

# Tuberculosis in the Royal Norwegian Navy during the war

## Abstract

Tuberculosis became a great problem in the Royal Norwegian Navy during the first years of the Second World War (when it operated in allied services mainly from Great Britain); with the highest incidence (9.6 per 1 000) during the first half of 1943. Main reasons were insufficient medical examination of recruits, crowded living conditions on board (favoured the contagion) and the physical and psychological pressure during sea operations, which may have reduced the immune defence.

Preventive measures in terms of tuberculin testing, chest X-rays of the positives, vaccination of the negatives, environment investigation when disease was discovered, and isolation of those infected, gave control from the second half of 1943 and onwards.

The article also mentions treatment, repatriation and the incidence of tuberculosis in the Navy before and after the war.

The tuberculosis situation is currently so favourable in Norway that routine chest X-ray of the recruits is no longer performed in the armed forces.

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In June 1940, the Norwegian Navy had 16 vessels, with approximately 600 men, stationed in Great Britain under Norwegian command. The Navy had suffered heavy losses during the military actions in Norway, and needed rebuilding and remaining virtually from scratch. By the summer of 1940 naval vessels had entered service in British waters. The number of naval servicemen increased considerably during the next years, and the Navy became the largest branch of the Norwegian armed forces in England during the war. By the end of the war, in 1945, there were 52 vessels with a personnel strength of 7 366 (1).

However, the large growth did not come without costs. A report (released in 1943) on treated active tuberculosis in the armed forces, showed that the Navy had far more cases of tuberculosis than the other branches of the Forces (2). In the Navy, 125 people had been treated for active tuberculosis.

This was a prevalence vastly exceeding that which would have been expected in Norway, and corresponded to a prevalence not seen in over 10 years in the Navy. We do not know the incidence of tuberculosis (TB) in the Royal Norwegian Navy in the years immediately preceding the war; the last health statistics available before the outbreak of war were from the years 1931 and 1935 (3). The incidence rate of tuberculosis showed a significant decrease in this period, from 10 in 1931 to approximately three only four years later (tab 1) (3, 4). There was a corresponding drastic decline in TB morbidity, which had been very high in the years after the Spanish influenza epidemic (5).

Tuberculosis caused a large number of lost workdays during the war. Johannes Kvittingen (1906–1996) & Nils Bonsaksen (1917–73), who served in the Navy during the war, has provided this documentation which is based on a number of Norwegian archives from Great Britain, Iceland and Canada, as well as reports and announcements from the British medical corps (6).

Altogether 237 new cases of tuberculosis were detected during the war years, but the distribution between servicemen based on land and at sea is unclear (tab 2).

## Reasons for a high prevalence in the Navy during the war

It has been postulated that the most important reason for the high incidence of TB infections was that the Navy was built up without making proper provisions for a comprehensive and effective naval medical corps. Not all measures for prevention of contagion coming into the Navy were exhausted (6).

The military services had a large personnel requirement, and men occasionally entered service without prior medical examination. Moreover, the criteria for fitness for service became markedly lower than in the pre-war period. It may be assumed that tuberculosis slipped into the armed services when volunteers were recruited (6).

The Lofoten Island raids exemplify this shift of paradigm, for amongst others Anders Chr. Gogstad. He writes: «Bemerkelsesverdig var at alle menn som kom fra Lofoten etter raidene der i 1941 ble fordelt på hær og marine uten forutgående legeundersøkelser. De fleste av disse kom til Marinen og medførte smittekilder» (It was noteworthy that all men who came back from the Lofoten Islands after the raids in 1941 were recruited to the Army and Navy without prior medical examination. The majority of them entered the Navy and included carriers») (7). The first Lofoten raid, «Operation Claymore», took place in the beginning of March 1941. On the return from the Lofoten Islands the ships were willing to take on board anyone who freely chose to go to Great Britain and join the Norwegian armed forces; 306 men and

## Main message

- Crowded living conditions on board naval vessels enhances the spread of contagious disease
- Tuberculosis at sea is avoided by preventing the tuberculosis bacillus from coming on board
- Defence against the spread of contagious disease is one of the main tasks of naval medicine

8 women enlisted (1). The second Lofoten raid, «Operation Anklet», was conducted at the end of December 1941. Altogether 266 Norwegians came to Great Britain with this raid. Additionally, families with children also fled, for fear of reprisals, such as those who had helped the soldiers during the first raid had been subjected to.

