination; under an apparently outward calm may lurk considerable emotional distress.

Tachycardia is the commonest cardiac sign; to it can be ascribed in large part the original term 'irritable heart' and Lewis' insistence of the significance of effort. Casual examination may give misleading results. Throbbing of the carotid arteries in the neck immediately draws the attention of the examiner.
to the soldier's heart. The pulse rate may be rapid (100 - 160 per minute) and the apex beat forceful. At this time the palpating hand may detect a cardiac impulse so slapping as to be reminiscent of Thyrotoxicosis or Mitral disease and with the Stethoscope this suspicion may be confirmed by the presence of a systolic bruit. Dismissal at this stage might lead to a gross diagnostic error. Not until the patient is calmed a little by lying down should a final opinion be expressed. Then the pulse rate will be slower and the heart action normal.

The exercise tolerance test shown no evidence of myocardial insufficiency but is poorly performed by many patients. The return of the pulse rate to the resting value is slower than the normal two minutes and many patients are unable to complete the test on account of pain and respiratory distress. Meakens and Wilson (1918) found that the acceleration of the pulse rate due to emotion, (induced by sudden noises), was greater in Effort syndrome than in normal controls and consider this test of more significance than the response to effort. There is no inherent irritability of the cardiac musculature but, via the hypersensitive state of the Autonomic Nervous System, the heart is more liable to exaggerated response. Indirect stimulation of the heart through the Sympathetic Nervous System gives a normal response; this is in contradistinction to the result in Thyrotoxicosis and is a useful diagnostic point. Experiments with Atropine on the heart rate show
Vagal tone to be normal.

Provided Paroxysmal Tachycardia and Thyrotoxicosis can be excluded the commonest cause of persistent rapid heart action without other physical signs is emotion.

The fluttering heart of the lovesick maid and the pounding of the soldier's breast have long been known to romantic writers. In Effort Syndrome the causal emotion may vary but the result is the same: palpitation and tachycardia.

A common observation in patients was undue sweating. The constant distribution in the axillae and on the palms of the hands was striking. In severe cases a constant trickle of sweat ran down the chest wall throughout the examination. It was not produced by effort or by heat; some of the most marked cases had waited for \( \frac{1}{2} \) to 1 hour in a cold waiting room in winter, nor was the sign more common in warm weather. Wood (1941) has pointed out that this distribution differs from thermal sweating of which that following exercise is an example. Associated with this symptom in some cases were cold blue hands the result, as White (1935) proved by sympathectomy, of Vascular spasm. This association and the peculiar distribution serves again to exclude Thyrotoxicosis where both dorsum and palm are affected while the hands are typically warm and pink.

In those cases where such overt manifestations were present tremor was frequently observed. This was coarse and irregular in type, easily distinguished from the fine regular movements of Thyroid disease, and
accentuated by examination, attention or any procedure which increased the already over tense and anxious state.

AETIOLOGY

A clear conception of what is meant by the diagnosis Effort Syndrome is necessary before any discussion of aetiology is possible. The necessity arises because of the many factors suggested at various times as causative or contributory.

This paper has shown that there is no demonstrable physical pathology and has suggested that the few signs which may appear are the autonomic response to emotion.

Lewis (1940) found that 50 - 60% of his cases dated their symptoms from illness and held that, in a few, infection was the sole cause. The latter are not really cases of Effort Syndrome. They are part of a group which shows, at one end chronic physical ill-health and at the other the temporary asthenia of convalescence. In all a physical cause is present and the diagnosis should be made accordingly unless the symptoms persist when the cause is removed.

Effort Syndrome comprises those cases which remain when all physical cause has been excluded or when the symptoms are out of proportion to the lesion found.

Modern psychiatric thought following the teaching of Adolf Meyer holds that mental health depends on a
satisfactory adaption to the organism to its environment. This implies not only a solution of the problem of survival in the material world but a personal compromise between powerful instinctive forces and the dictates of training and convention. Since the conflict in the latter case is on an unconscious level the appearance of symptoms due to a failure of adaption is as inexplicable to the patient as to an observer unless psychological search is made. To such failure are attributed the Psychoneuroses and certain Psychoses. To such also the Effort Syndrome.

Here failure is never sudden; in the majority the onset of symptoms is correspondingly slow and insidious: the conflict is frequently unconscious so that the patient is almost unaware of his illness until physical symptoms appear. The symptoms are frequently present but not disabling; only an unusual strain renders them intolerable. The Effort Syndrome patient does not differ from the physically ill in attributing his illness to the obvious, namely, that which makes him first conscious of it. The basic causation is not apparent or its significance is misunderstood.

Precipitating factors in Effort Syndrome are many and variable: a few require consideration.

**PHYSICAL ILLNESS (INCLUDING WOUNDS)**

If a maladjusted personality is accepted in the genesis of effort syndrome it is not surprising that so many patients attribute their symptoms to physical illness. Individual reaction to illness varies within
wide limits; medical students are exhorted to study the patient with the disease and to give due cognisance to the attitude of the patient to his illness. Illness, however, offers to all a release from responsibility; to the irresolute a readily accepted escape from the continual effort of life, both mental and physical; to the courageous, submission to eternal discipline and a temporary refuge from further difficulties. If by illness the potential Effort Syndrome patient is able to shelve his difficulties and shift his responsibilities the period of recovery and convalescence is manifestly optimal for the appearance of symptoms.

Rheumatic fever is the commonest precipitating illness on account of the attention paid to the heart and the necessarily long convalescence. Lewis found it in 12% of his cases and Parkinson, finding the incidence of Rheumatic Fever higher than in normal people, suggested a residual myocardial inferiority without valvular disease as a causal factor. There is, however, no evidence of Cardiac insufficiency and the Erythrocyte Sedimentation Rate is invariably normal.

Symptoms have been described following many illnesses - influenza, P.U.O., and pneumonia being among the most common.

Certain symptoms are common to Effort Syndrome and the period of Convalescence - tachycardia, nervousness, breathlessness and readily induced fatigue. Only when the original cause is removed and the period of regaining full health prolonged beyond normal limits does
convalescence merge into Effort Syndrome.

Infection and physical illness are casual only in so far as they expose latent mental instability; without further investigation the unconscious purposiveness of a perpetuated illness may be no more apparent to the doctor than to the patient.

SERVICE AND TRAINING

Mobilisation for War is probably the greatest human test of mass readaptation. Thousands of men from all walks of life, from all trades and professions and with widely different physical and mental gifts are gathered together and subjected to a uniform training. In all but the most fit and adaptable there will be strain. The sedentary work of civil life will reach 'toughness' by way of fatigue and aching muscles; to the student the noisy comradeship of the barrack room will be for a time poor substitute for the privacy of his study; the gourment will not find his personally chosen delicacies in the army mess room and the only child will be unsupported and alone.

The majority will benefit and complete their training: from a mixed group will emerge a standard in physical endurance and reaction. Others will fail. They will fail at various stages of their training and with different symptoms. To the anxious, the depressed, the maladjusted, the combination of difficulties may be the last straw. They collapse early. If the typical physical features which have been described then appear, such patients will be recognised as belonging to the
Effort Syndrome group.

Lewis points out that the majority of Effort Syndrome cases 1914-18 occurred not during training but on duty later. The picture however is no different. The exposure to cold in trench warfare, the irregular feeding, the violent noises, the exhaustion and recurring fear are but added straws—straws being heaped gradually on the camel's back until adaptation fails and the break occurs.

EMOTIONAL STRAIN

In considering this as a precipitating factor I use the term in the narrow sense of emotional reactions produced by external stimuli and do not intend to be included the continual endopsychic conflict between instinct and ideal. These strains are not peculiar to war; the economic instability, the domestic and business worry and the uncertainty of modern high pressure living produce the same results in civil life. War however provides its own contribution—the ever present fear of death for self and family, the horror, the incessant violent noise, the fatigue and privation. Cannon has described the normal response to severe or continued emotion and everyone has at some time experienced it—on the physical side, tachycardia, trembling, sweating, palpitation, polyuria, etc., and on the mental side, increased tension, exaggerated reaction and sustained expectancy. Criticism fails, anxieties increase out of all proportion to their cause, molehills become indeed mountains. It is not surprising
that in those of poorly integrated personality the re-
action will be excessive and the symptoms will not
subside with the disappearance of the stimulus.

These produce the reactive depression and the
anxiety states on the purely mental side and on the
psychosomatic, the anxiety hysterias and the Effort
Syndromes. Only psychological investigation will
explain the perpetuation of symptoms.

In spite of the obvious importance of these
precipitating factors, experience has shown that there
are other factors more remote and more personal which
are at work. For convenience we may refer to these as

PREDISPOSING FACTORS.

We have seen that, given suitable soil and suffi-
cient aggravating strain, Effort Syndrome is likely to
develop. If that soil is prepared by adverse
environmental influences the onset of symptoms under
difficulty is almost inevitable. The most important
of these influences are the attitude of the parents
towards the patient during his childhood and the un-
guarded and sometimes illadvised recommendations of the
family doctor.

Many of the patients have had a sheltered and
protected childhood. Pampered and coddled at home they
have been spared, throughout their developing years and
into youth, the rough and tumble of normal childhood.
Anxiety and apprehension about their health have
developed from the fussing and over solicitous attitude
of parents and relatives during minor illnesses. School
has found them unprepared, timid and unselfreliant. Restrained from the dangers of games by anxious parents, helped over every stile and enjoined constantly to be careful, it is not surprising that they regard themselves as somewhat different and less robust.

