

State of the Sector | Healthcare and Social Assistance

**Identification of Research Opportunities
for the Next Decade of NORA**

Executive Summary

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health



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EXECUTIVE SUMMARY

Public awareness of the potential for health care to actually be the source of harm to patients through exposure to infectious agents, unintended error or known side effects of hazardous treatments has spawned a highly visible "patient safety" movement. Less visible, however, is the risk this same environment and these same hazards impose on the health of the women and men who work there. Although often thought of as clean and safe, workplaces in the Healthcare and Social Assistance (HCSA) sector are associated with many of the same types of exposures to chemicals and hazards found in "blue collar" industrial settings. The HCSA sector is burdened by the historical and entrenched belief that patient care issues supersede the personal safety and health of workers and that it is acceptable for HCSA workers to have less than optimal protections against the risks of hazardous exposures or injuries. Because patients and providers share the healthcare environment, efforts to protect patients and providers can be complimentary, even synergistic, when pursued through a comprehensive, integrated approach.

In order to address occupational safety and health issues of the nation, including those of the HCSA sector, the National Institute for Occupational Safety and Health (NIOSH) is working with a range of partners to develop an updated National Occupational Research Agenda (NORA). Each industrial sector is being addressed by a group of experts and stakeholders called a NORA sector council. This document was developed by the NORA HCSA Sector Council to address the "state of the sector," including the magnitude and consequences of known and emerging health and safety problems, important knowledge gaps, and opportunities for research to improve the "state of the sector" over the next decade of NORA.

1 INTRODUCTION

The HCSA sector is defined by North American Industry Classification System (NAICS) Sector 62 and includes establishments which provide healthcare and social assistance to individuals. Industries in this sector exist on a continuum starting with those establishments providing medical care exclusively, continuing with those providing healthcare and social assistance, and finally those providing only social assistance. The HCSA sector is comprised of four NAICS subsectors: ambulatory healthcare services (621), hospitals (622), nursing and residential care facilities (623), and social assistance (624). Social assistance includes establishments that provide nonresidential individual and family services for youth, elderly, and persons with disabilities; community food, housing, and emergency relief services; vocational rehabilitation services; and child day care services.

An estimated 17 million people, about 11% of the U.S. workforce, are employed within the HCSA sector. About 80% of the workers are in healthcare industries and 20% in social assistance industries. Growth of the HCSA sector through 2014 is projected to be more than any other industrial sector, including 12 of the 20 fastest growing occupations. About 80% of HCSA workers are women, a greater percentage than in any other industrial sector and nearly double that for all industrial sectors combined. Social assistance employs a greater percentage of women than healthcare, with child day care services having the greatest percentage (95%). African-Americans represent approximately 17% of HCSA workers, leading all industry sectors and 1.5 times the private industry average of nearly 11%. Asians represent approximately 5.4% of HCSA workers, ranking third among other major industry sectors and first total number of workers (0.94 million). Thus, the HCSA sector is highly diverse and any efforts to improve worker safety and health must be attentive to this diversity, to health disparities, and to the needs of a range of potentially at-risk populations including women, minorities, immigrants, and other potentially vulnerable populations.

Workers in the HCSA sector work to provide services to the sick and those in need of assistance. A partial list of these occupations includes physicians, dentists, dental hygienists and assistants, pharmacists, nurses, nursing aides, technologists and technicians, home health aides, respiratory therapists, occupational and speech therapists, social workers, child care workers, and personal and home care aides. Registered nurses constitute the largest occupation within the sector and number over 2 million, of which 70% are employed in hospitals. Nurses are perhaps the best studied group within the HCSA sector, and issues with nursing recruitment, retention, and burnout exemplify the importance of occupational safety and health issues faced by the entire sector.

The industry also employs many occupations found in other industries, such as food preparers and servers; housekeeping cleaners; ambulance, truck, and bus drivers; pilots; receptionists; billing and posting clerks; material moving workers; secretaries; and file clerks.

1.1 COMPREHENSIVE INTEGRATED APPROACH TO IMPROVE PATIENT/WORKER SAFETY

Promoting a culture of safety in the healthcare workplace benefits workers, patients, family members, and all who enter these facilities. The potential hazards which exist in healthcare settings—such as exposures to airborne infectious agents; spills of industrial grade disinfectants or toxic, anti-cancer drugs; or encounters with distraught, potentially violent emergency room visitors affect both patients

and workers. Similarly, safe patient lift assist equipment protects the healthcare worker's back and also prevents patient injury from skin tears or unanticipated falls during lifting. Thus, safety programs should not discriminate between patients and workers. Rather, they should promote comprehensive "systems of safety" in these organizations and promote "cultures of safety" that address all known hazards and are supported by all levels of HCSA organizations. Although many examples exist of institutions that have successfully adopted comprehensive approaches to safety and health, widespread implementation in the HCSA sector remains an important goal.

