Sexually transmitted infections in seafarers: 2020’s perspectives based on a literature review from 2000–2020

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ABSTRACT

Background: Seafarers are a special population. The issue of sexually transmitted diseases among seafarers is as old as navigation itself, and is a public health issue and a matter of concern for seafarers themselves. The purpose of this article is to review the literature on sexually transmitted infections (STIs) in professional seafarers in the 21st century, with a view to guiding maritime physicians in their practice.

Materials and methods: This is a Medline® and Scopus® literature review covering publications between 01/01/2000 and 31/12/2019. Out of the 224 articles, 26 were selected.

Results: This review showed that at the beginning of the 21st century, attention has been focused mainly on human immunodeficiency virus (HIV). Few seroprevalence data were available. Between 10% and 91% of seafarers had been tested for STIs. Several risk behaviours were identified: out of 4022 seafarers surveyed, 34.3% said they had several sexual partners; out of 3722 seafarers surveyed, 19.5% engaged with sex workers; out of 3493 seafarers surveyed, 63.3% did not always use condoms, while 58.0% were aware of the relevance of this protection. There was a lot of misunderstanding about STIs: 28.3% of seafarers believed that a healthy-looking person could not be HIV-positive.

Conclusions: The main pathology studied was HIV. Many seafarers had no specific training and only learned about STIs and HIV through media such as television. Maritime doctors could use new technologies to disseminate the right information on STI prevention.

Key words: sexually transmitted diseases, seafarer, HIV-positive

INTRODUCTION

Seafarers are a special population. Depending on their activities, they may travel long distances or even circumnavigate the globe. They may stay at sea for several weeks, or make stopovers in many ports. On some ships, there are seafarers from many different countries. Seafarers cross borders and geopolitical boundaries. They can be both vectors of pathologies and victims of infectious diseases [1, 2].

The issue of sexually transmitted diseases among seafarers is as old as navigation itself, and is a public health issue and a matter of concern for seafarers themselves [3]. Data on sexual behaviour have shown, among other things, that being away from home for more than 1 month increases...
the prevalence of sexual relations with several partners [4]. The issue of sexually transmitted infection (STIs) among seafarers can be approached from several points of view, including the prevention of infections contracted in ports of call and arresting the spread of infection after returning home [5]. Shipowners and navies have set up prevention campaigns [6]. The French Navy, for example, has a strong public health policy. On-board doctors train seamen on microbiological risks before each port of call, so that they will take all the necessary measures to avoid infections. The training is comprehensive (prevention of food-borne infections, infections related to wildlife, etc.) and covers STIs. Recently, there has been an increase in STIs among French military seafarers, due to a drop in vigilance after returning from missions [7]. In Croatia, between 1985 and 2009, 9% of human immunodeficiency virus (HIV)-positive patients were seafarers [8].

Seafarers are therefore at risk of STIs [9]. This is a centuries-old health problem that affects the entire world [10]. In some countries, the HIV rate among fishermen is 10 times higher than that of the general population [11]. The purpose of this article is to review the literature on STIs in professional seafarers in the 21st century, with a view to guiding maritime physicians in their practice: which infections and which microorganisms should they focus on? These data may help for the 2020s.

**MATERIALS AND METHODS**

This is a Medline® and Scopus® literature review covering publications between 01/01/2000 and 31/12/2019. Keywords used were: “Sexually Transmitted Diseases” [Mesh] (also included were: Sexually Transmitted Diseases, Bacterial, Chancroid, Chlamydia Infections +, Gonorrhea, Granuloma Inguinale, Syphilis, Sexually Transmitted Diseases, Viral, Condylomata Acuminata +, Herpes Genitalis, HIV Infections +, Herpes Genitalis) “Hepatitis B” [Mesh], “Hepatitis C” [Mesh], “Chlamydiaceae Infections” [Mesh], “Vaginosis, Bacterial” [Mesh], “mariner”, mariners”, “seafarer”, seafarers”, “seaman”, seamen”, “fisherman”, “sailor”, “seafarers”, “fisher”, “fishers”, and “migrant health”. For Scopus®, the French key words were: maladies sexuellement transmissibles, infections sexuellement transmissibles, pêcheurs et marins.

