culosis had occurred in the latter year. The relative figures were: 561 notifications and 255 deaths for 1939, and 669 notifications and 329 deaths for 1940. It will be seen that the increase, approximately 17%, in this group is slightly lower than among the pulmonary cases.

The following table subdivides the notified cases of non-pulmonary tuberculosis into their particular types.

Year	Abdomen	Spine	Hip	Other Bones and Joints	Genito-urinary	Skin	Lymph Glands	Meninges	Multiple
1939	82	39	39	88	29	21	90	137	2
1940	80	60	37	101	38	18	130	184	4

From this it is seen that the spine, the meninges, and the lymph glands have shown the greatest increase in tuberculosis, while other sites have remained relatively unaffected. It was considered worth while to extract the age and sex distribution of the meningeal cases in order to discover which age groups were chiefly affected. It was found that the increase occurred in children of both sexes under 5 years, and to a lesser extent in females aged 15 to 25.

Possible Reasons for the Increased Incidence

It is evident from the above details that there must have been some factor in 1940 which was not present in 1939, or, if present, was intensified in 1940. The possible reasons for this increase are considered under separate headings.

(a) *Increased Virulence of the Tubercle Bacillus.*—The figures show that the notifications and deaths during 1940 increased in equal ratio, but there is no proof that the bacillus has become more virulent.

(b) *Malnutrition and Deficient Diet.*—This is not an important factor in the increased incidence of tuberculosis, for the following reasons: (1) The State has controlled the distribution of essential foods in such a way that each individual obtains a fixed minimum quantity of basic foodstuffs sufficient in itself to maintain the normal person in good health. (2) It can be presumed that if deficiency of diet was the main factor the various age groups would be affected equally when expressed on a percentage basis, whereas from the tables it has been seen that the maximum rise occurred in the 15-45 age group. This group comprises the workers, many fewer of whom were unemployed, and who on account of higher wages were able to feed themselves well.

(c) *Tubercle Bacilli in Milk.*—This may be considered a factor in producing some of the additional cases of tuberculosis affecting the lymph glands, but the fact that the number of cases of abdominal tuberculosis has remained stationary indicates that it cannot be the main reason for the increased incidence among non-pulmonary cases.

(d) *Examination by Military Medical Boards.*—These examinations have undoubtedly revealed some unsuspected cases of tuberculosis in the age group 20-35, but the number of cases so notified is not nearly comparable to the actual increase.

(e) *Exertion or Strain of Army Life.*—That the unaccustomed rigours of Army life have not been a dominant factor in the increase among males during 1940 is shown by the fact that the number of civil notifications in that year exceeded the total returns for 1939.

(f) *Long Hours in Shelters.*—This may cause a slight increase in the number of registered cases, but it is obviously of minor importance. Raids in Glasgow have been so infrequent that shelters have not been occupied to any considerable extent, and only a very small percentage of the population frequent them when there is no warning.

(g) *Overcrowding in Factories.*—Were contact infection in factories an important feature, one would have anticipated a proportionately greater percentage increase among pulmonary as compared with non-pulmonary tuberculosis—in fact, the increase is roughly 20% in each case.

(h) *Long Hours, Overwork, Strain, and Curtailed Rest.*—It has been noted that the main increase involved the age groups 15-45 in males and 15-35 in females. This is the period of

maximum working activity, when long hours of overtime are often undertaken. It must also be remembered that many a period normally devoted to rest or recreation has now to be sacrificed to fire-watching or Home Guard duties. In addition to this we have ascertained that young adults of both sexes are frequenting dance halls and picture houses with great regularity, and in numbers as high as, if not higher than, before the outbreak of hostilities. The significance of the rise in the 15-45 group in males becomes even more apparent when one realizes that the number of civilian males in this age group in 1940 has been considerably depleted by the calls of military service.

