AMERICAN JOURNAL OF INDUSTRIAL MEDICINE 58:688–696 (2015)

"Injury, Illness, and Work Restriction in Merchant Seafarers"

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Background *Research on seafarer medical conditions at sea is limited. This study describes the frequency and distribution of seafarer injury and illness at sea, and explores potential risk factors for resultant lost work.*
Materials and Methods *The study analyzed a telemedicine database of 3,921 seafarer medical cases between 2008 and 2011 using descriptive statistics and logistic regression.*
Results *There were over twice as many illness cases (n = 2,764, 70.5%) as injury (n = 1,157, 29.5%) cases. Disability was more often secondary to illness (n = 646, 54.3%), predominantly from gastrointestinal, dermatologic, and respiratory conditions. Logistic regression revealed age, rank, and worksite as potential risk factors for lost work.*
Conclusions *This study emphasizes illness as a significant problem occurring in seafarers at sea. Future research should further elucidate risk factors for illness, as well as injury, to inform preventive measures and reduce seafarer disability.* Am. J. Ind. Med. 58:688–696, 2015. © 2015 Wiley Periodicals, Inc.

KEY WORDS: seafarers; disability; telemedicine; occupational injury; epidemiology

INTRODUCTION

Seafarers are a vital international workforce essential to global commerce. The International Maritime Organization (IMO) estimates that over 90% of the world's trade uses marine transport [IMO, 2014; UN, 2014], the work of approximately 1.4 million seafarers worldwide [Baltic and International Maritime Council BIMCO, 2010]. Due to nature of their work, seafarers are at sea for several months at a time with limited access to medical care. In addition, ships are frequently inadequately manned for substitutions [Smith et al., 2006], therefore, compared to other worker populations, seafarers with illnesses, injuries are more likely to increase demands on co-workers, reduce overall productivity. Seafarer injury, illness also generates a substantial direct, indirect economic impact on ship owners [Henny et al., 2013], who must provide for their crew's medical care [Maritime Labour Convention MLC, 2006].

Despite these concerns, few studies have investigated seafarer illness and injury and the resulting impact on work ability. The published literature on seafarer health remains limited [Bloor et al. 2000; Carter, 2011], focusing predominantly on injuries [1989; 1997; 2002, 2008; Jensen et al., 2004,2005; 2005; 2006; Adam, 2013, 2014] and fatalities [Roberts, 1998, 2006, 2008; 2002; 2005, 2006; 2010]. Few studies have investigated illnesses among merchant seafarers at sea [Oliver, 1981; 1997; 2006; 2007; 2010], or the impact of injuries and illnesses on work [Levy, 1972; Hansen et al., 2002]

Seafarers are an important workforce with high occupational health risk, and a better understanding of seafarer health and medical disability is needed to guide preventive efforts. In this study, we report the patterns of illness, injury, and work restrictions of an international group of merchant seafarers at sea. In an attempt to understand potential risks factors in this cohort, we estimated job- and rank-specific incidence of injury and illness, based on estimates of the at-risk population. This study provides new information on medical conditions affecting seafarers at sea, and highlights the importance of illness as well as injury as a significant cause of seafarer work restriction.

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Accepted 17 March 2015
DOI 10.1002/ajim.22459. Published online in Wiley Online Library (wileyonlinelibrary.com).

MATERIALS AND METHODS

Study Design and Population

Data were obtained from Future Care, Inc., a company that manages the health of seafarers globally. This company provides telemedicine and case management services by an international staff of medical responders with first aid, nursing, public health, or medical expertise as necessary. This company maintains records of medical illness and injury that occur on contracted ships at sea, the vast majority of which are merchant vessels. Data are collected by case managers and entered into their database. The study included data for merchant seafarers aged 18 to 80 years, during the four year period of 2008–2011. This study was approved by Yale Institutional Review Board (IRB), and all data were de-identified in accordance with the IRB protocol.