We agree that an important reason for the increase in tuberculosis during the first years of the war were the reduced fitness requirements for entering military service and the inadequate screening of new recruits resulting from the urgent increase in recruitment needs. However, the first group who returned with the first Lofoten raid were, in fact, screened for tuberculosis (normal X-ray examination and X-ray screen photography). The screening was part of a research project, but was not comprehensive; the clinical examination before X-ray screen photography did not include sedimentation rate or TB testing. The Norwegian radiologist Kaare Tutein Poulsson (1904–67), who had escaped to Great Britain in February 1941, took part in a study where X-ray screen photography was compared to conventional chest X-ray examination (8, 9). The patient sample consisted of Norwegians who had come to London during the previous 3 months to join the armed forces and included amongst others «the group of men who had escaped from the Lofoten Islands during March 1941». No tuberculosis was found in this group. The TB carriers from the Lofoten Islands presumably came over with the second raid. Kvittingen & Bonsaksen report that the volunteers who came over with the Lofoten raid of January 1941 were not examined, however this cannot be correct and is presumably a textual error, as Kvittingen was one of the referring physicians while Gogstad could hardly have known about X-ray screen photography.

In addition to inadequate medical examination of new recruits, the cramped living conditions and enormous pressure during active service were fundamental factors behind the increase in the prevalence of tuberculosis. A person coming on board with contagious tuberculosis could easily cause an epidemic. The crew were very tightly quartered on the dark orloft deck (*i.e.* quarters for enlisted men beneath the main deck) and worked, ate and slept very close to one another. In those days men slept in hammocks that were rolled up and stored in communal bins during daytime.



During the war, the Government in exile established a chain of clinics for seamen on both sides of the Atlantic. Their mandate was to prevent and treat illness amongst seamen and to inspect Norwegian ships. In addition, they were given an advisory role towards the authorities. Illustrative photograph © courtesy of the Bergen Maritime Museum

The service could be extremely demanding. Storms, ice, torpedo attacks, frequent sounding of «battle stations», lack of sleep, wet clothes that never dried properly and the primitive sanitary conditions were the daily stock in trade when at sea. Folke Hauger Johannesen, later admiral and general officer, writes the following in his memoirs: «Det var ikke underlig at tuberkulosen krevde offer» (It is not surprising that tuberculosis claimed its victims) (10). He was captain of the destroyer «St. Albans» in 1943 when 10 cases of tuberculosis were reported, of which nine came from the same lower deck (2).

### Preventive measures

The Navy had previously maintained an extensive programme of preventive measures against tuberculosis. In 1920 a specialised medical examination of all recruits directed at preventing tuberculosis carriers from entering service was introduced in both the Army and the Navy (11). From 1922 and onwards, all recruits at Horten were examined by X-ray if there were suspicious findings from the clinical examination or the recruit's medical history, and if necessary admitted to the naval hospital at Karljohansvern «and injected with increasing doses of Koch's *tuberculinum*

**Table 1** Incidence of lung tuberculosis (2, 3) (total No. naval personnel in brackets)

Year	Navy		In the total population
	At sea	On land	
1931	10.1/1 000 (296)	1.5/1 000 (682)	22.4/10 000
1935	3.0/1 000 (331)	0 (596)	17.6/10 000

**Table 2** New cases of lung tuberculosis per 6 months according to Kvittingen and Bonsaksen (6)

Tuberculosis in the Royal Norwegian Navy	1940		1941		1942		1943		1944		1945
	30/6–31/12	1/1–30/6	1/7–31/12	1/1–30/6	1/7–31/12	1/1–30/6	1/7–31/12	1/1–30/6	1/7–31/12	1/1–30/6	
No. cases	3	8	21	34	31	50	27	37	18	8	
Per 1 000	1.7	4	7	9	6.9	9.6	4.8	6.2	2.8	1.1	



*The Norwegian Navy in rough weather in the arctic sea: after-deck with depth charges. Illustrative photograph © courtesy of the Naval Museum*

*vetus*). An X-ray screen photography apparatus was acquired before 1940 (12).

