Special Contribution

Occupational and Environmental Medicine in the United States:

A Proposal to Abolish Workers' Compensation and Reestablish the Public Health Model

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The workers' compensation model of occupational and environmental medicine should be converted to a public health model. Occupational and environmental medicine, as a part of the public health infrastructure, could play a much more substantive part in bringing about a national program to deal with occupational and environmental health. The workers' compensation insurance system could be discontinued at any time, but it will be vital to do so when national health insurance is adopted in the United States. Abolishing workers' compensation would remove the perverse incentives that currently undermine the practice of occupational medicine. Medical care for workers should be provided by health care professionals who are not subject to influence by employers or insurers. Eligibility for benefits should not be determined by health and safety professionals. Wage-replacement benefits for workers should be determined by guidelines established by government and industry that prevent manipulation of health and safety professionals by employers and insurers. A nationwide comprehensive system to track work-related injury and illness, superior to the current reliance on records provided by employers and collated by government agencies, should be adopted. When unusually high rates of injuries, illnesses, and fatalities occur, government inspectors ought to respond and regulate the industry accordingly. Occupational health and safety professionals trained in public health can and should participate in these activities, but not when they are in the employ of industry or insurers. *Key words*: workers' compensation; public health model; policy; occupational medicine; national health insurance.

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> The fundamental idea of this whole act is to get the injured, idle, unproductive man back to work and to help him during his enforced idleness following accidental injury. The relations, under the law, of the injured person to his employer and doctor are fairly definite. He is protected in that medical care must be accorded him by his employer for a period of ninety days following his injury. His relation to this doctor under these circumstances is a satisfactory one in that it is incumbent upon him to rigidly follow out the latter's instructions. Failure on his part to comply with these jeopardizes any compensation which he might receive under the law. Having the patient under proper discipline naturally aids the medical man in securing better results (Rumwell, 1915[28]).

The field of occupational and environmental medicine is at risk of further deterioration because of its acceptance of the workers' compensation model of occupational health training, research, and practice, which are subject to influence by industry and workers' compensation insurers. This article concludes two earlier analyses published in *American Journal of Preventive Medicine*. The first article recalls the period of intense interest in occupational medicine that occurred following passage of the Occupational Safety and Health Act (OSHAct) in 1970. The specialty was unable to sustain any serious progress toward addressing the problems of occupational health in the United States.[1] The second article presents the case for reform of occupational medicine. Workers' compensation and its control over physician behavior is advanced as the major cause of occupational medicine's failure to develop as a medical specialty.[2] These articles assert that occupational physicians practice within the framework of a seriously flawed workers' compensation system. The present article proposes abolishing workers' compensation in favor of a system that provides wage-replacement benefits to workers without input from health and safety professionals, and provides medical care for occupa-

tional injuries and illnesses within the framework of the national health care system.

Occupational health and safety is a serious public health issue that is not adequately addressed by the prevailing corporate medicine and workers' compensation scheme. The estimated 55,000 occupational fatalities each year in the United States make occupational fatalities the eighth leading cause of death, after diabetes and before vehicular accidents.[3] Injuries at work account for nearly half of all injuries in some age groups.[4] Occupational injuries and illnesses, if accurately reported, would be among the five leading causes of morbidity and mortality in the United States.[5–8] Cost estimates related to occupational fatalities and to 3.8 million disabling injuries per year exceed $150 billion.[3] Each year workers' compensation inappropriately shifts an estimated $23 billion in medical costs alone onto employees and their families, private insurance carriers, and the government.[7]

TWO COMPETING PRACTICE MODELS

What evolved as occupational and environmental medicine over the past century is not the medical specialty many intended. Occupational and environmental medicine today is an ill-defined practice of medicine that is largely subservient to business interests. Workers' compensation law is the major cause of occupational medicine's failure to develop as a medical specialty. Occupational medicine can be characterized as the practice of workers' compensation medicine. Political and economic pressures from employers, insurers, and business organizations have made the workers' compensation system dysfunctional, and have corrupted the practice of occupational medicine.

Workers' compensation law. In the years leading up to the enactment of workers' compensation laws in the United States, the vast majority of wage loss sustained by injured workers was borne by the workers themselves. Injured workers had little recourse other than to bring tort actions against their employers. Approaching the court with a claim for damages was expensive and time-consuming. Employers had three common law defenses that were difficult for workers to overcome: assumption of risk (employees supposedly knew the risks of the job before accepting employment), the fellow-servant rule (the accident was caused by the negligence of another worker), and contributory negligence by the employee (which required the injured employee to prove that no oversight or carelessness of his had contributed to the accident). As the number of traumatic injuries and fatalities mounted, however, judges allowed more cases to be brought to trial, and juries more frequently held employers culpable and determined monetary awards.[9]

By the turn of the 20th century, all European countries had workers' compensation laws. Workers' compensation law was a social agreement in which the employee gave up the right to sue the employer for negligence in exchange for the employer's agreement to pay the cost of medical care and to compensate the worker for time lost from work. In 1911, the first states enacted such laws, and by 1915 24 states had them.[10] Workers' compensation was a new venture, and legislators found it prudent to move with caution to obtain legal and popular acceptance. Consequently, the original acts excluded many workers, were elective in most instances, covered only accidental injuries, imposed waiting periods of two weeks or more, and set the compensation rate at only 50% of wages.[11] The long-term effect of the laws was to protect employers against political and legal uncertainties by limiting the workers' legal redress and capping compensation for accidents at a very low rate.[12] For 25 years after its inception, workers' compensation was the only social disability income program in the United States.[9]

Workers and their representatives were not in a position to know that their loss of ability to sue employers for damages was of any real significance. Neither labor nor organized medicine had much influence or interest in the formative stages of compensation legislation.[13] Employers, on the other hand, well knew that they were assuming only limited liability for most accidental injuries. Although injured workers were probably better off after the advent of compensation laws than they had been when liability laws left them at the mercy of employers and the tort system, workers' compensation was primarily intended to pressure employers to reduce accidents, not to replace workers' lost wages. It did not place health care within the reach of the average American worker, nor was it intended to do so.[12] Medical care and prevention had no place in the liability system and, in the beginning, were almost ignored under workers' compensation.[14]

At the time workers' compensation laws were enacted in the United States, occupational diseases were widely recognized by the medical profession, labor, and public health agencies.[15–17] The insurance industry collected considerable information showing widely varying causes of death by occupation.[18] However, the powerful industry forces that guided the legislative process saw to it that the new laws virtually ignored the existence of occupational diseases. It was an assertion of industry power and politics that set the stage for workers' compensation and for the field of occupational medicine that exists to this day.

