© 2005 Schattauer GmbH

Health Promotion in the Workplace – The Merging of the Paradigms

A. Yassi
Canada Research Chair in Trans-Disciplinary Health Promotion, Department of Healthcare and Epidemiology, Institute of Health Promotion Research, University of British Columbia, Vancouver, BC, Canada

Summary
Purpose: To synthesize the lessons from both occupational health and health promotion, to improve workplace health.
Approach: This article briefly outlines the evolution in defining and understanding health promotion as well as current thinking in occupational health and safety. It also discusses an approach taken in the healthcare sector in British Columbia, Canada, where evidence-based practices and collaboration became the cornerstones to bringing about change and achieve impressive cost-beneficial results in healthcare workforce health.
Conclusion: Traditionally, workplace health promotion and occupational health and safety have been two solitudes. Workplace health promotion is rooted in 'wellness' and healthy lifestyle choices, while occupational health is heavily dictated by workplace health and safety requirements and legislation. Recently however, there has been increasing recognition of the need for a more holistic approach that focusses on workplace culture, addressing both primary and secondary prevention [1], as well as interventions aimed both at the individual as well as the organisation [2].

Keywords
Health promotion, occupational health, environmental health, health care

Methods Inf Med 2005; 44: 278–84

The Evolution of Thinking in Health Promotion

The understanding of the determinants of human health has evolved considerably over the last 50 years. In 1947, when the World Health Organization (WHO) defined health as complete physical, mental and social well-being [3], the holistic approach surprised many in the medical profession. In 1974, the Lalonde Report [4] categorized health determinants as being related to lifestyles and environment, not just human biology and healthcare organisation, as had previously been the focus of study and interventions. However, as noted by Marmor et al. [5], health promoters had "individualized both the root of the problem and many of the remedies. In this way they avoided challenging either the conventional world of work, income distribution, and control over the environment, or the conventional medical establishment".

Heeding the desirability of looking at underlying causes to lifestyle and environmental health determinants, the World Health Organization's *Ottawa Charter for Health Promotion* (1986) entrenched a *systems approach* to health promotion, wherein public participation, supportive environments, strengthened community action, enhanced personal skills, and reoriented health services are all seen as integral [6], and led to the refined definition of health promotion as "the process of enabling people to increase control over and to improve their health". Nutbeam enlarged on this, defining health promotion as an approach in which individuals and *communities* increase control over the *determinants* of health as precursors to improving their health [7]. It was also especially important in recognizing the simultaneous interactions of influences at the family, the community and environmental levels. Hancock [8] later added sustainable development – including the concept of health as "a dynamic equilibrium" between host, agent, and environment.

Several other useful frameworks have appeared [9, 10]. The Hamilton and Bhatti model [10], which integrates population health research with health promotion is especially important as it undercuts the tension that had begun to develop between population health and health promotion researchers. Indeed, in the Institute of Health Promotion Research at the University of British Columbia, we have adopted this conceptual framework for our health disparities research (see Fig. 1), thereby relating the *determinants of health* to the *strategies for health promotion.* Moreover, we recognize that health promotion can and must occur across a variety of settings – schools, communities, clinical settings, as well as workplaces. We also have come to recognize that the health of populations anywhere in the world affects the health of people back home, giving us a moral as well as self-interested imperative to extend our work globally. In Canada, we are in the process of doing just that [11, 12].

Health promotion has thus evolved to recognise the influence of broader social policies, and addressing environmental, as well as specifically workplace factors, not just individual factors in efforts to promote health. We have evolved to recognize that key to health promotion is the commitment to evidence-based decision-making, collaboration with stakeholders, and especially common values and assumptions about the importance of the upstream factors impacting health. Health promotion has thus truly

moved to adopting a system's multi-level approach – far beyond the "individual lifestyle" focus that characterized the profession just a few decades ago.

The Evolution of Thinking in Occupational and Environmental Health

Meanwhile, in the occupational and environmental health community, an ecosystem health approach to human health had developed, also posited in the interconnectedness of a broad range of health determinants. The ecosystem approach to human health [13, 14] provides a framework for integrating a broad range of health determinants, which focuses on how this information can be *applied* to improve human health. This framework is also centered on the notion that people are a dynamic part of the ecosystem – thus perceptions, values and actions of individuals and communities are key to improving health.

