Sentinel Health Events (Occupational): A Basis for Physician Recognition And Public Health Surveillance

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Abstract: A Sentinel Health Event (SHE) is a preventable disease, disability, or untimely death whose occurrence serves as a warning signal that the quality of preventive and/or therapeutic medical care may need to be improved. A SHE (Occupational) is a disease, disability, or untimely death which is occupationally related and whose occurrence may: 1) provide the impetus for epidemiologic or industrial hygiene studies; or 2) serve as a warning signal that materials substitution, engineering control, personal protection, or medical care may be required. The present SHE(O) list encompasses 50 disease conditions that are linked to the workplace. Only those conditions are included for which objective documentation of an associated agent, industry, and occupation exists in the scientific literature. The list will serve as a framework for developing a national system for occupational health surveillance that may be applied at the state and local level, and as a guide for practicing physicians caring for patients with occupational illnesses. We expect to update the list periodically to accommodate new occupational disease events which meet the criteria for inclusion. (*Am J Public Health* 1983; 73:1054–1062.)

Introduction

Successful control of occupationally related diseases depends on two factors: recognition and diagnosis of cases by physicians, and the implementation of surveillance, prevention, and occupational control programs. Sadly, both of these factors have historically received inadequate attention.

In a letter-to-the-editor of the *New England Journal of Medicine*[1] it was indicated that among 67 physicians, "more than half of whom were board-certified pathologists" and interested enough in pulmonary pathology to take a one week intensive post-graduate course, fewer than 10 per cent (i.e., only six of them) suspected and diagnosed asbestosis in a microscopic section selected so as to demonstrate "a straightforward example of abestosis." This was in sharp contrast to 75 to 80 per cent successful diagnoses in "mystery" cases of non-occupational disease. A recent *Annals of Internal Medicine* editorial, "Occupational Medicine: Too Long Neglected,"[2] further documents the isolation of occupational disease.

Thus, occupational disease, despite its profound impact directly and indirectly on all of us, continues to remain outside the mainstream of American medicine and health surveillance. For example, occupational disease has always received very little time in the curricula of medical schools.[3] In the introductory course to clinical medicine where the medical student first learns to take a medical history and begins to identify key questions that alert physicians to follow logic trees that may lead to a probable diagnosis, the occupational history is almost totally disregarded. At the present time, the practicing physician is often at a great disadvantage in the diagnosis of occupational disease due to an inadequate educational background and the consequent diminished level of suspicion regarding the occurrence of occupational disease.

Health surveillance systems have likewise failed to keep abreast of epidemiologic requirements for occupational disease surveillance. The US National Committee on Vital and Health Statistics[4] in 1977 expressed this concern:

> "A common and well standardized set of procedures for obtaining, recording, and coding occupation, industry and materials to which people are exposed can increase comparability and improve the cost-effectiveness of the collection of health data and environmental exposure data."

Indeed, in a recent survey of state vital registrars,[5] it was determined that only 12 of the 50 states routinely code the industry and/or occupation (I/O) data entered on all death certificates. Without routine and nationally comparable recording of I/O data on death certificates, characterization of states' occupational mortality patterns becomes impossible; further, any sort of uniform occupational surveillance on the national level using death certificates becomes impractical. Failure of hospital abstract services to code I/O data frustrates attempts to establish morbidity-based occupational health surveillance networks and to identify cases of high interest for follow-back.

Two remedial approaches are needed to improve the reporting of occupational disease. The first is a table of occupational diseases that may serve as a framework to assist the practicing (or nascent) physician in diagnosis and to guide him in therapy. The second approach, currently being implemented by the National Institute for Occupational Safety and Health (NIOSH), is to increase the number of states that code I/O data on records. The main purposes of this paper are to describe a method of increasing physicians' awareness of occupational disease and to make available to a broad range of users a documented table of these conditions for use in occupational medicine education and surveillance.