1.2 HAZARDS OF EMPLOYMENT IN THE HCSA SECTOR

Providing competent, compassionate care to patients and clients in need is hard work. It is also hazardous. In 2005, there were 668,000 episodes of nonfatal occupational illness and injury in the sector, equivalent to one episode occurring every 47 seconds of that year. Compared to other industrial sectors, the sector had the second largest number of such injuries and illnesses. In 2005, the combined number of injury and illness cases involving days away from work for nursing aides, orderlies and attendants, and registered nurses accounted for over 30% of all occupational injuries and illnesses involving days away from work. In the same year, two-thirds of personal assaults and violent acts associated with occupation occurred in the HCSA sector.

Although there are many commonalities between the occupational safety and health problems faced by HCSA workers and workers in other industrial sectors, such as exposure to hazardous chemicals, there are also a number of issues that are unique to the sector. Because 8 in 10 HCSA workers are women, adverse reproductive outcomes and obligations outside of the workplace are especially prominent issues. Also unique to the HCSA sector is the stress of dealing with the highly charged HCSA environment, exacerbated by traditional patterns of work organization including long or unpredictable work hours, rotating shifts, and under-staffing. Other hazards unique to HCSA include risks associated with patient lifting and handling, work that takes place in private homes or "in the field," exposures to hazardous drugs administered to patients, and sharps injuries with their associated risk of transmitting hepatitis or other bloodborne pathogens. HCSA workers must also face unknown exposures and risks, as they are routinely on the front line in caring for those with emerging infectious diseases i.e. severe acute respiratory syndrome (SARS), avian influenza and pandemic influenza) or the emerging threat of bioterrorism i.e. anthrax and smallpox. Workers in the social assistance sector may also come in contact with clients with undiagnosed, contagious illness, such as tuberculosis.

1.3 WORKERS RECOGNIZE HIGH RISKS OF THE WORKPLACE

In 2001, the American Nurses Association conducted a survey of 4,826 nurses from across the United States. Eighty-eight percent of nurses participating in the survey reported that health and safety concerns influenced their decision to remain in nursing and the kind of nursing work they chose to perform. More than 70% said the acute and chronic effects of stress and overwork was one their top health concerns. More than two-thirds reported being required to work mandatory overtime every month. Disabling back injury and fear of contracting human immunodeficiency virus (HIV) or hepatitis infection from a needlestick injury were also among the top three health concerns. Seventeen percent had been physically assaulted, and more than half were threatened or had experienced verbal abuse in the last year. Remarkably, less than 20% of respondents felt safe in their current work environment. Similarly, a 2004 national study of licensed social workers found that 44% of respondents faced personal safety issues in their primary employment practice and of these, 30% did not think their employers adequately addressed safety issues (<http://workforce.socialworkers.org/whatsnew/safety.pdf>).

2 OPPORTUNITIES FOR OCCUPATIONAL SAFETY AND HEALTH RESEARCH IN THE HCSA SECTOR

A range of opportunities exist where research could lead to improved occupational safety and health in the HCSA sector. In the following discussion, these opportunities are organized into two groups. The first group of opportunities are those that can have a positive impact on many of the health and safety problems in the sector. The second group pertains to specific health and safety risks and outcomes.

2.1 CROSS-CUTTING RESEARCH OPPORTUNITIES IMPACTING MANY HEALTH AND SAFETY PROBLEMS

2.1.1 Safety Culture and Safety Climate

A key research opportunity impacting many other health and safety issues lies in the areas of safety culture and safety climate. Safety culture refers to the underlying principles, norms, values, and beliefs of an organization with respect to safety. Safety climate refers to employees' shared perceptions about safety within their work organization, including work in the field. Safety climate is therefore a manifestation of safety culture. A strong safety culture facilitates effective responses to

a range of health and safety hazards. Longitudinal studies with repeated measures of safety culture/climate and injuries/exposures, employee retention and recruitment, and patient quality-of-care outcomes would be helpful in providing reliable estimates of these relationships. Studies are needed on the cost-effectiveness of programs that enhance and support safety culture, as evidence of this type might be beneficial in building toward a culture of safety.