Preventive examinations were given lower priority during the first years of the war, due to the enormous resources demanded by rebuilding the Navy. When it was established, in January 1941, that there had been an increase of the TB incidence, the military medical corps gave orders and laid plans for a battle against tuberculosis in all branches of the armed forces (6). There was not much to do about the cramped living conditions that increased the risk of contagion on board ships, nor could one change the physical and psychological pressures of war, which could weaken the immune defences. However, one could prevent contagion from coming on board ships. The decision was taken that all naval personnel would be examined with Pirquet's test, all positives would undergo X-ray examinations, and all negatives would be given the BCG vaccination. Environmental investigations were to be undertaken in locations where new cases were detected. Those infected were to be placed in isolation to prevent the disease from spreading. With these preventative measures the disease was brought under control from 1943 onwards, and the incidence in the last half year of the war was the same as in the autumn of 1940. The introduction of systematic examinations

aimed at tuberculosis was not, however, unique to the Navy. The war against tuberculosis was also fought back home in Norway. Sophus W. Brochmann (1892–1956) introduced mass X-ray screening of the population in 1943. Brochmann was the inspector for tuberculosis under the Nazi regimen and had taken over the plans of the deposed Otto Galtung (1904–81). This took place under the surveillance of the health department of the German «Reichskommissar» in Norway (national commissioner), and the programme was approved as an independent Norwegian venture (13).

#### **Tuberculosis in the Canadian Navy**

The Royal Canadian Navy was in many respects similar to the Norwegian Navy and thus serves as an interesting basis for comparison with regard to prevalence and prevention of tuberculosis. Over 40% of the Canadian personnel served on ships, primarily on destroyers and smaller ships on escort duty under the same stressful conditions as parts of our Navy (14, 15). All men assigned to service on board underwent an X-ray examination before embarkation, and annual X-ray examinations of all personnel was intended though this was not entirely successful. During the war years the annual personnel strength increased from 27 614

to 99 078. Altogether 490 cases of tuberculosis were diagnosed with an annual average incidence of 2.36 per 1 000. In our small Navy there were 247 cases. The relatively low number of TB sufferers can primarily be explained by thorough examination of recruits, which prevented the intake of carriers.

#### **Treatment and follow-up of tuberculosis patients**

Towards the end of 1941 the Norwegian authorities were able to rent a part of Craiglockhart, which was a nursing home in Edinburgh that had been expropriated and turned into the «Emergency Health Service» in 1939. A hospital with 145 beds and a Norwegian staff was subsequently established and equipped (16). Hans Gabriel Dedichen (1901–81), who came to England in February 1942, took over the management of Craiglockhart hospital in January 1942 (8, 17). All Norwegians who contracted tuberculosis in Great Britain were referred there. During the three and a half years the hospital was in service, 988 TB patients were admitted, and of these 32 died. The archives from Craiglockhart show that children with home addresses in Lofoten had also been admitted to this institution; they must have come to Great



Britain with the second raid (18). Altogether 479 thoracic interventions were performed. Many patients were cured, but with few exceptions none from the Navy were allowed to return to duty either at sea or on land.

During the time in Great Britain the Norwegian Navy were not allowed to discharge patients who were cured, and consequently accumulated a large number of absentee days because of tuberculosis; in total 98 326. Several convalescence homes were established for TB patients. It was difficult to find suitable employment for the convalescents who subsequently became a significant expense for the Norwegian military health authorities.

Repatriation of TB patients after the declaration of peace presented transportation problems. Some of the Navy's patients in Scotland who were bacillus negative, were transported home by naval vessels (2). On the basis of a proposal from Dedichen, in his letter of 13 May 1945, it was decided that patients and personnel from Craighlockhart and convalescence homes in the Newlands and Brocklehurst should be transported together along with the archives from the individual institutions (16). The passenger-liner «Stavangerfjord» received the assignment and arrived in Oslo at the end of August 1945. The newspaper Arbeiderbladet referred to the unusual passengers brought home by the America Lines legendary ship with the following headline, «En broget last: Fra arresterte Quislinger til barn som skal døpes.- Overlege Dedichen hjem med alle sine pasienter» (A varied cargo: from arrested Quislings to children about to be baptised— Dr Dedichen home with all his patients). 14–15 of them were so unwell that they had to be carried on stretchers from the ship and driven directly to Berg hospital, which was a temporary hospital for evacuees at Berg school in Oslo (19). We have identified 24 report cards in the archives from the evacuation hospitals at Berg and Grefsen, which almost certainly refer to TB patients from the Navy (20).

