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Commentary

Statement on National WorkLife Priorities

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The National Institute for Occupational Safety and Health (NIOSH) WorkLife Initiative (WLI) [http://www.cdc.gov/niosh/worklife] seeks to promote workplace programs, policies, and practices that result in healthier, more productive employees through a focus simultaneously on disease prevention, health promotion, and accommodations to age, family, and life stage. The Initiative incorporates the Institute's foundational commitment to workplaces free of recognized hazards into broader consideration of the factors that affect worker health and wellbeing. Workplace hazards, such as physical demands, chemical exposures, and work organization, often interact with non-work factors such as family demands and health behaviors to increase health and safety risks. New workplace interventions being tested by the first three NIOSH WLI Centers of WorkLife Excellence are exploring innovative models for employee health programs to reduce the human, social, and economic costs of compromised health and quality of life. Many parties in industry, labor, and government share the goals of improving employee health while controlling health care costs. NIOSH convened a workshop in 2008 with representatives of the three Centers of Excellence to develop a comprehensive, long-range strategy for advancing the WorkLife Initiative. The recommendations below fall into three areas: practice, research, and policy. Responding to these recommendations would permit the WorkLife Center system to establish a new infrastructure for workplace prevention programs by compiling and disseminating the innovative practices being developed and tested at the Centers, and elsewhere. The WLI would also extend the customary scope of NIOSH by engaging with multiple NIH Institutes that are already generating research-to-practice programs involving the working-age population, in areas such as chronic disease prevention and management. Research to Practice (r2p) is a concept focused on the translation of research findings, technologies, and information into evidence-based

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prevention practices and products that are adopted in the workplace or other "real-world" settings. NIOSH's goal is to overcome the translational issues that now prevent state-of-the-art occupational health, health promotion, and chronic disease research findings from benefiting working age populations immediately, regardless of workplace size, work sector, or region of the country. Am. J. Ind. Med. 54:10–20, 2011.

KEY WORDS: WorkLife Initiative; employee health; health promotion; occupational health; workplace; health policy

RECOMMENDATIONS

Practice

1. Expand dissemination of practical, science-based information for improved worksite programs and practices. Significantly increase the dissemination of research information and practice models through national and regional conferences and proceedings, web sites, and shared distance learning seminars and other web-based educational offerings.

2. Develop an internet-based open source system for disseminating best practices recommendations, validated assessment instruments, tool kits, and model programs.

3. Provide cost utility information and other prevention cost metrics to assist employers in financing preventive measures through insurers and vendors.

Research

4. Identify the characteristics of best practice programs with a particular emphasis on programs that pay attention to differences in work settings and differences in worker demographics and that engage employee participation.

5. Identify factors contributing to, or limiting, program adoption, implementation, maintenance, and long-term sustainability.

6. Develop a conceptual framework useful to the academic and business communities and to government in order to guide and coordinate research directions and priorities.

7. Address key methodological barriers and challenges to this research.

Policy

8. Develop and communicate public policy options supporting integrated employee health programs for adoption by Federal and State lawmakers, employers and insurers, labor unions and pension funds, health care providers and health and safety professionals.

9. Extend the current NIOSH WorkLife Center of Excellence program to every region of the United States and fully fund all Centers to allow development of a comprehensive research, translation and outreach program to all employment sectors. Engage other CDC Centers and the institutes of the NIH in support of the National WorkLife Initiative.

10. Develop and fund integrated employee health demonstration projects in several employment sectors to document organizational, economic and health outcomes to guide further development of integrated employment-based health care programs.

HISTORY AND INTRODUCTION

Ill health and injury, whether caused by work or resulting from off-work activities, reduces income, quality of life, and opportunity, for both the affected workers and those dependent on them. The protection, preservation, and improvement of the health and well being of people who work are goals shared by workers, their families, their employers, and the government.

