

## CREW ACCIDENTS REPORTED DURING 3 YEARS ON A CRUISE SHIP

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### ABSTRACT

**Study objective** - To register and analyze data from all crew injuries reported to the medical center of a cruise ship with a median crew of 630 during a three-year period and to determine high risk areas, equipment and behavior.

**Methods** - All crew injuries reported to the medical center aboard were registered on a standardized form at first visit. An injury was classified at follow-up as 'lost time accident' (LTA) if it caused the victim to be off work for more than one day and/or to be signed off for medical attention (medical sign-off).

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**Results** - During 3 years, 361 injuries (23% women) were reported aboard. Thirty percent were LTA. The marine department accounted for 14% (deck 5%; engine 9%), the hotel department for 79% and contractors for 7% of the reports. Filipinos comprised half the crew, reported 35% of the accidents, and their rate of serious injuries were lower than non-Filipino crew ( $p<0.01$ ). Hotel crew had a higher rate of LTA occurring during work than marine crew ( $p<0.05$ ). The dancers' rate of serious injuries was higher than other hotel crew ( $p<0.05$ ) and marine crew ( $p<0.01$ ). The upper extremity was the most frequently injured body part (51%), open wounds the most common injury type (37%), and galleys the most common accident location (30%). Less than one in ten reported injuries caused medical sign-off.

**Key message** - Well-equipped, competent medical staff aboard can after crew injury effectively reduce time off work, as well as number of referrals to medical specialists ashore, helicopter evacuations and ship diversions, and medical sign-off.

## INTRODUCTION

The cruise industry has expanded greatly during the last decades, and more than 12 million North Americans were on a cruise in year 2006 [1]. The cruise companies are concerned about passenger and crew injuries and accurately register data from all injuries occurring during each cruise to detect patterns to prevent future accidents. The accident reports comprise all injuries registered at the medical center aboard and are more accurate and far more comprehensive than official accident statistics from the merchant marine which cover only injuries causing more than 1 day of sick leave and/or medical sign-off.

Few detailed studies on crew injuries on cruise ships have been published, and they comprise only series covering periods from a few months [2,3,4] to one year [5].

The aim of the present study was to register and analyze data from all crew injuries reported to the medical center of a medium-sized cruise ship during a three-year period to identify high risk areas, equipment and behavior.

## MATERIALS AND METHODS

### **Ship, Itinerary and Medical Staff**

The ship is a large, modern luxury cruise ship of Bahamian registry with a capacity of more than 1000 passenger and 650 crew members. During the 3-year study period it cruised worldwide, including transatlantic and transpacific crossings. There were two

distinctly different patient groups onboard: The vacationing passengers and the working crew.

The medical center, staffed with one physician and two nurses from Scandinavia, was equipped for most simple diagnostic and therapeutic procedures. One nurse was always on-call. The doctor had separate office hours for passengers and crew twice every day and was on 24-hour call for emergencies at sea. Medical service for the crew was free.

Eight different Scandinavian physicians, all with previous shipboard experience, worked aboard from two to twenty-two cruises each during the study period.

### **Definitions**

A '*crew member*' was defined as a person who had been subjected to standardized pre-employment examinations and had been assigned an official crew number.

The term '*crew*' comprises all officers, staff and ratings working on board. All other persons aboard were considered passengers, except 'contractors' who are workers occasionally hired to do short-term maintenance or installations aboard. Data on number of contractors and the duration of their work were not available.

Injuries were classified '*Lost Time Accidents*' (LTA) if they caused the victim to be off work for more than one day (including the day of injury) and/or to be signed off for further medical attention in a local port or at home (= '*medical sign-off*'), otherwise as '*minor injuries*'. LTA is internationally used for industrial accident reporting (= work time lost beyond the day of the injury) [6] and is in accordance with the reporting demands of the Danish Maritime Authority [7]. For comparison, injuries were also divided into '*not serious*' and '*serious*' according to the demands of the Norwegian Maritime Directorate (NMD): Accidents are to be reported if they cause crew members to be off work for more than 72 hours and/or medical sign-off [8].