2.1.2 Business Case for Managing Safety and Health

Successful companies recognize that safety and health must be managed like any other part of the business and, more importantly, understand that managing health and safety is the right thing to do. These companies rely on a programmatic approach to health and safety management, incorporating a culture where everyone in the organization (senior management, supervisors, and employees) values, takes responsibility for, and is accountable for health and safety performance. According to the Occupational Safety and Health Administration (OSHA), the American Society of Safety Engineers, the American Industrial Hygiene Association, Liberty Mutual Insurance Company, and others, companies with effective health and safety programs can expect a return on investment of at least \$3–\$6 for every \$1 invested, in addition to other benefits such as reduced workplace injuries and illnesses, improved employee morale, and increased public image as a safety and health leader. Although existing information provides powerful motivation for HCSA establishments to implement effective health and safety programs, further research documenting the economic advantages and business case for managing occupational health and safety risks remains essential.

2.1.3 Work Organization

Work organization refers to how jobs are designed and the way jobs are performed and managed. There are six major components to work organization—work schedule, caseload size, job design, interpersonal relationships with supervisors and coworkers, career concerns, management style, organizational characteristics—and some experts also include the work-home interface as a component of work organization.

There are many opportunities for research in each component of work organization. Research opportunities include surveillance to better identify work organizational hazards, the numbers of workers exposed, and the types of negative outcomes experienced. Research is also needed to guide the development of better work strategies, interventions to reduce risk and improve cost-effectiveness, and test procedures to assess the effectiveness of interventions.

2.1.4 Public Health Emergencies: Mass Casualty Events

In the event of a wide range of public health emergencies, whether natural (floods, tornadoes, hurricanes, pandemics) or man made (terrorist attacks, chemical spills/releases), the HCSA sector is part of the critical infrastructure needed to minimize morbidity and mortality. Because of the vast array of types of emergencies, HCSA workers could potentially encounter a broad range of scenarios with very different, specific needs concerning occupational safety and health. Still, there are common needs to develop and implement best practices for “surge capacity” that provide good patient care yet protect workers. These practices must promote a healthy safety culture/climate and address issues of work organization. A particular need is to develop solutions for workers’ outside obligations (such as caring for family members) that might interfere with their ability to work during public health emergencies. Development of systems for worker education and implementation of prevention measures tailored to specific types of emergencies are also important needs.

2.1.5 Prevention through Design

The most effective way to prevent a broad range of occupational injuries, illnesses, and fatalities is to “design out” or minimize hazards and health and safety risks early in the design process. A newly coined term, “prevention through design,” or PtD, describes this approach. Within the HCSA sector, PtD can be applied at all organizational levels, including the product-user interface; processes, materials, equipment, and associated work practices; work organization and policies; and design, construction, maintenance, and renovation of built environment with an emphasis on controlling airborne pathogens and manual handling. There are excellent opportunities for research in this area. Research and demonstration projects could be conducted to develop interdisciplinary collaborations between designers and HCSA workers. A clearinghouse of good practices could be developed. Training and education could be targeted to both designers and HCSA workers to improve mutual understanding and improve incorporation of health and safety concepts into new designs. Surveillance could be used to gather information about relationships between design and injury or illness and used to guide efforts for redesign/design to improve occupational safety and health. Such evidence could be used to develop or improve recommendations for standards and guidelines for design of medical and social service facilities and products to optimally protect the safety and health of healthcare and social service workers and patients/clients.

2.1.6 HCSA Sector and the Environment

There are important links between the HCSA sector and the environment. Environmental events, such as natural disasters or degradation of environmental

quality, create burdens for the HCSA sector. Conversely, the HCSA sector creates burdens for the environment. Hospitals and other healthcare organizations are major consumers of natural resources including energy and water. The healthcare system uses a wide variety of toxic materials with the potential for exposure and its effects on patients, workers, and visitors. The HCSA sector is also a significant source of pollution. Hospitals alone generate more than 2 million tons of waste annually and in recent years were the third highest source of pollution from dioxins and the fourth highest source of pollution from mercury. Up to the present, many of the efforts to reduce pollution by HCSA facilities have focused on reducing hazardous materials causing pollution without regard for the work environment. Research is needed to develop integrated solutions that consider occupational and environmental health and safety in concert and do not simply shift risks from one to the other. Research is also needed to demonstrate the economic advantages related to environmental health and safety in the HCSA industry. Educational programs targeted to designers and HCSA professionals are also needed.