Methodology

In 1976, a table of disease events was developed based on the concept of the Sentinel Health Event (SHE).[6] An SHE is a preventable disease, disability, or untimely death whose occurrence serves as a warning signal that the quality

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of preventive and/or therapeutic medical care may need to be improved. Thus, these events serve as negative indices of the quality of medical care. For example, a case of polio is an SHE. The occurrence of this preventable disease signals a breakdown in the immunization aspect of health care. Repeated consultation with specialists from various fields produced Table A in the 1976 report which was published and last brought up to date in 1980.[7] Each condition was selected because: 1) it is relatively easily recognized by the practicing physician; 2) it appears as an unnecessary disease, an unnecessary disability, and/or an unnecessary untimely death, i.e., a condition that was either preventable and/or manageable; and 3) the recognition of a single case raises the question, "Why did this happen?", and justifies a careful search for remediable underlying causes.

This approach—in effect identifying and counting the number of preventable tragedies in the health care field—has been successfully used in the past. In the 1930s, for example, every maternal death occurring in New York City was vigorously pursued; pertinent facts were collected and later evaluated by a group of obstetricians. The evolution and implementation of this process was followed by a rapid drop in maternal mortality in the city.[8] Application of these principles to infant deaths in 1967 and 1968 in Massachusetts demonstrated that about one-third of infant deaths in this state were preventable by medical means.[9]

Based on the previous experience with maternal and infant mortality, which was then successfully applied to all persons and ages by the SHE approach, we were convinced that, with appropriate modification, the SHE concept could be successfully applied to the field of occupational disease. Thus, we have defined the Sentinel Health Event (Occupational) (SHE(O)) as: an unnecessary disease, disability, or untimely death which is occupationally related and whose occurrence may: 1) provide the impetus for epidemiologic or industrial hygiene studies; or 2) serve as a warning signal that materials substitution, engineering control, personal protection, or medical care may be required.

The occupational health literature was then surveyed to assemble a list of SHE(O)s each of which would meet three criteria of scientific proof: documentation of associated agent(s), of involved industries, and of involved occupations. The disease/condition should also be codable within the framework of the Ninth Revision, International Classification of Diseases Adapted for Use in the United States, 1975 (ICD-9).[10] A list of conditions was selected and submitted to a panel of consultants for review. Table A-(O), an adaptation of Table A from the original article,[6] contains those conditions which were judged by the consultants to meet the criteria above. Some conditions that do not presently meet the criteria for inclusion have been put on a holding list for later review. It is expected, therefore, that further advances in occupational health research will require expansion and modification of the present list to keep it up to date.

In Table A-(O) there are two broad categories of SHE(O)s represented. The first group includes those diseases or conditions which, by their inherent nature, are necessarily occupationally related. Such conditions include the pneumoconioses. In other words, it is unlikely that these diseases would occur in the absence of an occupational exposure to the inciting agent. The second set of conditions includes such diseases as lung cancer, leukemia, peripheral neuropathy, and ornithosis which may or may not be occupationally related. In the case of lung cancer, for example, it is clear that some cases will be associated with occupational exposure to asbestos. However, the major etiologic agent in lung cancer is smoking. Therefore, it is necessary when taking a medical history to consider both occupational and non-occupational factors. This distinction becomes more difficult when death certificates are used for surveillance purposes since no history is available. However, the occupation or industry of the decedent as recorded on the death certificate may indicate a possible association between the cause of death and the decedent's employment history. For this reason we have listed these occupations and industries in Table A-(O).

The Table

Table A-(O) lists occupational disease sentinel health events. It is arranged in order of ascending ICD code number and encompasses 50 ICD rubrics. In addition to ICD rubrics, etiologic agents or processes, and I/O information, the Table also indicates whether or not the manifested unnecessary disease, unnecessary disability, and/or unnecessary untimely death can be controlled by prevention and/or treatment. As an example, ICD O11, pulmonary tuberculosis, is a preventable disease (denoted "P" in the appropriate column), whereas unnecessary disability and untimely death from pulmonary tuberculosis can be avoided through both prevention ("P") and treatment (denoted "T" in the appropriate column). In the Table, an "O" has been affixed behind the condition's name when further I/O information is needed to establish the relationship of disease to occupation.