Workers' compensation programs were flawed from the start. Most industrialized nations adopted federal workers' compensation programs based on the German model, with laws that applied to all workers in each country.[19] The German workers' compensation law required employees to pay part of the costs and called for highly centralized administration. Its cover-

age was broad, was compulsory, and provided for nonprofit mutual employers' insurance funds.[20] The British law embodied an entirely different approach from the German law. The British plan was elective, administration was left to the courts, and insurance was carried through private firms. The German system was closely linked to the rest of the social insurance system. It provided for accident prevention, medical treatment, and rehabilitation, whereas the British scheme did none of these things.[21]

Most European nations followed the German model. The worker's compensation laws in the United States, Canada, and Australia were influenced much more by the English system.[13] The United States, late in accepting workers' compensation, allowed the federal government and each individual state to evolve separate and unequal systems.[20] Like the original English Poor Law, prevention of poverty, not prevention of disability and its social management, was the driving concern for the development of workers' compensation programs.[9] The result is that today, none of these widely varying systems adequately deals with occupational illness and injury claims, and the variations in eligibility and benefits are scandalous. Physicians and other health and safety professionals compliantly or unwittingly participate in a system that overlooks most occupational injuries, illnesses, and fatalities. If the United States had followed the German model rather than the English model, the eventual course of occupational medicine might have been quite different.

The workers' compensation model. In the early years of the workers' compensation acts in England, physicians were often employed by industry to check on the validity of workers' complaints. In many cases, doctors gave the opinion that workers' diseases were not work-related, often attributing them to "improvidence" or alcoholism, or both. The result was the pejorative appellation of any doctor who worked for an employer as a "compensation doctor."[22]

The role assigned to physicians in workers' compensation systems in the United States was derived from the English tradition of the compensation doctor. Physicians were required by law to verify the legitimacy of claims following work injuries, and were told that the afflicted workers would not receive compensation until reports were submitted to a state agency. The designation of physicians as servants of the state was denounced by the medical profession.[23] The payment employers were required to give to the physician was so small that it served to limit the financial responsibility the employer and the insurer had in the industrial accident.[24] The physician was required to discern, "injuries arising out of and in the course of their employment," thus making the physician's decision about work-relatedness a critical factor in the payment the worker would receive. From the very outset of workers' compensation, physicians expressed their reservations about the legislated reliance on them to determine work-relatedness and extent of disability, as well as their reluctance to become the principal party responsible for judging the worker's veracity.[25] In response to these concerns, physicians' payments were increased slightly, but the laws were not amended, nor did they need to be.[26] The physician had become the cat's-paw of workers' compensation.

Workers' compensation advocates held that a simple determination of work-relatedness and the extent of injury would result in a system without litigation that provided benefits swiftly.[27] It is true that workers' compensation insurance did suppress the debate over fault, but many of the opportunities for denial of claims remained. Workers, employers, and insurers continued to battle over the costs of industrial injuries in compensation hearings and state legislatures.[27] The few physicians who represented the workers were often ignored, uniformly underpaid, and largely denied information about workplace hazards. The physicians who found places in the new system saw themselves in a role that served the interests of the employer through the narrow view of expeditious return of the injured worker to gainful employment.[28,29] As a result of this conflicted role, the physician ceased to be a symbol of genuine concern for the welfare of the workers.[30]

Given the economic incentives, structured inequality in the power of the players, complex legislation, and weak administrative agencies, the development of a highly adversarial system was inevitable.[31] The physician was at the center of that adversarial system. To this day, the treating physician must determine that the injury has been caused by work, diagnose the injury, prescribe the care, and determine the extent of impairment and the ability of the worker to return to work. The physician's critical determination that the injury or illness is the result of work is generally accepted by all parties. It is this role for physicians, inherited from the British model, and capitalized on by government and industry lawyers a century ago, that undermines the practice of occupational medicine and causes employers and insurers to seek to influence or control the occupational physician and the other health and safety professionals.

Emergence of the public health model. In 1912, the U.S. Public Health Service formed its Division of Industrial Medicine and Hygiene, establishing the public health roots of the new specialty. In 1914, the American Public Health Association, with direction provided by Alice Hamilton, recognized the influence of this form of public health work by forming the Section on Industrial Hygiene.[32] As a result of the positive image industrial medicine projected during the First World War, the new specialty was guardedly embraced by organized medicine as an attractive alternative to salaried company doctors.[33] By 1920, all but five states had adopted some form of workers' compensation, covering 60% of the eligible workforce.

Unfortunately, the income opportunities to be found in the adversarial workers' compensation system were the primary stimulus for growth of industrial medicine. Workers' compensation laws did not allow any other health and safety professionals to compete with the physicians' reign over decisions about the work-relatedness of injuries and illnesses. With rare exceptions, the states gave private-sector employers and insurers the choice of the treating physician. It is not surprising, then, that physicians began to serve as "gatekeepers" for the rationing of benefits.[34] In the early 1920s, many workers' compensation cases were contested by employers. Most conflicts occurred over the duration and degree of disability. Medical testimony was involved in nearly all cases contesting termination or modification of benefits. In the hearings before judges, the employer or insurer was represented by counsel while the worker was not. In the majority of contested cases, the issues were exclusively medical and the physician was there to serve the interests of the employer or the insurer, not the worker.[27]

Prior to enactment of workers' compensation laws, a narrow compensation remedy had evolved for illness caused by the employer's failure to warn of latent risks. This small, legal zone of protection of workers' health applied only to a small minority of workers with uncompensated, preventable work-related illness. However, workers gradually lost this ability to sue employers for the failure to warn once workers' compensation began to cover some occupational diseases, particularly following legislation passed in the wake of the extensive silicosis tort litigation of the mid-1930s.[18] When civil courts awarded damages to levels that alarmed employers and insurers, they sought redress in state legislatures. Most states complied with industry demands and enacted special provisions for handling dust diseases that denied workers with silicosis the same level of benefits available to other disabled workers.[35]

By the mid-1930s, when legislation proposed wider disability coverage through Social Security, workers' compensation was looked upon with scorn. Leading reformers saw little distinction between occupational and non-occupational disability. They also expressed skepticism over the quality of medical care that was provided for the injured workers by the large number of company doctors.[9] The federal government was by this time fully aware that industry was not doing enough to prevent occupational diseases, and workers' compensation was failing to compensate deserving workers. Moreover, government was aware that diseases such as tuberculosis, pneumonia, and degenerative conditions were more prevalent among industrial workers than in the general population, and that the life expectancy of the industrial worker was diminished: "It would seem, therefore, that the protection of the health of our workers is indeed an important health function and one which can be handled best through a governmental agency, such as a state or local department of health cooperating with the employers and worker."[36] In the decade that followed, the U.S. Public Health Service assigned an occupational health officer to all but two of the state health departments. The Public Health Service had an annual budget of more than $4.5 million for industrial hygiene.[37] During this important period, industrial medicine was the closest it had ever been to becoming a true public health specialty.