2.1.7 Nursing and Other Professional Worker Shortages

Research across the broad range of areas noted in this document is relevant to addressing problems of the nursing shortage, retention, and burnout. The nursing shortage and its ultimate effects on nurses' fatigue, injuries, and errors needs further exploration. Also important is how the work that nurses do impacts the quality of care patients receive, along with work organization issues that put nurses at risk. In addition, research should examine the role that nursing schools play in preparing nursing students to deal with occupational health and safety issues, including workplace risk and hazards associated with nursing. Students should acquire not only knowledge regarding these hazards but also how to protect themselves against exposures to these hazards. The relationship between worker safety and patient safety should be explored. Nursing curricula should also encompass other issues that exist in the real world of nursing practice. The increase of acute care in the home setting, home infusion opportunities, and other alternate-site nursing roles should be explored with nursing students. Another area worth investigation is why so many graduating students never practice in the nursing profession may provide insight into the gaps that exist in preparing the student for a realistic nursing career. Another important area for additional research is how best to support practicing nurses, in particular the aging nurse.

Nursing is not the only occupation facing workforce shortages. For example, a workforce shortage is also predicted for social workers. A recent study found that 12% of licensed social workers had plans to leave the workforce within the following two years. Seven percent of licensed social workers planned to leave due to retirement; another five percent planned to continue working, but to leave the

profession. The profession identified three challenges to maintaining its workforce; replacing retiring social workers; recruiting new social workers; and retaining the current work force.

2.1.8 Occupational Health Surveillance

Occupational health surveillance—the on-going tracking of work-related injuries, illnesses, hazards, and exposures—is an important need for the HCSA sector. Although surveillance of work-related fatalities is comprehensive in nature, existing national surveillance systems for tracking nonfatal occupational injuries and illnesses are fragmented and contain substantial data gaps. Innovative and comprehensive approaches involving multiple data sources are needed to track nonfatal work-related injuries and illnesses. Enhancing existing surveillance systems to include information on industry and occupation would permit ongoing assessment of the work-relatedness of health conditions. A national approach which focuses on the collection of data on leading indicators of work-related hazards, injuries, and disease is needed. Furthermore, robust surveillance data is needed to (1) identify new and emerging occupational health and safety problems and populations at risk, Surveillance systems must recognize diversity in the HCSA workforce and be able to identify and track health disparities across the full range of at-risk populations, including minority groups, immigrants, and other potentially vulnerable populations, (2) describe the magnitude and temporal trends of an injury or disease (or other health-related event or exposure), (3) guide immediate action for cases of occupational health importance, (4) set priorities for prevention and research activities, and (5) evaluate the effectiveness of interventions.

2.2 RESEARCH OPPORTUNITIES IMPACTING SPECIFIC HEALTH AND SAFETY PROBLEMS

2.2.1 Work-related Musculoskeletal Disorders

Work-related musculoskeletal disorders (MSDs) are defined as an injury of the muscles, tendons, ligaments, nerves, joints, cartilage, bones, or blood vessels in the extremities or back that is caused or aggravated by manual handling work tasks such as lifting, pushing and pulling, and carrying; as well as working in awkward postures with very repetitive or static forceful exertions. MSDs occur frequently in the HCSA sector. In 2005, the incidence rate of sprains and strains involving days away from work was 82.3 cases per 10,000 workers. The part of the body most affected was the trunk, with an incidence rate of 66.8 cases per 10,000 workers, nearly 1.5 times greater than private industry as a whole. The healthcare patient was the most frequent cause of injury at a rate of 47.5 cases per 10,000 workers.

Given that the average workers' compensation cost for back pain is \$10,689 per case, back injury alone represents a significant health and economic burden.

While there has been much progress in recognizing the hazards of manual patient handling to both patients and staff and in developing equipment that can reduce manual handling of patients, research is needed to address barriers to implementation of known interventions. There is still more to learn about how work system interactions between environment, technology, organization, task requirements, and individual factors can lead to MSDs and to further improve interventions at all of these levels. There is a particular need to address MSDs in the home health setting where interventions such as lifting equipment are generally unavailable. Better surveillance systems for tracking illnesses and injuries among HCSA workers in the home health setting are needed, as are interventions targeted to protect workers in that setting.