The Table may be entered via multiple routes contingent upon the parameter of interest. For example, a physician interested in the health effects of benzene may quickly scan the agent column for all entries pertaining to benzene. Similarly, a physician concerned with health effects seen among coke oven workers may rapidly note these effects by focusing on the I/O column.*

Utility

There are three facets to the utility of the SHE(O) list. The first relates to its application as a surveillance tool, the second to its value for the practicing physician, and the third to its value as a periodically updated compendium of occupationally related diseases.

As a routine surveillance tool, the list's practical attraction lies in the fact that all sentinel events are linked to an ICD code. Since almost all the available medical data sets (e.g., State Vital Registries, Social Security disability awards, hospital discharge records) are coded by ICD, rapid data processing of these data sets is possible with the appropriate software. As mentioned, one current drawback to the use of these data sets is the general lack of I/O information. While this fact has little impact on the use of those SHE(O)s which are inherently occupational (e.g., coalworkers' pneumoconiosis), it has important implications for those SHE(O)s where this further I/O information is

* It should be noted that the so-called "E-codes" (those ICD rubrics which address the classification of accident-associated events ascribable to external causes) are not included in this Table. Most accidental injuries and deaths occurring in an occupational setting will be classified within these codes. Exclusion of these codes from this Table was for brevity's sake and due to the self-evident occupational relatedness of their occurrence. A compilation of these codes is available, however, and will be provided to interested individuals upon request.

TABLE A-(O)—Occupationally Related Unnecessary Disease, Disability, and Untimely Death

