Occupational Drownings

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Worldwide, more than 300,000 workers are killed each year by traumatic injuries [1]. Work-related deaths have important societal impacts particularly in low- and middle-income countries where numerous people are involved in high-risk industries such as agriculture, fishing, and mining [2]. In the United States, the leading causes of work-related deaths are highway crashes, homicides, falls, and struck by object [3]. Drownings, however, occur to workers exposed to environmental hazards leading to submersion. Any maritime worker, including commercial fishers, merchant mariners, tugboat operators, and other water transportation workers, is exposed to drowning hazards. Construction workers, agricultural workers, and groundskeepers are also exposed to these hazards.

The scientific literature for work-related drownings, however, predominantly focuses on deaths in the commercial fishing industry. The hazardous nature of commercial fishing is global. Commercial fishing has been identified as one of the most hazardous occupation worldwide. The Food and Agricultural Organization of the United Nations estimates 24,000 deaths in commercial fishing globally each year [4]. Research from a variety of countries shows that commercial fishing is a high-risk industry. These studies come from the United States [5], the United Kingdom [6], Iceland [7], Denmark [8], Norway [9], Poland [10], Australia [11], and Canada [12]. These studies describe a trend of high numbers of fatalities among commercial fishers, and fatality rates exceeding that for the general workforce. For example, in one study, in the UK, commercial fishers had a fatality rate 115 times greater than the general workforce [6], and in Australia fishers had a fatality rate 18 times higher [11]. In addition, in Norway and Poland, scientists found that fishers on smaller vessels were at higher risk than those on larger vessels [9, 10]. While drowning is not the only cause of death in the commercial fishing industry, it is the most common and often occurs after vessel disasters and falls overboard.

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To understand the distribution of drowning across occupations in the United States, all fatal occupational drownings occurring in the USA during 2003–2008 were identified. Data from the US Bureau of Labor Statistics Census of Fatal Occupational Injuries (CFOI) was used to identify drowning deaths by occupation [3]. A case was identified as any fatal occupational injury with a nature of injury code of "092 Drownings," under the Occupational Injury and Illness Classification System (OIICS). The code includes only fatal drowning as well as drowning deaths with concomitant hypothermia. During 2003–2008 there were 974 occupational drowning deaths, an average of 162 each year. Of these, 95 % ($n=929$) were male and the greatest number occurred among workers ages 35–44 years ($n=219$; 23 %). The leading occupations for drowning fatalities were commercial fishers ($n=232$; 24 %), construction workers ($n=100$; 10 %), and water transportation workers ($n=85$; 9 %). The majority of these occupational drownings occurred while the worker was on a vessel. Other activities leading to drowning included construction, repairing or cleaning, and other physical activity. These patterns of occupational drownings may also be found in other developed countries. Commercial divers had far fewer fatal drownings while on the job, numbering 14 in the same time period.

Not surprisingly, commercial fishing was the occupation with the highest number of work-related drowning deaths in the USA. Persons employed in the commercial fishing industry are exposed to some of the most hazardous conditions including strenuous physical work, long hours, and extreme environmental conditions. During 1992–2008, commercial fishers had one of the most dangerous jobs in the USA, with an annual fatality rate of 129 deaths per 100,000 fishers, 33 times that of the rate of all US workers (4 deaths per 100,000 workers) [5].

Despite the high contribution to occupational drowning, commercial fishing deaths have been declining gradually since 1992 in the USA and in Scandinavian countries [5, 7, 9]. During the 1990s in the USA, the average number of deaths per year ranged from 48 to 96, but during 2000–2009, it decreased to 41–61 deaths annually [5]. Vessel disasters and falls overboard continue to be the main incidents leading to fatalities. Risk factors for vessel disasters and falls overboard, however, vary by type of fishing vessel, fish species sought, and geographic location of fishing grounds [5]. For example, the Gulf of Mexico shrimp fishery had the highest number of fatal falls overboard ($n=29$) than any other fishery in the country and the West Coast Dungeness crab fishery had 21 deaths resulting from ten vessel disasters, all occurring in heavy weather [5].

US commercial fishing safety regulations (46 CFR Part 28 (1991)) require that vessels carry various pieces of emergency equipment, including items such as immersion suits, lifejacket, life rafts, and emergency locator beacons, depending on vessel size and the operating area. This equipment has been shown to save lives by keeping the crew warm and afloat until rescued, thus focusing on survival rather than prevention of vessel disasters, falls overboard, or deck injuries [13]. Crew members, however, are not required by regulation to wear a lifejacket while working on deck. None of the workers who died from falls overboard during 2000–2009 was wearing a lifejacket, and 82 (53 %) of the falls overboard were not witnessed by other workers [5].