### **Crew Demographics**

Crew demographic data were collected from the official lists of the cruise line. Sex and age distribution was determined from the crew lists of 4 long cruises (January - May 2004) [4]. During that period, a total of 860 different crew members from 48 different nations worked aboard. There was an average daily number of 615 crew aboard; 22% were women, with median age 28 (range: 21 – 54) years, and 78% men with median age 31 (range: 20 – 61) years.

The Philippines provided 48% of the crew, while no other country supplied more than 5%.

Sixteen percent of the crew worked in the marine department (deck/engine: 50/50). In the deck section 37% and in the engine section 63% were ranked as officers (= wearing one or more 'stripes'). The marine department was predominantly male, but nursing and some secretarial positions were most of the time held by women.

Eighty-four percent worked in the hotel department (see Table 2 below), divided into pursers, housekeepers, galley crew, food and beverage service crew, entertainers, and concessionaires (casino, spa and beauty, photographers, shore excursions, laundry). Dancers comprised 19% of the entertainers.

#### **Data Collection**

Accident data were registered continuously during 3 years (1095 days) - from July 2003 to August 2006, comprising 85 cruises lasting 6 to 30 (median: 12) days. The number of officers, staff and ratings, from more than 50 nations, ranged from 561 to 665 (median: 630) per cruise.

The study was based on the ship's accident report system: Every accident or injury involving a crew member or a contractor that resulted in a consultation on board, regardless how slight, was registered by the ship's doctor on a standard form. During the first visit the following data were registered: date of accident; the patient's sex, age, nationality, rank, position and department; type of activity at the time of injury (work, emergency drills, off duty); location of accident: on board (with specified site), ashore or on a tender or lifeboat; equipment involved; cause of injury; type of injury (main diagnosis); injured body region(s); X-rays taken (yes/no), and main type of treatment. Only the most serious injury of each patient (plus its treatment) was included in the statistics. At follow-up visits, information was added about the number of days off work aboard; referral to specialist services (specified) in port and/or at home after sign-off; medical sign-off; medical evacuation; and hospitalization in port. The accident reports were used systematically for on board accident investigations, future accident prevention and quality assurance, and the above data were forwarded after each cruise to the company's medical consultant to be entered into an anonymous data base for statistical evaluation.

#### **Statistics**

The results were expressed as median and full range. Yates-corrected chi-square test was used for comparison of frequency distribution. Differences were considered significant when  $p < 0.05$ .

## **RESULTS**

During 3 years 361 accidents, 277 in men (77%) and 84 in women (23%), were reported from a total of 313 employees (241 men, 72 women) (Table 1). Their median age at the time of accident was 29 years (men: median 30 and range 21-58 years; women: median 28 and range 21-53 years). Thirty-one persons reported 2 accidents, 7 reported 3, while 1 dancer reported 4 accidents.

**Table 1.** All injuries. Percentage (number) of minor injuries and “Lost Time Accidents” (LTA) reported to the medical center on a cruise ship during a 3-year-period. LTA = Injury causing loss of work time beyond the day of injury. n= number.

	Frequency Distribution of Minor Injuries and LTA		Frequency of Injuries in Crew + Contractors
	Minor Injuries % (n)	LTA% (n)	All Injuries% (n)
Marine Crew	79 (41)	21 (11)	14 (52)
Hotel Crew	66 (187)	34 (97)	79 (284)
<b>Marine + Hotel Crew</b>	<b>68 (228)</b>	<b>32 (108)</b>	<b>93 (336)</b>
<b>Contractors</b>	<b>92 (23)</b>	<b>8 (2)*</b>	<b>7 (25)</b>
<b>Crew + Contractors</b>	<b>70 (251)</b>	<b>30 (110)</b>	<b>100 (361)</b>

\*) Difference between crew and contractors:  $p < 0.05$

Less than one third (30%) of the injuries were classified as LTA (Table 1), while only 14% (50/361) were serious enough to require reporting to NMD.