Criteria for inclusion were the following: English, French or Spanish articles were selected. The pertinence of results was analysed according to titles and abstracts available on Medline® and Scopus®.

Only articles studying STIs in professional, civilian seafarers were included. Excluded were articles studying other types of infections or infections in other populations (military seafarers, recreational seafarers, port officials, etc.) or articles in which it was not possible to distinguish seafarers from other populations that were studied. Also excluded were anthropological articles on discourse analysis as such, or articles on pre-exposure treatments [12]. Very specific articles on Lake Victoria fishermen were excluded because this was not a marine fishery and there is a “sex-for-fish” economy specific to this location [13].

Out of the 265 articles, 26 were selected (Fig. 1).

Data on seafarers’ risk behaviour and knowledge were collected by theme. If the articles dealt with comparable data (e.g. multiple sexual partners), prevalence rates in the virtual population were calculated by adding the numerators (mariners with the same response) and the denominators (mariners who responded).

**RESULTS**

The results are organised according to the theme studied: microbial ecology, prevention, risky behaviour and company policies [4, 14–38].

**MICROBIAL ECOLOGY**

There were few seroprevalence studies. Only 9 papers studied the prevalences of STIs, and mainly HIV. The rate of seafarers having had an HIV test varied from 10% in a study in Morocco and a study in Turkey to 91% in a study in the Philippines [14–16].

In Europe. In Croatia, seafarers were the population most affected by HIV, with a prevalence rate of 246.67 per 100,000 seafarers, which is 14 times that of the general population, between 1985 and 2009 [8]. A Croatian HIV study described the non-B HIV-1 subtype dissemination [17]. Of the 145 Croatian seafarers at risk, there were 25 seafarers and 13 seafarers’ wives. The study showed...
that heterosexual intercourse and travel in Europe promoted the spread of this subtype. For another Croatian study, 9.9% (43/435) seafarers ever had one STI [38].

In **Africa, Asia and Oceania**. Nguyen et al. [18] studied the prevalence of HIV and hepatitis B seropositivity among at-risk populations in Hai Phong, Vietnam. Among the 94 seafarers in the study, none had HIV, while 54% were hepatitis B carriers (HBs antigen and HBs antibody were positive) [18, 19].

In the majority of cases, the studies were carried out with the fishing community. Their results therefore corresponded to the lifestyle of small communities. In Cambodia, 3% (9/262) of fishermen had at least one HIV test [4]. In a systematic serology study among 446 Cambodian fishermen, 16.1% were HIV positive [20]. In 2000, 818 fishermen (582 Thai, 137 Burmese, 99 Khmer) had a serology. And 15.5% fisherman were HIV-1 positive [33]. In Myanmar, out of 2798 men receiving treatment for HIV between 2004 and 2014, 41.2% (1172) were fishermen, 22.8% of whom were also infected with hepatitis C virus (HCV) [21]. In Malaysia, 12.4% were HIV positive and 48.6% had HCV infection. But HCV infection was correlated with drug use rather than with sexual behaviour [22]. In Uganda, Katusiime et al. [24] conducted clinical assessments and serological tests on 16 fishermen. Among these fishermen, 38% (6/16) had an STI: 3 syphilis, 1 hepatitis B virus (HBV), 1 genital herpes and 1 gonorrhoea (nongonococcal urethritis).

In **the America**. In Mexico, the central blood bank of Veracruz studied prevalence and risk factors of positive serology for several biological agents: HIV, syphilis, Treponema pallidum. Fishermen had a higher risk of being positive for syphilis than the general population: odds ratio (OR): 1.92; 95% confidence interval (CI): 1.13–3.25 [23].

**PREVENTION AND TESTING**

A study conducted in 30 countries (including India, Indonesia, Myanmar, Philippines, Turkey, Ukraine — and major beneficial ownership countries such as Germany, Italy, Norway, and South Korea) showed that 3/4 of seafarers’ unions in these countries considered STIs to be a major public health problem, particularly HIV [25].