ICD-9	CONDITION	A	B	C	INDUSTRY/OCCUPATION[α]†	AGENT
011	Pulmonary Tuberculosis (0)[+]	P*	P,T*	P,T	Physicians[21], medical personnel[143], med lab workers[69].	*Mycobacterium tuberculosis.*[21,69,143]
011, 502	Silicotuberculosis	P	P,T	P,T	Quarrymen, sandblasters, silica processors, mining, metal foundries, ceramic industry.[33]	SiO_2 + *Mycobacterium tuberculosis.*[33,82,156]
020	Plague (0)	P	—	P,T	Shepherds, farmers, ranchers, hunters, field geologists.[17]	*Yersinia pestis.*[17]
021	Tularemia (0)	P	—	P,T	Hunters, fur handlers, sheep industry workers[89], cooks, vets, ranchers, vet pathologists.[169]	*Francisella tularensis.*[89,169]
022	Anthrax (0)	P	—	P,T	Shepherds, farmers, butchers, handlers of imported hides or fibers[30], veterinarians, veterinarian pathologists, weavers.[118]	*Bacillus anthracis.*[30,118,170]
023	Brucellosis (0)	P	P	P,T	Farmers, shepherds, veterinarians, lab workers[132], slaughterhouse workers.[118,170]	*Brucella abortus, suis.*[118,132,170]
037	Tetanus (0)	P	—	P,T	Farmers, ranchers.[169]	*Clostridium tetani.*[169]
056	Rubella (0)	P	P	P	Medical personnel[61,113,142], intensive care personnel[143].	Rubella virus.[61,113,142]
070.0 .1	Hepatitis A (0)	P	P	P	Day care center staff[65,171], orphanage staff[37], mental retardation institution staff[71,164], medical personnel[62].	Hepatitis A virus.[37,62,65,71,164,171]
070.2 .3	Hepatitis B (0)	P	P	P	Nurses and aides,[54,67,96] anesthesiologists[38], orphanage and mental institution staff[54], med lab personnel[96,102,106], general dentists[124] and oral surgeons[55], physicians[67,96,102].	Hepatitis B virus.[38,54,55,67,96,102,106]
070.4	Non-A, Non-B Hepatitis (0)	P	P	P	As above for hepatitis A and B	Unknown.
071	Rabies (0)	P	—	P	Veterinarians, animal and game wardens, lab researchers, farmers, ranchers, trappers.[169]	Rabies virus.[169]
073	Ornithosis (0)	P	—	P,T	Psittacine bird breeders, pet shop staff, poultry producers, veterinarians, zoo employees.[119]	*Chlamydia psittaci.*[119]
155M[#]	Hemangiosarcoma of the Liver	P	P	P	Vinyl chloride polymerization industry.[42]	Vinyl chloride monomer.[42,86,87,168,184]
					Vintners.[53]	Arsenical pesticides.[53,86]
160.0	Malignant Neoplasm of Nasal Cavities (0)	P	P,T	P,T	Woodworkers, cabinet, furniture makers.[12,14,34,107,151]	Hardwood dusts.[12,14,34,107,151]
					Boot and shoe industry.[11,12]	Unknown.[11,12]
					Radium chemists and processors[52], dial painters[141].	Radium.[52,141]
					Chromium producers, processors, users.[86]	Chromates.[86]
					Nickel smelting and refining.[48,85,176]	Nickel.[48,85,86,176]
161	Malignant Neoplasm of Larynx (0)	P	P,T	P,T	Asbestos industries and utilizers.[149]	Asbestos.[86,149]
162	Malignant Neoplasm of Trachea, Bronchus, and Lung (0)	P	P	P	Asbestos industry and utilizers.[24,49,99]	Asbestos.[24,49,86,99,159]
					Topside coke oven workers.[104,145,146]	Coke oven emissions.[104,145,146]
					Uranium and fluorspar miners.[45]	Radon daughters.[45]
					Chromium producers and processors[51], users.[108,172]	Chromates.[51,86,108,172]
					Nickel smelters, processors, users.[48,85]	Nickel.[48,85,86]
					Smelters.[175]	Arsenic.[86,175]
					Mustard gas formulators.[182]	Mustard gas.[182]
					Ion exchange resin makers, chemists.[57,185]	Bis(chloromethyl) ether, chloromethyl methyl ether.[57,86,185]
158, 163	Mesothelioma (MN of Peritoneum) (MN of Pleura)	P	—	P	Asbestos industries and utilizers.[24,99]	Asbestos.[24,82,86,99,159,160]
170	Malignant Neoplasm of Bone (0)	P	—	P	Dial painters[109], radium chemists and processors.[52]	Radium.[52,109]
187.7	Malignant Neoplasm of Scrotum	P	—	P,T	Automatic lathe operators[72,91], metalworkers[150].	Mineral/cutting oils.[72,86,91]
					Coke oven workers, petroleum refiners, tar distillers.[72]	Soots and tars, tar distillates.[72,86]
188	Malignant Neoplasm of Bladder (0)	P	—	P	Rubber and dye workers.[39,40,189]	Benzidine[158,189], alpha and beta naphthylamine[39,86], auramine[40,86], magenta[40,86], 4-aminobiphenyl[116], 4-nitrophenyl.[86,178]
189	Malignant Neoplasm of Kidney, Other, and Unspecified Urinary Organs (0)	P	P	P	Coke oven workers.[145,146]	Coke oven emissions.[145,146]
204	Lymphoid Leukemia, Acute (0)	P	—	P	Rubber industry.[114,115]	Unknown.[114,115]
					Radiologists.[110,111]	Ionizing radiation.[41,110,111]
205	Myeloid Leukemia, Acute (0)	P	—	P	Occupations with exposure to benzene	Benzene.[16,83,84,86,180,181]
					Radiologists.[110,111]	Ionizing radiation.[41,110,111]
207.0	Erythroleukemia (0)	P	—	P	Occupations with exposure to benzene.	Benzene.[16,83,84,86,180,181]
283.1	Hemolytic Anemia, Non-autoimmune (0)	P	—	P,T	Whitewashing and leather industry.[44]	Copper sulfate.[44]
					Electrolytic processes, arsenical ore smelting.[78]	Arsine.[78,92,134,139]
					Plastics industry.[15]	Trimellitic anhydride.[15]
					Dye, celluloid, resin industry.[59]	Naphthalene.[59]
284.8	Aplastic Anemia (0)	P	—	P	Explosives manufacture.[81,162]	TNT.[70,81,162]
					Occupations with exposure to benzene.	Benzene.[16,180,181]
					Radiologists[111], radium chemists and dial painters[163].	Ionizing radiation.[41,111,163]