Lifejacket use has been shown to increase chances of survival [14]. Increasing the use of lifejackets and fall overboard alarms would likely reduce the risk for drowning. Many new lifejackets have been designed to be worn while working on deck. Persons fishing alone on commercial vessels should use safety devices that can stop the engine if they fall overboard, and all vessel operators and crew should have a plan that will allow them to reboard the vessel. Some engineering suggestions to reduce the risk of falls overboard include creating more enclosed workspaces and raising gunnels. Gear entanglement may also lead to falls overboard, which may be prevented by having dedicated line bins and lockers or with engine kill switches that may be engaged by the entangled fisher [15].

By placing a priority on drowning prevention in commercial fishing, high-income countries have made progress in reducing fatalities. This is not true, however, in low-income countries where fleets may consist mainly of small and often nonmotorized vessels. There are limitations in vessel to shore communications, onboard navigation, and emergency equipment. These countries also lack the infrastructure that is necessary to enforce regulations and to conduct search and rescue. The biggest challenge in LMICs continues to be educating authorities on the extent of the problem, encouraging discussion, and persuading them to act [16].

Safety improvements in the commercial fishing industry have occurred as a result of several interventions, including safety regulations for emergency gear, marine safety training, and fishery-specific and geographic-specific interventions that focus on unique hazards by vessel types. In the future, safety interventions should be tailored to particular drowning hazards that exist within a fleet of vessels. Additional efforts are needed to prevent falls overboard and increase lifejacket use. Research is urgently needed to better understand drowning in other occupations, such as workers in the construction and water transportation industries, so that drowning in these occupations can be reduced as well.

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References

1. Concha-Barrientos M, Nelson DI, Fingerhut M et al (2005) The global burden due to occupational injury. Am J Ind Med 48:470–481
2. International Labor Organization (2011) Safety and Health at Work. From: www.ilo.org/global/topics/safety-and-health-at-work/lang--en/index.htm. Accessed 20 Dec 2011
3. Bureau of Labor Statistics (2011) Occupational Fatalities in the United States. From: http://www.bls.gov/iff/oshwc/cfoi/cfch0009.pdf. Accessed 20 Dec 2011
4. Food and Agricultural Organization of the United Nations Fishing (2005) The most dangerous occupation. From: http://www.fao.org/fishery/topic/12383/en. Accessed 14 May 2011
5. Lincoln JM, Lucas DL (2010) Commercial fishing death—United States, 2000–2009. Morb Mortal Wkly Rep 59:842–845
6. Roberts SE (2010) Britain's most hazardous occupation: commercial fishing. Accid Anal Prev 42:44–49

7. Petursdottir G, Hjoervar T, Snorrason H (2007) Fatal accidents in the Icelandic fishing fleet 1980–2005. Int Marit Health 58:47–58
8. Laursen LH, Hansen HL, Jensen OC (2008) Fatal occupational accidents in Danish fishing vessels 1989–2005. Int J Inj Contr Saf Promot 15:109–117
9. Aasjord HL (2006) Tools for improving safety management in the Norwegian fishing fleet occupational accidents analysis period of 1998–2006. Int Marit Health 57:76–84
10. Jaremin B, Kotulak E (2004) Mortality in the Polish small-scale fishing industry. Occup Med 54:258–260
11. Driscoll TR, Ansari G, Harrison JE et al (1994) Traumatic work related fatalities in commercial fishermen in Australia. Occup Environ Med 51:612–616
12. Hasselback P, Neutel CI (1990) Risk for commercial fishing deaths in Canadian Atlantic provinces. Br J Ind Med 47:498–501
13. Lincoln JM, Conway GA (1999) Preventing commercial fishing deaths in Alaska. Occup Environ Med 56:691–695
14. O'Connor PJ, O'Connor N (2005) Causes and prevention of boating fatalities. Accid Anal Prev 37:689–698
15. Lucas DL, Lincoln JM (2007) Fatal falls overboard on commercial fishing vessels in Alaska. Am J Ind Med 50:962–968
16. Food and Agricultural Organization of the United Nations (2001) Safety at sea as an integral part of fisheries management. FAO Fisheries Circular No, Rome, p 966