His Occupation: Safety and Fulfillment

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Work and health are inextricably linked. While toxic exposures, ranging from coal dust to unfair supervisors, shorten life and degrade its quality, work itself is essential for human flourishing. The International Labour Organization uses the term "decent work" for paid employment that provides a living wage, additional benefits (such as retirement, health insurance, family leave, etc.), safe working conditions, and the opportunity for development and respect [1]. Work plays a central but complicated role in the life of every adult. On the one hand, we shape our world, participating in the act of creation through growing food, framing houses, cleaning offices, repairing engines, exploring energy sources, treating cancer, selling insurance, plowing streets, teaching algebra, or any of the thousands of activities that combine to shape modern society. Especially for men, work may take on an outsized portion of their identity, although both men and women experience negative health outcomes from lack of work as well as from overwork.

1.1 Absence of Work

The big picture, of course, is that the absence of work can kill. Perhaps the most compelling evidence for the deadly impact of work loss comes from information gathered in the wake of the collapse of the former Soviet Union, when mortality rates for middle-aged men in Russia and the newly independent states of Eastern Europe skyrocketed and life expectancy precipitously declined [2]. Sweden, a

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country with an exceptionally strong safety net and linked health records, experienced a prolonged recession in the early 1990s that provided a virtual laboratory to explore the adverse effects of unemployment, including long-term unemployment [3, 4]. Male mortality associated with unemployment (compared to those never unemployed and adjusted for prior health status) peaked after 5 years of unemployment with a hazard ratio (HR) of 1.6. While female mortality also increased significantly among the unemployed, it peaked at an all-cause HR of 1.13. Among men, increased deaths from alcohol-related causes peaked at an HR of 2.87 after approximately 3 years of continuous unemployment, accompanied by a peak stroke HR of 1.55 and cancer HR of 1.18. Mortality from suicide, transportation, and other external causes in this Swedish cohort continued to increase and drove the overall increase seen after 5 years of continuous unemployment. A meta-analysis of suicide following unemployment found a relative risk of 2.50 (CI 1.83–3.17) within 5 years and 1.70 (CI 1.22–2.18) after 5 years and remained significantly elevated among those unemployed for up to 16 years of follow-up [5].

In the United States, periods of unemployment predict nonfatal myocardial infarctions. Using data collected by the National Institute on Aging's Health and Retirement Study, Dupre et al. reviewed prospective cohorts who were interviewed every 2 years from 1992 to 2010. Among 13,451 participants who reported ever having worked, 1061 reported having experienced acute myocardial infarctions during follow-up surveys. The risk was significantly higher among those who had been previously unemployed at any time (HR 1.35, CI 1.10–1.6). Not only was any period of unemployment a risk factor but also myocardial infarction risk increased with multiple job loss. Risk was highest during the first year of unemployment [6].

1.2 Workplace Fatalities

Work itself can kill. In 2012, fatal traumatic injuries occurring at work claimed the lives of 4628 people in the United States; 92 % of those killed were men [7]. Mortality rates for miners, agricultural workers, transportation workers, and construction workers are higher than for other occupations, and most of these workers are men. As the tragic case described in Box 1.1 illustrates, small business owners and the self-employed are at higher risk than the workforce as a whole. Extremely high mortality rates among those who log, fish, build structural steel or residential buildings, or fly airplanes in the bush for a living mostly affect men. Transportation incidents claim the most lives, followed by falls to a lower level, assaults (intentional or by livestock), contact with objects and equipment, exposure to hazardous environments, and fires and explosions.

Boring work can kill in the long run. Amick et al. demonstrated that working in low-control jobs for a working lifetime was associated with increased mortality (odds ratio 1.43, CI 1.13–1.81) [8], while others have found that workers in passive jobs (low control and low demands) are less likely to engage in leisure time physical activity [9]. The Whitehall II studies, providing longitudinal data about a cohort of British civil servants, has explored a number of work characteristics for their impact

Box Case 1.1
It was a family business. The 40-year-old business owner had been painting and performing maintenance on towers, such as radio and cell towers, for over 20 years. The new job involved painting a 1500-ft radio tower, replacing the beacon light on top of the tower, and installing rest platforms at various locations on the tower. On the day of the incident, the business owner was riding the hoist rope to the top of the tower to replace the beacon light. His 16-year-old stepson and a 19-year-old employee were riding the same hoist rope 1200 ft up the tower to continue painting. The owner's wife was operating the hoist rope system, when the rope began to slip. She was unable to gain control of the rope, and her husband, son, and the young employee fell to their death. She was later transported to the hospital for treatment of shock and severe rope burns on her hands.