The National Institute for Occupational Safety and Health provides national and world leadership to understand and prevent work-related disease and injury. Traditionally, NIOSH has focused efforts almost exclusively on prevention of exposure to toxic substances and hazardous conditions at work. This approach has had substantial success in contributing to reductions in occupational disease and injury, especially asbestosis, silicosis, and lead poisoning and many work-related cancers. On average, workers are healthier and less likely to be injured than when NIOSH was established by the Occupational Safety and Health Act of 1970 [Institute of Medicine, 2000].

However, the overall health of Americans of working age is influenced by factors both inside and outside the workplace: demands at work and home, physical and chemical exposures, energy imbalance from diet and limited exercise, smoking, the use of medications, hypertension, and alcohol use, to name a few. The effects of the many social, cultural, and economic influences on health [Landsbergis et al., 1998] cannot be artificially divided between ''at work'' and ''non-work.'' Just as workplace conditions can affect health and well-being, exposures, activities, and conditions outside of working hours can substantially determine health, productivity, and responses to exposures during work [Eakin, 1997; Albertsen et al., 2006; Sorensen et al., 2007; Punnett et al., 2009].

NIOSH has recognized the potential for improving workforce health and well-being through improved worksite programs and policies. The NIOSH WorkLife Initiative (WLI) was launched in 2004 to promote information dissemination, research, and policy development relevant to the integration of worksite health protection and health promotion programs and policies.

The Case for Change

Despite obvious interactions and effects on worker health from sources on and off the job, there has been a longstanding separation in the public health and employment communities between those interested in control of health risks and hazards from work and those focused on individual and community health risk reduction outside the workplace [Sorensen and Barbeau, 2004; Institute of Medicine, 2005]. On the one hand, members of the labor and occupational health communities sometimes regard health promotion in the workplace as a diversion of employers' attention from their legal responsibility to provide workplaces free of recognizable hazards and of scarce resources from occupational health strategies that involve investment in safer equipment and work processes. At worst, there is risk of distracting attention from the occupational health needs of most workers by emphasizing an individualized focus on a high-risk few [Levenstein, 1989; Blewett and Shaw, 1995; Barbeau et al., 2004].

On the other hand, some morbidity, such as musculoskeletal disorders, can be attributed to a mix of work exposures and individual worker characteristics such as obesity and lack of physical fitness. Prevention of chronic disease risk factors, as well as efforts to maintain high function and effectiveness, can not be confined to a 40-hr work week. It is also clear that a high functioning safety culture alone cannot eliminate some injuries or prevent many chronic diseases.

Those concerned with promoting health and controlling health care costs have viewed the workplace as a convenient and valuable venue to provide important services to a high priority population (and their families). However, many of these efforts have overlooked the impact of work exposures and the work environment (e.g., availability of healthy food choices or walking trails, ergonomic design of tasks and equipment, work organization and scheduling) and have focused instead exclusively on individual behavioral change [Aldana, 2001; Golaszewski, 2001; Harris et al., 2001; Sexner et al., 2001].

Considerable innovative rethinking of the relationships between work and health is needed. The divide between disciplines, among practitioners as well as scientists, could be bridged by developing better policies and communication, but there is also a need to inculcate a commitment to shared responsibility for improving health among employers and employees [Blix, 1999].

This new approach is resonating throughout the industrial world and anticipates the current emphasis on evidence-based practice and research-to-practice initiatives. A growing body of evidence justifies coordinated workplace interventions to diminish health threats to workers both in and out of work [Sorensen et al., 1992; DeJoy and Southern, 1993; Baker et al., 1996; Israel et al., 1996; Institute of Medicine, 2005; Henning et al., 2009; LaMontagne and Keegel, 2009; Punnett et al., 2009] and documents the benefits of these approaches [Sorensen et al., 1996, 1998b, 2002, 2005; Maes et al., 1998]. The World Health Organization and the Institute of Medicine have each concluded that both worksite health promotion and occupational health and safety are integral to good employee health management practices [World Health Organization, 1999; Institute of Medicine, 2005].