TABLE A-(O)—Continued

ICD-9	CONDITION	A	B	C	INDUSTRY/OCCUPATION[a] †	AGENT
288.0	Agranulocytosis or Neutropenia (0)	P	—	P	Occupations with exposure to benzene.	Benzene.[16,180,181]
					Explosives and pesticide industries.[32]	Phosphorus.[32]
					Pesticides, pigments, pharmaceuticals.[93]	Inorganic arsenic.[93]
289.7	Methemoglobinemia (0)	P	—	P,T	Explosives and dye industries.[66,70,125,188]	Aromatic amino and nitro compounds (eg. aniline, TNT, nitroglycerin).[66,70,81,125,188]
323.7	Toxic Encephalitis (0)	P	P	P	Battery, smelter, and foundry workers.[19,31]	Lead.[19,31]
					Electrolytic chlorine production, battery makers, fungicide formulators.[22,31]	Inorganic and organic mercury.[22,31,56]
332.1	Parkinson's Disease (Secondary) (0)	P	P	—	Manganese processing, battery makers, welders.[154]	Manganese.[154,167]
					Internal combustion engine industries.[60]	Carbon monoxide.[60]
334.3	Cerebellar Ataxia (0)	P	P	—	Chemical industry using toluene.[28]	Toluene.[28]
					Electrolytic chlorine production, battery makers, fungicide formulators.[31,43]	Organic mercury.[31,43]
357.7	Inflammatory and Toxic Neuropathy (0)	P	P,T	P,T	Pesticides[75], pigments, pharmaceuticals.[46]	Arsenic and arsenic compounds.[46,75]
					Furniture refinishers, degreasing operations.[74]	Hexane.[74,155]
					Plastic-coated-fabric workers.[26]	Methyl n-butyl ketone.[26]
					Explosives industry.[70]	TNT.[70]
					Rayon manufacturing.[56,179]	CS_2.[56,155,177,179]
					Plastics, hydraulics, coke industries.[121]	Tri-o-cresyl phosphate.[121,155]
					Battery, smelter, and foundry workers.[19,31]	Inorganic lead.[19,31,56,155]
					Dentists[88,161], chloralkali workers[166].	Inorganic mercury.[88,161,166]
					Chloralkali plants, fungicide makers, battery makers.[43]	Organic mercury.[43,56]
					Plastics industry[127], paper manufacturing[100].	Acrylamide.[100,127,155]
366.4	Cataract (0)	P	P,T	—	Microwave and radar technicians.[90]	Microwaves.[90]
					Explosives industries.[70]	TNT.[63,70]
					Radiologists.[120]	Ionizing radiation.[63,120]
					Blacksmiths, glass blowers, bakers.[120]	Infrared radiation.[63,120]
					Moth repellant formulators, fumigators.[59]	Naphthalene.[59,63,120]
					Explosives, dye, herbicide and pesticide industries.[130]	Dinitrophenol[120], dinitro-o-cresol.[130]
388.1	Noise Effects on Inner Ear (0)	P	P	—	Exposure.[131]	Excessive noise.[131]
443.0	Raynaud's Phenomenon (Secondary) (0)	P	—	—	Lumberjacks[97,144], chain sawyers, grinders, chippers.[173]	Whole body or segmental vibration.[97,144,173]
					Vinyl chloride polymerization industry.[47,98,103]	Vinyl chloride monomer.[47,87,98,103]