By 1940, 80% of workers were covered by workers' compensation. However, because of a number of exclusions under the law, only about half of workers were eligible. The pattern of exclusions had been shaped by political expediency rather than sound principle.[38] During World War II, optimum industrial productivity became a national goal, and the health of workers became a national responsibility. The rate of industrial injuries and disability increased significantly as a result of wartime production demands. Because of their contribution to wartime industry, physicians working in the plants enjoyed the same high level of esteem they had been shown in the earlier war. Wartime industry sustained three times the number of fatalities as there were combat deaths, and a vastly larger number of injuries and disabilities.[39] Industrial medicine was viewed as an attractive opportunity by military physicians, who saw in it a practice of medicine elevated from what had existed before the war. In one survey, more than 4,000 military physicians stated a desire to practice industrial medicine at the end of the war.[40]

The transition of so many physicians to government and company employment was met with surprising endorsements. The AMA Council on Medical Education ventured that, "given proper compensation, professional experience should be as stimulating and attractive in industrial medicine as in other medical specialties."[41] The expansion of industrial medicine influenced the Council to review the inadequate graduate training in industrial medicine and to consider the establishment of a certifying board. It also brought about discussions by the Public Health Service and various medical organizations about possibly increasing funding for industrial medical services.

Industry intervenes. A number of new training programs in industrial medicine were proposed during the immediate post-war period.[40] By 1948, however, most of the proposed new training programs had been reconsidered, and a disappointing ambivalence in academia and government was apparent. The AMA omitted the panel on industrial health at its annual meeting in 1948.[42] The few new training programs in industrial medicine were largely dependent on industry for funding and for clinical and management training sites. Industry deftly filled the vacuum created by the academic institutions and government agencies that failed to appropriate funds to further the specialty. As it had

from the outset, industry continued to finance and to control the field of industrial medicine and its related disciplines. A decade later, only nine graduate programs of occupational health had materialized, and in sum they were training fewer than 30 occupational physicians per year.[43,44]

By 1955, the Public Health Service budget for occupational health had been slashed to a paltry $544,000. Industry had attacked federal and state industrial hygiene programs, and threatened health departments with reprisals when epidemiologic or mortality studies revealed health hazards at work sites.[37] As a result of this largely unpublicized power play, health and safety personnel were reduced and many state programs ceased to exist. Industrial medicine had lost its opportunity to be a part of the public health establishment. Industrial medicine was, and remains to this day, the workers' compensation model intended by industry and its insurers.

The treating physicians, initially only peripherally involved in the workers' compensation process, by 1960 had been drawn to the very center, until they accounted for a third of all compensation costs, and the decisions to spend the other two thirds revolved around them.[45] Workers' compensation, however, remained constant in its handling of injury claims during this period. In practice, this meant that workers' compensation benefits for workers declined in real terms, to levels that stirred political and regulatory intervention eventuating in the passage of the OSHAct of 1970.[46] What followed during the period from 1970 to the present is described in the two earlier articles in this series.[1,2]

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Occupational medicine is defined at this time by workers' compensation, but manifests in other ways. In the last few decades industrial medicine evolved into what is today called occupational and environmental medicine, with affiliated nursing and other health care professionals, and now includes related disciplines of industrial hygiene, toxicology, and epidemiology. Practitioners of all these fields are consultants to, or employed almost exclusively by, industry and insurers.

Conflicts of interest. Many occupational physicians, toxicologists, and epidemiologists serve as expert witnesses for the defense of industry against lawsuits initiated by injured workers and citizen victims of environmental pollution, but very few are willing to appear on behalf of workers or community citizens in claims and lawsuits brought against industry.[47–49] Some of the most lucrative opportunities for these expert witnesses are in environmental lawsuits where the experts appear on behalf of companies with long histories of environmental violations. Conflict of interest is a problem that neither the American College of Occupational and Environmental Medicine (ACOEM) nor the International Commission on Occupational Health (ICOH) has effectively addressed either at the level of the individual member or at the organizational level.[50,51] The ACOEM takes industry positions on virtually all issues, and its official journal, the *Journal of Occupational and Environmental Medicine* (JOEM), is decidedly pro-industry in its editorial policy and publications.[49,52,53] Other journals that cover occupational and environmental medicine also have an industry bias.[54] Opportunities to publish in these journals are much greater when the author has a corporate sponsor. When journals require that contributors complete a written statement of conflict of interest, they are simply ignored, and significant disclosures are not published.[55]

Compromised research. The National Institute for Occupational Safety and Health (NIOSH) budget has provided less research and training funding to occupational health and safety with each succeeding year, while at the same time funds for biomedical research and education are increased. Conversely, private commercial funding of university research has expanded dramatically over the past decades. Such funding has grown to more than $2 billion, making U.S. universities more dependent on private commercial funding than ever before.[56] The extent of corporate-funded science is troubling because, as Egilman has pointed out, industry funding is accompanied by a "substantial tradition of manipulation of evidence, data, and analysis, ultimately designed to maintain favorable conditions for industry, at both the material and ideological levels."[57]

There is little satisfaction to be found with the science of occupational and environmental medicine, toxicology, and epidemiology so long as much of it is funded and manipulated by industry sponsors and published in journals that do not require disclosures of conflicts of interest.[49,52,53,58] Many researchers are intimidated to report study results antithetical to the interests of major corporations.[59–61] The damage such publication may to do to a researcher's career can be catastrophic. Even academic occupational and environmental physicians have seen their careers ended when they confronted industry interests.[62–65] There is no professional organization or governmental agency with any significant record of defending these heroic doctors and scientists.