The need for this new approach is further underscored by several important trends. With costs of health insurance outpacing wage and profit growth, many employers are cutting back on health benefits and families are paying more out-of-pocket for their care [Medoff and Shapiro, 2000; Ni and Cohen, 2001]. As the US workforce ages, employers are increasingly recognizing the importance of maintaining the health and well-being of the workforce [Gobble, 2002; Institute of Medicine and Committee on Communication for Behavior Change in the 21st Century: Improving the Health of Diverse Populations, 2002]. With the rising trend toward corporate restructuring, mergers, and outsourcing, as well as the growing reliance on contingent workers, increasing numbers of workers are facing job loss and concomitant pressures such as increased work load or hours [Dooley et al., 1987; Landsbergis et al., 1999; Lee et al., 2004]. These same labor force factors may also discourage investment in the long-term health of a dedicated workforce.

Facing these needs are several obstacles to comprehensive worksite health programs. Access to relevant information about best and promising practices to sustain and improve worker health and wellbeing is limited, particularly for managers and workers in small and medium-sized workplaces. Also missing is objective analyses of the generalizability of practices that have worked in limited settings. Nevertheless, while new research is being conducted, there are opportunities for improved practice based on current proven best practices, and for new occupational health care policy developments to support a healthier workforce for years to come.

METHODS FOR DETERMINING RECOMMENDATIONS

The following three sections and accompanying recommendations—Practice, Research, and Policy—were prepared

through a group editorial process. Core written presentations in the three areas were prepared by discussants (the co-authors) and benefited from vigorous discussion and feedback at the workshop. Final drafts, incorporating that feedback, were approved by consensus among the authors who represent the three Worklife centers funded by NIOSH (M.C., R.H., J.M., L.P., and G.S.). One co-author (G.W.) was affiliated with NIOSH and responsible for coordination, but not for funding or oversight, of the Centers and was not writing on behalf of NIOSH.

RECOMMENDATIONS FOR PRACTICE

Workplace health promotion programs need to incorporate recent research findings on the influence of the occupational environment on individuals' health behaviors and on the effectiveness of current programs. The workplace is a complex environment with many features presenting opportunities for interventions that can affect program success or failure. The workplace should not be treated merely as the venue for individual behavior change interventions but as an environment that may have direct impact on the same risk factors and diseases targeted by workplace health promotion (WHP) programs [Macdonald et al., 2008; Henning et al., 2009]. Perhaps the starkest affirmation of this perspective has come from the prospective Whitehall studies, which have linked cardio-vascular disease events and metabolic syndrome with work organization stressors to a degree that equals or exceeds all commonly recognized physiologic and biologic risk factors [Chandola et al., 2005].

Participants in the 2008 workshop strongly recommended that NIOSH and the Centers within the WorkLife Initiative develop a (virtual) resource center to address the needs of employers and practitioners for information, technical assistance, and education. An organized network of WLI Centers would serve multiple purposes for enhancing practice, especially facilitating communication among the various WLI stakeholders as well as developing and evaluating guidelines and benchmarking tools, outreach materials, and programs. Thus the center would be both a centralized source of information and guidance as well as a mechanism for feedback from the field to researchers and educators (Fig. 1). Successful examples of such models on a state or regional basis can be found in the historical function of agricultural extension services, as well as in the NIOSH Education and Research Centers and Agricultural Health and Safety Centers.