The LTA rate was not significantly higher in men than in women (31% versus 27%; ns).

Contractors (1 woman) filed twenty-five reports (Table 1). All their accidents occurred aboard during work. Only 2 were LTA, which was lower than in crew (8% versus 32%;  $p < 0.05$ ).

X-rays were taken on board in 84 (23%) cases, of which 37 (44%) were LTA.

Six accidents (2 women) occurred during drills, causing a total of 5 days of absence from work. In two cases a lifeboat cable hit the head. A finger caught between the latch and the hook necessitated 3 days of rest.

Seventy-one crew were injured off duty; 19 (27%) were LTA, and 9 of them (13%) resulted in medical sign-off.

The number of accidents varied between 0 and 22 (LTA 0-12) per month with no clear pattern of increase or decrease with time during the 3-year period.

#### **Crew Nationality**

Although almost half the crew members were from the Philippines, Filipinos reported only 35% (125/361) of the accidents. The occurrence rate of LTA tended to be lower in Filipino than in non-Filipino crew (28% versus 32%; ns), but the rate of injuries serious enough to be reported to NMD was significantly lower in Filipinos (6% versus 18%;  $p < 0.01$ ). No other nationality accounted for more than 5% of the crew or reported more than 6% of the injuries.

### Marine department

Fifty-two reports (14%), all from men, were from the marine department (Table 1). The proportion of crew injuries reported (15%) corresponded well with the marine population (= 16% of the crew positions). However, while there were just as many deck as engine positions (50/50), deck crew accounted for 19 (5%) and engine crew for 33 reports (9%). Within the marine department, officers accounted for 42% (14 engineers, 8 navigators) and ratings for 58% (19 from the engine, 11 from the deck department). The LTA rate was not significantly lower in deck than in engine crew (16% versus 24%; ns). The LTA rate tended to be, but was not significantly lower in officers than in ratings (9% versus 30%; p=0.06).

### Hotel department

Hotel personnel reported 284 (79%) accidents (Table 1); 202 from men (71%) and 82 from women (29%).

While the proportion of crew injuries reported from the hotel department (85%) corresponded with its population size (84% of the crew positions), there were some interdepartmental variations (Table 2): Pursers and concessionaires had a lower proportion and galley crew a higher proportion of injuries than expected from these work groups' percentage of the hotel population.

**Table 2.** Hotel crew injuries according to interdepartmental work groups. Percentage (number) of minor injuries and “Lost Time Accidents” (LTA) reported to the medical center on a cruise ship during a 3-year-period. LTA = Injury causing loss of work time beyond the day of injury. F&B = Food and beverage. n= number.

Hotel Work Group	Frequency Distribution of Minor Injuries and LTA		Frequency of Hotel Crew Injuries	Work Group's Percentage (%) of Hotel Population
	Minor injuries % (n)	LTA % (n)	All Injuries % (n)	
Pursers	71 (5)	29 (2)	2 (7)	6
Housekeepers	77 (44)	23 (13)	20 (57)	21
Galley Crew	59 (59)	41 (41)	35 (100)	24
F&B Service Crew	64 (49)	36 (28)	27 (77)	29
Entertainers	67 (18)	33 (9)	10 (27)	9
Concessionaires	75 (12)	25 (4)	6 (16)	11
All Hotel Crew	66 (187)	34 (97)	100 (284)	100

**Table 3.** Injuries occurring during work in marine and hotel crew. Percentage (number) of minor injuries and “Lost Time Accidents” (LTA) reported to the medical center on a cruise ship during a 3-year-period. LTA = Injury causing loss of work time beyond the day of injury. n= number.

