reactions. The evidence from two cases treated by transfusion supports the observation that even when a comparatively large volume of blood is given to an adult the effect upon the clotting activity is transient (Stewart, 1939). It appears from Case 6947 that when a transfusion of average volume is given the immediate effect upon the prothrombin index is dramatic (more rapid, though more limited, than can be obtained from the injection of vitamin K analogue alone). Unless, however, this early rise is supported by concurrent spontaneous restoration the prothrombin may fall to its original level and bleeding recur in a very few hours.

The prompt and maintained increase in the plasma prothrombin and the rapid control of haemorrhage (within two hours of administration where bleeding was superficial) after the injection of vitamin K analogues are manifestly quite independent of any coexistent tendency to spontaneous recovery. Moreover, 2.5 mg. of 2-methyl-1:4-naphthoquinone intramuscularly restored the prothrombin index and maintained it at adult levels even when the laevulose-tolerance test indicated deficient hepatic function (Case 7152). The site of injection (intravenous or intramuscular) has no effect upon the rapidity of action, and there is no material difference between oil-soluble and water-soluble preparations. The simplicity of this method and the extreme rarity of conditions in which vitamin K analogues will not be effective in arresting the haemorrhagic tendency suggest that one of them should be employed first in all cases of spontaneous and persistent bleeding in the newborn. It is probable that in the most severe cases, in which prolonged or massive haemorrhage is exsanguinating the patient, simultaneous treatment by transfusion and injection of vitamin K analogue should be given. The rapid action of the transfusion in elevating the haemoglobin and plasma prothrombin levels would then be reinforced by the slightly slower and much more sustained effect of the vitamin K analogue on the clotting activity of the blood.

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REFERENCES

- Hobson, F. C. G., and Wits, L. J. (1940). *Lancet*, **2**, 247.
 Illingworth, C. F. W. (1939). *Ibid.*, **1**, 1031.
 Innes, J., and Davidson, L. S. P. (1941). *British Medical Journal*, **1**, 621.
Lancet, 1940, **1**, 650.
Ibid., 1941, **1**, 250.
 Macpherson, A. I. S., McCallum, E., and Haultain, W. F. T. (1940). *British Medical Journal*, **1**, 839.
 Nygaard, K. K. (1939). *Acta obstet. gynec. scand.*, **19**, 361.
 Quick, A. J., Stanley-Brown, M., and Bancroft, F. W. (1935). *Amer. J. med. Sci.*, **190**, 501.
 Rodda, F. C. (1920). *Amer. J. Dis. Child.*, **19**, 269.
 Schloss, O. M., and Commiskey, L. J. J. (1911). *Ibid.*, **1**, 276.
 — (1912). *Ibid.*, **3**, 216.
 Stewart, J. D. (1939). *Ann. Surg.*, **109**, 588.
 Tallerman, K. H. (1937). *Eden and Holland's Manual of Obstetrics*, p. 615, London.
 Waddell, W. W., and Guerry, D. (1939). *J. Amer. med. Ass.*, **112**, 2259.
 Whipple, G. H. (1913). *Arch. intern. Med.*, **12**, 637.
 Ziffren, S. E., Owen, C. A., Hoffman, G. R., and Smith, H. P. (1939). *Proc. Soc. exp. Biol.*, N.Y., **40**, 595.

THE CAUSES UNDERLYING THE RECENT INCREASED INCIDENCE OF AND MORTALITY FROM TUBERCULOSIS IN GLASGOW

BY

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Pulmonary Tuberculosis

It would appear that for five years preceding the outbreak of war in 1939 the incidence of and the mortality from pulmonary tuberculosis were tending to stabilize themselves in Glasgow at figures of around 1,650 notifications and 960 deaths per annum. During the first year of war the returns under the above two headings were 1,908 and 1,177 respectively, a rise of approximately 250 notifications and 200 deaths. This increased incidence and mortality is being maintained during 1941.

The following table shows the total number of notifications and deaths from pulmonary tuberculosis during the past seven years, together with a forecast for 1941 based on the returns for the first half of the year:

Year	Notifications	Deaths	Year	Notifications	Deaths
1934	1,646	873	1938	1,748	960
1935	1,757	972	1939	1,574	972
1936	1,647	979	1940	1,908	1,177
1937	1,654	955	1941*	2,190	1,342

* Estimated figure—i.e., twice the notifications and deaths during the first half of 1941.

The seasonal incidence of notifications from pulmonary tuberculosis for the years 1939, 1940, and 1941 was studied when it was found that the graphs for 1940 and 1941 followed closely the path of the graph for 1939, but at a slightly higher level. It was observed that the rise in notifications during 1940 and 1941 was normally distributed throughout the year, and did not occur in any one particular season.

The age and sex distribution of the notified cases of pulmonary tuberculosis for 1939 and 1940 are tabulated below:

Age	Males		Females	
	1939	1940	1939	1940
— 5 years	34	47	21	40
—15	68	45	50	71
—25	237	287	341	437
—35	162	218	162	214
—45	130	164	72	82
—55	119	127	42	27
—65	79	79	25	26
—65	23	31	9	13
Total	852	998	722	910

The total number of notifications was 1,574 in 1939 and 1,908 in 1940. During the first half of 1941 there were 1,095 notifications and 671 deaths—figures that indicate that the disease is continuing to increase in incidence.

It will be seen from the table that the increased incidence has taken place almost entirely between the ages of 15 and 45 in males and 15 and 35 in females, and that both sexes show an all-round increase of 20% over the 1939 returns.

Non-pulmonary Tuberculosis

The comparative figures for non-pulmonary tuberculosis for 1939 and 1940 also show that a considerable rise in the number of notifications and deaths from this form of tuber-

The borough of Chelmsford, with an estimated population of 33,040, reports twenty-eight deaths of children under 1 year during 1940, and only ten deaths among young persons between 1 and 25 years. An attempt was made to establish a day nursery for children between 2 and 5, but the scheme had to be abandoned, chiefly owing to the difficulty of bringing and collecting children in the black-out, and of obtaining money, staff, and accommodation. The M.O.H. notes a good response to the diphtheria immunization campaign, and only three cases were reported during the year, with no deaths.

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

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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.