The database included seafarer age, job, nationality, sex, case type (injury or illness), diagnostic information (injured body part, type of illness), and work status. Following the approach of limited comparable studies [Oliver, 1981; Tomaszunas and Weclawik, 1997; Jensen et al., 2004], seafarer jobs were classified by the worksite, including the deck, engine room, and galley (workers in food preparation and other food services), and also by job rank, as either more senior "officers" or lower-ranking "ratings" (non-officers; less-senior workers in the deck, engine and food operations). The injured body part and illness types as listed in the database were classified into more general categories. For example, injuries of the finger, wrist, or elbow were grouped into the injury site category of "upper extremity injury." Work status was noted in the database as fit for full duty, fit for limited duty, or not fit for duty. Each injury or illness recorded in the database was treated as an independent event.

The overall distribution of specific injured body parts and illness types was determined. The number of illness and injury cases was stratified by age group, sex, nationality, worksite, rank, and work status. Seafarers with known work status (full, limited, unfit) were also stratified by age group, sex, nationality, worksite, rank, and case type.

In order to identify potential occupational risk factors of injury and illness, job- and rank-specific incidence of injury and illness were calculated over the four-year study period. The number of merchant vessels contracted over the entire study period was reported to be 1,322. Based on knowledge of the industry, the merchant vessel crew size was estimated to be 20 seafarers per vessel, consisting of nine engineers, nine deck workers, and two galley workers (food service), and a rank distribution of eight officers and 12 ratings. An estimated number of person-years at-risk for each job and rank over the four-year study period was calculated (for example: nine engineers/ship $\times$ 1,322 ship-years = 11,898 engineer person-years), and adjusted proportionally by the number of seafarers in the dataset for whom job or rank information was known. Job- and rank-specific incidence rates of injury and illness were then calculated as the number of cases divided by the at-risk person-years for each job and rank over the four year period.

Statistical Analysis

The χ^2 test was used to analyze for distributional differences in categorical variables between case types and work-status. The z-test for proportions was used to compare proportions. As recommended by Rosner [2011], incidence rates were compared using z-scores, whose calculation includes the number of cases along with the at-risk person-years. Student's *t*-test was used to compare means. Unadjusted as well as two adjusted logistic regression models were developed to model odds of work restriction after injury or illness events using the demographic data for injured and ill seafarers in the database. The first adjusted model included all main effects. The second was a parsimonious model which was developed by initially including all main effects (age, sex, nationality, worksite, and rank) as well as all 2-way interactions. Next, a backward elimination strategy was utilized with a significance level-to-stay of $P = 0.05$. All data analyses were performed using SAS v9.3 (Copyright SAS Institute Inc., Cary, NC).

RESULTS

The population studied included 3,921 cases of seafarer injury and illness (Table I). Overall, there were over twice as many illnesses as injuries, with 2,764 (70.5%) illnesses and 1,157 (29.5%) injuries. Illnesses occurred approximately 2 to 3 times more frequently than injuries in all work groups, nationalities, and age groups, and in similar proportion. The distributions of injuries and illnesses are displayed in Figures 1 and 2.

Work status, either full duty, limited duty, or unfit for duty (unable to work), was known for 3,780 (96.4%) seafarers, shown in Table II. Of note, over 30% of the illness and injury medical events resulted in the worker being restricted to either limited duty (530, 14.0%), or unfit for duty (660, 17.5%). Work restriction was more often due to illness than injury overall, with seafarer illnesses accounting for 54.1% of all work restrictions. Work-restricted seafarers in the oldest age group (>50 years) or of United States (US) nationality were disproportionally unfit for duty.

The distribution of injuries and illnesses resulting in work restrictions is shown in Table III. Among injury cases with work restriction, certain types of injuries were more likely to result in unfit for duty status, including 70.6% of eye injuries and 78.1% of those with head and neck injuries. Among illness cases with work restriction, 72.6% of

TABLE I. Baseline Characteristics of Seafarer Population with Injury or Illness (n = 3,921)