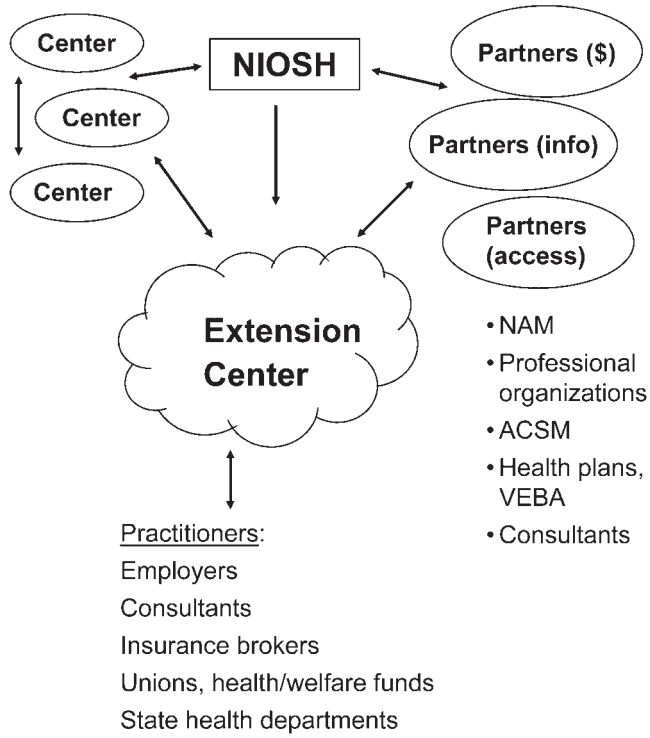

FIGURE 1. WLI virtual extension center: Examples of audiences for dissemination and partners, who may provide funding, information, and/or access to research or pilot sites (NAM, National Association of Manufacturers; ACSM, American College of Sports Medicine; VEBA, Voluntary Employee Beneficiary Associations).

> Recommendation #1: Expand dissemination of practical, science-based information for improved worksite programs and practices. Significantly increase the dissemination of research information and practice models through national and regional conferences and proceedings, web sites, and shared distance learning seminars and other web-based educational offerings.

This would be realized by NIOSH and the WLI Centers through:

- Expanded dissemination of research information and practice models, including research-to-practice, practice-to-research, and practice-to-practice.
- Networking among employers and professionals to share experiences and resources, including regional "brown bag" distance learning programs to advance working life skill levels among health and safety and employee services personnel.
- Feedback and evaluation from practitioners to the centers and to NIOSH.

It is essential to ensure that occupational health and safety obligations are addressed first, before employers seek to introduce health promotion activities. As a first principle, efforts to reduce common chronic disease, such as coronary heart disease, do not defer the primary requirement for a safe workplace. Employers should be encouraged to develop a culture of health based on a reference model of safety culture.

The OSHA Voluntary Protections Program (VPP) (http://www.osha.gov/dcsp/vpp/index.html) and the NASA culture of safety [Institute of Medicine, 2005] are two models that might be considered.

There is also a general need for ''research-to-practice dissemination,'' that is, sharing of research findings and instruments in a form that is useful to employers, unions and other labor advocates, worklife wellness and employee safety professionals, and other practitioners. Good practice can only be achieved if the information and services are available to effect behavior and workplace change, and if employers understand how to distinguish effective from ineffective programs.

Communication among stakeholders should be a two-way street: researchers can share the evolving evidence base for good practice, while practitioners can share experiences and raise questions that researchers might investigate. Field experience with variations in effectiveness among different settings will generate new research questions. Thus, a feedback loop should be built into the process of providing technical assistance for continuous improvement. In addition to responding to solicitations, the Centers would track what questions are being asked and develop a Frequently Asked Questions list.

The practice paradigm should include peer-to-peer activities. The center network could serve as a broker among employers, and also among different constituencies: employers, employees, unions, insurance companies, state health departments, etc. The Centers could facilitate ''practice to practice'' networking through documenting of case studies, sharing written and on-line resources, etc. The goals would be both to develop an employer practice network and to bring new content to existing networks.

The Centers could also develop ongoing mechanisms for communicating program experiences with each other and for circulating feedback from field sites, trainees, etc. This would serve to keep the research-practice feedback loop intact and viable. It presupposes a national network of regionally based centers. A NIOSH WorkLife news bulletin could include content from the Centers and external partners. Centers would also promote networking around shared goals with other health professionals and practitioners, including professional organizations such as the American College of Sports Medicine or the Society of Human Resource Managers.

> Recommendation #2: Develop an internet-based open source system for disseminating targeted best practices recommendations, validated assessment instruments, tool kits, and model programs.

