Available online at www.sciencedirect.com
ScienceDirect
Safety Science 46 (2008) 230–233
SAFETY SCIENCE
www.elsevier.com/locate/ssci

The public health approach to occupational injury research: From surveillance to prevention

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Received 23 March 2006

Abstract

The National Institute for Occupational Safety and Health (NIOSH) in the US uses the public health model as the framework for occupational injury prevention research. This model is described, along with where we have made progress in this research process, and where we need to focus our efforts in the future. The specific role of surveillance in research and prevention of occupational injuries is also discussed, as well as the importance of partnership efforts to facilitate the transfer of research to practice. Suggestions are provided for stimulating a global approach to surveillance and to the transfer of research to practice.
Published by Elsevier Ltd.

Keywords: Occupational injury

1. The public health model

The public health model, historically applied to infectious and chronic illness and more recently to injury prevention, is the framework used by NIOSH for occupational injury prevention research. It requires a multidisciplinary organizational approach to conducting research for prevention, including partnerships with practitioners, industry and labor in the public and private sectors. It has become clear over time that research results alone, even from the best designed and executed studies, may fall short of really having an impact in the workplace. Too often, practical research findings are not translated and transferred into preventive action in the workplace; are not adequately evaluated in real work settings; and are not adopted and implemented in industry simply because industry and the organizations that inform, and represent industry were not brought into the research process. Following each step of the public health model facilitates our efforts to move beyond the endpoint of publishing results of individual surveillance or research studies in the literature, to facilitating the transfer of research results to practice in the workplace.

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0925-7535/$ - see front matter Published by Elsevier Ltd.
doi:10.1016/j.ssci.2007.04.009

The public health model consists of the following steps: (1) Identify and prioritize problems through surveillance; (2) Quantify and prioritize risk factors through analytic research; (3) Identify existing or develop new strategies or technologies to prevent occupational injuries; (4) Transfer and implement the most effective injury control measures; and (5) Evaluate and monitor the results of intervention efforts.

Injury and fatality surveillance data provides information on when, where, and what kind of injuries are occurring. This both points the way for our research, and provides a yardstick by which to track trends and gauge prevention efforts. In NIOSH, a fatality investigation program complements our surveillance efforts by providing more details about causation in specific cases.

We use the data, the case investigations, and the trends and patterns they reveal to map out more in-depth research. Using analytic epidemiology and engineering methodologies, we identify risk factors and causal factors that contribute to workplace injuries. Then, options for prevention and control can be identified, or developed.

Evaluation research is conducted to determine effectiveness of prevention strategies and interventions—both in the laboratory and in real workplaces. Finally, efforts to communicate and transfer findings, and influence the implementation of effective prevention are key to closing the public health loop, and reducing the risk, and the ultimate toll of occupational injury.

Using the public health model as a framework, in 1998 NIOSH published a strategy document entitled *Traumatic Occupational Injury Research Needs and Priorities* (NIOSH, 1998). This document identifies the research needs and priorities in each phase of the public health model, from surveillance to evaluation. This document continues to drive our research program in NIOSH. We recently reviewed and reaffirmed its continued relevance in our priority setting and strategic planning. The recommendations also reflect the progress that has been made in each of these stages of work injury research over the past decade or two.

We now have reliable national surveillance data on traumatic occupational fatalities in the US, as well as good estimates of lost workday injuries and injuries presenting in emergency departments. And we know the industries and occupations and demographics and causes of those injuries and deaths, and which groups are at highest risk. Surveillance recommendations are now focused on increasing the detail of information, on improving exposure data, on identifying new and unique worker populations, and on coordinating and integrating surveillance systems, from the company level to national and international surveillance.

The needs and priorities for analytic research continue to emphasize the importance of bringing together the disciplines of epidemiology, engineering, and social and behavioral sciences, but also call for research efforts to move beyond the more obvious and traditional workplace risk factors to learn about organizational, socio-economic, and cultural influences, and emerging issues associated with the changing organization of work in a global economy.

There is an emphasis on prevention and control activities, especially in developing engineering solutions to risks, an area in which activity has clearly increased. But we continue to see the familiar need for cost benefit analyses, which still falls short.

We have learned a lot about communication and dissemination. We have moved from general broadcasting of information, to targeted and tailored communications in multiple media. Additional work is needed to ensure the adoption of effective prevention strategies in the workplace. Injury research and prevention efforts need to integrate health communication, social marketing, technology transfer, and diffusion techniques. We need to improve efforts to get knowledge and products into the workplace, and to evaluate their effectiveness, rigorously and scientifically, including their cost effectiveness.