The influence of the family doctor is but part of the same process. By misdiagnosis, by ill advised desire to please anxious parents, by undue convalescence the conviction of illhealth is fostered. This is well exemplified in those cases following Rheumatic Fever. Uncertain of the significance of a cardiac murmur, confusing the fatigue of recovery with that of cardiac insufficiency, a regime is recommended destined to preoccupy an already apprehensive patient with his physical health. What follows may be undue avoidance of fatigue, curtailment of exercise and attention to every symptom however trifling. This vicious circle established it is difficult to break. Exercise promotes fatigue; fatigue alarms and exercise is therefore reduced. Physical fitness then becomes an impossibility, so that in later life, under unexpected strain collapse is almost certain.

The observations made in this paper support the view of the importance of mental factors in the aetiology of Effort Syndrome. Further evidence in favour of this view is afforded by studies of family history. Oppenheimer and Rothschild (1918) found psychopathic manifestations, such as nervousness, insanity
and epilepsy in the parents of 56% of patients. This percentage is less than the 60-74%, given by various writers of the recognised Psychoneuroses but is almost four times as great as in normal controls (Wolfsen 1918). It is not known whether this parental influence acts by heredity or by precept but investigation has shown that Effort Syndrome patients are rarely well adjusted and that a psychiatric diagnosis is possible in the majority.

WittKower et al, whose character studies have already been referred to, suggest a special personality as most likely to develop the symptoms. The majority of these cases exhibited obsessional characteristics with an overkeen sense of duty and over rigid morality. A. Lewis found depression the most common psychiatric condition. My experience has been that, while the diagnoses Anxiety State and Depression are more often applicable than any other, the mental state varies considerably and covers practically the whole psychiatric field. The syndrome is no less an escape into illness than the conversion symptom of the hysteric. The basic psychopathology of which the illness is the expression will vary according to the previous mental build of the sufferer.

In the constitutional type, whose physical inadequacy and lack of mental robustness handicap them from an early age, psychological search will be fruitless, for the maladjustment is the whole individual and is genetic rather than psychogenic. At the opposite pole is the case of recent onset after prolonged or severe
emotional difficulty. As in many neuroses with somatic manifestation, the significance of the causal emotion is not apparent to the patient. The linking up of cause and effect will improve if not cure. Between these two extremes are the majority of cases.

The psychiatrist cannot be content with the term Effort Syndrome except as a useful administrative label. The final diagnosis must be of the mental state found and no permanent improvement is possible unless the psychological difficulty can be solved.

**TREATMENT**

It is customary to discuss medical treatment under the two headings, prophylactic and curative. Complete prophylaxis in the case of Effort Syndrome is manifestly impossible; the eradication of causal factors is in the province of the economist, the social legislator and even the geneticist as much as in that of the medical man. The latter can only ensure that the factors over which he has direction are optimal and that, if the condition is suspected, measures are instituted to check further development.

'Square pegs in round holes' are common enough in peace time; there is an inevitable increase in time of war. Few men can find a niche in their own speciality; the demand is for a standard fighting man. To some the change of occupation is welcome, to many others the novelty of the new life merges gradually.
into an accepted routine; to the 'potential Effort Syndrome' and to the man who precarious foothold in civil life has been maintained at the price of symptoms there is only increased strain and difficulty. If these men are recognised at this early stage much wastage of manpower might be prevented. An immediate diagnosis, an assessment of their limitations, and the choice of the army occupation most suited will in many cases prevent the occurrence of disabling illness.

Attention to personal idiosyncrasies in the army is impossible when the aim is to train and equip as large a body of men as possible in the minimum time. Formerly in a hurried, intensive training the weaker fell by the wayside and were disposed of. Provision is now made for many of these men by the power of medical Recruiting Boards to recommend graduated training. The sedentary worker of civil life is thereby enabled to reach the same standard of fitness as the trained athlete but by a slightly longer route. The same power is given to the Regimental Medical Officers of young soldiers' battalions and recruiting depots. Careful examination on enlistment and in the early days of training will pick out the men who require a less strenuous introduction to army life and much unnecessary illhealth and inefficiency will be avoided. Some will still fail and require disposal but the number will be much smaller.

The constitutional type described in an earlier section should not get past the recruiting board. Their physical inferiority and failure in civil life make them
easily recognisable. They are obviously unfit for service and will be a problem and a liability to any unit.

One further group must be considered before curative measures are discussed - those patients whose long standing disability has rendered them capable of only sedentary work. If even their symptoms persisted and working time was lost they are useless for army service and must be returned early to civil life in the hope that they may be able to maintain there some measure of health.

Three groups of cases remain; those whose symptoms have appeared only on training, those who have suffered from mild but not disabling symptoms before enlistment and those cases whose breakdown has resulted from recent emotional difficulty.

In all, the first essential is rapid diagnosis. Lewis (1940) and Culpin (1941) have stressed the danger of repeated examinations to exclude organic disease. From the nature of the illness nothing can do more harm. A single thorough physical examination is sufficient. For the same reasons hospitalisation is contraindicated in the majority of cases. As in the pure psychoneurotic illness occupation is essential. It is as dangerous to excuse the Effort Syndrome patient from duty as it is to advise the melancholic to shake off his depression by distraction and amusement.

It has been the custom in this hospital to reassure these patients about their symptoms and offer them an immediate and simple explanation of their
production. They have then been returned to their units for graduated training if recruits or for a few weeks light duty if trained soldiers. In some cases where it seemed advisable a change of duty was recommended. If improvement did not take place within 6 to 8 weeks of such regime admission to a special rehabilitation centre was arranged. The necessary period of delay before admission was spent at work.

Treatment in these special hospitals follows the lines laid down by Sir Thomas Lewis during the last war. An atmosphere of invalidism is avoided, discipline is maintained, the doctor has a purely advisory capacity and 'treatment' is under the direction of specially trained army instructors. Patients are grouped according to their capacity for effort and exercise; training is instituted accordingly; by the demonstration to each patient of his increasing capacity for effort without disabling symptoms, confidence is restored, optimism engendered and the heart exonerated in the patient's mind.

In spite of the obvious importance of mental factors in the aetiology of Effort Syndrome Psychotherapy has a limited application in treatment. Its place is nevertheless important. In the constitutional type and in the long standing case of civilian life, the malady is so much the individual that even deep analysis would offer no hope of betterment. For the recoverable cases the quite non specialised psychotherapy adopted in this hospital would seem sufficient - reassurance, encourag
ment and a simple explanation of their symptom causation. It has proved especially successful in the cases occurring for the first time during training and in a few otherwise healthy young men who have dated their symptoms from the suspicion of heart disease induced by their doctor.

In a few cases where a short examination reveals conscious or near conscious conflicts and difficulties, improvement will not occur without their solution and expert psychiatric aid is required.

**SUMMARY AND CONCLUSIONS**

Effort Syndrome has been surveyed from a Historical, Clinical and Aetiological viewpoint.

The importance of the problem in war time has been stressed, the reasons for the apparent increase in incidence stated, and suggestions for dealing with the various types of cases outlined.

The gradual change from the belief in a purely physical causation to the present psychological approach has been outlined.

The symptoms and signs are the 'physiological response to emotion' rather than to effort and occur in poorly integrated personalities or at times of severe emotional strain.

The condition arises from a maladjustment to environmental factors, conscious and endopsychic, and is more closely related to the Psychoneuroses than to Physical Disease.

Prophylaxis is difficult and, as in the pure
Psychoneuroses, is more Sociological than medical. Curative treatment will not be effective unless the emotional background is appreciated and dealt with.

A psychiatric diagnosis is possible in the majority of cases.
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CASE HISTORIES

CASE IN BARRY A, age 39 yrs. Complains of excessive faintness, precordial pain and breathlessness on slight exertion. He states that he has had attacks paroxysms of similar symptoms for the past two or three years in civil life but that since joining the army the attacks have become more frequent and more severe. The present one is so disabling that he cannot perform elementary drills without distress.

He had a protected childhood and adolescence; both parents were rather nervous and afraid of illness. After an attack of Scarlet Fever in childhood he was taken to a dynasty Group Specialist who declared that his heart muscle and mind avoid overexerting himself. Even those times, encouraged by his parents, he had been very careful about his health and has avoided unnecessary stress and fatigue.

Physical: Pale face, looking rather flabby young man. On examination the patient's tongue was large, smooth, and protruded with a tendency to indulge in frequent movements. Cardiac examination revealed no organic abnormality; pulse 102; blood pressure 110/70. Heart rate 102 per minute. Chest X-ray revealed no abnormal findings. The pressure was raised in the upper arteries and a faint systolic murmur was heard. After a few minutes the systolic murmur disappeared but the heart rate dropped to 80. The patient complained of general weakness, dizziness, and anorexia. After a few minutes a breathing of the ears and palms of the hands was noticed, followed by the observation of the extraneous hands.
CASE 1. PRIVATE A. age 27 yrs. Complains of dizziness; faintness, praecordial pain and breathlessness on slight exertion. He states that he has had short periods of similar symptoms for the past two or three years in civil life but that since joining the army the attacks have become more frequent and more severe. The present one is so disabling that he cannot perform elementary drill without distress.