495.0 to 495.6, .8	Extrinsic Allergic Alveolitis	P	P	P,T	Farmer's lung, baggassosis, bird fancier's lung, suberosis, malt worker's lung, mushroom worker's lung, maple bark disease, cheese washer's lung, coffee worker's lung, fish-meal worker's lung, furrier's lung, sequoiosis, wood worker's lung, miller's lung.[147,187]	Various agents.[147,187]
493.0, 507.8	Extrinsic Asthma (0)	P	P,T	P,T	Jewelry, alloy and catalyst makers.[35,135]	Platinum.[35,135,137]
					Polyurethane, adhesive, paint workers.[35,138]	Isocyanates.[35,137,138]
					Alloy, catalyst, refinery workers.[35]	Chromium and cobalt.[35]
					Solderers.[35]	Aluminum soldering flux.[35]
					Plastic, dye, insecticide makers.[35]	Phthalic anhydride.[35,137]
					Foam workers, latex makers, biologists.[35]	Formaldehyde.[35]
					Printing industry.[35]	Gum arabic.[35]
					Nickel platers.[35]	$NiSO_4$.[35]
					Bakers.[35,174]	Flour.[35,174]
					Plastics industry.[35,136]	Trimellitic anhydride.[35,136,137]
					Woodworkers, furniture makers.[35]	Red cedar and other wood dusts.[35]
					Detergent formulators.[35]	*Bacillus*-derived exoenzymes.[35]
500	Coalworkers' Pneumoconiosis	P	P	P	Coal miners.[76,122]	Coal dust.[76,82,122]
501	Asbestosis	P	P	P	Asbestos industries and utilizers.[24,99,126]	Asbestos.[24,82,99,126,159]
502M	Silicosis	P	P	P	Quarrymen, sandblasters, silica processors[20], mining, metal, and ceramic industries.[129,190]	Silica.[20,82,129,156,190]
	Talcosis				Talc processors.[95]	Talc.[95]
503M	Chronic Beryllium Disease of the Lung	P	P	P	Beryllium alloy workers, ceramic and cathode ray tube makers, nuclear reactor workers.[68,183]	Beryllium.[68,183]
504	Byssinosis	P	P	P	Cotton industry workers.[29,117,128]	Cotton, flax, hemp, and cotton-synthetic dusts[117,29,128]
506.0, 506.1	Acute Bronchitis, Pneumonitis, and Pulmonary Edema Due to Fumes and Vapors (0)	P,T	P,T	P	Refrigeration, fertilizer[101], oil refining industries.[123]	Ammonia.[101,123]
					Alkali and bleach industries.[123]	Chlorine.[123]
					Silo fillers, arc welders, nitric acid industry.[58]	Nitrogen oxides.[58,123]
					Paper and refrigeration industries, oil refining.[123]	Sulfur dioxide.[123]
					Cadmium smelters, processors.[123]	Cadmium.[123]
					Plastics industry.[73]	Trimellitic anhydride.[73]
570, 573.3	Toxic Hepatitis (0)	P	P	P	Solvent utilizers, dry cleaners,[23] plastics industry[105].	Carbon tetrachloride[140], chloroform[27], tetrachloroethane[105], trichloroethylene.[18,23]
					Explosives and dye industries.[32,70]	Phosphorus[32], TNT[70,162].
					Fire and waterproofing additive formulators.[79,94]	Chloronaphthalenes.[79,94]
					Plastics formulators.[112]	Methylenedianiline.[112]