TB patients also had to be transported home from America. Plans were laid for the repatriation of approximately 200 TB patients, of which 100 would require a stay in a sanatorium (16). They were received by Berg hospital for evacuees in October 1945, where they held an «emotional welcome home party for the sick seamen» (21). We know little about the fate of the TB patients after repatriation.

### Tuberculosis in the Armed Forces immediately after the war

After demobilisation 1 January 1946, the BCG vaccination of Pirquet test negatives was no longer mandatory. The law of 12 December 1947 was passed, tuberculin testing and vaccination of individuals or groups stated that Pirquet testing and vac-

ination could be made mandatory for individuals or groups. BCG vaccination did not become mandatory for all military personnel before October 1950. While the number of TB cases decreased in other branches of the armed forces it remained high in the Navy. Amongst other causes, there was an epidemic in 1947 where the carrier was probably an asymptomatic recruit. Cavernal lung tuberculosis was observed on X-Ray screen photography during the screening medical examination, but because the report was mislaid the result was not received before the recruit fell ill. By this time he had managed to infect many of his fellow recruits. By the time the environmental investigations were finally conducted, the men had already been sent to several different military locations, and amongst 221 servicemen, 65 with signs of TB infection were found.

The incidence of tuberculosis remained high in the Armed Forces in 1948 (23). The majority were in the Navy (prevalence 11.9‰); with a significantly higher prevalence than in the air force (4.5‰), in the army (3.9‰) and amongst civilian men in Oslo from the same age group (3.5‰). A reason for this may be that a larger proportion of the naval recruits came from the most tuberculosis ravaged coastal districts than those recruited to other branches of the armed forces (23). There were four times as many cases of tuberculosis in previously tuberculin negative individuals as in the air force or the army. Cramped living conditions could explain the increased risk of infection, also of other infectious diseases, which could conceivably reduce resistance to tuberculosis.

This negative spiral continued in the Navy. From 1949 to 1952 tuberculosis morbidity showed a marked decline among the enlisted men in the armed forces with the exception of the Navy (24, 25). While the incidence of destructive tuberculosis decreased significantly, from 18 to 6 per 10 000 between 1949 and 1952 in the armed forces as a whole, it still remained at roughly the same level in the Navy even in 1952. TB morbidity among the junior and non-commissioned officers does not show the same differences between the branches of the armed services.

### The situation today

Hygienic conditions on ships have been significantly improved since wartime, but cramped living conditions seem unavoidable. The naval medical corps is alert to the fact that tuberculosis is on the increase in many places around the world, with resistant strains of the bacillus being an additional problem. More recruits are tuberculin negative now that the BCG vaccination is no longer mandatory. The naval doctor looks for vaccination scars in all who are drafted into the military service for the

first time, and assesses whether referral is necessary for X-Ray examination of the lungs. BCG vaccine should be given to all personnel working on board ships or cleared for international duty who have no sign of a BCG vaccination scar, no documented vaccination, and a negative Mantoux reaction. All personnel coming home from international service are obliged to undergo a medical check up for monitoring and follow-up of tuberculosis.

The following quote, from a lecture given by Alexander Tuxen (1897–1980) in 1966, remains relevant today: «En vakker dag kommer folkemassene, folkehavene i bevegelse, og de har tuberkulosen med seg. En vakker dag, på en eller annen måte kommer tuberkelbasillen igjen hvis vi ikke passer på den» (Some day the masses will come, a sea of migrating people, and they will bring tuberculosis with them. If we become unvigilant, the tuberculosis bacillus will return one way or the other) (26).