He had a protected childhood and adolescence; both parents were rather nervous and afraid of illness. After an attack of Scarlet Fever in childhood he was taken to a Harley Street Specialist who stated that he had a heart murmur and must avoid overstraining himself. Ever since then, encouraged by his parents, he has been very careful about his health and has avoided excessive exercise and fatigue.

Examination: Unhealthy looking, rather flabby young man; overweight and obviously unfit. Anxious, worried expression; apprehensive of examination; Cardiovascular system showed no organic abnormality; pulse full, wave well sustained; Heart rate 100 per minute. B.P. 140/80 (patient trembled violently when the pressure was raised in the Sphygmomanometer arm band); slapping first sound in the mitral area. After a few minutes in the recumbent position the heart rate dropped to 78 per minute. No cardiac enlargement and no bruits. Chest expansion poor with deficient filling of lung bases. Sweating of the axillae and palms of the hands was marked; fine tremor of the outstretched hands. No evidence of Hyperthyroidism and apart from slight
obesity nothing abnormal in any system.

CASE 2. GUNNER B. Age 22 years. Referred to Hospital on account of shortness of breath on exertion, tachycardia; left inframammary pain and nervousness.

In civil life has suffered from similar symptoms for ten years and was occasionally confined to bed for several days on this account. Has always been nervous and retiring; did not play games because he did not feel strong enough; led a rather lonely, studious life; did not make friends readily and preferred going away by himself with a book to playing with his fellows. Conscientious and industrious at his work.

Examination: nervous and tremulous; feels depressed because he has had to report on sick parade; "Would like to be strong and fit to do my bit with the others."

Pale, weedy looking, bespectacled youth; slight upper lumbar scoliosis with stooping posture; narrow poorly covered chest; pulse rate 110 per minute dropping to 80 per minute after a few minutes rest; diffuse apex beat but no evidence of enlargement or Valvular disease. Marked tremor of the outstretched hands and profuse axillary sweating.

On account of his anxiety to serve and do well he was returned to his unit with a recommendation for graduated training combined with frequent reassurance and encouragement.
CASE 3  Driver C.  Age 22 years.  Complains of shortness of breath on slight exertion, pain in the praecordial region, palpitations and dry cough.

Has always been considered 'not very strong;' was absent from school frequently and was never able to take part in games. Pulmonary Tuberculosis was suspected on two occasions; between the ages of seven and eleven when he did not attend school at all and again from age nineteen to twenty when he had treatment at home from his family doctor. On this second occasion the symptoms were similar to those now present but less marked. No signs of active Tuberculosis were ever found. He has always been nervous about his health and has taken care not to overexert himself.

Examination: slight build; nervous and uncertain in his history; diffident and hesitant in speech; long narrow chest and slightly stooping shoulders. Marked pulsation of Carotid Arteries in the neck; deficient expansion of chest on both sides but no signs found of active disease. Marked axillary sweating; hyperaesthesia over left pectoral region. Heart rate 100 per minute; forcible apex heart with slapping first sound at the mitral area; no cardiac enlargement, no thrills and no bruits.

CASE 4.  Private C.  Age 25 years.  Complains of 'pain over the heart,' shortness of breath on exertion and palpitation.

Has always been of a nervous disposition, easily upset and inclined to worry unnecessarily over trifles;
appreciates the disability and realises it has made life more difficult, but cannot wholly control it. Has never lost time at work on this account nor consulted a doctor. The change from civil to army life produced an aggravation of his general nervousness so that for a short time after enlistment he became restless, apprehensive and sleepless. These symptoms gradually became less marked as he settled down to army training and he had little trouble until three weeks ago, when he experienced the first air raid. It was of short duration and not severe but he became jumpy, restless and tremulous and had difficulty in controlling himself. On that night he could not sleep and was for the first time conscious of his rapid heart action as he lay in bed. Since then he has experienced a sharp pain over the heart and breathlessness on exertion and was forced finally to report sick.

Examination: Thin asthenic man; nervous and apprehensive of examination. Constant nervous movements of hands and face during the interview. Chest narrow and poorly covered; expansion fair; pulse regular 110 per minute; P.B. 130/80, apex beat diffuse and forcible in 5th intercostal space; marked sweating of axilla and palms of hands; no evidence of organic disease in any system.

This man had some inside into the causation of his symptoms. After an explanation of their production, and reassurance about his physical health he was returned
to his unit for graduated training under medical supervision.

CASE 5. Gunner D. Age 27 years. Service 5 weeks.
Complains of sharp praecordial pain, breathlessness and palpitation on exertion.

Until a few years ago was in very fit physical condition. Was a regular soldier and played games regularly. In 1935 had Left basal Lobar Pneumonia with a long convalescence since which he has played no games. He was recalled from the Army reserve five weeks ago and has found the training difficult and distressing on account of above symptoms. He attributes these symptoms to his unfit state but is nervous about his heart and would like reassurance.

Examination: Tall, well built youth; pale and with rather flabby muscles. Chest expansion full and equal; lungs clear; Cardiovascular system; pulse rate 100 per minute when first examined in upright position; slowed to 90 after a few minutes rest on the couch. B.P. 120/85. No cardiac enlargement and no bruits. Hands moist and show fine tremor; no evidence of Hyperthyroidism.

Readily accepted an explanation of his symptoms.

In view of his past history, the recent onset of symptoms, and his wish to continue service he was returned to his unit for training.

CASE 6. Driver O. Age 24 years. Service 9 months.
Complains of palpitation, praecordial pain, breathlessness,
general nervousness and fatigue.

Ten years ago patient had sudden praecordial pain while playing football. He collapsed on the field and had to be carried home. He does not remember how long the pain lasted but he was confined to bed for four months by the family doctor. The diagnosis Rheumatic Fever with Carditis was made although the patient cannot recall either pain or swelling of his joints. Since this illness he has been taught to be careful of his heart, not to overexert or overtire himself and has always accepted the fact of a 'weak heart,' though he had no further symptoms till 1934. In that year he attended his doctor with 'tachycardia and cardiac dilatation,' and spent three weeks in bed. Thereafter he has had no further illness but prior to army enlistment played no games and avoided all exercise.


On account of previous medical advice and two periods of bed treatment for 'heart disease' this
patient was unwilling to accept the reassurance of cardiac health at one interview, and was recommended transfer to a military rehabilitation centre.

CASE 7 Trooper B. Age 32, Service 10 weeks. Complains of shortness of breath on exertion, palpitation, nervousness and fatigue.

Childhood and adolescence were punctuated by numerous though minor illnesses so that his school attendance was frequently broken. Rheumatic fever was diagnosed when he was 10 years old, though he spent only three weeks in bed and was absent only six weeks from school. Bouts of tonsillitis, respiratory catarrh and heavy 'colds' accounted for the other illnesses. Since the Rheumatic Fever he has not been considered very robust and though not deliberately avoiding games had never since taken regular exercise. In 1929 he received a head injury and was unconscious for twenty hours. He suffered from severe headaches for the following six months. The present symptoms have been present for one year; in addition, since joining the Army he has fainted on three occasions: from his description these would seem to have been of Vasovagal origin occurring in association with excitement, effort or a stuffy atmosphere.

Examination: Thin, undernourished, weedy looking man with drawn anxious expression. Diffident and hesitant in giving his history and not very willing to discuss his symptoms. Tremor of outstretched hands: hands cold and blue; chest thin and underdeveloped but
showing no evidence of active disease: Pulse rate 95 per minute. B.P. 130/95; apex beat regular, forcible in the 5th and 6th intercostal spaces in the nipple line. Auscultation in the upright position showed a coarse Mitral Systolic murmur conducted slightly towards the Left Axilla; in the prone position this disappeared and was not heard in that position even after exercise. No thrills and no evidence of Aortic disease. In view of the quality of murmur in a rapidly acting heart and the fact that it disappeared as the heart rate slowed little significance was attached to it. Recommendation was made for graduated training; failing improvement admission to a rehabilitation centre was advised.

CASE 8. Cadet G. Age 27. Referred to Hospital with a history of fainting attacks, shortness of breath on exertion and general nervousness.

Enjoyed healthy childhood; had no serious illnesses, played football and cricket at school and enjoyed all games. Has always been considered rather "highly strung," sensitive and easily offended. Had no difficulty in making friends and is popular with his fellows. Further enquiry into the fainting spells and associated symptoms showed that they usually occurred when he was in any way anxious or tensed as on the parade ground or on guard. The shortness of breath was not excessive, but exercise which would have caused no distress one year ago is now attended by fatigue and dyspnoea.
Examination: Tall, well built youth. Intelligent, co-operative and anxious to be fit. Pulse rate 75 per minute; P.B. 80. Exercise tolerance test normal. Patient had found that Ether and Carbon Tetrachloride tended to produce an attack. Given Ether to smell he had what he afterwards described as a typical attack - after 10-15 seconds he felt faint and slumped to the floor; the pulse rate and Blood pressure did not vary from normal nor did his colour change. This was confirmed by repitition.

These findings ruled out Vasovagal attacks and he was considered to be an Anxiety State or what Freud has termed an Anxiety Hysteria showing the Effort Syndrome Symptoms. He was referred to the Psychiatric Division and treated by explanation and suggestion. The report on his case after one month of treatment as an out-patient was that he showed marked improvement, was still nervous and a little apprehensive of drills, but that he had had no further fainting attacks.