TABLE A-(O)—Continued

ICD-9	CONDITION	A	B	C	INDUSTRY/OCCUPATION@†	AGENT
					Fumigators, gasoline, fire extinguisher formulators.[133]	Ethylene dibromide.[133]
					Disinfectant, fumigant, synthetic resin formulators.[80]	Cresol.[80]
584, 585	Acute or Chronic Renal Failure (0)	P	P,T	P,T	Battery makers, plumbers, solderers.[157]	Inorganic lead.[157]
					Electrolytic processes, arsenical ore smelting.[78,139]	Arsine.[78,134,139,157]
					Battery makers, jewelers, dentists.[157]	Inorganic mercury.[157]
					Fluorocarbon formulators, fire extinguisher makers.[157]	Carbon tetrachloride.[64,157]
					Antifreeze manufacture.[25]	Ethylene glycol.[25]
606	Infertility, Male (0)	P	P	—	Formulators.[36]	Kepone.[36]
					DBCP producers, formulators, and applicators.[50,152,186]	Dibromochloropropane.[50,152,186]
692	Contact and Allergic Dermatitis (0)	P,T	P,T	—	Leather tanning, poultry dressing plants, fish packing, adhesives and sealants industry, boat building and repair.[13]	Irritants (e.g., cutting oils, solvents, phenol, acids, alkalis, detergents); Allergens (e.g., nickel, chromates, formaldehyde, dyes, rubber products).[148]

External causes of injury and poisoning (occupational) include accidents and are classified in the ICD-9 under the E codes.

A = Unnecessary disease
B = Unnecessary disability
C = Unnecessary untimely death
@ = INDUSTRY/OCCUPATION listings are examples only
†Industry/Occupation reference numbers inside commas and inside periods apply only to the immediately preceding category; those outside of periods apply to all prior categories pertaining to a particular agent or process.
+ (0) = Only where an occupational exposure can be established
* P = prevention, T = treatment
#M = Modified ICD rubric

necessary to establish the sentinel nature of the event. For those states which do code I/O information on death certificates, software is easily developed to run cross tabulations of ICD code by I/O (Figure 1). Even in the absence of such I/O coding, the SHE(O) nonetheless has immediate applicability since the inherently occupational SHE(O)s may be readily surveyed and tracked.

As an episodic surveillance tool, the SHE(O) list may serve as a screening device for occupationally related diseases. When an SHE(O) occurs, the death certificate should be forwarded to state occupational safety and health officials or the epidemiologist where appropriate. A study of these selected events may indicate where follow-up is desirable and every effort should be made to be sure that this is done. In the absence of mandatory occupational disease reporting in states, cooperation may be arranged between hospital administration and staff to attempt to obtain similar information from hospital discharge records.

The Table may also be of value to the practicing physician. By scanning the Table he/she can easily identify the pertinent industries/occupations of his/her patients. Table A-(O) should be helpful in recognizing occupational disease in patients and in identifying the kinds of such illness that are likely to be present in his/her practice.

It must be acknowledged that this approach has some limitations. In the case of death certificates, where exposure data are usually impossible to obtain, we must impute exposure from the information given about the decedent's "last" or "usual" occupation. The issue of latency is also difficult to overcome: e.g., if a case of mesothelioma is discovered, it may not be valuable as an index case since the environment in which the exposure took place may now be completely changed. Nevertheless, an accurate recording of occupational experience on death certificates and on hospital and other medical records is necessary if the prevention, treatment, and management of occupational disease is to be effective. This concept is included in the studies by NIOSH,

