Fishery-Specific Risk Factors

Using the public health approach to improve fishing vessel safety.

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Although progress has been made to improve safety on commercial fishing vessels, commercial fishing continues to be the most dangerous occupation in the country. In 2008, commercial fishermen had a fatality rate nearly 36 times higher than the rate for all U.S. workers.[1] Broad interventions on a national level have had some success in reducing fatalities, but greater improvements will come from tailored programs targeted at specific hazards of various fleets.

The Public Health Approach

A proven and frequently used method for reducing injuries and illnesses in a variety of settings and circumstances is the "public health approach." The National Institute for Occupational Safety and Health (NIOSH) has also referred to this approach as "the Alaska Model" when describing safety improvements among high-risk workers in Alaska. This approach seeks to benefit the largest number of people through a systematic, four-step process. Applied to the problem of fatal injuries in the fishing industry, the steps of the public health approach are:

- Define the problem through surveillance. Collect data about the magnitude, scope, characteristics, and consequences of fatal injuries. It is especially important in the fishing industry to gather data about a specific fishery, gear, and type of vessel.
- Establish why fatalities occur. Use scientific research and industry input to determine the causes and risk factors.
- With input from industry, design tailored interventions for specific fisheries and evaluate their effectiveness.
- Implement the interventions found to be most effective.

The value and importance of this approach was demonstrated in the Bering Sea and Aleutian Islands (BSAI) crab fishery.[2]

The Approach in Practice

Scientists at NIOSH conducted injury surveillance in the Alaska fishing industry during the 1990s. They discovered that the BSAI crab fishery had the highest fatality rate in the state, and that capsizing due to overloading was the leading cause of fatalities.

In 1999, the identification of this major safety problem prompted the local USCG office to work with industry to develop an intervention—the USCG Preseason Dockside Enforcement Program. This program focuses on the immediate hazard of vessel overloading and does not allow vessels to be overloaded with crab pots when they leave port.[2]

NIOSH evaluated the effectiveness of this program and found that since implementation, the average annual fatality rate for the BSAI crab fleet has decreased by 60 percent—from a high of 768 deaths per 100,000 fishermen during 1990-1999 to 305 deaths per 100,000 fishermen during 2000-2006.[3] This success can be replicated in other fisheries across the country.

Step 1: Data collection

Historically, part of the difficulty in improving safety in the U.S. fishing industry has been with implementing this first step. There was a lack of data needed to properly identify hazards by region, fishery, and type of event. In 2007, NIOSH developed the Commercial Fishing Incident Database (CFID) to collect and analyze data on fatalities in the U.S. commercial fishing industry to identify high-risk fisheries (defined by species targeted, location of fishing grounds, time of year, and gear type) and to discover the patterns of risk factors that contribute to fatal events.

Every occupational fatality in the U.S. fishing industry is entered into the CFID each year. Currently, the database has detailed information about all commercial fish-

THE STATISTICS

According to the NIOSH Commercial Fishing Incident Database, during 2000-2009, 504 commercial fishing fatalities occurred in the U.S., averaging 50 per year.

Most deaths (261, or 52 percent) occurred following a vessel disaster (including sinking, capsizing, fire) in which the crew was forced to abandon ship. Falls overboard accounted for 155 fatalities (31 percent). The remaining deaths were due to onboard injuries (51, or 10 percent), diving injuries (19, or 4 percent), and on-shore injuries (18, or 3 percent).

Vessel Disaster

The 261 fatalities that resulted from vessel disasters occurred in 148 separate vessel disaster incidents, and were generally the result of a sequence of events. The most frequent initiating events were flooding (37, or 28 percent), vessel instability (24, or 18 percent), and vessels struck by a large wave (23, or 18 percent). Severe weather conditions contributed to 61 percent of fatal vessel disasters.

Falls Overboard

Among the 155 victims who died from falling overboard, none wore a personal flotation device, and 53 percent of falls were not witnessed. The main causes of falls overboard were trips/slips (43, or 33 percent), losing balance (34, or 26 percent), and gear entanglement (21, or 16 percent).

Geographic Data

The fisheries and events that led to the highest number of fatalities included:

- falls overboard in the Gulf of Mexico shrimp fishery (29, or 6 percent of total U.S. fatalities),
- vessel disasters in the Northeast scallop fishery (27, or 5 percent),
- vessel disasters in the West Coast Dungeness crab fishery (21, or 4 percent),
- vessel disasters in the Northeast multi-species groundfish fishery (19, or 4 percent).