CASE 9. 2nd/Lieut. P. J. Age 32. Service one year. Complains of palpitation, rapid heart action, fatigue on slight exertion, praecordial pain and breathlessness.

Has never had any serious illness; played games at school and University and enjoyed strenuous exercise without discomfort. Joined the Army at the outbreak of war and was Commissioned soon afterwards. Posted to a Regular regiment, he quarrelled with his Commanding Officer and was made to feel an amateur by his fellow officers. Tried hard to do his job well and adapt
himself to the new life but became nervous and lacking in confidence. His income had dropped considerably since war began and this was an added source of anxiety since he had to keep his invalid mother and his wife as well as to meet his Mess obligations.

Two months ago he had a T.A.B. inoculation and developed a painful arm and reactive pyrexia. His unit Medical Officer gave him one week's sick leave which he spent in Ireland. Feeling no better after a few days there he consulted a civilian doctor who told him he would not be fit for work for months and extended his leave for 14 days. The diagnosis was not given. After the extended leave he was posted to a new unit where the work was easier and near his home. Improvement resulted. Recently he has again become anxious and depressed and the symptoms which he had first in Ireland have recurred. During the last two weeks he has had repeated medical examinations and a medical board consequent upon his extended leave.

Examination: Quiet, reserved man; unwilling to discuss his case fully or talk about his difficulties. Restless uneasy and nervous throughout the examination. Appears fatigued and anxious. Physically of fair build and nourishment. Chest well covered, expansion full and equal. Cardiovascular System: Pulse rate 110 per minute at the beginning after examination; slowed to 80 per minute after a few minutes rest in the recumbent position. B.P. 120/85. Apex beat diffuse and forcible; no cardiac enlargement and no evidence of Valvular disease.
CASE 10  Private M.  Age 27.  Complains of inframammary pain and shortness of breath on exertion. The pain is stabbing in character and is felt over the heart and passing through to the angle of the left Scapula. It occurs only on exertion and is accompanied by palpitation and a feeling of suffocation. These symptoms have been present for one year and first occurred while the patient was in hospital. On the fourth day following operation for inguinal hernia he had a sudden attack of praecordial pain; he collapsed in bed and called his nurse. Examination revealed no cause, he had not further attack in hospital and made a good recovery. Ever since then any slight exertion has produced the pain and the associated symptoms.

Examination: Thin undernourished looking man; round shouldered and with stooping posture; slight dorsal kyphosis: Hands cold and blue; marked sweating of axillae and palms of hands. Chest poorly developed with little true expansion on deep inspiration. Pulse rate 110 per minute. B.P. 120/80, Apex beat forcible and diffuse; no cardiac enlargement and no bruits. Hyperaesthesia to pin prick of left pectoral region.

The patient was reassured about his symptoms and returned to his unit with a recommendation for breathing exercises and graduated Physical Training.

CASE 11  Sapper L.  Age 30.  Complains of frequent frontal headaches, dizzy spells, attacks of tachycardia
and undue fatigue on slight exertion. Previously a healthy man he was in hospital five months ago with cerebrospinal meningitis. He spent six weeks in hospital and five weeks at home on sick leave. After a rapid and uncomplicated recovery from the acute stage of the illness his progress was slow; headaches which had disappeared before he left hospital recurred while he was at home so that he spent part of the leave in bed. Since then he has never regained his former good health and feels unfit for duty.

Examination: Facies drawn and tired looking. Apart from this does not look ill and has not lost weight. No physical signs of any organic residua of the meningitis. Central nervous system normal. Marked sweating of the axillae and tremor of the outstretched hands. Pulse rate 100 per minute; Apex beat forcible with slapping first sound in the mitral area when patient is upright. In recumbent position rate dropped to 84; no evidence of enlargement or Valvular disease.

An explanation of the nature and cause of his symptoms was given and a recommendation for a period of light duty. Failing improvement after 6 weeks of this regime admission to a rehabilitation centre was advised.

CASE 12 Trooper R. Age 21. Service 3 months. Complains of shortness of breath, headaches, pain and tightness in the chest and nervousness. No serious illnesses in childhood or adolescence; always considered 'highly strung.' Nervous, easily worried and shy in the
company of strangers. Had a good school record and satisfactory work record as a Post Office Clerk until 1937. Previous to this date he had found his work well within his capabilities and causing him no anxiety after office hours; he now became easily fatigued during the day and worried in the evening whether he had made any errors. The daily routine left him exhausted, concentration was difficult and he complained of frequent vertical and right frontal headaches. After a holiday he felt better and returned to work. The fatigue and headaches persisted but were less disabling and he was able to continue work till enjoined in the Army. In 1939 he gave up what little exercise he had ever taken because even slight exertion produced fatigue and breathlessness. In December 1940 he had an attack of acute bronchitis; on discharge from hospital he went home for 7 days sick leave. This he spent in Southampton and experienced a 'blitz'; during this, bombs fell near his home; he collapsed and was taken to hospital where his present symptoms appeared.

Examination: Anxious looking and restless; tall, well built youth; marked flickering of closed eyelids and slight degree of false Rombergism. Axillary sweating marked. C.N.S. normal. Pulse rate 98 per minute; no cardiac enlargement and no evidence of Valvular disease. Chest, signs of mild chronic bronchitis; no evidence of active Tuberculosis. Slight fullness of both lobes of Thyroid gland but no evidence of Thyotoxicosis.
CASE 13. Private R.  Age 32. Referred to Hospital complaining of pain over the heart and at the angle of the left Scapula, breathlessness and fatigue.

These symptoms were first experienced during convalescence from Lobar Pneumonia six months ago and have persisted since. Patient had a protracted illness at that time and was in hospital for eight weeks. The convalescence was slow; he required one month's sick leave following three weeks in a convalescent depot before he was fit for duty. Now after one week with his unit the symptoms have become incapacitating.

Examination: Tense, anxious expression, well built, well nourished and of good colour. Slight tremor of outstretched hands; constant trickle of sweat from axillae. Clinical and X-Ray examination of chest shows complete resolution of the Pneumonic process. Cardiovascular system; Pulse 98 per minute; apex beat in normal position, forcible with slapping first sound in the mitral area; no evidence of organic disease found. Reassured about his physical health and an explanation of his symptoms given. Returned to his unit for one month's light duties and graduated physical training.

CASE 14. Private H.  Age 34. Service 8 months. Com- plains of headache, giddiness, breathlessness and undue fatigue. The headache occurs most frequently on waking in the morning; the other symptoms appear gradually during the day so that by early evening he is
exhausted and goes to bed immediately after duty.

The symptoms first appeared seven months ago when he was convalescent from Cerebrospinal Meningitis and have increased in severity since. Prior to his illness he had not enjoyed army life. He was a clerk in civil life, was married and had two children. He had few interests outside his home and had taken no exercise for many years. He volunteered for service along with a few of his fellows because he felt 'he had to do his bit.' The regular exercise and physical training exhausted him during the early days; the noise and lack of privacy in the barrack room made him uneasy and finally he had a severe reaction to his first T.A.B. injection. For a week before admission to Hospital for Meningitis he had felt 'out of sorts,' headachy, sleepless and nervous. He could not eat the army food and became depressed and anxious. Finally he reported on sick parade and was recommended one week's light duty. On the following day however he was admitted to Hospital.

Examination: Anxious tired and depressed; thin, undernourished and of poor muscular development. Marked tremor of outstretched hands and flickering of closed eyelids. Hands cold and moist. Central Nervous System normal. Chest narrow and poorly covered; expansion very poor; no abnormal signs in chest. Pulse 104 per minute at first examination; slowed to 90 per minute after five minutes in recumbent position. No cardiac enlargement and no murmurs. Carotid Sinus pressure induced immediate distress, dizziness, sense
of suffocation and lightheadedness.

A further period of graduated training was recommended though it seemed likely that treatment in a rehabilitation centre would probably be required later.


Childhood was happy and healthy. He had no serious illness till age 12 when he was in bed for 2 months with Rheumatic Fever. He made a good recovery and played games at school although he was rather short of breath. A second attack of Rheumatic Fever when he was aged 21 confined him to bed for six months. All the joints of his body were affected but he does not think there was any heart complication inspite of the long bed treatment. Since this illness he had taken no exercise. On joining the army he found that training exhausted him and that he became more distressed than his fellows during physical training. The present symptoms appeared first at this time but were less severe and he was able to carry on his duties and did not report sick. A recurrence of joint pains six months ago confined him to bed for three weeks. He made a full recovery and has been on duty since in spite of the present symptoms which have gradually become disabling.

Examination: Small, thin worried looking youth. Tremulous and apprehensive of examination. Restless and uneasy when first entered the examination room.
Respiratory rate 28 and pulse rate 110. Allowed to rest on the examination couch for a short time before examined further. Settled considerably; pulse rate slowed to 88 per minute and respirations to 20.

Axillary sweating and tremor marked. Apex beat in 5th intercostal space forcible and diffuse. Soft systolic murmur in the mitral area; this showed no conduction. Exercise tolerance test poorly performed - extreme distress and dyspnoea complained of after touching his toes four times. No evidence of organic heart disease present. Erythrocyte Sedimentation rate normal.