		Case type	
	All	**Injury**	**Illness**
	(n = 3,921) n (%)	**(n = 1,157) n (%)**	**(n = 2,764) n (%)**
Age			
18–29	993 (25.3)	289 (25.0)	704 (25.5)
30–39	1,103 (28.1)	316 (27.3)	787 (28.5)
40–49	963 (24.6)	294 (25.4)	669 (24.2)
≥50	862 (22.0)	258 (22.3)	604 (21.9)
Mean (SD*)	39.0 (11.3)	39.0 (11.4)	39.0 (11.3)
Sex			
Male	3,844 (98.1)	1,135 (98.1)	2,709 (98.1)
Nationality			
Indian	1,041 (26.6)	336 (29.0)	705 (25.5)
Filipino	1,019 (26.0)	244 (21.1)	775 (28.0)
United States	435 (11.1)	159 (13.7)	276 (10.0)
Ukrainian	468 (11.9)	140 (12.1)	328 (11.9)
Other	958 (24.4)	278 (24.0)	680 (24.6)
Rank			
Officer	1,198 (30.6)	283 (25.5)	915 (33.1)
Rating	1,853 (47.3)	586 (50.6)	1267 (45.8)
Unknown	869 (22.2)	288 (24.9)	582 (21.1)
Worksite			
Deck	1,416 (36.1)	381 (32.9)	1,035 (37.5)
Engine	1,254 (32.0)	383 (33.1)	871 (31.6)
Galley	232 (5.9)	54 (4.7)	178 (6.5)
Other/unknown	1,018 (26.0)	339 (29.3)	680 (24.6)

*SD = standard deviation.

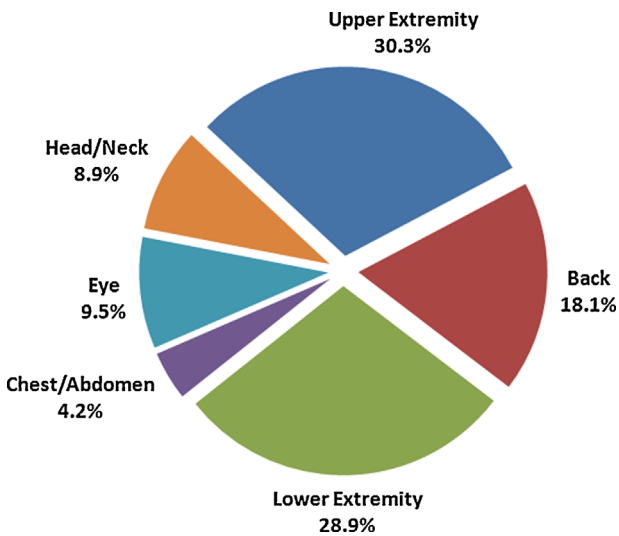

FIGURE 1. Distribution of injured body parts in seafarers with injuries (n = 1,144).

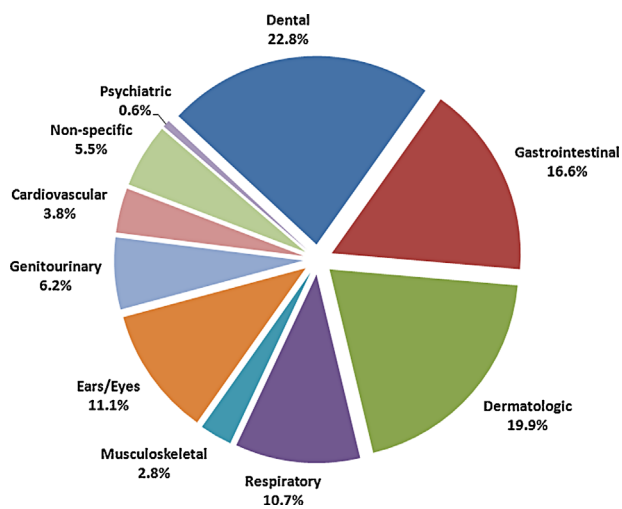

FIGURE 2. Distribution of diagnoses in seafarers with illness (n = 2,710).