Distorted regulations. Industry guidelines and federal standards fail to protect workers from toxic chemical exposures. Federal OSHA has Permissible Exposure Limits (PELs) for fewer than 500 toxic substances, out of the more than 10,000 chemicals that are routinely used in industrial facilities. Virtually all of the substances with established PELs have standards that are based on toxicological study results and case reports from 35–50 or more years ago. In the 1940s, the American Conference of Governmental Industrial Hygienists (ACGIH) first proposed industrial guidelines known as "Threshold Limit Values" (TLVs). Most OSHA PELs were adopted in 1971 based on the 1968 ACGIH TLVs and have never been revised. The experts who participate in the working groups that develop industrial health and safety stan-

dards are often industry-supported.[66–70] Corporate representatives—rather than independent scientists—were given primary responsibility for developing TLVs for more than 100 substances, including at least 36 carcinogens.[68] Occupational exposure limits (OELs) in The Netherlands and Germany are now being reviewed, and many of the old limits including ACGIH's TLVs adopted in Europe in the past are being discarded as having inadequate scientific bases.[71]

BOARD CERTIFICATION—AMERICAN BOARD OF PREVENTIVE MEDICINE

The post-WWII period found occupational physicians politically and academically isolated from mainstream medicine and public health.[37] One partial solution was to find a method of certification of occupational medicine as a specialty. Unhappy that states allowed simply any practitioner to qualify as a treating physician under workers' compensation, company doctors sought to define the certified industrial physician as one who uniquely had his or her own company-doctor credentials. "Those who are industrial physicians—the medical directors, chiefs of medical service, plant physicians, and industrial medical consultants who are grounded in plant experience—know who they are. Those who will be entitled to the distinction of certification had to earn and did earn that distinction in industry. Certification will properly identify them."[72]

Concern about this informal definition of the certified specialist in industrial medicine led the AMA Council on Medical Education and the Advisory Board for Medical Specialties to approve an affiliation of occupational medicine in 1955 with the American Board of Preventive Medicine (ABPM).[73] To win the support of the company doctors, it was necessary to create a "founders group" of company doctors who would be given board certification without examination.[74] The plan to develop an American Board of Occupational Medicine never materialized, and occupational medicine is still associated with preventive medicine.

Preventive medicine was as ill-defined a medical specialty as occupational medicine, and had no more secure funding for research and training than its new affiliate. Since 1955, occupational medicine has been a major source of applicants for testing and certification by the ABPM (Table 1). In time, preventive medicine and occupational medicine would witness similar problems of failed academic acceptance and weak market demand for their specialists.

The ABPM certifies other orphan medical groups such as medical toxicology, undersea medicine, and hyperbaric medicine. These fields have no training or clinical practice remotely associated with preventive medicine, but like occupational medicine they were in search of some academic stature. The small number of certifications sought by these specialties to date indicates the difficulty ABPM has in finding a role for itself (Figure 1). Funding for preventive medicine research, training, and program development has been on the same decline as that of occupational medicine. As is the case with occupational medicine, preventive medicine residency programs have been closing because of the failure of the existing programs to attract new trainees.[75] The association of occupational medicine with preventive medicine has not benefited either group. Its continuation reflects little more than the comfort of status quo.

TABLE 1 ABPM Certificates Issued through 2005

Aerospace medicine	(since 1953)	1,397
Occupational medicine	(1955)	3,518
Public health/general preventive	(1983)	2,079
Medical toxicology	(1995)	31
Undersea medicine	(1993)	10
UM and hyperbaric medicine	(2000)	223

Source: American Board of Preventive Medicine, 2006.

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The failure of the workers' compensation model of occupational and environmental medicine is abundantly clear. It fails everyone except its corporate sponsors, the workers' compensation insurance industry, and health and safety professionals who have a vested interest in its preservation.[76–89] The company doctor is a dying institution, viewed with ambivalence by the rest of medicine. A lay writer recently wrote a scathing book on the topic of company doctors, in which she also observed that all physicians who care for workers' compensation cases are forced to serve the interests of the company over that of the worker patient.[90] We must find an alternative to this unflattering yet largely deserved public perception of occupational and environmental medicine.

A PROPOSAL TO REESTABLISH THE PUBLIC HEALTH MODEL

The isolation of occupational and environmental medicine from the mainstream of medicine and public health damages the profession and society. We must at long last abandon the workers' compensation model and reestablish a public health model of occupational and environmental medicine. As part of the public health infrastructure, it could play a much more substantive role in bringing about a national program to deal with the important issues of occupational and environmental health. The burden of responsibility should be placed on government and employers to prevent occupational injuries and illnesses and environmental pollution, and when they fail to do so, they should provide for health care that is not controlled or manipulated by employers and insurers. It should not be the role of the health care professional to determine the benefits injured workers receive. It is the responsi-

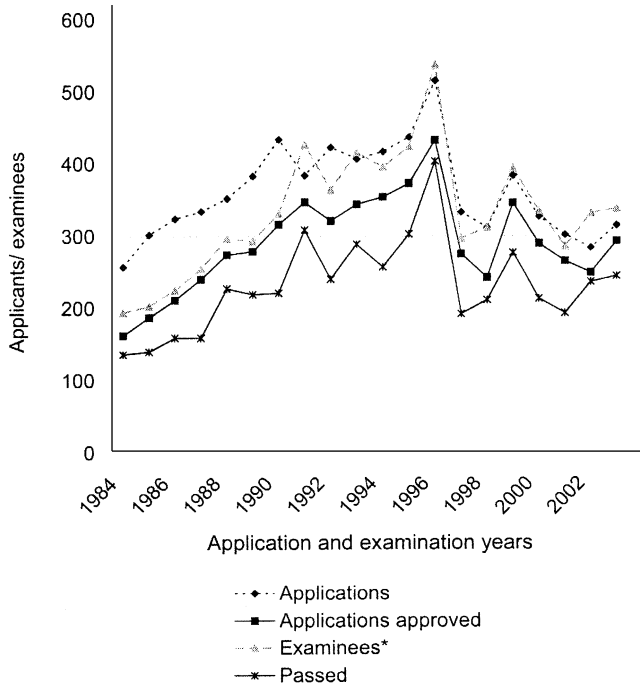

Figure 1—American Board of Preventive Medicine applications and examination data. Source: American Board of Preventive Medicine. As it appears on p. 407 in Ducatman AM, Vanderploeg JM, Johnson M, et al. Residency training in preventive medicine. Challenges and opportunities. Am J Prev Med. 2005;28:403-12. Reproduced with permission.

bility of the employer and government to provide benefits to workers. Physicians and other health care professionals should be allowed to provide medical care for workers without being required to serve as gatekeepers to limited benefit packages. Only through a major, national reform will the practice of occupational and environmental medicine be assured of a future while protecting the rights of working people.