2.2.2 Slip, Trip, and Fall Incidents

Slip, trip, and fall (STF) incidents are another important cause of injury in the HCSA sector. In 2005, the rate for STF incidents in HCSA workers was 35.2 per 10,000, 76 greater than for private industry as a whole. Risk of STF incidents is based on a range of factors including personal factors, environmental characteristics of the workplace, and housekeeping procedures. There are known effective interventions for reducing STF incidents. Research is needed to identify effective ways to implement these interventions. In addition, more research is needed that is specifically targeted to HCSA workers, nursing homes, outpatient centers, and other areas where HCSA workers deliver services, including the home health setting. More research is needed to identify slip-resistant flooring and shoes that can be worn by staff. Public health information dissemination is needed to raise awareness and facilitate implementation of interventions.

2.2.3 Violence

Violence is a major problem for HCSA workers. Available data from BLS, which is already compelling, probably underestimates the true extent of the problem. More minor injuries resulting from violence, that do not result in lost time away from work, often go unreported. Failure to report is often the result of a perception that exposure to violence, often from confused, disoriented patients or clients, is part of the job and cannot be totally eliminated. Proposed interventions exist. In 1996, OSHA issued *Guidelines for Preventing Workplace Violence for Healthcare and Social Services Workers*. A recent evaluation suggested that, although these guidelines capture what are thought to be the essential elements of a violence prevention program, little empiric evidence exists that documents their effectiveness.

An intervention additional to those presented in the guidelines, informing HCSA workers of the prior assaultive behavior of violent patients/clients, has been suggested as very effective. Rigorous research is needed to evaluate the effectiveness of all the components of comprehensive violence prevention programs. Economics research is needed to assist employers in assessing the cost-benefit of prevention and compare cost-effective options. Assessment of benefits should consider burn-out and workforce shortages. Methods to ensure accurate and consistent reporting of violent episodes are needed to target the development of prevention programs, to monitor trends, and to evaluate effectiveness. The implications and opportunities associated with using electronic medical records to identify patients with histories of violent behavior should be explored.

2.2.4 Hazardous Drugs

Drugs are classified as “hazardous” if studies in animals or humans indicate that exposures to them have a potential for causing cancer, developmental or reproductive toxicity, or other organ system damage. Most hazardous drugs are those used to treat cancer, but also include other types of drugs such as antiviral agents used to treat HIV/acquired immunodeficiency syndrome (AIDS) and other viral infections. Although the potential therapeutic benefits of hazardous drugs outweigh the risks of side effects for sick patients, exposed HCSA workers risk these same side effects (especially cancer and adverse reproductive outcomes) with no health benefits realized. Evidence for work environment contamination and worker exposure to hazardous drugs used for treating patients has steadily grown and has been well documented. The clinical significance of exposure is unclear, however. Surveillance systems designed to track both cancer and adverse reproductive outcomes by occupation and specifically by specialization within an occupation (e.g., oncology nursing, oncology pharmacy practice) are sorely needed. Research is also needed to document the efficacy of healthy safety culture/climate promotion and adherence to safe handling practices in reducing exposures to hazardous drugs.

2.2.5 Chemical Hazards

HCSA workers are also at increased risk for many of the types of adverse health effects potentially caused by hazardous chemical exposures, including cancer, adverse reproductive outcomes, work-related asthma and dermatitis. Although a wide range of hazards exists, a key barrier to addressing them is the misconception that HCSA work is safer than other work involving exposure to chemical and physical hazards. Improved health and hazard surveillance could help to address this issue, as would epidemiological studies to better evaluate relationships between hazardous exposures in the HCSA sector and development of work-related health outcomes such as cancer, adverse reproductive outcomes, asthma, and skin

disorders. Research is needed to document a beneficial impact of improved safety culture/climate, especially with regard to implementation of measures to reduce exposure including elimination; substitution; use of appropriate work practices, engineering controls, and personal protective equipment; and adoption of a precautionary approach in dealing with exposures of uncertain toxicity.

2.2.6 Sharps Injuries and Bloodborne Pathogens

Sharps injuries and bloodborne pathogens remain an important issue in the HCSA sector. HIV, hepatitis B virus (HBV), and hepatitis C virus (HCV) are bloodborne pathogens of special concern because of their potential for occupational transmission and the severity of illness that they cause. A vaccine exists for HBV, but vaccines are not available for HIV or HCV. Thus, prevention of transmission in HCSA workers depends on prevention of sharps injuries and other blood and body fluid exposures. Unfortunately, sharps injuries continue to occur frequently. Although surveillance data is fragmentary, it has been estimated that over 384,000 percutaneous injuries are sustained annually by hospital-based healthcare personnel. Since hospital-based personnel only account for about half of all healthcare personnel, the total number of percutaneous injuries in the HCSA sector may be considerably higher; only limited data is available to support an estimate that includes nonhospital-based personnel. Elimination of sharps injuries will require a coordinated, multifaceted, and multidisciplinary approach. Priority action items developed during a recent stakeholder meeting sponsored by CDC included improved surveillance, education and training of HCSA workers, identification of human and organizational factors that reduce adherence to safe practices and developing interventions to address them, and continued development and implementation of devices with engineered sharps injury prevention features.