The National Institute for Occupational Safety and Health (NIOSH) conducted an investigation of the incident but was unable to determine exactly why the hoist system failed. They did find that the hoist rope system was not rated for lifting people. Additionally, the total weight being lifted that day was likely over the amount for which the system was rated. Multiple safe work practice recommendations were made, and it was noted that child labor laws were violated. The Fair Labor Standards Act prohibits workers under the age of 18 from performing hazardous work, such as those leading to the tragic deaths of these three men.

To read the complete report, follow this link: http://www.cdc.gov/niosh/face/In-house/full200007.html#recommendations (NIOSH FACE Report 2000-07).

on cardiac and other outcomes. Controlling for other risk factors, workers followed for an average of 11 years who routinely work 3–4 h overtime daily were 67 % more likely to die from a fatal MI or CHD (HR 1.67, CI 1.02–2.76) [10]. In a series of studies, workers who self-reported more unfair supervisory treatment at baseline were also more likely to sustain fatal cardiovascular events at follow-up, had a greater risk of developing metabolic syndrome, had increased inflammatory markers, and had poorer cognitive function [11–13].

1.3 Injuries in the Workplace

Injuries result from safety hazards, all of which can be identified and reduced. The Bureau of Labor Statistics [14] reports that, in 2013, US workers suffered over three million nonfatal work-related injuries and illnesses. The cost and scope of nonfatal work-related illness and injury are difficult to ascertain because diseases often go unrecognized as work related and injuries may go unreported if the

individual has other forms of insurance and wants to avoid stigmatization [15]. Some of the highest rates, particularly for the more serious injuries, are in male-dominated industries, such as construction and agriculture, and occupations, such as laborers, truck drivers, and warehouse workers.

The industrial revolution and assembly-line work, and later the computer and cubicle workplace transformation, gave rise to an ongoing epidemic of injuries variously known as "cumulative trauma disorders," "repetitive motion injuries," or more recently "musculoskeletal disorders" (MSDs). MSDs, such as sprains and strains, tendinitis, and carpal tunnel syndrome, are more commonly associated with upper extremity injuries; however, lower extremity and back injuries may also fall into this category. In 2013, MSDs accounted for 33 % of all occupational injuries [16]. Again, male-dominated jobs, such as truck driving, construction, farming, movement of materials, and warehousing, have some of the highest MSD rates. Early studies of computer users and, subsequently, numerous studies in a wide variety of industries have strongly linked the following physical job exposures to MSDs: repetition, high force, awkward postures, vibration, cold temperatures, and tool use [17]. A combination of these factors can increase the risk of developing MSDs severalfold. Early recognition of MSD symptoms by workers and early diagnosis and treatment by clinicians can significantly improve outcomes, both in terms of severity and resolution. Prevention of work-related MSDs is accomplished through ergonomics, which is the science of fitting the workplace to the worker, through the design of tasks, processes, tools, and equipment to control and eliminate the above-mentioned physical exposures [18, 19].

1.4 Work Exposures and Disease

Illnesses result from a variety of health hazards, which may be chemical, biologic, physical, biomechanical, or psychosocial. Toxic exposures may cause systemic illness or may target specific end organs or both. Some illnesses are associated with specific job tasks. For example, metal-fume fever, a flu-like illness associated with welding on galvanized steel, is recognized as an occupational disease based on the exposure history. A discussion regarding the exposure history is found later in this chapter.

The two most common routes of exposure in the workplace are the skin and the lungs, although ingestion may occur through handling of contaminated food, nail biting, smoking at work, and other activities that result in gut absorption. The route of absorption is often the target organ, e.g., nickel exposure and contact dermatitis, chlorine gas and reactive airway disease. But this is not always the case. Inhaled lead fumes may affect the kidneys and nervous and GI systems; dermal absorption of organophosphate pesticides may lead to systemic symptoms. Pneumoconioses or dust diseases of the lung, such as asbestosis, silicosis, and coal workers' pneumoconiosis (black lung), are familiar to most clinicians and not difficult to diagnose when the history of exposure has been elicited and characteristic chest X-ray findings are seen. However, because the history is not always obtained, cases can be

misdiagnosed as idiopathic pulmonary fibrosis or other entities. Thus, underreporting of occupational diseases is surprisingly common. Occupational asthma, the most common occupational respiratory disease, is often not recognized either by clinicians or by the worker experiencing the symptoms, again because the appropriate exposure history is often not asked.