Health care reform. The workers' compensation insurance system should be discontinued at the very latest when national health insurance is enacted in the United States. This would remove the perverse incentives that currently undermine the practice of occupational medicine.[7,21,91–95] It would be a serious mistake to integrate the failed system of workers' compensation into a national health insurance plan. We will have a major opportunity to accomplish both reforms at the same time if sufficient planning and effort are invested now.

The 2000 U.S. Presidential election raised the issue of expanding health insurance coverage. The United States fails to provide universal coverage, financing health care for the majority of the population by for-profit, minimally regulated private insurance companies. These arrangements leave one sixth of the population uninsured at any given time, and they leave others at risk of losing insurance as a result of normal life-course events. Most voters agree that passing laws to help uninsured Americans obtain health insurance should have high priority.[96] Powerful groups have been able to defeat every effort to enact national health insurance for the past century. With assets greater than those of the largest industrial corporations and with well-paid insurance lobbyists at work in nearly every state, the insurance industry is a formidable foe.[97] Nonetheless, the level of dissatisfaction with health care in the United States strongly suggests that discussion of a national health insurance plan is going to return to center stage in the near future.

The Clinton Health Security Act debated by Congress in 1994 initially favored merging the medical component of workers' compensation into a national health care system.[98] The Act required that employees receive all of their health care through the same insurance plan, whether the injury or illness occurred at home or at work.[99] When President Clinton later proposed a more incremental process, integrating the delivery but not the financing of occupational and nonoccupational medical care, and the creation of a commission to study the possibility of full integration, the entire plan was going down to defeat. When one examines the insurance industry arguments against the Clinton Administration efforts, it is clear that no form of merger or integration, or even exclusion of workers' compensation from national health insurance, would have been considered acceptable by that industry.[98]

Various other proposals for national heath insurance have downplayed or completely ignored the issue of workers' compensation.[100] Debate about the relationship of workers' compensation to general health care typically centers on whether integration of workers' compensation medical care into the general health care delivery system would increase or decrease costs.[80,101–103] Medical costs in workers' compensation have not been subject to the extensive oversight that has become commonplace under traditional insurance.[101] Shifting these costs of care could eliminate price differences between the currently separate systems and thus reduce workers' compensation costs by half or more.[80,82]

Exclusive remedy. Elling emphasizes that workers' compensation reform should provide for tort liability when damage from work has occurred because of employer negligence or wrongdoing.[21] The right to sue the employer is crucial to advance worker protections, and to ensure that employers cannot simply pay their way past problems while continuing the same dangerous practices. The current system of minimally fining employers encourages this negligence to continue. The worker, in the absence of workers' compensation insurance, would have the right to sue the employer and his agents. Currently, the workers' compensation system is based on a premise of liability without fault. The "exclusive remedy" is the quid pro quo under which the employer enjoys immunity from being sued in

exchange for accepting absolute liability for all work-connected injuries. Similarly, physicians, nurses, industrial hygienists, and safety professionals employed by industry are protected from malpractice liability by workers' compensation law. Thus, health and safety professionals are paid by the employer to be responsible for the health and safety of the workers, and if they fail in the effort, the employer's workers' compensation insurance protects them from malpractice claims by the workers. Exclusive remedy is a form of protection from malpractice litigation that no other health care provider is given. In practice, it is a formula for benign neglect and, on occasion, outright abuse. As workers' dissatisfaction with the adequacy of workers' compensation benefits increases, the impetus to challenge the exclusivity doctrine has likewise grown. In response, employers and industry associations have successfully brought their concerns to state legislatures, resulting in strengthened exclusivity protections against employer fault in several states.[94]

If occupational physicians, nurses, industrial hygienists, and safety specialists were not protected from litigation by the exclusive-remedy provision, there would be much less attention paid to the interests of employers, and a lot more concern for the wellbeing of workers. Many activities currently assigned to occupational health and safety professionals more properly belong in the purview of the corporate security office. Physicians, nurses, and other health care providers would be far less likely to participate in drug-testing programs, background checks, and surveillance activities, or to share medically sensitive information with employers and insurers, if they were subject to suit by workers. In the absence of exclusive-remedy protection, it is likely that there will be far fewer health and safety professionals working for companies. The vacuum could be filled by health and safety professionals with public health training working in settings that will not respond to the influence of corporations and insurers. Many proposals for reform in occupational medicine assert that health services must be separated from employer control, and that this can be accomplished only through clinical and preventive care services that are independent of the influence of employers and their insurers.[90,106,107]

Even if workers' compensation were abolished, some employers would continue to employ health and safety professionals to help them comply with government regulations and to minimize work loss through prompt medical care and a variety of return-to-work incentives. Employers also may continue to refer injured workers to physicians who understand the need for prompt return to work whenever possible. These practices may be appropriate so long as the employer and his selected health and safety professionals are aware that there is no protection from malpractice litigation in the absence of workers' compensation insurance. Health and safety personnel will be more costly for employers to retain.