Different communication strategies are likely to be needed for multiple audiences. Useful outreach materials might include a set of selling points for taking an evidence-based integrated approach to achieving a health-promoting company culture with a high degree of employee participation; and distance learning and other packages addressed directly to human resources and health and safety personnel. Examples of effective electronic communication include adaption and web-distribution of the IOM Integrated Employee Health Model by the Washington Business Group on Health (http://www.businessgrouphealth.org/pdfs/ib_stepsintegratingempHealthservices.pdf), convening and disseminating results of two national NIOSH WorkLife Conferences (http://origin.cdc.gov/niosh/programs/worklife/), and regional conferences like *A Healthier Workforce: Perspectives for Iowa and the Nation* (October 2008) which will be made web-available.

Centers would evaluate and compare a variety of strategies for engaging different functions within an organization (e.g., employee benefits, employee assistance, risk management, human resources, etc.) to join in an integrated approach. Cross-disciplinary teams (ranging from nurses to economists) sponsored by the Centers could provide outreach to multiple audiences. Centers based in academic environments could also utilize students and future professionals, who in turn would benefit from the training opportunities.

Some types of employee health programs and activities should be customized to smaller enterprises that have fewer resources, including technical personnel, or sector-specific where there are very distinctive features affecting occupational safety and health (OSH) and the general work climate, such as healthcare or construction. Programs must be affordable and accessible to small employers, unions, public sector, and non-profit groups. It is also necessary to consider different employee socioeconomic levels and the effects of telecommuting and home work on disparities in access to flexibility and program participation.

New informational ''toolkit'' resources will be developed, emphasizing and defining the integrated approach of combining workplace health and safety with wellness. The essential content features would be assessment, priorities, and goal setting. For example, one item in the toolkit might address organizational readiness, that is, the company's baseline preparation for implementation of change. Another form of outreach would be the development of course curricula and teaching cases for nursing students, MBA programs, and future wellness professionals. There is also an opportunity to train insurance representatives and health underwriters in how to integrate health and wellness with OSH, through a ''broker's institute.'' This could be an effective dissemination channel to potential WLI audiences, especially if these professionals were provided with a practical tool kit.

While integrating interventions that include conditions of work with components of individual health is fundamental to the WLI, truly integrated programs have been elusive.

The side by side co-management of health and safety and health promotion programs is an improvement over current practices, but it falls far short of an approach that simultaneously addresses the work environment and the individual. The potentially greater costs of structural interventions and resistance to concepts that suggest workforce self-management are formidable barriers. Employer caution and employee non-participation are the measures of unsuccessful integration. Considerable experimentation will be required, and that is a principal task of the current WLI centers.

Recommendation #3: Provide cost utility information and other prevention cost metrics to assist employers in financing preventive insurances through insurers and vendors.

Work organization interventions could be presented in relation to productivity and economic competitiveness. For example, a calculator or toolkit could enable quantification of benefits for a private sector employer, with analogous economic calculators for the public sector. Calculations would include program impact on both workers' compensation and group health costs, to insure that these tools go beyond conventional metrics (lost time, premium costs) to assess whether programs are effective in improving health and productivity. Return on Investment (ROI) and other calculators would also be desirable to assist employers in choosing services and vendors.

Implicit in recommendations 1–3 is the development of assessment guidelines and other benchmarking tools for assessing whether or not WHP services utilize a beneficial-integrated approach to worker health. WLI Centers would not take on the task of evaluating and recommending specific consultants or service providers but would seek to assure that services offered to employers are based on the best available evidence, for example, by disseminating criteria for evaluating quality and comprehensiveness of a given approach. Annotated checklists or other practical guides are possibilities. It is not foreseen that Centers would take on a certification or quasi-regulatory function.

