work (r = .52; p = <.001), hence could prove useful to occupational health practitioners. Use of the HAQ was successful with this population; however, it needs to be evaluated in other samples to more conclusively determine its utility in evaluating occupational injury disability. Sequential administration would be useful to assess whether the HAQ is sensitive in detecting minor patient status changes over time.

Session 9: Methodologies Used to Collect and Analyze Surveillance Data

Formal Safety Analysis Methods as Tools for Hazard Surveillance—Kerkering JC

Traditional health surveillance methods are based on a disease-and-illness model. That is, the model is used to respond to the incidence of illness and disease by categorizing and counting such incidences and describing the circumstances surrounding the occurrence. This approach is dictated by perceptions of a cause-and-effect relationship where the cause is not readily observable and a significant time lapse lies between the initial cause (source) and its effect (illness). Hence, traditional health surveillance has, by necessity, often been reactive and descriptive rather than proactive and predictive.

Such a reactive surveillance model, as stated in the NORA research guideline document (p. 53), is deficient where the topic of concern is worker safety, and the effect of a triggered hazard is usually immediate with often fatal results. Surveillance activities, where used to prevent traumatic injury, must identify these workplace hazards and the conditions that trigger accidents. It is often possible to identify the causes of accidents in terms of hazards and triggering conditions and thus predict possible effects before an accident occurs.

The author claims that an effective hazard surveillance model for hazard identification and accident prediction requires a proactive approach, an approach that is feasible using well-established, systematic, safety-analysis procedures. This paper describes two broad safety-analysis approaches, inductive and deductive, and then suggests how these approaches can be used to anticipate accidents so that preventive measures can be taken. Preliminary hazard analysis is described as an example of an inductive approach, while fault tree and event tree analyses are described as examples of deductive approaches. The mining industry provides examples for each approach: a fault tree analysis of a blocked ore chute in a deep metal mine and a preliminary hazard analysis of a longwall escapeway in a coal mine. The author concludes that these methods could improve hazard surveillance results and provide new insights into cause-and-effect relationships related to risk and traumatic injury in mining.

Surveillance of Disaster - A View from the Denominator—Chaiken RF

Surveillance plays a very significant role in the NIOSH epidemiological model as applied to occupational health and safety. Surveillance studies are used in identifying occupational problems, evaluating the effectiveness of intervention procedures, establishing research priorities, and allocating resources for its health and safety program.

The NIOSH surveillance system has been highly successful in serving NIOSH's mission of prevention of occupational injuries as applied to relatively large number, relatively high frequency events such as falls, machinery mishaps, and environmental exposures. However in the case of relatively low number and low frequency industrial disasters such as explosions and fires, and commercial aircraft accidents, the applicability of the surveillance model is far less clear. I believe that some of the problem lies with worker exposure - its interpretation and evaluation, and some of the problem lies with assumptions (both explicit and implicit) as to weighting factors (i.e., economic, societal and hazard impacts) to be or not to be considered in the data analysis. I believe there is a definite need to broaden the data base that exists in current surveillance S&H models; particularly in the area of worker exposure.

These points will be elaborated on in terms of the 'numerator' and the 'denominator' of surveillance information, in which BLS and NIOSH surveillance studies revolve around a count of the injured (the numerator) normalized to some count of the workers exposed (the denominator). If one interprets the 'numerator' of surveillance rate data as referring to those individuals, institutions and events which are directly affected by accidents that occurred, then weighting factors that relate to the numerator (referred to as N-factors) can be defined based on degrees of hazard or injury and the economic and societal impacts that are directly associated with the occurrence of the accident.

The 'denominator' of surveillance data will likewise be affected by weighting factors, but the D-factors will refer to those individuals, institutions and events which are in harms way, i.e., those who will be affected by future accidents. As will be described, the D-factors being different from the N-factors, will lead to a ranking scheme which is different from that currently employed by NIOSH, but one that could lead to an all-inclusive model for epidemiologic analysis of accidents.

Another aspect of the model employed by NIOSH for prevention of occupational injury is what might be called the 'Haddon Strategy' for reducing injuries. With this paradigm, remediation efforts focus on those means available for reducing injuries associated with an accident, rather than on determining the exact cause(s) or 'anatomy' of an accident. For example, water purification will control disease even in the absence of specific knowledge as to the pathogens that would cause disease. Unfortunately, low frequency disastors, such as mine explosions and fires, often involve the liberation of energies so great that prevention of occupational injury dictates that the event must be prevented from occurring. This requires a fundamental understanding of the exact causes that can lead to the event. In these cases, it is only through a detailed anatomy (research) of an accident that solutions for prevention will be found.

The Effect of Using Death Certificate Information on Industry and Occupation Specific Fatality Rates—Wolf SH, Loomis DP, Gregory E, Runyan CW, Butts JD

Death certificates are a primary source of information used to estimate industry and occupation specific fatality rates for the United States. Funeral directors completing this information are instructed to record the decedent's usual industry and occupation. However, the usual industry and occupation during a decedent's lifetime, rather than their industry and occupation at the time of the injury, may be misleading in determining industry and occupation specific rates of fatal injury at work. The purpose of this study is to compare the