Asthma in the United States has been on the rise for over three decades [20], and exposures at work are estimated to cause 15–17 % of adult-onset asthma [21, 22]. An even larger percentage of workers with underlying asthma will have exacerbations of their asthma at work [23]. Lack of recognition and management of work-related asthma can lead to worsening symptoms, increased use of medications, more emergency department visits and hospitalizations, and fatal asthma attacks. The Centers for Disease Control and Prevention (CDC) estimates asthma healthcare costs at $56 billion a year. Almost 1/3 of adults with asthma miss work because of asthma attacks [20]. Preventing and managing work-related asthma depends on workplace controls to minimize or eliminate exposure, worker training on exposure health effects and symptoms, medical surveillance and early diagnosis, and removal from further exposure [24, 25]. Clinicians, employers, and workers all play a part in prevention.

Physical hazards include noise, heat, cold, hypo- or hyperbaric atmospheres, and ionizing and nonionizing radiation. Noise-induced hearing loss is a clear example of a prevalent and potentially disabling work-related condition that should be preventable [26]. Clinicians can identify noise exposure on and off the job as a hazard, offer advice on noise reduction, and request to review any workplace audiometry testing (or provide it for self-employed individuals). Heat stress and heatstroke impact young, healthy populations of workers, athletes, and others, in addition to frail elderly. Clinicians can help educate workers and identify predisposing conditions that require additional acclimatization or accommodation. The case described in Box 1.2 offers a clear example of a missed opportunity for identifying an at-risk individual whose need for appropriate worksite interventions would have been life sustaining.

Box Case 1.2

A 43-year-old previously unemployed cement worker began his first day at a new job with a cement contractor in midsummer of 2010. He worked for 5 hours installing forms for poured concrete walls. He took a lunch break in an air-conditioned truck and then returned to work. Shortly thereafter, he complained of light-headedness and fell backward, striking his head on the concrete. He initially refused medical treatment and was given some water and then moved to an air-conditioned trailer. He asked to be driven home; however, en route he lost consciousness and was taken to the local emergency department (ED). On arrival, he was in cardiopulmonary arrest with a core body temperature of 108 °F. He was resuscitated twice in the ED before his transfer to the intensive care unit. He died the next day of multi-organ system failure due to heat stroke.

(continued)

Box Case 1.2 (continued)

The deceased worker was obese with a BMI of 39.9. Cirrhosis of the liver was found on autopsy, but he had no other underlying medical conditions and toxicology was negative for alcohol or other drugs. On the day he collapsed, the outdoor temperature was 82 °F with 76 % humidity, which results in a heat index of 88 °F [43]. He had been unemployed for a significant amount of time before hiring onto this job. The Occupational Safety and Health Administration (OSHA) opened an investigation into this worker's death. Although the employer had provided water and an air-conditioned break area, OSHA identified several deficiencies in the employer's safety practices that lead to this worker's death. These deficiencies included lack of worker training, inadequate work/rest cycles, and most importantly, no period of acclimatization for new workers.

Psychosocial hazards in the workplace include long hours, shift work, violence, harassment, and discrimination. Recently, we have witnessed dramatic examples of the psychological effects of that most devastating work hazard—war—in military personnel returning from Iraq and Afghanistan. Anxiety, depression, post-traumatic stress disorder, and suicide rates in this population have reached historic highs [27]. Studies funded by the National Institutes of Health (NIH) and US Army identified the following risk factors for suicide in army personnel: being male, being white, recent demotion, and previous suicidal thoughts or actions [28, 29]. These mental health sequelae reach beyond the soldiers to their families, relatives, and friends. Workplace violence is encountered in a wide variety of occupations ranging from law enforcement to driving taxicabs to providing healthcare and social services. Workplace homicides are the fourth leading cause of fatal occupational injuries [30]. More subtle but pervasive is stress in the workplace from job insecurity, increased workload demands, and changing employment practices, such as greater use of temporary workers. The National Institute for Occupational Safety and Health (NIOSH) supports research on work organization and other factors that influence job stress with the goal of identifying ways to redesign jobs to create safer, healthier workplaces [31].