TABLE II. Characteristics of Seafarers with Injury or Illness by Work Status (n = 3,780)

	Full duty	Work restricted		
		Total	Limited duty	Unfit for duty
	(n = 2,590) n (%)	(n = 1,190) n (%)	(n = 530) n (%)	(n = 660) n (%)
Age				
<30	665 (69.6)	291 (30.4)	125 (43.0)	166 (57.0)
30–39	735 (69.1)	328 (32.9)	152 (46.3)	176 (53.7)
40–49	617 (67.1)	303 (32.9)	162 (53.5)	141 (46.5)
≥50*	573 (68.1)	268 (31.9)	91 (34.0)	177 (66.0)
Mean (SD**)	38.9 (11.3)	39.3 (11.5)	38.7 (10.5)	39.7 (12.2)
Sex				
Male	2,536 (68.5)	1,168 (31.5)	523 (44.8)	645 (55.2)
Nationality				
Indian	715 (70.7)	296 (29.3)	135 (45.6)	161 (54.4)
Filipino	693 (70.3)	293 (29.7)	146 (49.8)	147 (50.2)
United States*	279 (65.5)	147 (34.5)	41 (27.9)	106 (72.1)
Ukrainian	298 (67.4)	144 (32.6)	69 (47.9)	75 (52.1)
Other	605 (66.1)	310 (33.9)	139 (44.8)	171 (55.2)
Rank				
Officer	867 (73.2)	317 (26.8)	142 (44.8)	175 (55.2)
Rating	1,250 (68.1)	586 (31.9)	262 (44.7)	324 (55.3)
Unknown	473 (62.2)	287 (37.8)	126 (43.9)	161 (56.1)
Worksite				
Deck	992 (70.5)	416 (29.5)	184 (44.2)	232 (55.8)
Engine	865 (69.5)	379 (30.5)	175 (46.2)	204 (53.8)
Galley	164 (71.0)	67 (29.0)	29 (43.3)	38 (56.7)
Other/unknown	569 (63.4)	328 (36.6)	142 (43.3)	186 (56.7)
Case Type				
Injury	558 (50.6)	544 (49.4)	248 (45.6)	296 (54.4)
Illness	2,032 (75.9)	646 (24.1)	282 (43.7)	364 (56.3)

*$P < 0.05$ comparing limited duty vs. unfit for duty.
**SD = standard deviation.

gastrointestinal cases, 60.7% of respiratory cases, and 75.6% of cardiac cases were unfit for duty.

In order to evaluate which seafarer workers were more at risk for injury and illness, rank- and worksite-specific incidence rates were estimated as described above (Tables IV and V). Ratings had a significantly higher estimated four year incidence of total injuries than officers (5.13 per 100 person-years vs. 3.27 per 100 person-years). Total illness rates were similar between ranks, although notably officers had a significantly higher rate of psychiatric disease than ratings.

When incidence was examined by worksite (Table V), deck and engine workers had a higher incidence of total injuries than galley workers (4.47 per 100 person-years and 4.45 per 100 person-years respectively vs. 2.77 per 100 person-years). Examined by illness, total illness was higher among deck workers than either engine workers or galley workers. Of note, skin disease was more frequent among galley workers than either deck or engine workers.

We modeled the odds of any work restriction (including limited or unfit for duty) versus no work restriction (full duty) for all variables including age, sex, nationality, rank, worksite, and 2-level interaction terms. Table VI displays the unadjusted and adjusted main effects. Both the unadjusted model and the adjusted main effects model revealed that ratings were approximately 30% more likely than officers to be work-restricted (OR 1.28, 95% CI 1.09–1.51 and OR 1.37, 95% CI 1.15–1.62, respectively). The parsimonious model was notable for the significant interactions of rank with worksite and rank with age (not shown). Younger galley ratings (age <40 years) were less likely than galley officers to be work restricted. A similar but not statistically significant trend was seen among the older

TABLE III. Work Status by Seafarer Injury Site or Type of Illness (n = 3,715)

