

# Skin disorders at sea

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## ABSTRACT

*The purpose of this study is to characterize the types of skin disorders occurring at sea requiring acute treatment. The case logs of a tele-medicine service for US flagged ships at sea were reviewed from March 1, 2006 until March 1, 2009. Of 1844 total cases, 10% (n = 183) were for skin disorders. Sixty-eight percent (n = 125) were infections, 14% (n = 25) were inflammatory, 7% (n = 13) were environmental, and 11% (n = 20) were non-specific rashes. Cutaneous abscesses and cellulitis (n = 84) were the most common acute skin disorders encountered. In some cases (n = 81), still digital photographs aided in the diagnosis.*

## INTRODUCTION

Skin disorders are a very common occupational hazard with reported rates ranging from 4.3–8.2 cases per 10 000 full time workers in all occupations in the United States (US) from 1992–2001 [1]. In 2001 in the US the rate of occupational dermatitis in workers in the agriculture, mining, and fishing industries combined was higher than any other category in US National Institute for Occupational Safety and Health statistics [1]. Contact dermatitis, both of allergic and irritant origin, is the most commonly reported occupational skin disorder, accounting for up to 95% of skin diseases in some series [2]. The true overall incidence of skin disorders in the maritime industry is difficult to assess because in many countries the only reportable skin disorders are occupational dermatitis, eczema, chemical and plant caused irritations, and a limited number of infections [3–5]. However, other skin disorders such as infections, envenomations, and sequelae to environmental exposures are also important in the maritime industries and are probably underreported.

Al-Hamdi and Al-Malikey [6] described the epidemiology of skin diseases in fishermen in Iraq and found skin infections to be the most commonly reported skin disorders, with frequencies higher than non-fisherman patients in their hospital dermatology department. Contact dermatitis represented only 10% of their cases. Dahl reported two case series showing that skin disorders were the number one

reason that cruise ship crew sought care in the ship's infirmary [7, 8]. There is scant other medical literature on the overall incidence of skin problems in the maritime industry to include diagnoses that are not reportable to national occupational disease registries. For physicians and health planners, understanding the spectrum of acute presentations for all types of skin problems in the fishing and maritime industry will aid in adequate care for these patients and may help guide prevention strategies.

## OBJECTIVE

The objective of this study is to report the epidemiology of all types of skin disorders occurring at sea in a variety of types of vessels, which require consultation with a tele-medical advice service.

## MATERIALS AND METHODS

The study population included seafarers covered under a subscription tele-medicine service based in the Department of Emergency Medicine at The George Washington University in Washington, DC. During the study period, the service covered 200 US-flagged vessels with nautical ranges from near-coastal to deep sea, and locations around the world. Sixty percent of vessels were cargo ships, 12% were tugs, 8% fishing vessels, 5% cruise ships, and 15% other types of vessels. All tele-medical physicians were US board-certified emergen-

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cy physicians. The provider on board was either the ship medical officer or the captain with medical training at least to the level of the STCW Medical First Aid at Sea curriculum [9]. Ship-to-shore contact was most often by satellite telephone but also included electronic mail. All vessels covered by the service are given a medical manual with a structured patient evaluation template for various chief complaints, including rashes, which the medical officer reports to the medical advice physician. In many cases, digital still photographs were transmitted electronically to the treating physician to aid in diagnosis, but were not required.

All cases that presented to our tele-medical advice service from March 1, 2006 until March 1, 2009 were reviewed. All cases were placed into diagnostic categories by the tele-medical physician at the time of treatment. The study authors reviewed in detail each case involving or possibly involving a skin disorder. Upon review, each case was placed into one of the following more refined diagnostic categories: 1) infectious – presumed bacterial, fungal, or viral, 2) inflammatory – contact dermatitis, other cutaneous manifestations of allergy, or eczematous rashes, 3) environmental – burn, chemical, frostbite, insect or animal bite, or 4) other miscellaneous causes. Acute traumatic wounds were excluded unless they secondarily became infected. Data were analyzed using summary statistics.

## RESULTS

For the study period there were 1844 total requests for tele-medical advice for acute care at sea. Ten per cent of all cases ( $n = 183$ ) were for skin disorders. In 44% ( $n = 81$ ) of dermatologic cases photographs were transmitted from the vessel.

A breakdown of the types of skin disorders encountered is displayed in Table 1. Sixty-eight per cent of cases ( $n = 125$ ) were skin infections including bacterial ( $n = 106$ ), fungal ( $n = 8$ ), and viral ( $n = 10$ ) aetiologies. The most common bacterial infections were cutaneous abscesses ( $n = 49$ ) and cellulitis ( $n = 35$ ). Fourteen percent of cases were inflammatory in nature, including contact dermatitis ( $n = 12$ ), allergic dermatitis ( $n = 9$ ), and eczema ( $n = 4$ ). Seven per cent of cases were environmental in nature including burns ( $n = 8$ ), chemical irritations ( $n = 2$ ), and frostbite ( $n = 2$ ). Twelve per cent of cases were non-specific rashes and skin complaints otherwise not categorized. There were three serious cases requiring evacuation and hospitalization: one serious burn, one case of Fourniere's gangrene, and one case of necrotizing fasciitis in the leg.