Recommended admission to Military rehabilitation centre.

CASE 16. Trooper P. Age 29. Service 4 days. Complains of general nervousness, palpitations, shortness of breath and left inframammary pain on exertion.

This man was found unfit for elementary training on account of these symptoms and referred to Hospital. He has always been nervous and inclined to worry unnecessarily, excitable and easily upset especially during the last year. For the last six months has not slept well, becomes agitated when the air raid sirens sound and has to get out of bed and walk about the room. Three months ago one of his children was killed when his house was hit during a raid in Bristol. He and his wife were unhurt but badly shocked. He did not require hospital treatment, but since then has been unable to work.
on account of the present symptoms.

Examination: Tall thin and stooping; narrow flat chest with little expansion; lungs clear; Pulse rate 90 per minute; apex beat forcible and diffuse; no evidence of organic heart disease. Marked tremor of outstretched hands and constant trickle of sweat from the axillae.

He was anxious to be trained as a soldier and had some degree of insight into his illness. The explanation of his symptoms was readily accepted. He was returned to his unit for graduated training. Mild sedatives and encouragement were advised.

CASE 17 Signalman W. Age 22. Service 7 months.

States that as long as he can remember he has found physical exertion unpleasant and accompanied by left mammary pain, rapid heart action and feeling of distress.

He has never had Rheumatic Heart disease but had numerous minor illnesses in childhood and was considered a weakly child. He was restrained from games in childhood and later advised against them by his parents because of his weak heart.

Examination: Tall, thin, weedy looking youth; sallow skin and round shoulders. Grinned in a nervous way throughout the examination. Pulse rate 100 per minute, regular; varies rapidly with effort and change of posture. Apex beat diffuse; no cardiac enlargement and no evidence of valvular disease. Chest long and narrow with deficient expansion at bases; no evidence of organic disease; tenderness of muscles
over left pectoral region. Pressure over the Carotid Sinus provoked distress and rapid breathing but no cardiovascular response.

In view of the chronicity of his symptoms and his conviction of disability, recommendation was made for admission to a rehabilitation centre.

CASE 13. Cadet T. Age 27. Service 1 year. Has complained for three weeks of faintness, palpitation and tachycardia on route marches and on physical training. Previously a healthy man he has had no illness during his service and has enjoyed the army life. One week before the onset of his symptoms his home was bombed and his wife injured. He was granted compassionate leave which he spent visiting his wife, arranging new accommodation for her and salvaging what was left of their old home. He did not have much rest during the four days and returned exhausted. Since then concentration on lectures and attention to his work have been difficult and he has not slept well. He feels disinclined for exercise and experiences his present symptoms when he takes part in training.


The emotional background of his symptoms was explained to him and reassurance about his physical
health given. Recommended a gradual return to full duty and mild sedatives for two or three weeks.

CASE 19  Sapper T.  Age 33.  Service 8 weeks.
Complains of shortness of breath, fleeting pains in the chest, general lassitude and cough. Poor family history as regards both physical and medical resistance. High incidence of Tuberculosis on both sides of the family and patient as a child attended the out-patient department of Guy's Hospital. Repeatedly X-Rayed but active Tuberculosis never found. Mother is nervous and irritable; one sister had a nervous breakdown. Patient was always timid and nervous, has never been fit for regular employment and is now anxious and given to worrying over trifles.

Examination: Adenoid facies; mouth breather; round shouldered with resultant poor posture and deficient chest expansion. Lungs clear on clinical examination. X-Ray of chest and 3 sputum examination negative for Tuberculosis. Sweating of axillae marked; hands cold blue and moist. Pulse rate 100 per minute; Apex beat diffuse and forcible. No evidence of organic heart disease. Carotid Sinus pressure induced much distress, choking, rapid breathing and dizziness.

A poor constitutional type unlikely to prove an efficient soldier. Recommended for discharge.
CASE 20. Private S. Age 35. Service 1 year.
Referred to hospital as a case of suspected Pulmonary Tuberculosis. Complains of shortness of breath on exertion, palpitation, and undue sweating. Has never had any serious illness or been confined to bed for more than one week but for the past 8 - 10 years has not enjoyed really good health. Always tired and lacking in energy, has had recurrent vague rheumatic pains in the back and shoulders; frequent attacks of coryza and on two occasions Bronchitis during the winter.

By nature a quiet living, retiring man, conscientious and painstaking; lacking self confidence and on that account anxious and apprehensive.

**Examination:** Timid and nervous on examination; looks tired and rather depressed though the latter is denied. Small, slightly built man; slight dorsal kyphosis. Chest narrow and poorly covered; poor expansion at bases; few scattered dry bronchi. X-Ray shows clean lung fields; 3 Sputum examinations negative for Tubercle Bacilli. Marked sweating of axillae and palms of hands. Pulse rate 96 per minute slowing after initial anxiety of examination had passed to 84 per minute. Apex beat forcible; soft mitral systolic whiff without conduction; this disappeared when the heart rate decreased and was not heard when the patient lay down for a few minutes.

CASE 21. Fusilier R. Age 28. Service 1 year. Complains of stabbing left mammary pain, shortness of breath and exhaustion on exertion. Employed as a quarryman in
civil life, he enjoyed good health. Since joining the army he has become 'nervous and jumpy' though he has had no active service. On one occasion 9 months ago he lost his voice for a few days. This loss was not preceded by any febrile illness or throat trouble and appears to have been an hysterical manifestation. Has never had Rheumatic Fever. His mother had goitre and patient thinks that his neck has been swollen for the past year.

Examination: Broad shouldered well built man; anxious tired expression. Chest well covered; expansion good but breath holding poor; no abnormal clinical signs in the chest. Pulse rate 90 per minute, regular; apex beat has forcible thrust within the nipple line in the 5th intercostal space; no thrills and no murmurs; hands moist. Slight diffuse thyroid enlargement but no evidence of toxicity.

An early case in a physically strong man. Given an explanation of his symptoms and returned to his unit for duty.

CASE 22. Serjeant R. Age 27. Complains of shortness of breath on exertion, left mammary pain, palpitations, dizziness and general fatigue.

He states he was confined to bed for some weeks ten years ago with 'Rheumatism and Myocarditis' and has considered since that he has a weak heart. On this account he has played no games and avoided exercise altogether. The dyspnoea and dizziness have attended
every undue exertion he made in civil life but have not been severe or accompanied by pain until the regular drills and physical training in the army.

**Examination:** Big, strongly built man; anxious and preoccupied with his symptoms but would not admit to any other worries. Tremor of the outstretched hands and axillary sweating marked. Throbbing of carotid arteries in the neck. Pulse rate 120 per minute. B.P. 130/90. Forcible diffuse apex beat with slapping 1st sound in the mitral area. After resting for five minutes on the couch the heart action became slower (80 per minute) and less tumultuous. After a few simple toe touching exercises patient complained of dizziness and dyspnoea while the pulse increased in rate to 106 per minute. Chest showed full expansion and no signs of organic disease.

This patient was unwilling to accept assurance about his heart. Recommended one month's light duty and graduated exercise. He did not improve and admission to a rehabilitation centre was arranged.

**CASE 23. Private F.** Age 23. Service 3 weeks. Complains of left mammary pain and breathlessness on exertion, palpitations especially at night, occasional faints and general anxiety.

Four years ago he was unemployed for seventeen months on account of a 'nervous breakdown' and has attended his panel doctor ever since for his nerves. His symptoms four years ago were insomnia, lack of concentration, palpitations and tremulousness. His
present symptoms began three months ago. Sleep became broken and he woke in the night with attacks of palpitation, sweating and feelings of apprehension. Army training has been impossible; he was forced to report on sick parade during the first week of service.

Examination: Thin, nervous looking youth; quick hesitant speech; constant facial tics and nervous hand movements during the interview. Marked tremor of the outstretched hands and flickering of the closed eyelids. Constant trickle of sweat from the axillae. Labile pulse rate, 105 per minute in the upright position slowing to 80 per minute after a few minutes rest. Diffuse forcible apex beat but no evidence of cardiac enlargement, thrills or murmurs.

CASE 24. Lance Corporal G. Age 48. Complains of left inframammary pain, palpitations and shortness of breath on exertion. He occasionally feels dizzy and unduly exhausted after slight exercise.

Health previously good; no serious illnesses, no Rheumatic Fever; occasional mild attacks of bronchitis during the last few winters. Admits to nervousness of late and worry about himself and his family; easily upset, startled by loud noises, rather irritable and impatient; sleep is less sound than formerly and disturbed by dreams. Both physical and nervous symptoms have come on gradually over the last six months.

Examination: Tall, thin, anxious looking man; marked axillary sweating; hands cold and blue; tremor of the outstretched fingers. Pulse rate 100 per minute.
regular; B.P. 140/90. Apex beat in 5th left interspace, diffuse and forcible; no cardiac enlargement and no murmurs detected. Chest long and narrow; hyperaesthesia over left pectoral region with erection of the left nipple; chest expansion fair; air entry full in all areas; breath sounds coarse with scattered dry rhonchi. Diagnosed as mild chronic bronchitis with superadded Effort Syndrome symptoms. Recommended for Home Service only and if possible a change to a sedentary job. Reassured about his health and returned to duty.