**Testing.** The rate of seafarers who were tested for HIV varied from study to study. It was generally around 10%. But it could sometimes be very high: 91% in a study in the Philippines; 60% of seafarer officers and 66% of crew members in a Croatian study [14–16, 38].

**Training and knowledge.** There were many false beliefs about STIs, especially HIV (Table 1). For example, some seafarers believed that only homosexuals could be infected with HIV (9/186) [25]. Or, many seafarers believed that HIV could be transmitted through mosquito bites (Table 1).

In Turkey, the nursing university studied seafarers’ knowledge of STIs through a knowledge and perception self-questionnaire [15]. Of the 660 seafarers, 53% had inadequate knowledge about STIs and their prevention. This was particularly the case for HIV: only 44% of seafarers had adequate knowledge of protective measures. Their knowledge came mainly from the media, for 68% of them. Although the majority considered themselves at risk, only 10% had been tested.

A study of 27 Italian shipowners, involving 197 seafarers of several nationalities (Italian, Indian, Filipino, Ukrainian, Romanian, Bulgarian and others) showed that 93% of Filipino, 92% of Indian, 73% of Eastern European and 53% of Italian seafarers had received training on STIs by health professionals [26].

**RISK BEHAVIOURS**

Many seafarers had multiple sexual partners or engaged with professional sex workers (Table 2). Several risk factors for risky behaviours were identified.

A study of 502 seafarers in the Philippines showed that certain factors were correlated with higher rates of unprotected sex and sex with multiple partners: alcohol consumption (p = 0.027), being single (p = 0.007) and being under 35 years of age (p = 0.05) [27]. Similarly, Robate et al. [28] showed several risk factors for having multiple partners and unprotected sex: being aged 15 to 34 years (51.4% vs. 33.3%, p < 0.001), and being unmarried (60% vs. 39%, p < 0.05). Ford and Chamrathrithirong [29] studied STI risk behaviours among Thai workers. Seafarers engaged with sex workers more often than workers in other occupations did: OR: 6.22, 95% CI: 3.67–10.54 [29]. The same was true in Malawi [30]. For Zafar et al. [31], lower education and higher income were significantly associated (OR: 2.25, 95% CI: 1.11–4.55; OR: 3.04, 95% CI 1.03–9.02, p = 0.04) with negative attitude and un-safe practices towards HIV/AIDS, respectively [31].

**COMPANY POLICIES**

For cruise ships, a study reported several possible prevention policies by means of a questionnaire on behalf of 24 companies with a total of 155 ships. All 8 companies with a medical department had a written HIV policy. Thirteen companies required pre-sea HIV testing. 12 had a written HIV policy regarding HIV testing and prevention, and 18 had free condoms for the crew [32]. A positive HIV test would result in revocation of the employment offer and 18 had free condoms for the crew [32]. A positive HIV test would result in revocation of the employment offer from 5 companies, and another 6 companies established HIV as a pre-existing condition. Eight companies required HIV-positive seafarers to demonstrate stability at regular intervals as a condition for sailing.

For transport seafarers, the International Transport Workers’ Federation (ITF) launched the ITF’s Global HIV/AIDS...
Table 1. Misconceptions and knowledge about sexually transmitted infections (STIs) and human immunodeficiency virus (HIV) among seafarers