RECOMMENDATIONS FOR RESEARCH

A growing body of evidence from research points to the importance of comprehensive and coordinated worksite programs, policies, and practices for improving worker health. This research, however, is in its infancy, and there remains a broad range of research questions that need to be addressed in order to maximize the potential impact of workplace interventions [Sorensen and Barbeau, 2004]. Research plays an important role at many junctures. Efficacy and effectiveness studies can provide rigorous approaches to evaluating interventions, allowing researchers to determine the extent to which observed outcomes can be directly attributed to the intervention being tested, and providing a means of controlling for secular trends [Flay, 1986; Koepsell et al., 1992; Susser, 1995; Murray, 1998; Sorensen et al., 1998a; Goldenhar et al., 2001; Shadish et al., 2002; Rabin et al., 2006]. In addition, research can illuminate the intersecting relationships among the physical and organizational work environment, individual health behaviors, and worker health outcomes. As tested interventions are moved into practice, research can help to identify effective strategies and tools for broad-based dissemination and adoption of programs, policies, and practices across diverse workplace settings.

Together, researchers across a range of disciplines can create broad-based partnerships with industry and labor in the design and evaluation of feasible, innovative, and comprehensive interventions. The development and dissemination of effective intervention methods will be enhanced with implementation across a broad research spectrum, from methods development studies through dissemination research. Through careful planning and purposeful and strategic operations, advances in the field will follow the application of rigorous research methodologies to evaluate the efficacy, generalizability, sustainability, and dissemination of integrated interventions across a range of worksite settings [Sorensen and Barbeau, 2004; Stokols et al., 2005].

Recommendation #4: Identify the characteristics of best practice programs, with particular attention to:

- The characteristics of best practices and processes across different work settings, industry sectors, worksite size, and related worksite characteristics;
- The characteristics of best practices and programs for different workers, based on occupation, race/ethnicity, wage, age, and other relevant worker characteristics; and
- The effect of employee participatory processes on program content and design, employee access, effectiveness, and long-term sustainability.

Evidence to date has focused on interventions tested within a relatively narrow set of worksites. Tested interventions need to be adapted to assure that there is an appropriate fit between tested methods and the context, setting, and circumstances of the population [Wandersman, 2003]. For example, effective programs are needed for the growing service sector; approaches shown to be effective in manufacturing settings may not be presumptively transferable without adaptation. Lessons learned from programs that address different types of workplace hazards (chemical, ergonomic, etc.) may also not be completely transferable. Similarly, the changing demographics of the workforce, including the growing number of immigrant workers and older workers and rising income inequalities and related

social disparities in risk-related behaviors and hazardous occupational exposures [d'Errico et al., 2007; Boyer et al., 2009], underscores the need for practices and programs that are responsive to the specific concerns and work experiences of our increasingly diverse workforce.

Recommendation #5: Identify factors contributing to, or limiting, program adoption, implementation, and maintenance.

Examples of factors that should be assessed include

- Barriers to and facilitators of program adoption (e.g., economic indicator, regulations, worker satisfaction);
- Outcomes of value to different stakeholders (e.g., employers, unions, workers, insurers);
- Factors contributing to the transferability and sustainability of programs, policies, and practices influencing worker health outcomes.

Research is needed to explicate the process of moving evidence-based interventions into practice [Bowen et al., 2009]. It is important that research identify motivators and facilitators as well as barriers to adoption of evidence-based interventions from the perspectives of employers, labor unions, insurers, workers, and other key stakeholders. In addition, it is important to explore factors contributing to the sustainability of these interventions, in order to assure that they can supported, maintained, and enhanced over time, especially in light of changing markets, labor practices, technologies, economies, etc. [Kottke and Pronk, 2006]. Intervention studies by the three NIOSH-funded national Work Life Centers are already providing valuable and unanticipated insights into program contouring to specific workforces.

Recommendation #6: Develop a conceptual framework useful to the academic and business communities and to government in order to guide and coordinate research directions and priorities.

Such a framework would help to:

- Articulate and synthesize diverse approaches for coordinating and integrating programs, policies and practices to promote and protect worker health;
- Outline shared outcomes and pathways through which programs, policies and practices may effectively influence worker health;
- Stimulate a dialogue across disciplinary boundaries; and
- Reflect a systematic review of the literature highlighting key gaps.