In the case of females the institution of marriage and the ties of family life necessitate a shorter working life among large numbers. This would account for the drop in female notifications at an earlier period than with males—a fact that is confirmed by the following tables of occupations:

	1939	1940
Pre-school children and scholars	173	165
Military class	35	71
Professional class	24	30
Commercial class	218	211
Domestic class	309	321
Miscellaneous	121	208
Tradesmen		
Unskilled workers	674	932
Skilled workers		
Labourers		

Our conclusion, therefore, is that it is a combination of long hours, overtime, strain, and ill-spent leisure which is the factor producing the rise in the number of cases of tuberculosis, and it may be assumed that the increase will be at least maintained so long as these factors remain unchanged.

AVOIDABLE DISABILITY SEEN IN RECENT AMPUTATIONS

BY

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Since the present war began many publications have appeared on the subject of amputation. The multiplicity of advice given renders difficult the choice of procedure for those with little or no experience upon which to draw. It is not the object of this paper to criticize individual methods of amputation, but simply to draw attention to certain types of case in which different operative technique and after-care would have resulted in speedier recovery with less disability. At the present stage it is impossible to evaluate some of the newer methods, but it is not too early to point out that procedures are still being employed which have already been condemned by examination of the results of the amputations performed in the last war. All the patients forming the basis of these observations have been seen in one of the special hospitals after primary amputation in Army or Emergency Medical Service units.

As amputation below the knee presents the greatest number of difficulties and comprises a large proportion of all amputations, the causes of prolonged disability will be

PROLONGED DISABILITY IN AMPUTATIONS BELOW THE KNEE

Cause	Effect
1. Bad design of skin flaps.....	(a) Healing by secondary intention with or without terminal low-grade osteitis. (b) Painful scar. (c) Intertrigo from loose folds. (d) Late breakdown.
2. Skin grafting of bare areas....	Stump will not stand artificial limb.
3. Too early re-amputation.....	Post-operative sepsis.
4. Failure to use skin traction in guillotine amputations	(a) Pain and misery. (b) Loss of length at re-amputation.
5. Failure to use post-operative splintage (applies especially to knee).....	Flexion deformity.

considered in detail in relation to this stump. The various headings will also be found to cover, to some extent, disability in relation to other amputation stumps.

Skin Flaps

No blame can be attached to the surgeon when the injury does not permit of planned flaps, but numbers of almost identical stumps have been seen where the design leaves no doubt that they have been planned as such. An example is the use of equal lateral flaps, giving an antero-posterior scar. This fashion has been recommended in a recent publication on war surgery because of the better drainage afforded. Good drainage is unquestionably advisable, but methods must surely be employed which do not cause additional disability. The objection raised to equal lateral flaps in amputation below the knee is the occurrence of a scar on the subcutaneous part of the tibia. In the post-operative period failure to heal by first intention exposes the tibia and adds many additional weeks to hospital treatment. Should the scar heal by first intention it is still placed at the point of maximum pressure between the end of the tibia and the socket of the prosthesis when the leg is swung forward in walking. Late breakdown may occur, especially if the scar is adherent to the bone.

It is not with these late complications that we are most concerned, but with those stumps that have not yet healed and show a small area of apparently dead bone projecting from the end. Radiographs of these stumps may eventually show terminal sequestration, but only after many months of waiting. Re-amputation below the knee while the wound is still open is impossible without risk, as the majority only measure six to seven inches below the knee. When the wound has healed or almost healed with a thin covering of scar tissue, re-amputation, with removal of one inch or more of bone, may enable the surgeon to cover the stump with sound skin flaps. To allow a patient to be fitted with his prosthesis when the stump end is covered only by scar tissue is to lay the foundations of trouble and disappointment. Therefore re-amputation, though wasteful of time, is necessary in order to provide a serviceable stump. It is hoped that the practice of using equal lateral flaps for amputations below the knee will rapidly disappear.