2.2.7 Other Infectious Diseases

In addition to bloodborne pathogens, HCSA workers are also at risk for a number of other occupationally acquired infectious diseases. Depending on the specific pathogen, transmission can occur via direct contact with patients or contaminated surfaces or by airborne exposure to bio-aerosols, generated mainly by sneezing and coughing, that range from large projectile droplets to small particles remaining in the air. The potential threats associated with new and emerging infectious hazards have caused much concern; these threats include SARS, avian influenza, pandemic influenza, and multidrug-resistant pathogens such as methicillin-resistant *Staphylococcus aureus* (MRSA) and extensively drug-resistant tuberculosis (XDR-TB). Since the anthrax attacks of 2001, there has also been great concern about the risks that HCSA workers might face in subsequent attacks using highly contagious bioterrorism agents such as smallpox. In many cases, interventions

exist to prevent transmission. Hand washing, vaccination, and rapid recognition and appropriate isolation of potentially contagious patients are especially important interventions. There are a number of opportunities for research with relevance and impact. Although routine surveillance is performed for some infectious diseases, there is no broadly representative, ongoing surveillance for all infectious diseases across the sector. Research is needed to identify barriers to adherence and achieve better implementation of known, effective interventions such as hand washing and immunization for influenza. A particularly important need is to better understand the potential for agents, such as SARS and influenza, to be transmitted via the airborne route. A related need is to better understand how exposures to airborne infectious agents should be reduced using interventions such as engineering controls and personal protective equipment. In the case of personal protective equipment, implementation issues, such as appropriate frequency of fit testing, have been particularly controversial; research could help to resolve this. Another area for research is to better understand the risks faced by HCSA workers with illnesses or on medications that compromise their host defense systems and how best to protect them from occupational infectious diseases.

3 RECOMMENDATIONS

The NORA HCSA Sector Council identified many opportunities for a national agenda that would address the needs of the HCSA sector and have a high likelihood of impact. Examples of research in need of funding and support include hazard and health surveillance, demonstration projects to apply and refine best practices, research studies to demonstrate intervention effectiveness and to evaluate the impact of regulations (e.g., patient lifting, safe needle devices), economic studies to document the financial impact of interventions that improve HCSA worker safety and health, research to develop new interventions (e.g., safer medical devices, personal protective equipment and clothing, novel ventilation), and studies that evaluate the relationship between worker health and safety and patient outcomes. A very important need is research targeted to nonhospital settings, especially home healthcare settings and social service settings.

Health and safety culture is viewed by many as the single most important driver in achieving a positive impact on worker health and safety. Studies are needed to improve measurement of HCSA safety culture/climate and to document the relationships between safety culture/climate and occupational safety and health metrics. Development of interventions that strengthen HCSA safety culture/climate, such as education and training for management and workers, is an important need.

Public health marketing is needed to improve awareness of occupational health and safety issues within the HCSA sector and those it serves. A particularly important need is to overcome the misconception that it is appropriate, acceptable, or necessary to risk HCSA worker safety and health while treating patients. On the contrary, improving HCSA worker safety and health leads to improved patient safety.

The business case for implementing an effective health and safety program is compelling. Companies with strong health and safety programs experience a return on investment of at least \$3 to every \$1 invested. Many other benefits add value to an organization, such as improved employee morale and increased public image as a health and safety leader. There is a need to market the business case for health and safety to employers in the HCSA sector and to promote implementation of the key elements of effective health and safety programs.

Advancing health and safety research in the HCSA sector will require strong partnerships. Stakeholders in industry, labor, academia, and government must come together and share their different perspectives and abilities to address the problem. Similarly, addressing the needs of the sector will require partnerships between many disciplines. Involvement of industrial hygienists, epidemiologists, laboratory researchers, architects, engineers, social scientists, economists, communications experts, educators, and clinicians all are necessary to ensure that key research issues are adequately addressed. Although the challenges are great, so are the opportunities to address them through broad and inclusive partnerships.



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