Comprehensive approaches to worker health require coordination and collaboration across multiple disciplines, with representation from occupational health and safety, behavioral and social sciences, health promotion, labor education, economics, and other areas. Such approaches offer the ability to apply both quantitative and qualitative research methods [Israel et al., 1996; Sorensen and Barbeau, 2004]. Development of a shared conceptual framework is needed to guide future research, stimulate discussion, and harmonize new collaborations across disciplines, ultimately contributing to improved programs, policies, and practices. This conceptual framework must additionally identify the range of underlying work conditions influencing worker health and those participatory features of programs which enable employees to take a more active role as the primary stakeholders [Macdonald et al., 2008; Henning et al., 2009].

Recommendation #7: Address key methodological barriers and challenges to this research.

The approach to addressing methodological barriers would include

- Assessment of the extent to which currently available tools adequately capture work exposures and their responsiveness to change, and develop or identify measures to assess work exposures across levels (e.g., worksite, supervisory, and worker levels);
- Identification of measurable outcomes that may motivate key stakeholders to adopt programs and assure broad-based application of standard measures (e.g., health, economic, product quality, and related outcomes);
- Development of tools and methods for observational research that can be applied as opportunities arise (e.g., to capture the effects of new policies or changes within vanguard companies); and
- Incorporation of mechanisms by which lessons learned from research and practice are used to inform the evolving WLI research program.

As this new field of research grows, it will be necessary to develop measurement tools that allow researchers to capture the impact of tested interventions across diverse settings using standardized, reliable, and valid measures. In addition, it may be necessary to diversify the research methods used, with particular attention to the development and adaptation of methods that bridge across disciplines. Observational methods must be fine-tuned for use as opportunities for natural experiments arise.

RECOMMENDATIONS FOR POLICY

Focusing on a healthy workforce and worker well being presents a different direction from traditional occupational

TABLE I. Current Trends in America for a Healthy and Productive Workforce

Perspective	Current state	Desired state
Function	Absenteeism	Performance
Cost metrics	Medical costs	Economic outcomes
Care model	Treatment focused	Prevention/behavior focus
Medical model	Individual	Population
Health metrics	Disease status	Health status
Interventions	Single-risk focused	Multiple-risk focused
Health framework	Employer/condition/ employee centric	Program centric
Management systems	Segregated programs	Integrated programs

safety and health protection programs. It requires a paradigm shift in defining employee health and safety goals, in organizing employee health programs, and a willingness to recognize and adapt to trends being set by leading US employers. The case for change from the traditional approach to an integrated employee health model has been summarized by the IOM in 2005 [Institute of Medicine, 2005], reproduced here in Table I.

While several major employers have already taken initial steps to implement these changes, there is no single model that can be readily transported. Many large international employers have idiosyncratic cultures that are entirely *sui generis*. There is a great need to elevate and emphasize public policies to drive the case for change among all US employers, not just among the largest and wealthiest American corporations.

> Recommendation #8: Develop and communicate public policy options supporting integrated employee health programs for adoption by Federal and State lawmakers, employers and insurers, labor unions and pension funds, health care providers and health and safety professionals.

An example of such a policy option would be federal legislation that would provide employers tax credits (or state-based workers' compensation premium reductions) if they were to adopt a comprehensive, integrated employee health program that would assure worker protection while also providing integrated health promotion and prevention incentives and targeted chronic disease management services.

Implementation of public policy through health care reform legislation may be the most efficient approach to achieve the needed paradigm shift, but passage of any federal or state-based health care reform is a difficult and often adversarial process. A less challenging and complementary policy approach would be to enhance significantly dissemination of currently available published research, case studies of current corporate models, and conference proceedings engaging stakeholders nationally and regionally. NIOSH can promote this type of dissemination through the WLI centers and can use the WLI network as a platform for piloting experimental programs.