1.5 Reproductive Health and the Workplace

Reproductive health is a leading public health concern. More than two million couples in the United States suffer from infertility; 10–20 % of pregnancies end in spontaneous abortion; and 3 % of children are born with major birth defects [33]. Box 1.3 describes a case of reversible male infertility from exposure to lead, a hazard that has not yet been eliminated in the workplace. Table 1.1 (adapted from references 34–36) lists chemical and physical occupational exposures known to adversely affect the male reproductive system. These exposures may cause harmful effects to

Box Case 1.3

A 41-year-old law enforcement officer ("Mr. B.") presented to his family physician with a 3-month history of nonspecific symptoms of headache, dizziness, irritability, and trouble sleeping. During the visit, he raised an additional concern: he and his wife had been unsuccessfully attempting to conceive a child. No cause for the infertility had been diagnosed, and he had successfully fathered a child 14 years previously. Among other tests, the physician ordered a semen analysis which revealed a low sperm count.

Taking a work history, the physician learned that Mr. B. had been working full time as a firearms instructor for 2 years, first on an outdoor range but in the last 6 months at an indoor range. In addition to instruction, his duties involved cleaning and maintaining the range, including sweeping up the dust. Although Mr. B. used a respirator when sweeping, he noted that the ventilation system was not always operational. The astute physician drew a blood lead level, which was markedly elevated at 88 μg/dl. Mr. B. was initially removed from work and treated with a short course of chelation. Subsequently, Mr. B. was able to adjust his job duties to classroom instruction and limit his time at the range to a few days a year to maintain his qualifications.

Over the next 6 months, Mr. B.'s blood lead level decreased to the mid-30s. His physician continued to monitor his sperm count, which rose as his blood level dropped. One year later, Mr. B.'s wife gave birth to a healthy baby [32].

Table 1.1 Selected occupational exposures known to cause adverse male reproductive health effects

Exposure	Observed effects	Occupations/industries where exposure may be found
Chemicals		
Carbon disulfide	Reduced sperm motility and viability; abnormal sperm morphology; erectile dysfunction	Manufacture of rayon; synthesis of some chemicals and pesticides; rubber manufacture
Ethylene glycol	Reduced sperm count	Chemical manufacturing; use of antifreeze
Phthalates	Decreased sperm motility; abnormal sperm morphology; hormonal abnormalities	Plastics and glue manufacturing
Solvents (i.e., benzene, styrene, trichloroethylene)	Reduced sperm count and motility; abnormal sperm morphology; genotoxicity; erectile dysfunction	Petrochemical industry; plastics manufacturing; dry cleaning; degreasing operations

(continued)

Table 1.1 (continued)

Exposure	Observed effects	Occupations/industries where exposure may be found
Metals		
Cadmium	Reduced sperm motility	Manufacture of batteries, solar cells, alloys, pigments, plastics; electroplating; recycling and hazardous waste operations
Chromium	Abnormal sperm morphology; reduced semen quality; hormonal abnormalities	Manufacture of stainless steel, pigments, batteries; chrome plating; tanning and glassmaking; wood preservation; painters, cement workers, welders
Lead	Reduced sperm count, motility, and viability; abnormal sperm morphology; reduced semen quality; infertility	Brass/bronze foundries; manufacture of car batteries; residential and commercial remodeling (construction before the 1980s); sandblasters; firing range instructors
Pesticides		
Dibromochloropropane (DBCP)	Reduced sperm count; hormonal abnormalities; testicular atrophy; infertility	Agricultural fumigant, now banned in the United States
Organophosphates	Reduced sperm count; reduced semen quality; hormonal abnormalities; genotoxicity	Pesticide manufacture; insecticide sprayers; farmers; pharmaceutical manufacture; military
Multiple pesticides	Reduced sperm count and motility; abnormal sperm morphology; erectile dysfunction; hormonal abnormalities; spontaneous abortion; birth defects	Pesticide manufacture; insecticide sprayers; farmers; greenhouse workers
Physical agents		
Heat	Reduced sperm counts and semen quality; abnormal sperm morphology; hormonal abnormalities; infertility	Work near large furnaces (ceramic industry) and other heat sources; welders
Mechanical pressure, i.e., bicycle saddles	Erectile dysfunction, penis sensitivity	Bicycle patrol officers; bicycle messengers
Radiation ionizing	Reduced sperm count; infertility	Nuclear power plant workers; healthcare workers; researchers; military
Radiation nonionizing (radar, microwave)	Reduced sperm count and motility; abnormal sperm morphology	Power line, cell tower, and radio tower workers; use of lasers; welders

the testes, accessory sex glands, or neuroendocrine (hormonal) system, resulting in one or more of the following outcomes: reduced sperm counts, motility, and viability; abnormal sperm morphology; reduced semen quality; abnormal neuroendocrine hormone profiles; reduced sexual function; and adverse birth outcomes, such as low birth weights, spontaneous abortions, and birth defects [34, 35].