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<td><strong>Type of knowledge</strong></td>
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<tr>
<td>A healthy-looking person is not contagious</td>
<td>6% (11/186)</td>
<td>-</td>
<td>19% (96/502)</td>
<td>-</td>
<td>-</td>
<td>61.6% (183/297)</td>
<td>24% (63/262)</td>
<td>-</td>
<td>28.3% (353/1247)</td>
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<tr>
<td>AIDS is treatable</td>
<td>8% (15/186)</td>
<td>-</td>
<td>-</td>
<td>85.9% (255/297)</td>
<td>-</td>
<td>-</td>
<td>55.9% (270/483)</td>
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</tr>
<tr>
<td>Transmission of HIV by certain vectors</td>
<td>Food and drink 8% (15/186)</td>
<td>Mosquitos 59.3%</td>
<td>Mosquitos 47.9% (240/502)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Insects 15% (197)</td>
<td>Food 34% (55/400)</td>
<td>-</td>
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<tr>
<td>Systematic condom use protects against STIs/HIV</td>
<td>39% (73/186)</td>
<td>-</td>
<td>76.1% (381/502)</td>
<td>36% (100/275)</td>
<td>80% (128/160)</td>
<td>50.2% (150/297)</td>
<td>-</td>
<td>56% (224/400)</td>
<td>58.0% (1056/1820)</td>
</tr>
<tr>
<td>HIV transmission through unprotected sexual relations</td>
<td>52% (96/186)</td>
<td>-</td>
<td>-</td>
<td>62% (170/275)</td>
<td>73% (113/160)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>67.6% (553/818)</td>
</tr>
<tr>
<td>HIV transmission through blood (needle, razor, etc.)</td>
<td>-</td>
<td>91.2% (1255/1376)</td>
<td>-</td>
<td>62% (170/275)</td>
<td>73% (113/160)</td>
<td>44.4% (132/297)</td>
<td>32% (84/262)</td>
<td>79.2% (156/197)</td>
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Abbreviations — see text
## Table 2. Risk behaviours in seafarers and fishermen

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<tbody>
<tr>
<td>Type of maritime activities (fishing or other activity)</td>
<td>Seafarers</td>
<td>Seafarers</td>
<td>Seafarers</td>
<td>Seafarers</td>
<td>–</td>
<td>Fishermen</td>
<td>–</td>
<td>Fishermen</td>
<td>Fishermen</td>
<td>Fishermen</td>
<td>Fishermen</td>
<td>Seafarers and fishermen</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td>Country of origin of the population</td>
<td>International</td>
<td>International</td>
<td>Filipino</td>
<td>Filipino</td>
<td>International</td>
<td>India</td>
<td>Indonesia</td>
<td>Thailand</td>
<td>Pakistan</td>
<td>Pakistan</td>
<td>Kiribati</td>
<td>Kiribati</td>
<td>Morocco</td>
<td>–</td>
<td>–</td>
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<tr>
<td>Several partners</td>
<td>14% (26/186)</td>
<td>56% (110/197)</td>
<td>20% (100/502)</td>
<td>59% (59/100)</td>
<td>37.7% (164/435)</td>
<td>32.3% (459/1420)</td>
<td>13.4% (33/247)</td>
<td>–</td>
<td>–</td>
<td>90.2% (268/297)</td>
<td>4% (10/262)</td>
<td>38.6% (311/806)</td>
<td>37% (102/273)</td>
<td>47% (69/147)</td>
<td>32% (437/1376)</td>
</tr>
<tr>
<td>Engaging with sex workers</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1.5% (75/502)</td>
<td>–</td>
<td>2.1% (9/435)</td>
<td>9.0% (84/937)</td>
<td>–</td>
<td>–</td>
<td>66% (131/200)</td>
<td>4% (10/262)</td>
<td>14.4% (160/1109)</td>
<td>34% (63/184)</td>
<td>47% (59/125)</td>
<td>26.3% (360/1367)</td>
</tr>
<tr>
<td>Inconsistency in protected sexual relations</td>
<td>55% (103/186)</td>
<td>47.6% (94/197)</td>
<td>25% (125/502)</td>
<td>–</td>
<td>20.1% (91/435)</td>
<td>31.3% (413/1320)</td>
<td>86% (212/247)</td>
<td>–</td>
<td>–</td>
<td>74.4% (221/297)</td>
<td>78% (205/262)</td>
<td>79.2% (638/806)</td>
<td>–</td>
<td>–</td>
<td>84.9% (1161/1367)</td>
</tr>
<tr>
<td>Condoms</td>
<td>18% (34/186)</td>
<td>–</td>
<td>4.5% (23/502)</td>
<td>not available</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>90% (236/262)</td>
<td>not available</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>10.5% (101/1367)</td>
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</table>
Programme in 2006, including ITF seafarer’s affiliates [25]. Twenty eight unions said HIV prevention, 19 the prevention of other STIs, and 16 stigma and discrimination linked to HIV. For a second survey, 615 seafarers replied to a questionnaire. Their knowledge and behaviours were assessed to help better target prevention (Table 1).