CASE 25. Gunner F. Age 27. Service 8 weeks. Complains of breathlessness and palpitation on exertion, dizzy spells and exhaustion after slight effort, and general nervousness.

Healthy childhood and school career: no serious illnesses and no Rheumatic Fever history. Was always considered nervous and 'highly strung'; reserved and shy as a youth; did not make friends readily and did not mix well with his fellows. In spite of these difficulties he played football and other games at school but gave them up on leaving. When aged 27 he gave up work for one year and was confined to bed for two months with symptoms similar to those he now complains of. No diagnosis was given him, but he was advised against overtiring himself and warned to take care of his health.
On this account and from lack of inclination he has taken no exercise of any kind.

**Examination:** Tall, asthenic, round shouldered man, ill at ease and nervous during the examination. No evidence of organic disease in heart or lungs. Chest poorly developed, flat and showing little true expansion; respiratory rate rose to 30 per minute, shallow and jerky, after a few bending exercises: marked tremor of the outstretched hands and flickering of the closed eyelids, both accentuated by these exercises. Pulse rate 90 per minute. B.P. 130/80. He was unwilling to discuss his difficulties but on persuasion stated that he did not enjoy army life, had dreaded being called up for service and did not seem able to adapt himself to it. He felt uncomfortable and out of place in a barrack room and could not easily join in the fun there. He could not make friends with his fellows and felt nervous and apprehensive on parades.

In view of the chronicity of his disability and his evident anxiety admission to a rehabilitation centre was advised though it seemed likely that discharge to civil life would later be necessary.

**CASE 26. Private C.** Age 30. Service 4 months. Complains of left inframammary pain, shortness of breath on exertion, palpitations and headache.

This, the second attack of these symptoms has come on gradually during the last three months. The first attack, 3 years ago, was less severe, was diagnosed as Myocardial Insufficiency and was improved by one month
in bed and three months convalescence at home. The pain and dyspnoea have never quite disappeared since and have always manifested themselves if any undue exertion was made. Since enlistment the symptoms have been present all the time and the regular exercise and physical training have provoked distress so that he was forced to report on sick parade.

**Examination:** Generalised tremulousness on examination most marked in the outstretched fingers; nervous twitching of face and hands throughout the interview; slight fullness of thyroid gland but no evidence of toxicity. Central nervous system normal. Chest thin and narrow but no abnormality detected. Pulse 110 per minute on first examination; reduced to 84 after 5 minutes rest in the recumbent position. Apex beat in 5th left interspace, forcible and diffuse; soft systolic murmur heard when patient standing upright; this disappeared as the heart rate was slowed by rest. No cardiac enlargement and no evidence of Valvular disease.

**CASE 27. Gunner G.** Age 21. Service two months. complains of praecordial pain, palpitations and breathlessness on exertion.

Employed as a clerk in civil life; led a quiet retiring life; had few friends and no interests outside his home. Occupied his leisure time reading, gardening and doing odd jobs about the house. Has never played games or taken regular exercise. When age 10 had rheumatic fever and was confined to bed for three months.
He made a good recovery and has had no recurrence. Was a little apprehensive of his fitness for service when first called up but has enjoyed the change and the communal life of the army. Still feels strange and rather 'out of it;' is reserved and has not made any friends; does not go out with his fellows after duty but stays in the barrack room reading. Found the parades and drills tiring and after two weeks became fatigued and breathless during physical training. These symptoms have gradually increased in severity and are now accompanied by palpitations and occasional praecordial pain.

Examination: Tired looking and nervous; apologetic and diffident about his illness. Well built but rather overweight and flabby. Chest well covered; expansion good; breath holding poorly performed. Heart rate 100 per minute, regular. Apex beat forcible. Marked sweating in the axillae and palms of hands. No signs or organic illness detected. Readily accepted an explanation of his symptoms and was returned to his depot for graduated training under the supervision of his medical officer.

Complains of breathlessness on exertion and palpitation. Had relatively good health until one year ago. Was confined to bed for three months when aged 9 for Rheumatic Fever and again when aged 16. On both occasions he made a good recovery. Played games at school and adult life. Since joining the army he has
had regular exercise and recreation. One year ago in Singapore had a succession of minor illnesses, bronchitis followed by a crop of boils and finally he contracted Dengue Fever. He made an uninterrupted recovery in hospital and had a full examination during which he inquired and was reassured about his heart. Since his discharge however he has felt less fit than before his illness and became more easily breathless after exercise. This symptom has increased in severity and had been accompanied by consciousness of the heart's action after routine physical training.

**Examination:** Tall, strongly built man, rather anxious strained expression. Bright watery eyes; quick nervous speech. Vasomotor blushing over neck and face. Slight tremor of outstretched hands. Feeling of giddiness and faintness on pressure over the Carotid Sinus but no vasomotor disturbance. Pulse rate regular 86 per minute. Heart normal. Chest normal.

Reassured about his physical health and his symptoms. Returned to his unit for full duties.

**CASE 29. Private H. Age 46.** Complains of tachycardia breathlessness and exhaustion on effort.

The patient states that he has had these symptoms for short periods during the last five years. His National Health Insurance Cards show that on several occasions during these years he has lost work on account of 'Tachycardia'. Since joining the army one year ago he has been free from symptoms although employed on full duties and taking more exercise than he did in civil life.
Two months ago he received news that his son was missing in the Middle East; he was naturally upset, became sleepless, anxious and emotional. After one month he learned that his son had died and since then his 'nerves have gone to pieces' and a recurrence of his symptoms has occurred.


He had a fair degree of insight into the causation of his symptoms and was anxious to remain in the army. Accordingly he was returned to duty with a recommendation for recategorisation to Home Service grade since he found the work in his present A I Category exhausting.

CASE 30. Probationer H. Age 46. Service 1 month.
Complains of nervousness, tremulousness, shortness of breath on exertion palpitation and insomnia. Healthy until 1917. Taken prisoner in France and suffered much privation and unhappiness in German prison camp. Discharged from the Army in 1919 with the diagnosis 'Debility'. The most marked symptoms then were praecordial pain and nervousness. Showed a gradual improvement in civil life and made sufficient readjustment to be able to work as a clerk from 1921 - 1930 without illness.
In 1930 he had a temporary recurrence of symptoms but was able to continue work until four years ago when he had a 'nervous breakdown' and was off work for seven
months. He made a fair recovery and was in employment when he volunteered for service. Since he began training one month ago his nervousness and tremulousness have returned and are gradually becoming more disabling.

Examination: Small, thin, anxious looking man; hands cold and blue; marked tremulousness of whole body; axillary sweating marked; left pectoral hyperaesthetic to pin prick with erection of the left nipple. Pulse rate 110 per minute, regular. B.P. 140/90. Apex beat visible and forcible in 5th left intercostal space: no cardiac enlargement, no thrills, no murmurs.

In view of his age and the long history, discharge from the army as unfit for service was recommended.

CASE 31. Gunner H. Age 30. Service 8 months. Complains of shortness of breath on exertion, left inframammary pain and nervousness. The nervousness is most apparent at night when he is subject to sudden starts with palpitation and sweating.

Employed as a miner in civil life; has always enjoyed good health except for mild chronic bronchitis with occasional acute exacerbations. Served in France 1940-41 and took part in the retreat of the B.E.F. Was under continual fire then and experienced 14 days of extreme physical strain and mental tension. Had little sleep and insufficient food during these days but was evacuated safely and unwounded. Recovered satisfactorily from the extreme exhaustion and went home on leave.
fairly well. Since rejoining his unit he has noticed the gradual appearance of his present symptoms which are becoming more severe.

Examination: Stocky, strongly built man; well nourished and of good colour. Nervous of examination but told his story clearly and without emotion. Chest well covered; expansion fair; signs of mild chronic bronchitis and slight emphysema. Pulse rate 100 per minute. P.B. 115/80. Apex beat in 5th left interspace forcible and regular. Exaggerated respiratory response with sighing respirations on exercise; axillary sweating marked.

The chest condition was not considered sufficient to account for his physical symptoms. Transfer to a rehabilitation centre for further investigation and treatment was advised.


Healthy childhood and adolescence. Was always considered nervous and 'rather highly strung.' Reserved and shy of meeting strangers. During school days had a marked stutter in his speech; this was corrected by speech training but occasionally recurs in modified form when he is excited or anxious. Played games at school but has taken no regular exercise since. Was called up for service in his age group. Nervous and apprehensive during the early days of training and found parades and routine physical training exhausting.
Disliked drill parades and was frightened of "doing the wrong thing."

Examination: Thin but fairly well built youth; muscles atonic and flabby; obviously unfit. Hands cold and blue; slight tremor of the outstretched hands. Chest expansion fair but breathholding poorly performed with much distress and tenseness. Slight hyperaesthesia over left pectoral region. Pulse rate 90 per minute with only slight slowing to 84 after five minutes rest on the examination couch. No evidence of cardiac enlargement or valvular disease of the heart. It was considered that he would improve considerably with training. His symptoms were explained to him as due partly to his physically unfit state and partly to his acknowledged anxiety. He was reassured that they would gradually disappear as training advanced and was recommended a graduated course of drills and physical training.

CASE 33. Driver L. Age 25. Service 1 week. Complains of breathlessness, palpitations and praecordial pain on exertion.