	Full duty	Work restricted		
		Total	Limited duty	Unfit for duty
Injured body part (n = 1,090)	n (%)	n (%)	n (%)	n (%)
Lower extremity	159 (50.2)	158 (49.8)	70 (44.3)	88 (55.7)
Upper extremity	157 (48.2)	169 (51.8)	79 (46.7)	90 (53.3)
Back	81 (40.1)	121 (59.9)	70 (57.9)	51 (42.1)
Eye	73 (68.2)	34 (31.8)	10 (29.4)	24 (70.6)
Head/neck	61 (65.6)	32 (19.4)	7 (21.9)	25 (78.1)
Chest/abdomen	21 (46.7)	24 (53.3)	11 (45.8)	13 (54.2)
Total injury	552 (50.6)	538 (49.4)	247 (45.9)	291 (54.1)
Illness type (n = 2,625)				
Dental	483 (81.0)	113 (19.0)	90 (79.6)	23 (20.4)
Dermatologic	434 (82.5)	92 (17.5)	38 (41.3)	54 (58.7)
Gastrointestinal	291 (66.6)	146 (33.4)	40 (27.4)	106 (72.6)
Ears/Eyes	245 (84.8)	44 (15.2)	20 (45.5)	24 (54.5)
Respiratory	191 (68.2)	89 (31.8)	35 (39.3)	54 (60.7)
Genitourinary	125 (79.1)	33 (20.9)	15 (45.5)	18 (54.5)
Non-specific	104 (70.3)	44 (29.7)	8 (18.2)	36 (81.8)
Cardiovascular	60 (59.4)	41 (40.6)	10 (24.4)	31 (75.6)
Musculoskeletal	48 (65.8)	25 (34.2)	22 (88.0)	3 (12.0)
Psychiatric	11 (64.7)	6 (35.3)	0 (0)	6 (100)
Total illness	1,992 (75.9)	633 (24.1)	278 (43.9)	355 (56.1)

TABLE IV. Incidence Rate (per 100 person-years) of Injury and Illness by Rank over Four Year Study Period

	Rank	
	Officer	Rating
Injured body part		
Upper extremity*	0.95	1.44
Lower extremity*	0.92	1.47
Back	0.59	0.82
Eye	0.33	0.50
Head/Neck	0.24	0.43
Chest/Abdomen	0.12	0.20
Total Injuries*	3.27	5.13
Illness type		
Dental	2.28	2.17
Dermatologic	1.89	2.01
Gastrointestinal	1.58	1.69
Respiratory	0.98	0.98
Ears/Eyes*	0.88	1.22
Non-specific	0.64	0.54
Genitourinary	0.51	0.62
Cardiovascular	0.44	0.30
Musculoskeletal	0.27	0.32
Psychiatric[a]	0.20	0.07
Total Illness	9.75	10.12

*$P < 0.05$ comparing officers vs. ratings.

TABLE V. Incidence Rate (per100 person-years) of Injury and Illness by Worksite over Four Year Study Period

	Worksite		
	Deck	**Engine**	**Galley**
Injured body part			
Lower extremity*,***	1.37	1.22	0.55
Upper extremity	1.21	1.32	0.91
Back	0.77	0.65	0.81
Eye**,***	0.44	0.46	0.05
Head/neck	0.25	0.40	0.40
Chest/abdomen**	0.21	0.16	0.00
Total injury**,***	4.47	4.45	2.77
Illness type			
Dental*,**	2.63	2.05	1.44
Dermatologic*,***,**	2.13	1.68	2.44
Gastrointestinal**	1.73	1.63	1.10
Respiratory*,***	1.30	0.89	0.67
Ears/eyes	1.11	0.91	0.91
Non-specific	0.61	0.59	0.53
Genitourinary	0.55	0.54	0.53
Cardiovascular	0.39	0.35	0.38
Musculoskeletal	0.26	0.36	0.34
Psychiatric	0.10	0.07	0.05
Total Illness*,**	11.59	9.70	8.82

*$P < 0.05$ for comparison of deck vs. engine workers.
**$P < 0.05$ for comparison of deck vs. galley workers.
***$P < 0.05$ for comparison of engine vs. galley workers.

age groups. Older ratings in deck or engine positions were more likely to be restricted than deck or engine officers, respectively.

DISCUSSION

This study demonstrates that illness and injury events are highly frequent in seafarers at sea and commonly result in work restrictions. Across all worksites, incidence rates of total illness were 2 to 3 times higher than the corresponding total injury rates, and accounted for more work restrictions and lost work time than injuries. Studies to date looking at seafarer injury and illness rates and risk factors are limited and difficult to compare, with most of the prior studies focusing on injuries.