Disability determinations. Workers' compensation programs require that the physician determine that an injury or an illness is work-related, which in turn largely determines the extent of benefit coverage. Workers' compensation has come to be known as a medical benefit plan as much as it is a plan to provide for lost wages. The common misconception is that work injuries are medical matters, and compensation payments must be based on the doctor's decision about the duration of disability and the extent of impairment.[45] Work injuries should only marginally involve physicians, and should under no circumstance corrupt the practice of medicine. As the system now operates, filing a workers' compensation claim legally constitutes a blanket waiver of medical confidentiality. In some states this includes both the transfer of medical records and oral communications between medical providers and employers or insurers.[94]

Many formulas for determining disability that do not require physician participation have been used by government agencies in other countries. By the time the formulas were discussed in medical journals in the United States, physician participation in workers' compensation was subject to powerful economic incentives. Physicians had come to appreciate the legal protection from competition with other health and safety providers, and with government agencies, that workers' compensation law provided them.[106] Workers' compensation had duped the physician in the early 20th century, but 50 years later, the physician was being paid for much more than he or she could competently do. Over time, the costs associated with disability became a serious societal concern, but physicians offered no solutions to what some saw only as, "all the devious motivations of patient, physician, and lawyer."[107]

Physicians are not the appropriate arbiters of "causality" when their patients are injured or become ill while at work. They assume this role because it is required by workers' compensation law, but they have no particular skill, training, background, or information to perform the task better than many other individuals. In the workers' compensation systems of some other countries, the physician is not required to serve in this conflicted capacity. In an alternative system, penalty assessments should be imposed in response to observed conditions without waiting for the disabilities to occur. The employer ought to be responsible for his employees when they are injured or ill from whatever cause, and health care for all injuries and illnesses should be provided without interference or delay. Wage replacement for workers ought to be provided for a period of time stipulated by government. For long-term injuries and illnesses, a benefit system that does not involve health and safety professionals should be developed by industry and government. Industry should deal directly with government agencies to determine the future course of indemnity costs. Compensa-

tion adequate for the maintenance of a decent life style should be given to every citizen with a disability, whether it is work-related or not.[108] Such a social security disability system would remove the strife and confusion from the workers' compensation system.[21]

Stone characterizes the concept of disability embodied in social welfare policy as predicated on the assumptions that most people would prefer to be in the need-based distributive system (in other words, they don't want to work), and that inability to work is highly subject to deception.[34] The evaluation by the physician is supposed to provide a tight boundary around the need-based distribution, and clinical criteria form the preliminary screen through which any applicant must pass. Physicians are charged with determining impairment in disability cases and thereby become the gatekeepers for disability programs. The physician is prepared to be suspicious of the claim and to suspect that the patient is willing to falsify information in order to obtain some secondary gain. Stone points out the fallacy of such beliefs; "The clinical concept of impairment and its associated devices of medical examination, diagnostic technology, and medical reasoning did not provide unique, consistent and incontrovertible answers to the fundamental distributive questions raised by the disability program. Thus, there is a constant need for dispute resolution, which in our society is the province of the judicial system. In fact, then, even though medical reasoning and evidence are supposed to form the basis of the program, legal concepts of evidence and legal reasoning predominate."[34]

Recent legal trends in the United States, the United Kingdom, and Canada are putting much greater emphasis on defensible arguments based on empirical data and less on expert judgment.[109] Some jurisdictions are even required to examine scientific evidence directly rather than rely on interpretation by experts. These changes suggest that the outdated adversarial legal proceeding that characterizes so much of workers' compensation is no longer widely supported, and that abolishing the system is an acceptable and achievable goal.

REPORTING OCCUPATIONAL INJURIES AND ILLNESSES

Occupational illnesses, injuries, and fatalities should be treated and reported promptly, and the incidence rates of their occurrences be subject to the scrutiny of independent public health agencies. This will require a major change in the method of reporting and analyzing medical reports. There is a pressing need to establish a nationwide comprehensive system to track work-related injury and illness. In addition to a large workers' compensation database, there are many other data-collection systems that record occupational injuries and illnesses on a national level.[110] These systems lack standardization, and because of gross under-reporting are of limited value to those responsible for the prevention of occupational injuries and illnesses.[76,111–113]

Many state-of-the-art occupational health and safety systems now being developed by various government agencies provide examples of data collection and analysis that could be used instead of the outmoded system preferred by industry. These tracking and surveillance systems are much superior to the antiquated records provided by employers and collated by government agencies.[114] When unusually high rates of injuries, illnesses, and fatalities occur, government inspectors ought to respond and educate, fine, and regulate the responsible industries accordingly. Occupational health and safety professionals trained in public health can and should participate in these activities, but not when they are in the employ of industry or insurers.

Two of the better examples of state-of-the-art surveillance systems in the United States that apply to occupational and environmental health are the Sentinel Event Notification System for Occupational Risks (SENSOR) and the Hazardous Substances Emergency Events Surveillance (HSEES) system.

SENSOR. A Sentinel Health Event (SHE) is a preventable disease, disability, or untimely death whose occurrence serves as a warning signal that a workplace hazard probably requires better identification and control, and that preventive and/or therapeutic medical care may need to be improved. A SHE (Occupational) is a disease, disability, or untimely death that 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 original SHE(O) list encompassed 50 disease conditions that were linked to the workplace.[115] Since its inception, NIOSH has updated the list to contain many more diseases and conditions.

NIOSH developed the Sentinel Event Notification System for Occupational Risks (SENSOR), which uses designated physicians to recognize and report selected occupational disorders to a state surveillance center. SENSOR is a cooperative state–federal effort designed to develop local capability for preventing selected occupational disorders.[116] SENSOR has been used for surveillance of work-related carpal tunnel syndrome,[117] as well as other occupational injuries.[118] SENSOR has been applied to investigations of reproductive outcomes measures,[119] occupational diseases such as silicosis,[120] and occupational asthma, [121-123] and to surveillance of pesticide exposures. [124,125] SENSOR can be used to monitor deaths that are related to occupation and provides a useful aid in epidemiologic studies.[126,127]

HSEES. The Hazardous Substances Emergency Events Surveillance (HSEES) system is a state-based surveillance of hazardous-substance releases and public health consequences. Maintained by the Agency for Toxic Substances and Disease Registry (ATSDR) since

1990, the system captures information about acute releases by industrial, agricultural, construction, or mining activities of hazardous substances into air, soil, and water and into surrounding communities. HSEES data help identify risk factors associated with hazardous-substance releases. The most frequently released substances are volatile organic compounds, acids, herbicides, and ammonia. The HSEES system has demonstrated its utility in studies of mercury spills and chlorine releases.[128,129] Knowledge of these factors is useful in planning public safety interventions and can impact the formulation of guidelines and policies to help reduce the number of events (primary prevention) and the morbidity and mortality associated with these events (secondary prevention).[130]

The HSEES system can be used to determine which industry categories have the highest proportions of events with victims, [131,132] and to identify factors associated with the severity of injuries of victims harmed in acute chemical release events, [133] as well as the most frequently reported injuries. [134] Identifying industries at high risk for hazardous-materials releases can facilitate prevention of and preparation for such events. The industries with the highest average annual numbers of events have been found to be agricultural chemical manufacturing; petroleum refining; industrial and miscellaneous chemical manufacturing; electric light and power; and pulp, paper, and paperboard mills.[135]

TRI. One approach to compensating workers for occupational diseases suggests that payment be based on the employee's exposure to hazards.[7] The approach would utilize the EPA Toxic Release Inventory (TRI) Program, in which firms are required to report the types and amounts of toxic substances they release into the air and waterways. Individual firms might be assessed premiums or federal taxes based on the amounts and types of toxic substances they released. The authors propose that these assessments be made by a new federal department within OSHA. They point out that OSHA does not have an equivalent program. It is vital that OSHA participate in this and in the SENSOR and HSEES data systems. Regulatory agencies should evaluate and utilize all the state-of-the-art systems at their disposal.