Evaluation of intervention effectiveness remains an underserved phase of the public health process of occupational injury research. Too frequently, intervention strategies, ranging from training, to policies and practices, to control technologies, are put into use with no scientific knowledge of their effectiveness. Injury researchers and prevention professionals must partner and collaborate with industry and labor in the evaluation of interventions in real work settings. There are now numerous successful examples of government–industry partnerships that demonstrate the win–win outcomes of such collaboration, and open the door to such partnerships.

2. Partnerships

Looking at this overall model, it should be apparent that there are areas that simply cannot be effectively addressed without the participation of people and organizations outside NIOSH, outside government, and outside academia. We would be hard pressed to conduct meaningful surveillance and injury investigations without the participation of the companies involved, and the government agencies within these jurisdictions. Analytic epidemiology often requires the collaboration of industry and labor, whether the researcher is looking at records, collecting data, or interviewing workers. Even engineering research in our own laboratories cannot be effectively conducted without input from end users to ensure relevance. Our evaluation efforts would not be possible without strong industry partners; likewise, our attempts to communicate key findings, including both risk and prevention information, would fall far short without input from representatives of our target audiences—including employers and workers.

We now have a number of examples of successful research partnerships between government and industry and labor groups which have provided valuable experience to draw from. Having industry partners is crucial to the design and conduct of relevant, prevention-oriented research, for a number of reasons. Through interaction with those in the business, NIOSH has better understanding of industry processes, hazards, risk factors, feasible control strategies, and other industry-specific characteristics. Partnership interactions help ensure that research is relevant, directly addressing injury problems being faced by the industry. Partners provide NIOSH researchers with access to work sites and worker populations for study, and enable evaluations and demonstrations of prevention strategies and programs in real workplaces. These same partners are more likely to implement the prevention measures that prove to be effective (and cost-effective). Industry partners also provide important input into our study designs and to disseminating our findings more broadly throughout the industry.

3. Research to practice

The value of occupational injury research, of course, is putting the results into practice in the workplace. NIOSH is emphasizing this with a new "research-to-practice" or r2p initiative to facilitate the transfer of scientific findings to prevention practice in the workplace. Our research findings are used as support for guidance and regulatory activities; as content for development of information products and training materials; as data to inform policy making and strategic planning; and as criteria for use in design of safety programs, practices, and protective equipment. We used to believe that a published article was the endpoint of our research. We are now recognizing a responsibility for playing a more direct role in translating and transferring the research into action.

Using the public health approach as a framework, prevention-oriented research is being conducted successfully through partnerships in the US, and the results are being applied in workplaces and reducing injuries to workers. Industry, labor, government and other sectors are communicating and collaborating to solve work safety problems and to reduce risks. The NIOSH r2p initiative is intended to promote and facilitate this way of working.

There are some challenges too. Partnerships and prevention do not always come about easily. It can be a challenge to convince a hospital or construction company or labor groups to allow government to observe their work. But as we have demonstrated the win–win benefit of collaboration—the reduction of injuries and costs—it has become easier and more successful. As we learn to involve relevant partners and end users throughout the research process, beginning at the conceptual point and continuing throughout the stages of the public health model, we will continue to increase the implementation and impact of our work.

4. A global approach

There has been substantial progress in occupational injury research in the US in each stage of our research approach. But there are still many needs to address. And many of these needs are not unique to the US but are global needs and priorities for work injury research.

Efforts towards a global approach to prevention will need to begin with a global approach to surveillance. Surveillance is not only the first step in this approach; it is the key driver to efficient and effective research for prevention. Surveillance data allow us to identify the most important problems to efficiently target our resources toward the greatest potential impact for the investment. Surveillance data can also be useful for direct prevention action, where recognition and awareness of the problem can lead to direct intervention and prevention.

Surveillance also helps us identify new and emerging problems that we might mitigate before they increase. Surveillance data are then used for tracking and monitoring, and for assessing the effectiveness of prevention efforts. Comparisons of surveillance data between companies, states, or countries, allow us to identify differences in the magnitude and risks of similar occupations, industries, or causes, and to discover where successful prevention efforts might be transferable to other venues. As national surveillance systems are developed, it will be important to maximize the comparability so that surveillance data can be compared between countries as well as combined for an international perspective (Feyer et al., 2001). Such efforts could begin to drive a global approach to occupational injury prevention research.

Acknowledgements

The author is grateful to Herb Linn for his contributions to the conceptualization of this paper. The findings and conclusions in this report are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

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