Despite the list in Table 1.1, many chemicals encountered in the workplace have never been tested for reproductive toxicity, and signs and symptoms of impairment to male reproductive health can be difficult to identify [36]. For instance, dibromochloropropane (DBCP), an agricultural fumigant used in the 1970s, was only discovered to be a potent testicular toxin after the wives of employees of a DBCP-manufacturing company, talking at a company softball game, discovered that they were all having trouble conceiving children. DBCP was subsequently banned in 1977. Alert clinicians may be the first to discover such a sentinel event.

1.6 Prevention in Occupational Health

Clinicians can play a major role in preventing work-related injuries, illnesses, and fatalities. Since toxicology is fundamentally an aspect of pharmacology, exploring patient exposures to toxic substances, whether in the workplace or at home, uses the same approach. Contact irritant or allergic dermatitis, urticaria, phototoxicity, or other skin disorders trigger a search for work or home exposures or for prescription, over-the-counter, or traditional medications. Similarly, liver disease, renal disease, or neurologic disorders may warrant consideration of potential exposures in the workplace, home or community environment, in addition to a review of personal habits, diet, and medication usage. Occupational and toxicology textbooks organized by organ system as well as by a class of toxicants provide useful information, and each region of the United States is served by a NIOSH-funded Education and Research Center that includes occupational medicine expertise. The OSHA's Office of Occupational Medicine launched a *Clinicians* webpage (http://www.osha.gov/dts/oom/clinicians/index.html) to assist primary care clinicians and others caring for patients who work. Since one of the first steps in assessing exposure is to identify what the worker uses at work, the webpage includes a link to the OSHA Hazard Communication Standard and information on how to obtain a safety data sheet (SDS, formerly referred to as MSDS). All employers are required to have the SDS available for each potentially hazardous chemical in the worksite. The SDS contains the chemical name of the components and a listing of toxicological information, including both acute and chronic health effects.

Workplace injuries and illnesses are the result of safety and health hazards that can be anticipated, identified, and remediated. Each instance of fatal or nonfatal disease or injury is, by definition, preventable. Primary prevention starts with a general understanding of the work the patient does and potential hazards encountered. As the story in Box 1.2 shows, workers routinely exposed to heat (and their clinicians) should understand preventive measures, know the signs of heat-related illness, understand the potentially fatal risk from heat stroke, and be aware of

underlying health conditions, medications, or habits that may increase the risk [37]. Clinicians can play an important role in educating both their patients and employers regarding heat-related illness. For helpful information, see OSHA's Water, Shade, Rest Heat Campaign link under Resources at the end of this chapter.

1.7 Screening for Occupational Health Concerns

Asking about work can be challenging for clinicians, not only in terms of the time crunch in clinical practice but also because it involves ceding the role of "expert" to the patient, who has a body of knowledge that is not immediately available to us. Both patients and clinicians may have the tendency to "medicalize" workplace issues, seeking to provide medical or surgical interventions when actual prevention would require changes in work practices, labor-management negotiation, safety or industrial hygiene interventions, or regulatory enforcement. Clinicians may be asked to "fix" problems by providing written evaluations or requests for accommodation and other documents, often, it seems, to nobody's satisfaction. Breaking down these issues into components can help, along with identifying useful sources of information and referral patterns, some of which are included at the end of this chapter. It may help to keep the big picture in mind. Asking your patient about his work establishes respect and rapport, giving you a better insight into how he spends his time and what matters to him [38]. These two screening questions can be helpful in determining whether more time should be set aside for a detailed history:

- What do you do?
- Do you have any concerns about exposures at work?

Table 1.2 provides a list of situations that should trigger obtaining a more complete occupational and environmental exposure history.