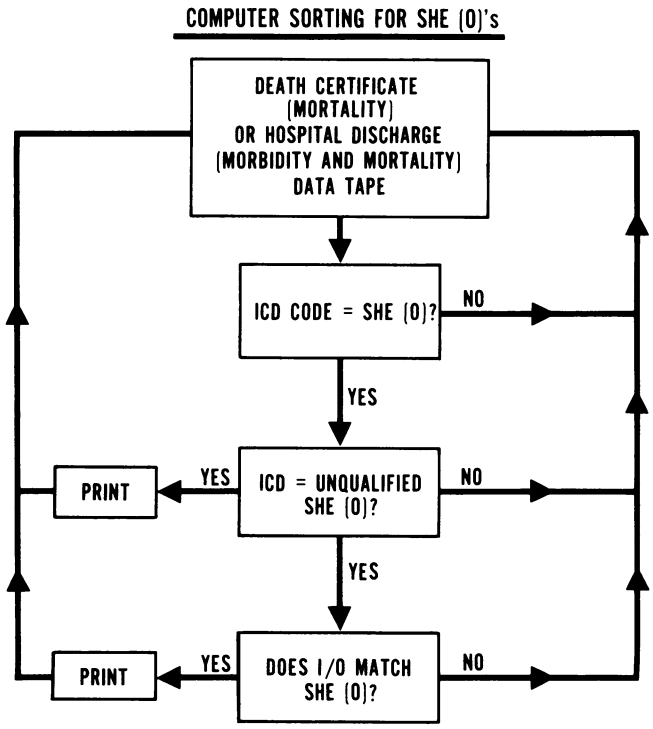

FIGURE 1—Computer Sorting for Sentinel Health Events (Occupational)

in collaboration with selected states, of the utility and validity of the SHE(O) method.

Effective control of occupational disease cannot be successful without the active collaboration of those practicing physicians who are responsible for suspecting and diagnosing occupational disease in their patients. Such collabo-

ration could be accomplished if, in the near future, medical education in the medical schools and in the hospitals brings occupational medicine into the mainstream of American medicine.

Finally, the list provides a powerful heuristic framework upon which to build. As a tool for researchers, Table A-(O) can provide insight into priority setting and decision making in occupational safety and health research. Periodic review and updating of this table is anticipated as our knowledge of occupational disease expands.

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ERRATUM

In: Placek PJ, Taffel S, Moien M: Cesarean section delivery rates: United States, 1981. Am J Public Health 1983; 73:861–862.

Due to a printer's error, on page 861, second column, two lines of type were incorrectly positioned at the end of the column instead of at the top of the column. The corrected Results section is reprinted below, and corrected reprints are available from the senior author: Paul J. Placek, PhD, Statistician, Natality Statistics Branch, Division of Vital Statistics, National Center for Health Statistics, 3700 East-West Highway, Hyattsville, MD 20782.

Results

In 1965, about 4.5 out of every 100 deliveries were performed by cesarean section; this rate rose steadily over a decade and a half to 17.9 per 100 deliveries in 1981. Before we had seen the 1981 rate, we wondered whether the upward trend had abated; but now we have concluded that the 1980 rate of 16.5 was slightly understated due to sampling variation. The rate increase from 1965 to 1981 has been threefold for women over 30 years of age, and higher than fourfold for women under age 30 (Table 1 and Figure 1). The continued rising rate of cesarean sections for younger mothers may lead to still higher rates in the future since most of their subsequent births will be cesarean sections to the extent that the "once a section, always a section" norm prevails.

Table 2 shows that nationally, larger hospitals have higher cesarean section rates, but within regions, rates are more variable by hospital size. Also, proprietary hospitals have the highest rate (22.0), followed by voluntary non-profit hospitals (18.5), and city, county, and state government hospitals (15.4). This relative ranking has been observed for the past decade.

In 1981, the mean stay in hospitals for all deliveries was 3.7 days, 6.2 days for cesarean sections, and 3.1 days for vaginal deliveries (table not shown). The longer stays for cesarean sections plus the accompanying surgical fees have important cost implications for patients and providers of health insurance.[8] Blue Cross as an expected source of payment was indicated for 213,000 of the 701,000 cesarean sections which occurred in 1981 (Table 3). Other private or commercial insurance covered 297,000 cesarean section deliveries. The national pattern persists within regions and is similar to that observed in several previous years.