

Infections at sea past and present

Tim Carter

Norwegian Centre for Maritime Medicine, University of Bergen, Norway

The papers in this issue are from the International Maritime Health Association workshop, 'infectious disease in the twenty-first century'. This was held in Singapore in November/December 2009 [1]. The title of the workshop begs the question: what is special about infectious diseases in those at sea in the twenty-first century compared with earlier times? Thankfully it is too early to speculate on infectious disease at sea in the twenty-second century yet!

Infectious disease at sea has occurred for as long as the sea has been conquered in pursuit of fresh lands to live in or the slightly shorter time that it has been a means of transport. But for most of that time infectious diseases, as we now understand them, would not have been seen in this way. They might have been seen as pestilences indicating anger in heaven, and they would undoubtedly have been a source of concern, illness, and death. They would not have been recognized as a consequence of invisible living organisms multiplying in the bodies of their victims. For many centuries the role of ships and seafarers in transmitting the diseases we now know as infections from one port to another has been known and feared. Plague, smallpox, cholera, syphilis, and yellow fever were all repeatedly spread in this way, but understanding was limited and the adoption of quarantine and the inherent xenophobia and fear of mingling with seafarers from strange lands, unless you were desperate enough to have to sell sexual or other services to them, give an inkling of the ways in which contagion was seen to be associated with 'those who go down to the sea in ships'.

The roots of our present understanding of infectious disease have their origins in the late nineteenth century, well after steam ships and liner services had started, contemporary with the last flowering of sail in the tea clippers, and long after the European na-

tions had established world maritime and colonial empires [2]. Bacteria, viruses, and parasites are new kids on the block in comparison with the world of ships and maritime trade and travel.

One of the longest continuing sources of information on the management of infections at sea is the British *Ship Captain's Medical Guide*. This was first published in 1868 and there have since been twenty-one further editions. The changes between editions open windows on contemporary thinking about how best to managed infectious disease in the maritime setting [3]. The first editions of the Guide precede the germ theory of disease, those before 1900 are prior to the recognition of the importance of insect vectors in malaria and yellow fever, while it was only in the 1940s that effective chemotherapy for diseases other than syphilis (mercury and then salvarsan) and malaria (quinine) became available. Since then understanding of infections has been enhanced, as have the means of treating them, up to a time in the 1970s when they were seen as diseases of yesteryear. Such optimism is now seen, with the benefit of hindsight, to be unjustified with new infections such as HIV being recognized, while old ones such as malaria and tuberculosis have mutated to defeat the treatments originally used for them, and viral pandemics are a continuing phenomenon. This is why the workshop was timely.

A study of the *Ship Captain's Medical Guide* and its modification to take account of new knowledge can shed important light on the practicalities of infectious disease management at sea [4]. When a case or outbreak occurs action is called for, preferably to treat cases and prevent spread, but even if these aims are not possible it remains essential to avoid panic and to keep the ship functioning. Where action is possible, prevention is ideal, failing that con-

✉ Tim Carter, Norwegian Centre for Maritime Medicine, Department of Occupational Medicine, Haukeland University Hospital, JonasLies vei 65, PO Box 1, 5021 Bergen, Norway; e-mail: Tim.carter@mcga.gov.uk

tainment of spread, and if possible the treatment of cases. The first of these, prevention, is closely linked to an understanding of the disease. Thus for both malaria and yellow fever their association with swamps onshore and with native villages were recognized early and recommendations on anchoring well away from these features were made. However, as soon as the role of mosquitoes as vectors was recognized preventative advice became more specific: screening, covering skin, and not going ashore in the evening were added [5]. Quinine was not a readily accepted prophylactic but as soon as synthetic alternatives became available for malaria and immunization for yellow fever was introduced these became essential aspects of prevention on board [6]. Similar developments can be seen once water was seen as the route of infection for cholera, typhoid, and dysentery. Plague made a surprising re-emergence in the 1890s, and complex arrangements for de-ratting ships were developed in response, coupled with some return to the quarantines of an earlier age [7].

Case management at sea, as on land, depends on diagnosis. This is no easy matter for a ship's master who has little training and often no experience of the presentation of different illnesses. An important feature of the Guide was a series of tables setting out the symptoms and signs of each infectious disease, enabling the pattern that best fits the case to be identified [8]. However, pictures of rashes only came much later when printing techniques improved while, as this was an official publication where there were sensitivities about its cost for ship owners, a low cover price was seen as essential! [9]. The introduction of diagnostic tools was an interesting aspect; for instance, it was considered in the 1880s that mortality from yellow fever could be reduced by rest. The earliest sign of infection was a raised temperature. But how to differentiate between the ill seafarer and the one who wanted to avoid working? The answer lay in the provision of what was then a new diagnostic aid, the clinical thermometer [10].

One of the most problematic diagnostic differentiations was between smallpox and chicken pox. When smallpox was still common and the immunity of onshore populations was also high many of the problems were simpler than in more recent times when it became rare and immunity onshore was lower. However, the politics of vaccination meant that while every naval seaman had to be vaccinated an absolute requirement was not seen as practicable for those on merchant ships. But at all times smallpox was

among the most feared infections both aboard and in port cities [11].

Prevention of spread posed problems, particularly in the confines of a crowded fore-castle. Isolation sometimes involved placing the ill person in the ship's boat or rigging an awning in deck. Safe disposal of faeces and bedding and the generous use of disinfectants, as well as good precautions when nursing, all played a part; as in the wise recommendation to always use crew members who have been vaccinated or who have had smallpox to look after anyone with the remotest suspicion of having this disease.

Definitive treatment at sea was limited and, prior to antibiotics and sulphonamides, only feasible for malaria. Regimens of diet and bowel control were recommended and were revised as medical knowledge onshore developed. Thus starvation diets for typhoid gave way to more nutritious but still soft ones in the 1900s [12]. Treating infections at sea on long passages was a fraught task as deaths occurred and new cases developed. Access to medical help in ports, from passing ships, or by the 1920s from shore-based radiomedical services eased some of the burden on the ship's master [13].

Throughout the period venereal diseases remained in a category of their own, first because of the moral overlays and second because of the need for weekly intravenous injections when salvarsan became available around 1910 as an effective treatment for syphilis [14]. Finally it had to be acknowledged, under the conditions of war in the 1940s, that seamen were going to get infected and that VD was going to reduce the available seagoing manpower, and so morality was replaced by practical advice on avoidance, prevention, and the use of condoms, which then became a part of the ships medical stores [15].

We still see many parallels with the period reviewed in the workshop's discussions about infectious disease management in today's seafarers. The limited skills and facilities, the need for clear instructions on what to do to prevent, diagnose, and treat as well as concerns about the responses of port health officials to suspected cases are all still matters for debate. These are featured in the papers that follow, and the lessons from past problems, if learnt, can enable the right actions to be taken in a timely way. Thus the lack of disturbance to maritime transport during the major influenza epidemic in 1917–1920 is important in considering how best to plan for the recent, thankfully less severe, pandemic of H1 N1. In just the same way, stigmatization

and requirements for treatment of syphilis in the early part of the twentieth century has many parallels with HIV in seafarers today.

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