Table 1.2 Reasons to take an occupational and environmental exposure history

• To determine and document mechanisms of work-related injuries
• To determine work-relatedness of injuries and illnesses (or to document reasoning for referral to a specialist for consultation regarding work-relatedness)
• To explore possible causes of illnesses of unknown origin, especially those of the skin, lungs, central nervous system, peripheral nervous system, liver, and kidneys
• To aid in management and return to work decisions regarding both work-related and non-work-related injuries and illnesses
• To determine whether or not illnesses are aggravated by work factors
• To explore causes of unexpected decline in clinical course or lack of treatment efficacy
• To provide patient education regarding the interaction between workplace hazards and health (i.e., asbestos workers and cigarettes; sleep apnea and truck driving)

1.8 Responding to Identified Occupational Concerns

When evaluating a possible work-related injury, clinicians must determine the mechanism(s) of injury, including the specific work tasks and ergonomic factors that may have contributed to the injury. Important factors include the number of hours worked per day, overtime, recent changes in job tasks or processes, tools used, environmental factors (such as temperature), previous work injuries, and exposures to chemical, biological, physical, biomechanical and psychosocial hazards. Cultural factors within the workplace and the worker including his or her primary language should be recorded. This information is important not only in establishing the cause of the injury for workers' compensation cases but also in making decisions on treatment, management, work restrictions, and return to work. Occupational diseases with long latencies require asking about previous jobs and exposures. Work activities and exposures should be considered when the usual medical management does not result in the expected improvement of a patient's illness, such as in work-exacerbated asthma, or when the etiology is unclear, especially for common target organs such as the lungs, skin, liver, kidneys, and central nervous system.

Because of its significant economic, social, and legal impact on workers and employers alike, the decision of work-relatedness for both injuries and illnesses should be based on as much information as possible. Helpful resources include OSHA's Clinicians' webpage and the Agency for Toxic Substances and Disease Registry (ATSDR)'s "Taking an Exposure History," which has a sample exposure history form, along with discussion and case studies. These and other tools and links can be found in the Resources section of this chapter.

1.9 Ethical Issues in Occupational Health

Ethical issues arise commonly in the field of occupational health. What information is an employer allowed to receive when paying for a preplacement or medical surveillance exam? What should a physician do when he or she is concerned about a dangerous workplace? How should a physician respond to an employer who is pressuring the physician to act in a way that is uncomfortable? The fundamentals of bioethics, beneficence, autonomy, justice, and non-maleficence apply in occupational health as they do in any other field of medicine. The American College of Occupational and Environmental Medicine (ACOEM)'s Code of Ethics [39] provides a good starting point for tackling these issues. Table 1.3 lists the guiding principles of ACOEM's Code of Ethics.

Maintaining confidentiality of a patient's personal health information is second nature to physicians, who are well versed in the Health Insurance Portability and Accountability Act (HIPAA). However, laws, such as State Workers' Compensation regulations or federal OSHA standards that include medical surveillance, create significant confusion in this regard. In general, physicians should follow usual practice, keeping medical information confidential, and only release information with

Table 1.3 Seven principles of ACOEM's code of ethics

1	An obligation to enhance a safe and healthy workplace environment
2	An obligation to maintain ethical standards
3	An obligation to avoid discrimination
4	An obligation to maintain professional competence
5	An obligation to maintain patient confidentiality
6	An obligation to advise and report
7	An obligation to address conflict of interest

patient authorization. Physicians should become familiar with their State Workers' Compensation laws and understand their roles and responsibilities when performing industrial examinations, such as fitness for duty and medical surveillance exams. OSHA's Clinicians' webpage includes a link to state and federal workers' compensation agencies.

In the situation where a clinician becomes aware of a dangerous workplace, the ethical challenges are to intervene and prevent further illness or injury while respecting the autonomy of the patient. Depending on the situation, a clinician may gain permission from the patient to speak with the employer in an effort to advise the employer and remove the exposure. It may be possible, for example, to engage the employer's workers' compensation insurance carrier, which should be able to mobilize resources such as safety and industrial hygiene consultation that can identify hazards in the worksite and advise on approaches to remediation. OSHA also offers small business consultations separate from its enforcement activities (see OSHA links in the Resources section of this chapter). When the hazard or the illness is new or unexpected, for example, when workers in a popcorn manufacturing facility developed bronchiolitis obliterans [40] or when workers in a swine processing facility developed progressive neuropathy [41], the NIOSH Health Hazard Evaluation (HHE) program is more suited to evaluate emerging issues. More information on the NIOSH HHE program can be found in the Resources section of this chapter.

