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The research-defining Accident Investigation Methodology of the National Institute for Occupational Safety and Health

by Joseph Gustin, MS (Hyg) [1]

GUSTIN J. The research-defining Accident Investigation Methodology of the National Institute for Occupational Safety and Health. *Scand j work environ health* 7 (1981): suppl 4, 106—108. The Accident Investigation Methodology (AIM), developed for the National Institute for Occupational Safety and Health through a contract effort by Safety Sciences of San Diego, California, is a composite procedure utilizing many useful concepts and approaches from existing investigative techniques in addition to innovations. The investigation procedure is oriented toward the identification of occupational accident/injury countermeasures and associated research needs. Emphasis is placed upon modern "systems theory," which considers human factors as a primary component in the etiology of worker injury. The investigation manual is primarily intended for knowledgeable safety practitioners with some previous experience. Interviewing techniques and preparations for conducting an investigation are thoroughly addressed. The necessary tools and forms for actual investigation are included, as well as a sophisticated analysis procedure and coding system for the computer accessing of all relevant data.

Key terms: accident coding, investigation manual, safety investigations.

The need for the National Institute for Occupational Safety and Health (NIOSH) to develop and perfect an investigation procedure specifically for application to occupational accidents was evident when a review showed currently available methods to be unsatisfactory. The Institute believes that the collection of information on occupational accidents must be obtained through proper investigation techniques and must include a strong behavioral component, as well as the usual organizational and environmental elements. Other investigation methods reviewed were found to contain useful concepts and approaches, many of which contributed to the methodology presented in this report (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13).

Therefore, the essence of this project was to develop a strategy to investigate and analyze work accidents in a more comprehensive and precise manner, the result being better defined accident etiologies. Also of primary concern was the inadequate or nonexistent capability of other investigation procedures to facilitate the coding and computer processing of the mass of collected data. The NIOSH research defining concept solves this problem through the use of sophisticated coding and analysis components. Reaching these overall objectives necessitated a complete review of the state of the art.

Discussion

The NIOSH Accident Investigation Methodology — hereafter referred to as AIM — will be an integral part of a four-level surveillance system intended to monitor the occupational accident/injury experience of the American worker. The first level will consist of routine company accident

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reports of all types, such as the worker's compensation first report of injury. These reports will be used to help establish research priorities and identify specific problems requiring further in-depth study. Level two consists of detailed but limited questionnaire surveys that access information from the injured worker, but lack corroborating data from other sources and often depend on recall ability many weeks after the fact. The third level consists of in-depth accident investigation. AIM will allow NIOSH to improve significantly on any previous attempts to gain this level of data which benefits from quick response, trained investigators, and sophisticated data gathering tools. The fourth level simply represents using AIM as the investigative procedure in highly defined studies, eg, epidemiologic studies of a specific activity, occupation, or industry. Since in-depth investigations are expensive, they will only be performed — on a planned basis — in areas identified as high priority (as determined from level one and two data). Of course, selected accidents will occasionally be investigated on an individual basis, given available resources and the need for data.

Obviously, as in any investigation process, the interview questionnaire is the basic tool and should be adaptable to suit the nature of the object or activity under investigation. The NIOSH methodology includes, in addition to the questionnaire, a complete set of forms for accident site surveys, participant statement forms, accident sequence analysis flowcharts, and summary analysis forms.

These last two forms are intended to assist the researcher in identifying multifactor relationships. They will also assist the researcher in formulating corrective actions and identifying the most promising sites for their application. The development of AIM was a contract effort under the direction of NIOSH. The present methodology evolved from a preliminary study performed and completed in 1978. The initial study addressed only those accidents classified as falls, and, although the study was complete in itself, NIOSH desired to expand the scope of the methodology to the current version which is more comprehensive and, therefore, capable of addressing all the major accident types, eg, caught in, under, or between; struck against; etc. A procedures manual for the use of the field investigation was developed and is currently in the review stage.

Although the investigation method has not been fully tested, NIOSH believes that the goals of the project were met. These goals included objectivity and the gathering of facts, and AIM succeeds in these respects. Occupational hazards are analyzed without determination of blame or fault. Value judgements are not made and all terminology implying culpability or liability are eliminated. AIM also stresses multifactor involvement, eg, the interrelationships that may occur among factors involved in the work task, equipment and tools, work environment and facilities, the worker himself, and his organization. A good procedure should also direct the investigator sequentially through data collection and analysis so that all pertinent facts can be obtained in as short a period of time as possible. In addition all sources of error should be examined, including design-induced management oversights and worker failures.

The greatest amount of innovation incorporated into AIM resides in its data base orientation. The data collected through the use of AIM is an integral part of a total information system, and unlike other methods of investigation AIM includes a means for coding, abstracting, analyzing, and retrieving the data. The result of this sequential process is the generation of potential corrective actions, which simply indicates that the NIOSH procedure is not only directed to problem understanding, but toward problem solving. The intention is to identify recurring hazards and locate accident patterns. All precipitating events must be addressed, not just the primary "cause." In short, the system must be readily capable of evaluating and analyzing problems and prescribing solutions. The NIOSH investigation method accomplishes these objectives.

This accident investigation procedure has been used on numerous occupational injuries in 1979—1980 and found to be very successful. AIM will definitely require and receive additional field testing

and refinement as more investigations are completed and evaluations are received. In the event that investigations into highly specific injuries associated with unusual processes or equipment are necessary, special supplements to AIM may also be required. It is also hoped that the operational manual and general philosophy of AIM will be used and evaluated by safety practitioners throughout industry as a tool for potentially improving the quality and usefulness of the collected data. The pertinent concepts that are embodied in the NIOSH accident investigation method are listed for quick review.

AIM
- focuses on determining multifactor involvement,
- has a multidisciplinary perspective,
- is able to identify factor relationships and sequences of events,
- emphasizes the accident — not the injury — and the events which precipitate the accident,
- emphasizes the role of "human factors" in accident occurrence, eg, risk-taking behavior, design-induced error and management deficiencies, and
- allows for development of feasible corrective actions.

Finally, AIM uses a new charting analytical format which preserves nearly all the collected data and maintains these data in their correct relationships. This format is standardized for easy use and helps insure reproducible results by any researcher.

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