Employed as a clerk in civil life. Has had no serious illnesses since childhood; never enjoyed games and has taken no exercise for years. Has few friends and leads a rather lonely life; spends his leisure hours reading, going to the cinema or occasionally gardening. Has noticed that, for two or three years any undue effort produced symptoms similar to those now present but did not pay any heed to them and did not consult his
doctor. On joining the army found that the enforced exercise immediately produced distress which has gradually increased until he had to report sick.

**Examination:** Tall fairly well built youth; strained anxious facies; slight upper dorsal kyphosis. Chest narrow, flat and poorly developed; expansion poor. Hands cold and blue; slight tremor of the outstretched fingers. Pulse rate 100 per minute, regular. Apex beat in normal position, forcible and diffuse. No evidence of organic disease. Exercise tests and breath-holding poorly performed with much apparent distress and emotional accompaniment. Pressure over the Carotid Sinus produced faintness and sense of suffocation but no cardiovascular response.

Returned to unit for graduated training and exercise.

**CASE 34.** Lance Corporal R. Age 36. Service 17 months. Complains of shortness of breath on exertion, palpitations, exhaustion and occasional stabs of left infra mammary pain after exercise. When aged 14 he was a patient at King's College Hospital with 'Heart Trouble.' He does not know whether he had Rheumatic Fever or not but thinks he made a complete recovery. He had had no serious illness since but during the last few years has suffered from dyspepsia and vague 'rheumatic' pains for both of which he has had frequent 'bottles' from his panel doctor. He was admitted to hospital three months ago for extraction of teeth and spent 65 days there. No details of this prolonged hospitalisation are available.
He states that he 'passed out' after an intravenous anaesthetic and that he has experienced his present symptoms ever since.

**Examination:** Small, thin, undernourished looking man. Restless, nervous and preoccupied with his disability. Edentulous. Marked termor of the outstretched hands. During physical examination he began to tremble all over and his pulse rose from 96 per minute to 110. Axillary sweating marked, forming a constant stream down his chest. Chest underdeveloped and flat; expansion deficient at both bases; no evidence or organic chest disease. Pulse showed rapid postural and emotional variation. Apex beat diffuse and forcible. No murmurs detected on auscultation.

Recommended recategorisation for Home Service only. Reassured about his health and returned to his unit for 1 month's light duty followed by gradual return to full activity.

**CASE 35. Driver L.** Age 30. Service 2 months.

Complains of praecordial pain and aching joints.

These symptoms have been present in slight degree for seven years but have become more severe since he joined the army and took part in drills and physical training. Seven years ago he spent seven weeks in St. Bartholomew's Hospital with Rheumatic Fever. He was unable to work for some months after discharge on account of praecordial pain and respiratory distress on exertion. Since then he has never done a full day's work as a hairdresser without some fatigue and distress.
Examination: Short stocky build; anxious, self-pitying expression; childish complaining voice. Grimaces when passive movements are carried out at his wrist joints though there is at present no clinical evidence of active Rheumatic infection and movements are full and easy. Erythrocyte Sedimentation Rate 4 m.n.s in 1 hour. Tremor of the outstretched hands. Pulse rate 90 per minute. No abnormal signs in heart or lungs. Considered to be an early case of Effort Syndrome. Returned to his unit for firm handling, encouragement and graduated training.

CASE 36. Gunner M. Age 26. Service 4 months. Has complained for the last six months of left infra-mammary pain, tachycardia and palpitation on exertion. He sweats unduly and becomes easily frightened and upset. He spent seven weeks in bed with Rheumatic Fever when aged 11 and since then has never played games or taken regular exercise. Always nervous, diffident and shy in company; readily becomes excited and blushes readily. Three years ago had diphtheria but made an uninterrupted recovery. Did not wish to join the army and was apprehensive and nervous when first called up. He has settled to the new life fairly well, has made a few friends but is unable to take a full part in training on account of his symptoms.

Examination: Small, thin man. Narrow, flat, poorly covered chest with deficient basal expansion. Respiratory rhythm irregular and jerky. No clinical evidence of lung disease. Hands moist and cold; marked
tremor of the outstretched fingers; excessive axillary sweating; slight hyperaesthesia of left pectoral region and tenderness of the pectoral muscles. Pulse rapid 100 per minute. Heart action forcible but no evidence of organic disease elicited.

He was reassured that there was no organic disease present and encouraged that by regular training his capacity for exertion would increase and his general health improve. Graduated training was recommended for 4 - 6 weeks. Failing improvement admission to a military rehabilitation centre was advised.

CASE 37. Signalman C. Age 29. Service 10 months.

He was forced to give up regular sport three years ago and at present is finding increasing difficulty in the army training on account of shortness of breath, palpitations and pain over the heart. At times after exercise he becomes dizzy and unduly exhausted; he does not faint but feels 'things swimming in front of his eyes.' He has had no serious illnesses and played games regularly until three years ago. He admits that 'his nerves are not so good as they were' but cannot qualify this except that he worries more than formerly, sleeps less soundly and becomes easily depressed and irritable. He feels that these factors may have something to do with his present symptoms.

Examination: Tall, well built and apparently 'in good condition.' Chest shows full expansion and no abnormal signs. Pulse regular 98 per minute. Apex beat diffuse and forcible in the 5th and 6th intercostal
spaces within the nipple line. Heart action rapid and forcible with marked pulsation of the Carotid arteries in the neck: no evidence of cardiac enlargement or valvular disease. Axillary sweating marked.

In view of the partial insight and the patient's good physical development he was returned to his unit for continuation of training after further explanation of his symptoms had been given.

Referred to Hospital on account of distress on route marches and during games. He complains of stabbing pain in the praecordium, headaches and dizziness when taking part in these exercises. Has always been nervous, timid of meeting strangers or his superiors, worrying unduly about his work in an Insurance Office, tremulous, lacking concentration and interests outside his work. The separation from home, his first, has made his nervousness and sense of insecurity worse. He has been relatively happy in the army so far but cannot stop worrying about his family and has not made any friends in his three months service. He does not go out with his fellows after duty but hangs about the barrack room and goes to bed early. For the last month the headaches and praecordial pain have increased his difficulties until he was forced to report sick.

Examination: Small, thin youth; pale, tensed and anxious appearance; depressed because he is not like his fellows and feels inadequate. Marked tremor of the outstretched hands and flickering of the closed
eyelids. Hands moist and cold. Chest narrow and underdeveloped; expansion fair. Pulse rate 110 per minute on first examination; after five minutes in the recumbent position this slowed to 94 per minute. Apex beat visible and forcible in 5th intercostal space; slapping first sound at the mitral area with patient in the upright position. Heart action settled considerably with the fall in rate after rest.

Complains of breathlessness on exertion with palpitation and stabbing praecordial pain.

Since leaving school, where his record was poor he has had numerous jobs. Each one he has had to give up on account of illhealth though he has never had to consult a doctor. The symptoms were always similar, undue fatigue, nervousness, tremulousness and fainting turns. He has never been well enough to play games. He had been unemployed for two years prior to army service on account of dizziness and dyspnoea on exertion. The present symptoms have become gradually worse since he has undergone regular training. On two occasions he has fainted on the drill square.

Examination: Tall, thin, weedy looking youth; slight dorsal kyphosis with stooping gait. Teeth decayed and dirty; a mouth breather. Chest thin, narrow and underdeveloped; little real expansion on inspiration. Pulse regular and rapid, 110 per minute. Apex beat diffuse in 5th intercostal space within the nipple line. Heart action forcible with slapping first sound in the
Mitral area. No cardiac enlargement and no evidence of valvular disease. A few bending exercises caused an increase of the respiratory rate to 30, much expressed distress and unsteadiness. A similar response was noted on Carotid Sinus pressure. On account of the poor constitutional type, physically and mentally, and the chronicity of his symptoms discharge from the army was recommended.

CASE 40. Sapper T. Age 26. Referred to Hospital with enlarged thyroid gland and complaint of dyspnoea.

He is indefinite about the duration of the thyroid swelling but thinks he first noticed it about 5 years ago. The dyspnoea occurs only after exercise and is accompanied by headache and palpitation.


Insufficient evidence to incriminate the thyroid gland. Considered to be an Anxiety State with Effort Syndrome symptoms. Recommended reassurance and encouragement during a graduated course of training.

CASE 41. Private N. Age 22. Service 3 weeks. Complains of left inframammary pain, palpitations, sweating, tremulousness and apprehension.

Has been nervous, worrying, and easily upset for a number of years; intolerant of noises and easily
provoked to temper; has had no illness requiring medical attention but rarely felt fit and rested whenever possible. In recent years troubled with insomnia; sleeps lightly and frequently wakes in the night trembling and anxious. The present symptoms have for years been the inevitable accompaniments of exercise which on this account he has avoided. Since joining the army the daily recurrence of pain and palpitation have made him miserable so that he was forced to report on sick parade.

Examination: Thin, round shouldered, asthenic youth with wide eyed anxious expression. Generalised tremulousness; hands cold, blue and moist; marked axillary sweating. Respiration sighing and breath-holding poorly performed. Pulse rate 90 per minute. Exaggerated pulse and respiratory rate response to simple exercises. Giddiness and unsteadiness on Carotid Sinus pressure. In spite of the chronicity of his complaints and the extreme degree of disability the patient showed considerable insight. "If only my nerves were right, I'd be able to carry on." Recommended admission to a military rehabilitation centre.