	Frequency Distribution of Minor Injuries and LTA		Frequency of Injuries in Marine and Hotel Crew
	Minor Injuries % (n)	LTA % (n)	All Injuries% (n)
Marine Crew	84 (37)	16 (7)	17 (44)
Hotel Crew	63 (140)	37 (81) *	83 (221)
All Crew	67 (177)	33 (88)	100 (265)

\*) Difference between marine and hotel crew:  $p < 0.05$

During work, the hotel department had a higher rate of LTA than the marine department (Table 3; 37% versus 16%;  $p < 0.05$ ). Dancers reported 17 accidents (4 men, 13 women), and all but two happened on stage. The LTA rate was higher for dancers than marine crew (47% versus 21%;  $p < 0.01$ ), and tended also to be higher for dancers than other hotel crew (47% versus 33%; ns). When applying NMD reporting demands, the rate of serious injuries was higher in dancers than in both marine crew (40% versus 8%;  $p < 0.01$ ) and other hotel crew (40% versus 14%;  $p < 0.05$ ).

#### **Accident location**

Most of the accidents (94%) happened onboard, while 17 (5%) occurred ashore, and only 3 (1%) took place on a moving lifeboat/tender (Table 4). Most accidents occurred aboard during work (73%), and one third (33%) of the work injuries were LTA. Most hotel crew injuries occurred in galleys and pantries (39%), followed by cabins, including bathrooms (18%). The engine rooms accounted for 36 % of the marine department accidents, followed by work on deck (28%). Deck (24%) and engine rooms (20%) were also the most frequent accident locations for the contractors.

**Table 4.** Accident location. Percentage (number) of minor injuries and “Lost Time Accidents” (LTA) reported to the medical center on a cruise ship during a 3-year-period. LTA = Injury causing loss of work time beyond the day of injury. n= number.

	Frequency Distribution of Minor Injuries and LTA		Frequency of Accident Locations
	Minor Injuries % (n)	LTA % (n)	All Injuries % (n)
Galley	60 (65)	40 (44)	30 (109)
Deck/Stairs/Gangway	40 (34)	60 (13)	13 (47)
Cabin/Bathroom/Balcony	76 (28)	24 (9)	10 (37)
Dining Area	68 (19)	32 (9)	8 (28)
Engine Area	84 (21)	16 (4)	7 (25)
Own Cabin	74 (17)	26 (6)	6 (23)
Corridor	77 (17)	23 (5)	6 (22)
<b>Ashore</b>	<b>71 (12)</b>	<b>29 (5)</b>	<b>5 (17)</b>
Stage	65 (11)	35 (6)	5 (17)
Pool/Gym	90 (9)	10 (1)	3 (10)
Store/Locker/Office	60 (6)	40 (4)	3 (10)
Lounges/Casino/Shop	56 (5)	44 (4)	2 (9)
Laundry	100(4)	0	1 (4)
<b>Tender (Lifeboat)</b>	<b>100 (3)</b>	<b>0</b>	<b>1 (3)</b>
<b>Sum</b>	70 (251)	30 (110)	100 (361)

#### **Injured body region**

The upper extremity was injured in half the cases (Table 5), and finger(s) alone in one third (LTA: 38%). The back was involved in only 7%, but 2 out of 3 of them were LTA, as opposed to head injuries where less than 1 in 10 were LTA.



**Table 5.** Injured body region. Percentage (number) of minor injuries and “Lost Time Accidents” (LTA) reported to the medical center on a cruise ship during a 3-year-period. LTA = Injury causing loss of work time beyond the day of injury. n= number.