A NEW BENEFIT SYSTEM

Workers' compensation has poorly served workers in the United States. There have been continuous calls for reform, but efforts to modify state programs have been exerted for many decades without apparent success.[136] Attempts to stop litigation through various forms of restrictive legal rules, insurance industry crises, campaigns for tort reform, and no-fault compensation schemes have met with only partial success.[91] The complexity of the workers' compensation system, and its arcane distribution through federal and state governments, has eluded public attention and media concern. The public is often purposely confused about workers' compensation and its failure to provide an adequate level of social insurance. The resulting frustration and diminished public interest in the problems of workers' compensation allow the insurance industry to perpetuate a flawed and costly system. Industry and insurers can increase or decrease benefits and coverage with minor incremental improvements, thereby undermining any far-reaching efforts to redesign the system.[136] Affordability of workers' compensation insurance is the primary basis for reform, without regard to whether benefits provided to injured workers meet a standard of adequacy.[94]

Alternative approaches. Workers' compensation systems in highly developed countries are integrated with broader social security or welfare programs to such an extent that workers' compensation ceases or virtually ceases to exist as a distinct program. In these systems, national policies not only determine the total social cost of disability, but also the way in which the cost is shared between the private and public sectors.[137] Workers' compensation systems based on disability eliminate much of the complexity inherent in cause-based workers' compensation systems.[138] Systems that are disability-based are particularly successful in decreasing litigation costs. The greatest improvement in the recognition of occupational disease will be achieved when workers' compensation is replaced by a comprehensive plan for the compensation of all disabilities and premature deaths. Under such a plan, etiology will be irrelevant to eligibility for compensation, but it will be part of the formula for cost distribution. Costs can be distributed by reference to cause, but it can be done by using aggregate data, rather than by a costly inquiry into etiology in each case.[139]

New Zealand has had a comprehensive accident insurance system since 1974. The New Zealand model provides compensation for all victims of injury by accident, regardless of the cause of the accident, and eliminates tort remedies for all injuries.[140] Under this system, emphasis is placed on accident prevention and, when necessary, on the rehabilitation of injured persons. Tort litigation over accidents has been almost entirely eliminated. Public hospitals provide medical treatment, and awards may be granted for permanent disability as well as for pain and suffering.[141] While the system is still largely free of financial and legal barriers, it has not satisfied all its detractors.[142–144]

In Japan, compensation benefits are determined by the Labor Standards Inspection Office (LSIO). The Office asks the victim's doctor to submit written opinions about the diagnoses and other relevant data. For occupational diseases, the worker must file a claim for compensation. On occasion, the LSIO may ask for an opinion from its own medical advisors whether the compensation benefits should be paid or not. The decision of the LSIO is seldom questioned by workers or employers.[145] Asian compensation systems' presump-

tion of official authority may not provide many ideas to include in a system acceptable in the United States.

In European welfare states, all employees are covered by social insurance against the risk of wage loss due to temporary sickness or permanent disability. Europeans have broad access to health care through combinations of public, tax-funded programs, social insurance, and regulated private markets.[137] Some European social security systems provide universal coverage for disability, and leave to the systems' managers the technicalities as to financing based on causation. Wage replacement is intended to protect the standards of living workers have achieved. Wage-replacing schemes consist of social insurance covering the loss of earnings due to old age, unemployment, temporary sickness, or permanent disability. European workers who lose their jobs are usually covered by unemployment insurance. In The Netherlands, Germany, and Sweden, workers may receive unemployment insurance until they reach pension age, with automatic conversion of benefits thereafter.[146]

The Netherlands abolished the distinction between work-related and other causes of incapacity under its disability insurance scheme in 1967. In The Netherlands, all employees are covered by a compulsory scheme that insures loss of earnings resulting from long-term disability. The amount of benefits depends on the degree of disability and the extent of lost earnings. Under this system, there is no specific insurance against employment injuries and occupational diseases. Workers receive the same health care that all others who have sustained injuries and illnesses receive under the national health insurance system. The disability program is unique in that it distinguishes disability categories, and has a system of partial benefits. Disability assessments are made by teams of insurance doctors and vocational experts employed by independent industrial associations.

In Germany and Sweden, disability insurance is part of the national pension program, which is run by an independent, national board that is closely supervised by those who are politically responsible for the operation of the social security system and therefore subject to parliamentary control. The difference between these countries and The Netherlands, then, is that their disability systems are under a stronger form of budgetary control.[137] These boards monitor disability plans and safeguard uniformity in award policy by issuing rules and guidelines to local agencies. Sweden allows administrative checks of disability claims only on the basis of written, medical and other, reports in order to prevent the program's gatekeepers from being influenced by self-reports and by the physical presence of claimants. In Germany, too, award decisions are made by using medical reports and by applying uniform decision rules developed by specialists' panels, each covering a diagnostic group.

Canada has a disability insurance system that relies on the government to provide industrial consultation and guidelines for benefits.[147,148] The Province of Ontario requires employers to establish joint health and safety committees, to inform workers about possible hazards, and to conduct medical monitoring of employees potentially or actually exposed to hazardous materials. Other Canadian provinces also are innovating with laws designed to move occupational health programs onto neutral ground and away from direct management control.[149]

A no-fault disability system without workers' compensation in the United States would provide an opportunity for occupational physicians to practice medicine objectively. The proposal to abolish workers' compensation entirely in favor of a new system will threaten vested interests. Many of them will argue that if employers and insurers have no control over the physicians who care for injured or ill workers, work-loss time and medical costs will increase.[150] However, research does not support the contention that employer choice of medical providers reduces medical costs, and virtually no research addresses how cost control affects the quality of care and patient satisfaction.[80] If companies are willing to insure health care professionals against malpractice, they ought to be able to employ or refer their workers to them for treatment. But in the public health model, this will be a very small percentage of health care providers. Moreover, many of the consultative services formerly provided to industry by company doctors will become available from the local public health agencies.