*Disclosed conflicts of interest: None*

### Literature

1. Steen EA. Norges sjøkrig 1940–1945. Bd. 6, 1. del. Marinens operasjoner fra baser i Storbritannia. Utgitt av forsvarrets krigshistoriske avdeling. Oslo: Gyldendal, 1963: 23–5.
2. Rapport fra Øystein Snorre Stray. Riksarkivet. Sosialdepartementet, Medisinaldirektøren i London, sakarkiv, eske 98.
3. Sykestatistikker for den kgl. norske marine 1914–1935. Saniteten i sjøforsvaret.
4. Norges offisielle statistikk X. 55. Sunnhetstilstanden og medisinalforholdene. 1940. 88. årgang. Utgitt av Statistisk Sentralbyrå. Oslo: I kommisjon hos H. Aschehoug & Co., 1943.
5. Schiøtz A. Folkets helse – landets styrke. Det offentlige helsevesen i Norge 1603–2003. Bd. 2. Oslo: Universitetsforlaget, 2003: 218–23.
6. Kvittingen J, Bonsaksen N. Sykdom og skader i den kgl. norske marine i krigsårene 1940–1945. Oslo: P. Solberg Trykk, 1952: 11–25. Marine-museet, Horten.
7. Gogstad AC. Slange og sverd. Bergen: Alma Mater, 1995: 332.
8. Ulstein R. Englandsfarten. Bd. 1. Oslo: Det Norske Samlaget, 1965: 51, 291.
9. Clark KC, Poulsson KT, Gage H Courtney. Further experiments in x-ray screen photography. Br J Radiol 1941; 163: 250–4.
10. Johannesen FH. Gå på eller gå under. Oslo: Faktum forlag, 1988: 201.
11. Øverland B. Kampen mot tuberkulose. I: Storsten E, red. Social håndbok for Norge. Oslo: Norsk forening for sosialt arbeide, 1937: 140–51.
12. Bergen byarkiv. BBA-A-2617-J1. Bergen helseråd-lungepoliklinikk. Bergen helseråd 01054–28.VI.40. Brev fra Siemens til Stadsfysikus.
13. Riksarkivet. Reichskommissar. Abt. Gesundheitswesen. Hyllenr. 1C24133, pk.11.
14. Peirce CB, Jarry G, Richardson AC. The incidence of tuberculosis in the Royal Canadian Naval Service. Can Med Assoc J 1944; 51: 46–51.
15. Jarry G, Richardson A, Maynard WV. Tuberculosis in the naval service from 1930 to 1945 [inclusive]. Can Med Assoc J 1946; 55: 368–9. [1930 er trykkfeil, skal være 1939 bedømt etter innholdet.]
16. Riksarkivet. Sosialdepartementet. Tuberkulosekontoret H3, Serie D, eske 142.
17. Dedichen HG. Norsk helsetjeneste i Storbritannia under krigen 1940–45. Nordisk medicinhistorisk årsbok 1977: 189–98.
18. Riksarkivet. Craighlockhart hospital: serie Cb, eske 12 og 13, TBC-kort.
19. En broget last: Fra arresterte quislinger til barn som skal døpes. Arbeiderbladet 20.8.1945.

20. Riksarkivet. Statens evakueringssykehus Berg og Grefsen. Serie Cb-registre og protokoller. Kartotek kort A-Å 1945–1946. KParkiv 39.
21. Aftenposten (morgenutgave) 4.10.1945.
22. Strøm A. En tuberkuloseepidemi i forsvaret. Tidsskr Nor Lægeforen 1948; 68: 270–1.
23. Seip M. Tuberkulosen i forsvaret i 1948. Tidsskr Nor Lægeforen 1949; 69: 328–30.
24. Høst H. Tuberkulose i forsvaret i 1949–50. Tidsskr Nor Lægeforen 1953; 73: 337–42.
25. Høst H. Tuberkulose i forsvaret i Norge 1951–1952. Nordisk Hygienisk Tidsskrift 1955; 36: 133–42.
26. Tuxen A. Tuberkulose og tuberkulosebehandling i min tid. Et tidsbilde. Tidsskr Nor Lægeforen 1967; 87: 1310–5.

*The Manuscript was received 5.5. 2008 and accepted for publication 30.10. 2008. The medical editor was Anne Kveim Lie.*