> Recommendation #9: Extend the current NIOSH WorkLife Center of Excellence program to every region of the United States and fully fund all Centers to allow development of a comprehensive research, translation and outreach program to all employment sectors.

It is widely appreciated by policy makers that improved health protection and disease prevention programs together with better chronic disease management programs are likely to improve health outcomes while controlling downstream health care costs. Such employment-based programs are now increasingly available to American workplaces through insurance companies and independent vendors, but typically they emphasize individual behaviors rather than working conditions, may be limited in effectiveness, and lack rigorous evaluation. Because of the presumed, but poorly documented, positive health outcome and cost savings benefits of integrated health care programs, public policy leadership is needed to further develop and evaluate model programs.

The key to effective policy in the area of WorkLife is the development of a national network of regional centers for excellence. This has proven to be a highly successful strategy to promote comprehensive disease-specific research. An illustration is the National Cancer Institute's (NCI) Comprehensive Cancer Centers. The approach has been utilized by NIOSH to develop sector-specific occupational safety and health research through the Agricultural Health and Safety Centers. The WorkLife Center of Excellence program is a logical extension of this time-tested research program strategy, but it remains in its infancy, being limited to three Centers, two in the Northeast and one in the Mid-West. To respond more fully to the many research needs and, most importantly, to disseminate practices that improve health and reduce the chronic disease burden in the workforce, the NIOSH Center of Excellence program should be fully developed. Because the scope of the Centers will extend beyond traditional occupational safety and health and because the Centers' activities will be mainstreamed into the broader discourse on health and chronic disease prevention and management, the programmatic involvement of both the NIH and national public health institutions will be essential.

> Recommendation #10: Develop and fund integrated employee health demonstration projects in several employment sectors to document organizational,

economic and health outcomes to guide further development of integrated employment-based health care programs. Engage the institutes of the NIH and national public health institutions in the support of the National WorkLife initiative.

- Such a grant program would be a logical extension of the NIOSH WorkLife Initiative and would have the advantage of engaging key stakeholders from several employment sectors among both larger and smaller employers. A major advantage of such a research approach would be to better understand the organizational advantages and barriers together with collection of risk factor and health and injury outcome data. One-sized programs do not fit all, but effective pilot programs can offer a finite number of practical model solutions. These types of pilot programs will differ from more conventional feasibility studies, since a well-resourced observational researcher will often be impractical and more evaluative forms of program assessment will be required.

Coordinated efforts across the Federal government hold great promise for efficient and effective use of scarce resources in support of improved workforce health and well-being. Development and strategic funding of a joint research agenda, for example, would permit each Institute or Center to fund relevant projects within their own mission area while filling critical knowledge gaps.

CONCLUSIONS

The American workforce is diverse in its demographics, its conditions of employment, and its health status. The health of the American workforce extends far beyond the workplace, affecting families, communities, and our social and political systems. The impacts of impaired health on production and competitiveness can be measured with some effectiveness; the human costs of ill health and the benefits of healthy workplaces for longevity and quality of life are more elusive. A healthy workplace can extend life, limit the impact of chronic disease, and contribute broadly to national life.

In the United States, many working age adults are insured through their employment. A large part of waking hours for working age adults involve work and workplaces. The costs of being unemployed, working under severe conditions, or working for economically challenged organizations can add significantly to physical and mental disease. The NIOSH WorkLife initiative is an acknowledgement of the important interplay between work, health, and well-being. It is also an acknowledgement that the modern American workplace is increasingly complex and is demanding ever higher cognitive skills, management skills in workplace organization, and professional skills in health and safety.

The NIOSH WorkLife Initiative is an opportunity to test, validate, and disseminate innovative workplace programs, policies, and practices, thus empowering employers to develop and implement programs that will sustain and promote the safety, health and wellbeing of the American workforce. The long-term WLI research agenda seeks to build relevant evidence on program effectiveness, including the macro- and micro-level factors that promote or hinder such programs, and on strategies for meaningful dissemination of those program elements or approaches that prove beneficial.

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