The larger medical community also will be assisted in caring for occupational injuries and illnesses by the public health community. In the public health model, consultation by health and safety professionals would be equitably distributed to industries of all sizes, not concentrated among the larger corporations as is currently the practice. The public health model of occupational medicine would provide a strong direction from government agencies staffed by health and safety professionals. France, Belgium, and Germany employ physicians to conduct inspections of worksites and examinations of employees. These physician consultants provided by government are able to mandate employer-financed occupational health services in sizable plants.[104] A complete hazard survey for every workplace in the country is conducted in Germany, followed by health examinations of the workers, and a plan for removal or control of hazards according to the severity of risk [21]

If physicians are to be assigned to staff company occupational health programs, either by the public health agency or by the employer, their independence from the employer must be maintained. In some countries, the occupational physician is equally accountable to management and labor.[151] Sweden, Germany, Denmark, and Finland have worker-based systems in which union health and safety representatives have been

trained in occupational health and safety. Finland provides occupational health services to every workplace in the country. Wherever it has been tried, the participation of health care professionals in workers' compensation systems has been disappointing. Whether in the employ of government or industry, the physician, nurse, and other providers become part of the corporate culture. The health care professionals' job security and collegial interests lead them to support management's desire to control costs and maintain competitiveness more than they support the interests of workers. Again, health and safety professionals should not be participants in the workers' compensation system other than as experts in the development of public health policies and guidelines.

Research. Although there is a large published literature in occupational health, the level of science is not on a par with that of science in other medical specialties. This occurs because industry hires scientists to produce a "reputable" literature friendly to industry interests. It also occurs because NIOSH is in charge of a small research budget for which it must compete within its own agency. Research budgets are inadequate to support major health studies. A related problem posed by NIOSH is that it fails to require industry participation in unbiased studies when it is in the best interest of workers' health and safety to do so. The monopoly interest NIOSH has over research funds should be curtailed. NIOSH should not be allowed to interfere with grant applications to other funding agencies. The National Institutes of Health and the National Cancer Institute in particular should be more open to research proposals for occupational health studies. NIOSH should be given its own research budget, but that budget should be capped to prevent it from competing with the funding needs of other applicants.

It is not possible to stop industries from retaining occupational health and safety professionals to assist them in litigation. Moreover, the funding of research activities by industries is likely to continue. It would be a significant achievement if all industry employees and consultants, and all researchers receiving funds from private industry, were required to sign declarations of conflict of interest. These declarations are now commonly used to help control the problem of industry influence in many government agencies. Author declarations should be required in advance of all journal and textbook publications. Declarations could be placed with the public health agencies, and non-compliance could affect licensure if necessary.

Training and board certification. Occupational health and safety professionals when assigned to public health agencies will be adequate in the numbers currently available, and if current levels of training and replacement are continued. An Institute of Medicine (IOM) study concluded in 2000 that the overall supply of health and safety professionals was roughly consonant with employer demand.[152] The efficiency of the public health model of consultation among health care providers, industry, and government, as opposed to the old system of larger companies controlling the majority participation of health and safety professionals, will allow the specialty, in spite of its limited size, to support an adequate national effort. It is unlikely that government will be any more likely to fund an expanded program than industry has been up to this point. Efficiency will be the key to the public health model's ultimate success.

Occupational and environmental medicine clinicians should be trained in internal medicine and other appropriate specialties, with board certification by the primary specialty. The occupational medicine training programs now in place should be continued as part of the training programs in public health at their universities. NIOSH should fund the programs on the basis of quality of education and not as an effort to broaden geographic opportunities. The residency programs that are producing greater numbers of graduates, usually with industry funds, are not generally as effective as the programs in the better institutions. NIOSH should favor quality over quantity in allocating training and research funds. We must not think of occupational medicine as a large specialty. As a part of the public health agencies, it will be a small but effective consultative agency of highly trained specialists.

The current reliance on the American Board of Preventive Medicine (ABPM) for board certification does not serve the interests of either occupational medicine or preventive medicine. Preventive medicine has no better source of funding for research and training than is the case with occupational medicine. Preventive medicine and occupational medicine have endured the same problems of failed academic acceptance and weak market demand for their specialists.[75] Occupational medicine did find some measure of academic acceptance in board certification by the ABPM a half century ago, but in reality the ABPM has no more credibility today than does the field of occupational medicine. Occupational and environmental medicine would be better served by an association with schools of public health for credentials after occupational medicine has resolved its stigmatizing problems with workers' compensation.

CONCLUSIONS

Reform in occupational medicine will require that the United States abolish workers' compensation. Such reform will not be widely supported, even though the failure of the workers' compensation system is beyond dispute. Workers' compensation is a state prerogative, and states have always been unwilling to relinquish the responsibility of regulating workers' compensation insurance.[102] Private workers' compensation insurers

are not going to agree to the loss of an entire industry. Physicians and insurance companies have long worked together to thwart attempts at reform in health care.

A new approach and a new willingness to embrace reform will be necessary to deal with the serious problems of occupational and environmental medicine. The existing leadership of occupational and environmental medicine, the ACOEM and the NIOSH-supported Educational Resource Centers, is not sufficiently serious about reform.[75,153–155] The Institute of Medicine (IOM) showed some interest in occupational health and safety, but its effort was slowly overtaken by the vested interests of its members. In 2000, the IOM conducted a manpower study of occupational health and safety that led the IOM committee members to be satisfied with the status quo.[152] The IOM is unwilling to endorse any exercise of governmental authority.[156]

Abolishing workers' compensation is a reform that will need to find support among those who favor a national health insurance plan that is not tied to the past through integration of extant systems. These reformers must recognize that integration of workers' compensation into a national health insurance plan will significantly harm the future prospects of success of the national health insurance plan, and that perpetuating the workers' compensation system will continue to provide little or no benefit to the country and its workers.

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