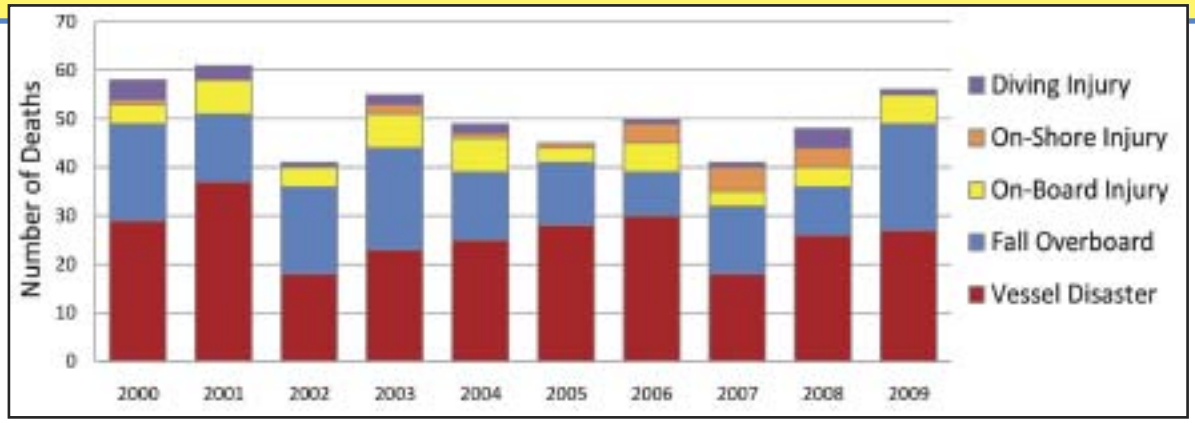
The 29 fatal falls overboard in the Gulf of Mexico shrimp fishery were largely caused by trips/slips (48 percent) and losing balance (24 percent). About half (48 percent) of these falls overboard were not witnessed.

Initiating Events

The main initiating events for the nine vessel disasters (leading to 27 fatalities) in the Northeast scallop fishery were vessel instability (25 percent), collisions (25 percent), and snagging gear on the ocean floor (25 percent).

In the West Coast Dungeness crab fishery, the main initiating events for the 10 vessel disasters (leading to 21 fatalities) were crossing a river bar (40 percent), vessel instability (30 percent), and vessels struck by a large wave (20 percent). Severe weather was associated with all vessel disaster incidents in this fishery.

Finally, in the Northeast multi-species groundfish fishery, the main initiating events for the 12 vessel disasters (19 fatalities) were instability (50 percent) and flooding (40 percent).



U.S. fishing fatalities by year and incident type, 2000-2009 (504 total), "Commercial Fishing Deaths–United States, 2000-2009." MMWR 2010; Vol. 59, No. 27.

ing fatalities in the country during 2000-2009. The information comes from multiple sources including USCG investigation reports, local law enforcement reports, news media, and death certificates. The CFID includes information regarding the vessel characteristics, environmental factors, and victim demographic data for each incident.

Step 2: Identify risk factors

With 10 years of robust fatality data available for the country, NIOSH recently moved forward to the second step of the public health approach—data analysis to identify the causes and risk factors for fatalities in hazardous fisheries. The results can be used to design tailored interventions that address the primary risk factors in specific fisheries.

Steps 3 and 4: Develop, evaluate, and implement tailored interventions

To be most effective, interventions should focus on the fisheries and incident types accounting for the highest number of fatalities.

For example, shrimp fishermen falling overboard in the Gulf of Mexico led to the highest number of fishery-specific fatalities in the country during 2000-2009 (see sidebar). Since none of these fishermen wore a personal floatation device (PFD), identifying and understanding the barriers to PFD usage is necessary. In addition, many of these events were caused by trips/slips and losing balance, and almost half were not witnessed. Fishermen need to be able to alert others when they fall overboard or be able to stop the engine and re-enter the vessel if they are fishing alone.

In the Northeast scallop fleet, preventing the hazards leading to vessel instability, collisions, and snagging gear on the ocean floor is necessary. A previous study on the scallop fleet in Maine reported a distinct pattern of serious injuries and capsizings in the mid-1990s while towing fishing apparatus across the sea bed or while lifting laden fishing apparatus from the water to recover the catch.[4] USCG personnel then engaged the fishermen in town hall meetings to discuss the hazards and potential solutions. This type of an approach could be repeated for the entire Northeast scallop fleet, and an evaluation could be done for its effectiveness.

The causes of vessel disasters in the West Coast Dungeness crab fishery are different from those in the Northeast scallop fishery, and so require interventions tailored to the problem. In 2008 NIOSH published a report outlining the hazards in the West Coast Dungeness crab fishery and recommended continuing the preseason safety inspections in place for this fleet, as well as improved weather reporting, addressing the hazards of river bars, marine safety training, and encouraging fishermen to wear PFDs.

Since the report was published, the USCG has implemented stricter guidelines for all vessels crossing hazardous bars, legislatures have sought better infrastructure for marine forecasting, and the Oregon Dungeness Crab Commission has encouraged fleet participation in safety training programs by offering incentives for members to attend. The commission has also sponsored a rebate program to help fishermen purchase PFDs. These types of targeted efforts and others should continue and should be evaluated for their effectiveness.

Conclusion

Every fishery has unique risk factors, and interventions must be tailored to each fishery to be effective. Interventions should be evaluated to measure their effectiveness. Once a safety intervention has been pilot tested and found to be effective, it should be expanded to cover other vessels that experience similar risk factors and become a permanent safety improvement.

More work is needed to develop and implement interventions in fisheries across the country. NIOSH will continue to collect and analyze data in the CFID and provide detailed information on fishery-specific hazards. Organizations, agencies, and other groups located near the fishery can use the information to create practical, industry-supported solutions.

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Endnotes:

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