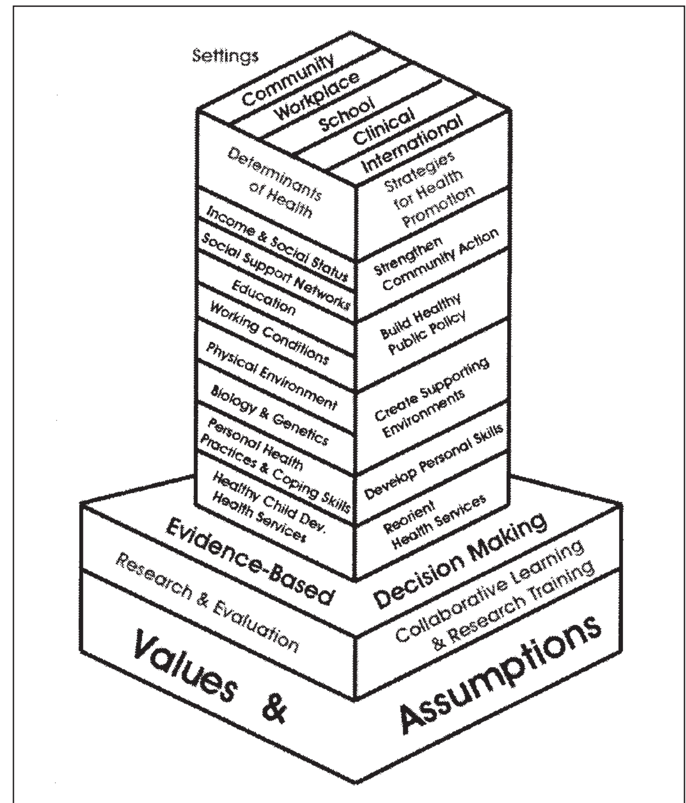

Fig. 1 Conceptual framework for health disparities research, adapted from Hamilton and Bhatti (1996)[10]

The "Driving Force-Pressure-State- Exposures-Effects-Action" (DPSEEA) intervention approach came from the environmental movement, but is quite analogous to the Precede-Proceed model of health promotion [15], wherein before proceeding to implementing and evaluating an intervention to improve health, the underlying predisposing, reinforcing and enabling factors must be considered, and for these, a thorough understanding of the social context is needed.

Concepts within the domain of occupational health and safety have also been evolving. The importance of psychosocial factors in the workplace setting is increasingly recognised, as is the need to move from a more traditional occupational health and safety approach to one that incorporates a more comprehensive understanding of workplace organisational factors as determinants of health [16, 17]. A healthy workplace might be defined as one that maintains and promotes the physical and mental health of its employees. Feelings of being overwhelmed, unhappy with the workplace social environment, lack of decision-making control or support from coworkers, and even feeling overqualified for the job, are all now well-recognized to be factors that impact mental health [16, 18], as well as physical well-being [19]. Job strain has been unequivocally shown to affect personal relationships, increase sick time and job dissatisfaction, and is associated with increased injuries [20, 21]. Other more discrete health outcomes include stress-related problems and increased risk of morbidity [16].

Sources of stress on the job include high job demands coupled with low control over day-to-day organisation of one's own work [16, 20]. Pressures such as restructuring, job insecurity and imbalances in labour supply and demand impact both job demands and rewards [20]. Effort/reward imbalances are associated with a variety of adverse health outcomes, particularly cardiovascular disease and mental health problems [22, 23].

A work-life imbalance ensues with the polarisation of work hours, with more people working long hours and more people working part-time, often involuntarily [24]. Work overload and job stress create serious problems for healthcare workers: in a study of a nationally representative group of 2500 employees and self-employed workers, a predominance of healthcare workers (45%) state that their job is very stressful, and far more so than any other employment group [24]. The link between hours at work, role overloads, work-life conflicts, burnout and health problems suggest that these loads and patterns are not sustainable [24].

Some workplaces are healthier than others even within the same sector and subsector. 'Magnet' hospitals in the United States, for example, have been able to recruit and retain staff despite a nation-wide nursing shortage [25]. The hospitals are known among nurses as being 'good employers'. Organisational characteristics of the hospitals are associated with better nurse health outcomes [25]. Today, "the search for the major causes… of occupational injuries has really moved now to concentrate on the systemic and organisational aspects of work rather than on the immediate circumstances and behaviours that lead up to each individual accident" [20].