Body region and most frequent locations	Frequency Distribution of Minor Injuries and LTA		Frequency of Body Region Injured
	Minor Injuries % (n)	LTA % (n)	% of all Injuries (n)
Head/Neck/Throat	88 (66)	12 (9)	21 (75)
Face	(24)	(3)	(27)
Eye	(22)	(3)	(25)
Thorax/Abdomen	0	100 (2)	1 (2)
Back	33 (8)	67 (16)	7 (24)
Upper Extremity	68 (126)	32 (60)	51 (186)
Finger	(77)	(45)	(122)
Hand	(25)	(8)	(33)
Lower Extremity	69 (51)	31 (23)	20 (74)
Ankle	(16)	(4)	(20)
Knee	(12)	(7)	(19)
Sum	70 (251)	30 (110)	100 (361)

#### Type of injury

The most frequent type of injury was open wound, which accounted for more than one third of all injuries (Table 6). Sprains and strains accounted for only 13%, but half of them were LTA. All 3 concussion/whiplash cases and two thirds of the fractures/dislocations, but none of the chemical burns, were LTA.

**Table 6.** Type of injury. Percentage (number) of minor injuries and “Lost Time Accidents” (LTA) reported to the medical center on a cruise ship during a 3-year-period. LTA = Injury causing loss of work time beyond the day of injury. n= number.

	Frequency Distribution of Minor Injuries and LTA		Frequency of Injury Types
	Minor Injury % (n)	LTA % (n)	All Injuries % (n)
Wounds + Punctures	71 (96)	29 (39)	37 (135)
Contusions	78 (73)	22 (21)	26 (94)
Sprains + Strains	50 (24)	50 (24)	13 (48)
Thermal Burns	75 (21)	25 (7)	8 (28)
Fractures + Dislocations	33 (7)	67 (14)	6 (21)
Chemical Burns	100 (19)	0	5 (19)
Foreign Bodies	83 (10)	17 (2)	3 (12)
Concussion + Whiplash	0	100 (3)	1 (3)
Contamination	100 (1)	0	<1 (1)
Sum	70 (251)	30 (110)	100 (361)

### **Accident cause / mechanism**

Sharp objects (knives, other tools, broken glass and plates, sharp edges) causing cuts accounted for one fourth of all injuries (26%), followed by falls after slips/trips (19%). Pull, lift and twist accounted for 11% of the reports, but more than half (53%) of these injuries were LTA. Sharp objects caused a relatively high rate of LTA (40%), while all chemical burns (most eye injuries) were considered minor (< 1 day off work). Among the LTA, knives were involved in 17, doors in 11 and broken glass or plates in 8 cases. Fights were the cause of 4 injuries aboard and 3 ashore, including 2 robberies. Alcohol intoxication was only noted as a contributing cause in 3 injuries, all LTA. Weather conditions were mentioned as a contributing cause in 8 cases (strong wind 3, rough seas 5). Sports activities caused 17 of the off-duty injuries (5 LTA, 1 medical sign-off). Another 10 injuries (3 LTA, 1 medical sign-off) occurred by fall from a bunk bed. Lack of protective gear was noted in several cases, especially in chemical eye burns, while it was reported in other cases that wearing eye protection, ear covers or proper work shoes had reduced the extent of the damage.

### **Treatment**

“ICE” (ice, compression, elevation) was the most frequent primary treatment (113 cases). In 88 patients open wounds were closed with sutures and in 28 with sterile tape and/or tissue glue.

### **Sick leave aboard**

Injuries resulted in sick leave aboard for 181 crew members from 0.5 to 19 days (total number of sick days: 456 days; median 2 days). Among them, 103 were more than 1 day off, and their injuries were therefore LTA, as were those of another 7 crew who were signed off after less than 1 day of sick leave aboard. Among those 103 LTA with more than 1 day off, 37 (36%) had open wounds closed by suture (n=32) or sterile tape and/or tissue glue (n=5). Of them, 29 (78%) were food-handlers treated for cuts on hands and fingers. Only 5 crew members were more than 10 days off while on board.

### **Referrals**

Twenty-two crew members were referred to medical specialists in local ports and returned to the ship the same day: Radiologist (5), orthopedic surgeon (4), emergency physician (4), dentist (4), hand surgeon (2), ophthalmologist (1), ear-nose-throat (1), and laboratory services (1). Another 5 were referred to specialists at home during scheduled vacation.