CASE 42. Driver P. Age 37. Service 14 days. Complains of breathlessness, giddiness and fatigue on exertion. Always very nervous and easily upset. Eleven years ago had a 'nervous breakdown' and was unable to work for two months. At that time he complained of insomnia, undue fatigue, nervousness and headaches. He thinks his 'heart was affected' at that time because he
has been unfit for regular work since. The present symptoms have appeared since joining the army and taking part in the enforced regular exercise.

**Examination:** Nervous, aggressive, preoccupied with his symptoms and convinced of his disablement. Thin, undernourished and round shouldered. Hands show irregular tremor; sweating of the axillae excessive. Narrow flat chest with poor basal expansion. Pulse rate 90 per minute. No evidence of organic disease in chest or heart.

Unwilling to accept reassurance about his heart. Probably unlikely to make an efficient soldier but returned to his unit for a trial period of firm handling and graduated training.

**CASE 43. Gunner M. Age 32. Service one month.**

Complains of praecordial pain and shortness of breath on exertion.

These symptoms first appeared in February 1941 after hospitalisation for dry pleurisy. The pain of the acute stage passed quickly but he took several weeks to recover strength and has not been fit for heavy work or any undue effort since.

**Examination:** Small, thin, nervous and tremulous. Hands cold and blue. Throbbing pulsation in the neck. Chest narrow and poorly covered. Expansion deficient at both bases with jerky shallow respiratory movement. Pulse rate 110 per minute; apex beat diffuse and forcible in 5th left intercostal space; first sound in mitral area slapping. After five minutes rest the heart action
quietened and the pulse rate fell to 86 per minute.

X-Ray of chest showed clear lung fields.

CASE 44. Lance Corporal W. Age 25. Service 2 years.
For some years has been short of breath after excessive exertion and since enlistment has noticed aggravation of these symptoms.

Had 'rheumatism' when age 12 and was confined to bed for several months. For some years afterwards he was not allowed to play games and all activities were controlled. After leaving school however he took more regular exercise without discomfort until the appearance of the present dyspnoea.

Conscientious and industrious in his civil occupation and a reliable N.C.O. Inclined to be over painstaking and particular; worries unnecessarily and becomes easily upset and irritable. Does not smoke nor drink. Was unwilling to report sick but was noticed to be distressed on training schemes and sent on sick parade by his Company Officer.

Examination: Few abnormal signs detected. Hands cold and blue; axillary sweating marked. Rapid forcible heart action with slapping first sound in the mitral area. Considered to be a mild case of Effort Syndrome. Reassured about his health and recommended a few weeks light duty with encouragement.

Complains of shortness of breath, palpitations and giddiness during training. He had three attacks of
'acute rheumatism' when aged 11, 15 and 19 years. On each occasion he spent 6 - 8 weeks in bed and made a good recovery. At no time was he told that his heart was affected until four years ago he consulted his family doctor with symptoms similar to those now present. He was told he had valvular disease of the heart and would remain well only if he did not smoke, drink, run or jump. He has obeyed these instructions carefully and has taken no exercise since. The physical training and parades have cause a recurrence of symptoms. Examination: Thin but well built youth; anxious and tremulous. Muscles flabby and atonic. Chest fairly well covered; expansion good. Throbbing of Carotid arteries in the neck. Pulse rate 98 per minute. Apex beat forcible and diffuse in 5th left intercostal space. Heart not enlarged; first sound in the mitral area slapping but no thrills and no murmurs detected. Recommended graduated training with frequent encouragement and reassurance.

CASE 46. Gunner B. Age 23. Service 1 week. Complains of headaches and shortness of breath. He has suffered from occasional headaches for as long as he can remember; they have been diagnosed Migraine and do not cause him much trouble. The breathlessness has been present after exertion for the past two years. Works as a gardner in civil life and leads a very quiet life. Has never played games, has few friends and no interests outside his work. Feels 'out of his depth' in the army, is nervous on parades and quickly becomes
exhausted. The breathlessness has become more severe due he states to the physical training and on two occasions he has had to drop out of the class.

**Examination:** Small, thin man; slight upper dorsal kyphosis. Strained anxious expression and general tremulousness. Chest flat, narrow and poorly developed; lower half of sternum depressed; expansion poor. Tremor of the outstretched hands marked. Constant trickle of sweat from the axillae. Pulse rate 80 per minute. Forcible apex beat. Heart shows cardio-respiratory murmurs at the base but no signs of valvular disease. Considered that discharge on medical ground might be necessary later but returned to his unit for further period of graduated exercises. An explanation of the symptoms was given and reassurance about his physical health but the conviction of *chronic invalidism* seemed established.

**CASE 47. Gunner D.** Age 30. Service 7 months.

Complains of breathlessness on exertion, hot flushes, palpitations and general weakness.

Has had no serious illnesses. Never played games at school or since; felt disinclined for effort and preferred studying and sketching. Reserved rather lonely life in adolescence and early manhood. Has only one real friend; does not like company and is nervous of meeting strangers. Five years ago was medically examined at the London Hospital for Insurance purposes. Complained then that any undue effort produced shortness of breath but was assured that his
was healthy and that, if he took things easy he would be alright. Twice during the last two years was persuaded to play tennis; was forced to give up after ten minutes on account of palpitations and respiratory distress.

Called up for service 7 months ago, and recommended graduated training. This has not proved successful and any exertion still produces distress.

Examination: Tall, angular and thin. Restless, nervous and rather detached in manner. Intelligence above average. Chest narrow but well covered; expansion fair but breath holding poorly performed. Sweating of axillae marked. Pulse rate 110 per minute when patient was upright; settled to 88 after five minutes rest but showed rapid increase to the original rate after a few bending exercises. These were accompanied by rapid sighing respirations. No evidence of organic heart disease. Carotid Sinus pressure produced subjective faintness and respiratory distress.

CASE 48. Gunner A. Age 19. Service two weeks. Complains of praecordial pain, breathlessness, giddiness, faintness and headache. These symptoms accompany and follow effort and have arisen during the fourteen days of army service.

Confined to bed for seven weeks when aged eleven with Rheumatic Fever. He made a good recovery but remained under medical supervision for some years afterwards. His doctor told him that his heart had been
affected and that his activities must be restricted. He has accordingly never played games and always worked in sedentary posts. He has quite enjoyed his army life but has found the training quite impossible.

Examination: Tall thin but fairly well built. Chest flat with poor muscular development; expansion good. Hands cold and blue. Marked axillary sweating and slight hyperaesthesia of left inframammary region. Pulse rapid 100 per minute. Apex beat diffuse and forcible. No evidence of valvular disease of the heart. The mechanism of symptom formation was explained to the patient and he was advised to continue graduated training.

CASE 49, Sapper S. Age 22. Service 3 months. Complains of praecordial pain, tachycardia and undue fatigue on exertion. Never had much schooling; frequent minor illnesses and infections. Was never considered strong and required long convalescent periods after the ordinary illnesses of childhood. Mother nervous and always apprehensive about his health. No other nervous manifestations in the family - two brothers in the Army; both younger than the patient and stronger. Since leaving school has had no regular employment; has never been fit for any hard work which promotes distress and the present picture. Had 'nervous breakdown' with insomnia tremulousness and extreme nervousness when aged 17. Did not work for 6 months after this illness. Has been easily upset and intolerant of noise since then.
Examination: Conforms to the constitutional type. Anxious, depressed self-pitying expression: tremulous and apprehensive of examination. Readily upset and distress induced by breathing exercises, bending exercises and Carotid Sinus pressure. Tremor of outstretched hands and flickering of closed eyelids. Constant stream of sweat from the Axillae. Hands cold blue and moist. Chest narrow and poorly developed; tenderness of left pectoral muscles. Pulse rate 120 per minute on first examination. Apex beat visible and diffuse. Heart action forcible with systolic whiff in the mitral area. This showed no conduction and disappeared as the heart slowed after rest.

Recommended discharge from the Army as unfit for service.

CASE 50. Signalman T. Age 29. Service 1 year. Referred to Hospital as suspected early Pulmonary Tuberculosis. Complains of loss of weight, insomnia, breathlessness and giddiness on exertion and nervousness.

Previously a healthy man. Volunteered for army service and enjoyed the early months of army life and was a smart soldier. Three months ago spent two weeks in hospital with bronchitis. Discharged much improved and given 7 days sick leave. Overstayed his leave by three days on account of domestic difficulties and worry about his wife. Reprimanded by his Company Officer and returned to duty. Gradual onset of present symptoms since.

Examination: Anxious and depressed unwilling to discuss
his personal difficulties but feels that if he could get home for a few days and arrange his domestic matters he would be more fit for duty. Slight tremor of the outstretched hands and dizziness and faintness on pressure over the Carotid Sinus. No cardiovascular response to this test. No clinical evidence of Tuberculous Infiltration in the chest. X-Ray of chest shows normal lung fields. Pulse rate 78 per minute. No evidence of organic heart disease. Erythrocyte Sedimentation rate normal. Considered to be an anxiety state showing the Effort Syndrome symptoms. Recommended compassionate leave followed by a period of light duty with a gradual return to full activity. He readily accepted an explanation of his symptoms and reassurance about his eventual recovery.