## DISCUSSION

In the present study, acute skin disorders represent 10 per cent of all cases requiring tele-medical consultation for

acute treatment among seafarers. Most of these cases were skin infections, a pattern also found by Al-Hamdi's report on fishermen in Iraq [6]. However, in this study, most infections were bacterial in nature rather than fungal as Al-Hamdi reported. This may be due to the increasing global rate of community acquired methicillin-resistant staphylococcus aureus (ca-MRSA), the inclusion of infected wounds in our study, or that many minor fungal infections are cared for onboard our vessels without contacting the medical advice physician. Furthermore, the current study included a heterogeneous group of seafarers, whereas Al-Hamdi only looked at fishermen. Nevertheless, both studies give evidence that infections are an important source of acute occupational skin disorders in the maritime industry.

Occupational dermatitis is a reportable occupational disease in the US [3], the UK [4], Europe [5], and elsewhere. However, the relative importance of this condition compared to other skin problems has remained unknown since other

**Table 1.** Diagnosis in 183 cases of skin disorders at sea

Skin Disorder		n	(%)
<b>Total Infectious</b>		<b>125</b>	<b>68</b>
Bacterial	Cellulitis	35	
	Cutaneous abscesses	49	
	Folliculitis	6	
	Paronychia	7	
	Infected wound	6	
	Impetigo	3	
Fungal	Tinea	8	
Viral	Herpes zoster	5	
	Primary herpes simplex	3	
	Primary Varicella	1	
	Wart	1	
Parasitic	Scabies	1	
<b>Total Inflammatory</b>		<b>25</b>	<b>14</b>
	Contact dermatitis	12	
	Allergic rashes	9	
	Eczema	4	
<b>Total Environmental</b>		<b>13</b>	<b>7</b>
	Thermal burns	8	
	Chemical burns	2	
	Frostbite	2	
	Insect bite	1	
<b>Other</b>	<b>Non-specific rashes</b>	<b>20</b>	<b>11</b>

skin problems, notably skin infections, may not be reported to national occupational health databases. In this study, only 14% of acute skin problems were occupational dermatitis, similar to the 10.9% reported in the Iraqi study [6]. Thus, the total burden of acute occupational skin disorders in the maritime industry may be substantially underestimated in published national health statistics if they only report occupational dermatitis and not other types of occupational skin disease.

In a previous epidemiological study of acute injuries and illness at sea from our tele-medical service [10], the rate of skin problems (10%) was similar to respiratory infections (15%), abdominal complaints (10%), and genitourinary complaints (8%). Thus, from a health care planning perspective, provision for caring for dermatological conditions at sea is important given their high relative rate of occurrence. Preparation includes training of medical officers in the care of dermatologic conditions; this is included in the STCW training requirements for the Medical Person in Charge curriculum but not in the Medical First Aid at Sea curriculum [9]. Our service uses a structured template with various questions from the history and physical examination that the medical officer is supposed to perform before calling the medical advice physician. Although unproven, our experience is that it helps in diagnostic accuracy. Physicians giving medical advice should be familiar with common dermatologic complaints and should have consultation with a dermatologist available if needed.

Digital still photographs can be invaluable in optimizing radio-medical advice in caring for these conditions. Given the relative low cost of a digital camera and current satellite communications, this should become the standard of care. Guidelines on how to take an acceptable picture for diagnosis (level of light or flash, including a ruler for size, etc.) could potentially help improve the quality of photographs. Less than half of all cases in this series involved digital photographs, suggesting there is room for improvement in the industry.

Other reports suggest ca-MRSA may be an important pathogen in the maritime setting [11], so appropriate antibiotics for this pathogen, in addition to standard antibiotics and anti-fungals, are important for the ship's medicine chest. Topical and oral steroids, antihistamines, emollients, and topical drying agents would complete the pharmacologic armamentarium for skin disorders at sea. Non-pharmacologic management may be equally important. For cutaneous abscesses, incision and drainage alone may be curative without antibiotics [12]. For occupational dermatitis, investigation of the probable cause and avoidance strategies may be the only means to successful long-term management. This may include modifications of personal protective equipment or job reassignment.

There are limitations to this study. In many cases, the diagnosis was presumptive without confirmation by culture, biopsy, or other definitive means. This of course is very difficult when treating cases at sea. Furthermore, the study population was predominantly from cargo vessels and may not be generalized to every maritime setting.

In addition, minor skin problems, skin cancers, and other cutaneous disorders, which may be occupationally related, but not requiring acute treatment on board would not be identified in a study such as ours. Nevertheless, they may be very important. For example, in a study of 81 North Carolina fishermen, 15% of them were found to have a skin cancer on screening [13], lesions which would not necessarily be brought to the attention of a tele-medical advice service but could have significant long-term health implications.

## CONCLUSIONS

In this review from a single tele-medicine service for a variety of types of vessels, acute skin disorders accounted for 10 per cent of all cases requiring urgent consultation with an online physician. Bacterial skin infections were the most common problem encountered. Thirty per cent of all cases involved purulent infections. Therefore, medicine chests should include antibiotics that cover ca-MRSA, which is becoming a common cause of purulent infections worldwide. Additionally, medical officers should be trained and equipped to perform incision and drainage of abscesses. Topical and oral steroids, oral antihistamines, and topical emollients and drying agents would help treat the remainder of inflammatory and nonspecific cases that occur onboard. In many cases, still digital photographs aided in the diagnosis. The ability to transmit digital photographs should be considered standard procedure when radio or tele-medical advice is needed. Although serious dermatologic conditions are rare, a thorough patient evaluation, including vital signs, will help identify cases that are truly emergent.

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