Several findings were notable. The most frequent illnesses were dental (22.8%) dermatologic (19.9%), and gastrointestinal (16.6%). Limited prior studies have similarly found such illnesses to be common [Oliver, 1981; Tomaszunas et al., 1988; Rizzo et al., 1997; Ehara et al., 2006; McKay, 2007]. Notably, our study demonstrated that deck workers had higher rates of total illness, and specifically respiratory and dental illness, than either engine or galley workers, whereas galley workers had higher rates of dermatologic illness than both deck and engine workers.

Also notable are our data on seafarer work restrictions, both fit for limited duty and unfit for duty. Although prior studies have characterized seafarer injuries and illness, data on associated disability are very limited. Our data show that injury remains a substantial cause of lost work, with almost 50% (49.4%) of seafarer injuries resulting in work restriction. Work restriction most frequently resulted from injuries to the upper and lower extremities and back. These findings are consistent with the limited other studies investigating work disability. Hansen, in a study of 1,993 seafarer injuries on Danish ships, found that most disabling injuries were injuries of the extremities and back [Hansen et al., 2002]. Similarly, a study of injuries in Polish seafarers found that 80% of accidents caused work incapacity, with the vast majority of injuries affecting the upper and lower extremities [Tomaszunas and Weclawik, 1997].

Of note, our data showed that overall work restrictions were more commonly due to illness than injury, with gastrointestinal disease, respiratory, and dermatologic illness being the most common illness causes of unfitness for duty. There are few comparative data. A study of disability in Polish seafarers [Tomaszunas et al., 1988] showed 48.9% of

TABLE VI. Unadjusted and Adjusted Main Effects Models for Work Restriction

	Unadjusted		Adjusted	
	OR	**95% CI**	**OR**	**95% CI**
Age group				
<30	1	(ref)	1	(ref)
30-39	1.07	(0.86, 1.34)	1.11	(0.88, 1.39)
40-49	1.06	(0.84, 1.3)	1.07	(0.84, 1.35)
≥50	1.10	(0.87, 1.40)	1.12	(0.88, 1.43)
Sex				
Male	1	(ref)	1	(ref)
Female	0.83	(0.42, 1.66)	0.83	(0.41, 1.68)
Nationality				
Indian	1	(ref)	1	(ref)
Philippines	1.01	(0.81, 1.25)	0.94	(0.75, 1.18)
United States	1.14	(0.84, 1.54)	1.09	(0.80, 1.50)
Ukraine	1.13	(0.86, 1.50)	1.12	(0.84, 1.49)
Worksite				
Galley	1	(ref)	1	(ref)
Deck	1.03	(0.76, 1.39)	0.95	(0.70, 1.30)
Engine	1.07	(0.79, 1.46)	1.00	(0.72, 1.37)
Rank				
Officer	1	(ref)	1	(ref)
Rating	1.28	(1.09, 1.51)	1.37	(1.15, 1.62)

lost work days were due to accidents, with the remainder of days lost due to illnesses, primarily respiratory, neurological, and gastroenterological conditions. Another study of disability claims data in Japanese seamen (fishing, trading, and cruise ships) found a high prevalence of gastrointestinal, musculoskeletal, and circulatory conditions [Ehara et al., 2006]. Of interest, our data show that cardiovascular disease, although only a small proportion of illness cases, was a significant cause of seafarers being unfit for duty. These findings are notable given that several recent studies related to seafarer fitness for duty have demonstrated high rates of cardiovascular risk factors such as hypertension and obesity among seafarers [Tomaszewski et al., 1990; Filikowski et al., 2003; Oldenburg et al., 2010; Roberts and Jaremin, 2010; Hansen et al., 2011; Hjarnoe and Leppin, 2013; Scovill et al., 2012; Pougnet et al., 2013].