Another type of flap, the long anterior, which has been the standard textbook recommendation for many years, is still seen in recent amputations. Fortunately its use appears to be on the wane, for it has proved to be one of the least desirable flaps on account of its poor blood supply. Necrosis of the skin at the distal part of the flap may be a post-operative complication, but is not nearly so serious as necrosis of the skin overlying the tibia. The problem presented by ulceration of part of the flap over the tibia is exactly similar to that described in connexion with the antero-posterior scar. As Verrall has stated, the ideal scar, from the point of view of both skin nourishment and limb-fitting, is secured by the use of short anterior and long posterior flaps.

A number of stumps are still found with too generous a skin covering, and require the removal of superfluous skin before the artificial limb can be worn in comfort. This is a minor operation and adds little to the total disability period, but it deserves mention because some patients, already fitted with limbs, have had troublesome intertrigo from infolding of the skin or friction in the socket. Skin flaps should be tailored neatly on the stump at the time of amputation. If this is done there will be fewer possible sites for haematoma formation with the attendant risk of sepsis, and the time necessary for shrinking the stump will be lessened. The ideal stump is, of course, firm and tapering to the end, with rounded contours and a minimum of flabby tissue.

Skin Grafting

Although skin grafting has been performed on a few occasions the results have been unsatisfactory. Re-amputation, as soon as sepsis will allow, has been the only method of securing a serviceable stump. Various types of free graft and the tube pedicle graft, transferred in two stages from the abdomen, have been done. The Thiersch graft is not strong enough to stand the wear of the socket, and the whole-thickness grafts encountered so far have been so irregular with scars in vulnerable positions that limb-fitting was out of the question. Patients who have undergone several operations for grafting, with a long pre- or post-operative period of stump dressing, are naturally disappointed when informed that re-amputation is necessary.

Guillotine Amputations without Skin Traction

Too many cases of this type have been seen; the patient's misery is so real and so unnecessary. In the rush and hurry inseparable from this form of amputation time is really saved by taking a few seconds longer to cut through the skin at a lower level than the other structures. Two or three sutures can then be inserted over a generous gauze pack. This method is quicker than the application of skin traction with a weight over the end of the bed, and is effective for all but the very rare case in which it is desired to keep open the whole area of cross-section for drainage purposes. Skin traction has been applied at a late stage with little success. Three to four inches have often been lost at re-amputation in the thigh, while the loss in the lower leg has usually been less.

Too Early Re-amputation

Patients who have already undergone re-amputation have been received with discharging amputation stumps. It does not seem to be fully appreciated that re-amputation of two to three inches of a stump which is septic or has been septic is a procedure fraught with considerable danger of post-operative sepsis. With a clear five inches or more the risk is less. Stumps should be healed, or almost healed, before re-amputation is performed, and it is advisable to allow the patient to be up and about before the operation in order to activate latent sepsis, which otherwise might make its appearance at the time of operation or later. Ideally, before operating on the patient in whom every inch is of importance, the surgeon should wait for healing by scar tissue and a period of massage and heat to test for latent sepsis, but in view of the time involved operation may sometimes be considered a justifiable risk when the bare area appears really clean without a trace of surrounding oedema or tenderness. After all, re-amputation is a plastic operation done at leisure, and the result is usually of much greater importance than the excision of a facial scar, which has so much time and care lavished on its performance by plastic surgeons.

Flexion Deformity at Knee or Hip

This is one of the most easily avoided disabilities connected with amputations in the lower extremity, yet it is surprising how often it is encountered when the patient is sent for limb-fitting. Knee-joints are safe from this deformity if bandaged to a back splint for the healing period, but in amputations above the knee the hip-joint must be inspected to see that extension remains full. Ward routine should preclude the possibility of the stump resting on a pillow. Flexion deformity of either hip or knee is a serious disability, and its complete correction is an extremely difficult problem. In fact, if the deformity has lasted for more than a few weeks it is unlikely that it can be entirely cured.