When the employer is unwilling to investigate and reduce exposures, you or your patient may wish to contact OSHA to determine whether a complaint should be filed. OSHA enforcement activities are highly structured and the best information comes from the local area office. OSHA inspections can reduce hazards and adverse health outcomes. Levine et al. reported that randomly inspected worksites subsequently experienced a 9.4 % decline in injury rates [95 % CI −0.177 to −0.21] compared with worksites that had been randomly selected on the same criteria but not inspected [42]. However, with fewer than 2000 inspectors nationwide for private workplace enforcement activity, even the most efficient targeting systems can address only a fraction of hazardous worksites. For information on contacting OSHA, worker rights, and clinicians' role, see the Resources section of this chapter.

1.10 Summary

Despite the frustrations and challenges, attention to occupational safety and health offers unique insights into patients' emotional and physical well-being and provides patients an opportunity to take ownership of important aspects of health promotion and injury prevention. Acknowledging the centrality of the patient's role in creating and ensuring a safe, healthy and fulfilling work environment helps establish respect and honors the dignity of his calling.

1.11 Resources

The Occupational Safety and Health Administration (OSHA) [http://www.osha.gov/] is charged with creating and enforcing regulations for safe and healthy workplaces. OSHA has a webpage for workers, detailing their rights for a safe and healthy workplace: http://www.osha.gov/workers/index.html. Employers can learn about their responsibilities and how to obtain assistance from OSHA at this link: http://www.osha.gov/employers/index.html

- Occupational Safety and Health Administration (OSHA). Heat Campaign: Water Rest Shade. Accessed at: http://www.osha.gov/SLTC/heatillness/index.html. It has many resources for employers and workers, including low-literacy information and a smartphone app that calculates the heat index and provides reminders about workplace protective measures.
- OSHA's Clinicians' webpage: http://www.osha.gov/dts/oom/clinicians/index.html. It provides information, resources, and links to help clinicians navigate OSHA's web site and aid clinicians in caring for workers. Key sections of the Clinicians' webpage include:
  - Ethics and Confidentiality in Occupational Health
  - Evaluating Occupational Exposures and Injuries
  - Medical Records—Laws and Confidentiality
  - Reporting a Dangerous Workplace
  - Setting up a Safe Outpatient Office
  - Workers' Compensation

The National Institute for Occupational Safety and Health (NIOSH) [http://www.cdc.gov/NIOSH/] is the US federal agency that conducts research, provides education, and makes recommendations to prevent worker injury and illness. NIOSH webpages of particular interest:

- Men's Reproductive Health in the Workplace: http://www.cdc.gov/niosh/topics/repro/mensWorkplace.html.
- NIOSH's Education and Research Centers [http://www.cdc.gov/niosh/oep/erc.html] are university-based programs located around the country. The centers provide clinical services, train occupational health professionals, and do research.

- NIOSH Health Hazard Evaluation [http://www.cdc.gov/niosh/hhe/] is a worksite evaluation that can be obtained through a request by an employer or three or more employees.
- NIOSHTIC-2 [http://www2a.cdc.gov/nioshtic-2/] is a searchable bibliographic database of occupational safety and health publications, documents, grant reports, and journal articles supported in whole or in part by NIOSH.

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency of the US Department of Health and Human Services tasked with providing evaluation and education regarding environmental health hazards. ATSDR's Case Studies in Environmental Medicine include "Taking an Environmental History": http://www.atsdr.cdc.gov/csem/exphistory/docs/exposure_history.pdf.

The Association of Occupational and Environmental Clinics (AOEC) [http://www.aoec.org/] is a nonprofit organization committed to improving the practice of occupational and environmental health through information sharing and collaborative research. AOEC has a network of over 60 clinics and 250 individual members across the United States and in some other countries. AOEC's clinic directory is a helpful resource: http://www.aoec.org/directory.htm.

The American College of Occupational and Environmental Medicine (ACOEM) [http://www.acoem.org/] is the professional organization of physicians specializing in the field of occupational and environmental medicine. ACOEM conducts continuing educational training for physicians, produces clinical guidelines and policies, and is a source for locating an occupational medicine specialist.

The American Public Health Association (APHA) [https://www.apha.org/] is the largest organization of public health professionals in the United States. APHA is comprised of multiple interest groups, including an Occupational Safety and Health section [https://www.apha.org/apha-communities/member-sections/occupational-health-and-safety] and a Men's Health Caucus [https://www.apha.org/apha-communities/caucuses/mens-health-caucus].

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