Given the high prevalence of work restrictions in our population, we attempted to discern possible risk factors for illness, injury, and work restriction. Older seafarers (over age 50 years) were more frequently deemed unfit for duty than fit for limited duty. US seafarers were also disproportionally deemed unfit for duty than seafarers of any other nationality, a finding which should be further explored in future studies. As age and nationality appeared to be potential risk factors for seafarer work restriction, we performed logistic regression modeling to determine if demographic or occupational characteristics were significant risk factors for seafarer work restriction. This logistic regression modeling revealed significant risk for work restriction associated with seafarer rank, which must be considered together with age and worksite. This is consistent with Hansen's 2002 study of Danish merchant vessels, which found that several variables, including age, nationality, ship type, occupation, and the interaction of age and occupation, contributed to injury-related disability [Hansen et al., 2002]. We are not aware of any studies that have evaluated risk factors for illness-related seafarer disability. Importantly, our modeling revealed that deck and engine ratings (particularly in older age groups), as well as galley officers were at increased relative risk of work restriction due to illness or injury at sea, identifying these as target groups for earlier preventive interventions.

The findings presented here on seafarer illness, injury and work restriction also suggest possible preventive interventions. For example, it is possible that some gastrointestinal and respiratory illness was infectious in origin. If so, preventative interventions such as hand washing and wearing a droplet mask may prevent transmission of disease to other crew members, maintaining the health and efficiency of the crew. Similarly it is possible that some skin conditions among galley workers are related to occupational risks factors in food preparation, such as frequent hand washing, dish washing, or other cleaning activities. If so, preventive measures might reduce dermatologic problems, one of the most frequent causes of lost work. The finding that

older workers and cardiac disease account for a disproportionally high number of seafarers being unfit for duty emphasizes the importance of optimizing seafarer cardiac status prior to boarding, and having appropriate cardiovascular medications onboard, especially given the aging seafarer workforce [Sulpice, 2011]. Similarly, cardiovascular risk reduction may be an important target of seafarer wellness programs.

Strengths and Limitations

This study has several important strengths. A large database that included all captain requests for medical assistance was used, and thus likely is representative of the types of illnesses and injuries seafarers experience at sea. The data on work restriction represent another strength, providing some indication of the impact injuries and illnesses have on the seafarers' ability to work. This study also used stratified incidence rate estimates to compare risk between worksites and ranks. Few studies report estimated incidence rates of seafarer injury or illness [Tomaszunas et al., 1988; Tomaszunas and Weclawik, 1997; Jensen et al., 2004; Hansen et al., 2008; Adam, 2013; Adam et al., 2014]. This study also demonstrated the significance of seafarer age, rank, and worksite in predicting seafarer work restrictions. We are unaware of previously published studies of risk factors for seafarer work restriction.

One important but unavoidable weakness of this study is the lack of information on the true at-risk seafarer population, a common problem hindering seafarer medical research. We were limited by the data available in the database. For example, due to the lack of data on the at-risk population, we were unable to determine the rate of injury or illness by nationality, a demographic variable of increasing interest [Hansen et al., 2008; Ellis et al., 2010; Gron and Knudsen, 2012; Adam, 2013]. However, our analysis did not find any effect of nationality on work restrictions. In addition, without specific information on merchant vessel type and distribution, risk related to vessel type similarly could not be assessed in this study. Future studies may be able to fill these important gaps if data on the at-risk seafarer population and vessel characteristics become available. Another limitation to our analysis was missing information in the database, such as no job information on for 26.0% of the workers, nor data on the length of the resulting work restriction. An additional limitation is potential referral bias. Our finding that illness, compared to injury, was the dominant type of medical case could be the result of a referral bias; ship medical officers, with mainly non-medical duties and often with little medical training or experience, may be less comfortable managing illness than injury, and therefore have a lower threshold for requesting assistance in managing illness at sea.

CONCLUSION

Seafarer health research is challenging due to the workforce being transient, international, difficult to access, and often overlooked. This study demonstrates that seafarer illnesses are common and a major contributor to lost work among seafarers. Risk factors for work restriction included age, rank, and worksite, demonstrating the importance of further characterizing the risk factors for seafarer injury and illness, especially given the aging population. Further studies on seafarers may demonstrate potentially modifiable risk factors for seafarer illnesses, injury and work restriction.

ACKNOWLEDGMENTS

This study was funded in part by Future Care, Inc.

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