### **Medical sign-off**

Four crew members were signed off and hospitalized in a local port the same day. Two of them were hospitalized on the day of the accident, and the other two 3 and 4

days after the accident, respectively. Another 23 crew members were signed off because of their injuries for further specialist care at home. Among the medical sign-off conditions were 10 fractures, 6 strains and sprains, 5 contusions, 2 open wounds, 1 dislocation, 1 concussion, 1 whiplash, and 1 burn. The following body parts were involved: 10 upper extremities (7 fingers), 9 lower extremities (6 knees), 6 backs and two heads.

Helicopter evacuation and ship deviation because of crew injury were not necessary during the 3-year-period, and there were no deaths.

## DISCUSSION

Seafaring is well documented to be a dangerous occupation [9,10,11,12], and the present study confirms previous short-term reports [2,3,4] that accidents occurred frequently on a medium-sized cruise ship: One in two crew members reported an injury during a 3-year period. Since every injury leads to a minimum of two and often multiple visits [5], accidents create quite a lot of extra work for the medical staff.

Because it is not possible to get time off for illness or injury without visiting the medical center aboard, all LTA will be registered. The present study therefore gives a more complete view of the accident situation aboard than official maritime reports in which underreporting is common [13]. Availability of competent medical personnel and proper equipment made it possible to treat aboard conditions that otherwise would have to be sent ashore, and during the study period costly ship deviations and helicopter evacuations were not necessary. After initial treatment two thirds did not require time off for more than one day beyond the day of the injury (LTA) and would therefore not have to be reported as occupational injuries to maritime authorities ashore. The focus on LTA reflects the fact that flag states' primary concern is not the seafarers' health, but their capacity to work. LTA successfully treated aboard is of little interest to the insurance companies as long as expensive medical sign-off can be avoided and permanent disability is unlikely.

Official statistics are difficult to compare because reporting demands vary: While the Danish Maritime Authority demands that the captain reports all LTA [7], the Norwegian Maritime Directorate registers injuries causing more than 72 hours off work [8]. Norwegian statistics will therefore show fewer, but more serious injuries; they would catch about 1 in 7 of the injuries of our study. The Bahamian Maritime Authority simply states that the master must report 'serious injury' [14]. However, all accidents

are all potentially dangerous, and by continuously reporting, evaluating and acting on all accidents happening aboard, more serious injuries may be avoided.

Drills are simulated emergency situations and can easily cause injuries [15]. Drills involving crew were routinely conducted more than once a week, and the larger lifeboats (tenders) run by crew are used for passenger and crew transport between ship and shore when the vessel is at anchor. Hence, it was reassuring that only a few, not very serious accidents happened during drills or on lifeboats. Wearing a hardhat might have prevented only two of them.

Filipinos worked in all departments and comprised almost half the crew population, but accounted for only 35% of the injuries and their rate of more serious injuries were less than that of non-Filipinos. This is in agreement with other series [13], which show that crew from South-East Asia appear to be less accident-prone than crew from Western and Eastern Europe. Since underreporting is unlikely in our study, culturally conditioned risk aversion in Filipinos is a more probable reason for this difference.

Ratings tended to have a higher rate of LTA than officers, corresponding to large series from the merchant fleet based on official reports [9,12], but the difference was not significant. However, hotel crew had a higher rate of LTA among accidents occurring during work than marine crew, indicating that work at sea is not only dangerous for the traditional (marine) seafarers, but also for those working in hotel functions. And while the number of injuries both in marine crew and hotel crew corresponded well with the population size of their respective departments, there were some notable discrepancies within the two departments: Although the number of engine and deck crew members was the same, engine crew reported more injuries and they tended to have more LTA than deck crew. This is in contrast to official reports from merchant ships [13], where deck crew have more injuries than engine crew and may reflect that deck work on cruise ships is in general less physical or dangerous than on other types of merchant ships.