DISCUSSION

This review of the literature on STIs in seafarers and fishermen at sea has shown that at the beginning of the 21st century, attention has been focused mainly on HIV. Few seroprevalence data were available. Between 10% and 91% of seafarers had been tested for STIs. Several risk behaviours were identified: out of 4022 seafarers surveyed, 34.3% said they had several sexual partners; out of 3722 seafarers surveyed, 19.5% engaged with sex workers; out of 3493 seafarers surveyed, 63.3% did not always use condoms, while 58.0% were aware of the relevance of this protection. There was a lot of misunderstanding about STIs: 28.3% of seafarers believed that a healthy-looking person could not be HIV-positive.

This review was limited by several factors. The notion of sea worker includes different populations that are not comparable. Commercial seafarers and offshore fishermen do not have the same constraints as coastal fishermen, especially those from the poorest countries. Some studies have shown in particular the specific vulnerability of fishermen in certain countries. The cultural environment may encourage engaging with sex workers, or value sexual philandering, or devalue the use of condoms [39]. Some coastal fishermen may belong to groups with particular cultural representations or economic situations, making the data not generalizable. These articles were therefore removed from the review [40]. Commercial seafarers, on the other hand, have access to port areas where brothel density or access to alcohol and drugs may vary from country to country. This type of article is also limited due to publication bias. Not all data on seafarers’ STIs are available in medical databases. Each reader should review the data from his or her own health authorities for an assessment of the prevalence in his or her country. However, this review provides a global view of the problem. This global and worldwide vision is relevant, since some seafarers are required to travel to several countries around the world. Doctors providing medical follow-up for this population could therefore draw information from it; risk behaviours were sometimes quantified, which could help guide prevention campaigns.

There were few studies on the prevalence of STIs in seafarers. Several explanations are possible. The difficulty of studies with examinations and the disparity of tests could hinder this type of study. Moreover, there could be a psychological barrier: seafarers in some parts of the world might not want to be tested, whereas in other regions testing was systematic. Some teams have suggested better screening of seafarers using personal screening kits. Seafarers could then act as a relay to their peers [41]. Without better assessing the prevalence of certain STIs, this could help seafarers begin to undertake treatment.

The issue of STI care must be integrated into comprehensive health care [42]. Certain behaviours can interfere with medical follow-up or with proper compliance with treatment [43]. Other socio-economic factors such as age, income and education could influence adherence to treatment or to prevention rules [44].

Prevention policies must also take into account cultural differences, especially around condom use. In some countries and in some communities, gender hierarchies and cultural representations hinder consistent condom use [45]. This review has also highlighted the wide disparity in condom availability [46]. Seafarers’ doctors could take decisive action on this issue. For example, they could inform the health authorities to help them target information and condom distribution campaigns. Or they could encourage shipowners to make condoms available. Prevention policies are possible. Altaf Chowdhury et al. [25] have shown that unions can help raise awareness and take action. Interaction between the different social partners and the states could help [47]. Prevention campaigns must take into account language proficiency. A study of immigrant workers (including seafarers) showed the correlation between mastery of the local language and the level of knowledge of preventive measures [48]. Seafarers are often migrant worker [49]. STI screening is all the more important as seafarers are often migrant workers, likely to be carriers of mild symptoms [50]. They can therefore ignore their state of health.

CONCLUSIONS

Sexually transmitted infections among seafarers were a major health issue at the beginning of the 21st century. The main pathology studied was HIV. There was a wide variety of situations. Nearly half of the seafarers interviewed in different studies did not consistently use condoms, and nearly a third of seafarers had sex with multiple partners or even sex workers. Information was not always available. Many seafarers had no specific training and only learned about STIs and HIV through media such as television. Maritime doctors could use new technologies to disseminate the right information on STI prevention, especially HIV prevention. For example, internet training or smartphone campaigns have not been reported in the literature. A better understanding of the risks could encourage the use of testing and could also help to better integrate HIV-positive people socially.
REFERENCES