Also, dancers and crew preparing food accounted for a relatively higher report rate than would be expected from the size of their respective work groups within the hotel department. Dancers seem to be the most accident-prone work group aboard with higher rates of serious injuries than both other hotel crew and marine crew. Irregular work and rehearsal schedules and physically demanding jobs on a moving ship make trips, slips, falls and pulls part of their professional life, and thus they tend to report only accidents that will stop them from performing. It takes weeks to months to prepare a stand-in for all the various shows, so they are difficult to replace and are allowed longer rehabilitation periods aboard instead of temporary sign-off for recuperation.

As pointed out by others [13], rather minor cuts involving hands of galley and catering crew often make them unfit for food handling, while the same injury would not become LTA in marine or office crew. It is hardly surprising that galleys were the

location of more than one third of the accidents aboard. The tools are sharp, equipment is hot, strong chemicals are used for frequent cleaning, and the victims often stated: 'I got distracted while in a hurry!' Improved logistics by going through every step of each work operation carefully with simplicity and safety foremost in mind may do more for accident prevention than unrealistic calls for more crew or more space on an already cramped passenger ship.

It is 'internationally agreed' [16] that the upper extremity, particularly hands, is the most frequently injured body part, which is in agreement with our findings. But whereas cut was the most frequent injury type in our study, slips, trips and falls top the list of international seafarers' accidents, followed by 'hitting against/being hit' and 'handling of tools' [16]. While acknowledging possible overestimation, a large questionnaire study reported that 43% of accidents at sea were related to slips, trips and falls [17] and proposed use of adequate footwear and anti-slip floors for prevention. Their proportion of falls was more than twice as high as in our study, which involved a new state-of-the-art vessel where these measures were routinely used. However, the occurrence of chemical eye burns shows that use of protection still needs to be enhanced. Fortunately, none of the eye injuries were serious, which may to some degree be attributed to prompt use of eye irrigation stations placed in strategic locations.

Heavy seas is said to be the predominant cause in 13% of all accidents among seafarers [16]. In our study the percentage was far less, but movements of the ship may have been regarded as such an obvious part of ship life that weather conditions were only mentioned in the reports when they directly caused the accident, like 'fell out of bunk bed because the ship lurched'. Bunk bed accidents are well known also on land [18]. On a cruise ship, where space is so limited, bunk beds can't be as easily replaced by lower beds as ashore. Hence, safer bunk beds should be created. The bunk bed injuries also illustrates that prevention of many of the accidents seen aboard will have to start before the ship is constructed [13].

Fractures, dislocations and back conditions are injury types that frequently cause medical sign-off. In the present study it is more remarkable that a high fraction of victims of such injuries could remain on board. Dental fractures were successfully dealt with by port dentists, and with the right motivation many jobs could be safely done while a reduced and immobilized finger or toe fracture was healing.

Seafarers are known to have a high risk lifestyle causing many accidents at sea and ashore [9]. The relatively low number of accidents ashore in our study most likely reflects that crew members work long hours also when the ship is in port, and that many prefer to spend their short leisure time aboard rather than on a rushed shore leave.

Injuries because of fights aboard were rare, and alcohol intoxication was only mentioned in a few injury cases. There were strict policy rules for crew use of alcohol,

but the medical center objects to participate in any policing role. Documentation of abuse would therefore only be done in cases where strong clinical evidence suggested that alcohol was a contributing cause or when this was proven by alcohol testing ordered by the investigating security officer.

In conclusion, different practices for reporting injuries at sea around the world make it difficult to compare statistics from different flag states. Injuries reported to the medical staff on a cruise ship were frequent and far more so than official statistics would indicate since less than a third of the victims required more than one day of rest, and less than one in ten had to be signed off for medical attention ashore. Well-equipped, competent medical staffs aboard can after crew injuries effectively reduce time off work, referrals to medical specialists ashore, helicopter evacuations and ship diversions, and medical sign-off. Our findings may be of value for prevention of shipboard accidents, for planning of new ships, for medical professionals considering cruise ship work, and as background for further discussions on international guidelines for cruise medicine.

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