Management commitment and worker participation are recurring themes in 'best

practices' literature [17, 26]. The traditional workplace health promotion effort, focusing on individual risk factors, is seen as limited because not all employees participate, and environmental risks are not ligated by individual worker's behaviours [27]. Increasingly, it is being concluded that interventions at multiple levels, including individual and organisation-levels, will have the most effect. Collaboration, in identifying the issues, devising alternate structures, work organisation and habits, and in implementation, is also vital.

In keeping with the health promotion evolution of knowledge that it is crucial to involve the key stakeholders, it has come to be recognized that trade unions are very important to include in designing and implementing interventions to improve workforce health [17]. Unions have always played a major role in promoting safety at work, greater influence over one's job conditions, stability of job contracts, improved working hours and better social security. While "wellness", as well as issues underlying strategies for recruitment and retention, have traditionally been seen as management concerns, it is natural to extend the involvement of unions into initiatives promoting a healthy workforce, not just a healthy workplace.

Collaboration requires a culture change. In the example discussed below, the approach taken in the healthcare sector in British Columbia, Canada, illustrates that this is not only possible, but highly cost-beneficial.

Case Study: Promoting Workforce Health in BC Healthcare Workers

The Healthcare Workforce

The health of healthcare workers (HCWs) in Canada is under strain, exacerbated by restructuring of the healthcare sector. The healthcare workplace is complex, with many healthcare associations, practitioners and policy-makers working to provide high-quality care under considerable political and public pressure. Difficulties in recruitment and retention, high rates of work injuries, illnesses and absences from work, and exposures to biological, chemical, physical, ergonomic and psychosocial workplace hazards contribute to the escalating costs plaguing Canada's healthcare system. In BC, the healthcare sector accounts for more injuries and time loss than any other sector in BC. In addition, the average injury rate is much higher than in other sectors; while the average injury rate for all industries in BC from 1997 to 2001 was 3.6, the healthcare sector average was 5.4 [28]. The outbreak of sudden acute respiratory syndrome (SARS) highlighted HCW vulnerability to infectious diseases [29-32], on a global scale. HCWs are also exposed to tuberculosis, HIV, other blood-borne diseases [33-35], and many chemical hazards [36, 37]. Their injury risk is 35% higher than that of other workers in BC [28], and in 2001 11% of nursing assistants sought care for mental-health reasons, compared to 7% of other Canadians [38]. From 1995 to 1998 in BC, compensation claims costs consistently increased, with a sharp rise of 25% from 1997 to 1998 alone [39].

Merging the Paradigms to Develop a Collaborative Evidence-based Strategy

Key players were brought together, united by a shared concern over increasing healthcare injury rates and their financial impact. The Occupational Health and Safety Agency for Healthcare (OHSAH) was formed, with the goal to work with all members of the healthcare community to develop guidelines and programs to promote best health and safety practices and safe early return to work, and to implement pilot programs and facilitate sharing of best practices [17].

A key component of OHSAH's mission is to work with the workplace and the workforce, in a consolidated effort to address issues from the perspective of both the employer and the individual worker. The agency board of directors therefore includes healthcare leaders representing both the workforce (including union representatives of nursing staff, therapists, technicians, support staff and others) and the workplace (employers and management). The newly created agency was also seen as a synthesis between research and decision-making – the goal being the collaborative identification and implementation of evidence-based best practices. There was a recognized need to work with researchers with skills in generating evidence for decision-making, because all guidelines and procedures were to be evidence-based. Bringing research into policy-making can help resolve conflict and increase the likelihood of consensus [40]. Programs were therefore developed with the input of those responsible for budgets and work organisation, as well as those providing services and hands-on care, along with strong input from researchers.

The needs assessment conducted at the inception of OHSAH revealed that the top cause of morbidity and time lost from work was musculoskeletal injury (MSI) – particularly MSI due to patient handling [41]. Initiatives to prevent MSI included collaboratively developed best practices guidelines and promoting a culture of safety. Safe patient handling guidelines were developed through an extensive national and international peer review process in combination with utilizing local best practices identified in the province-wide survey. The cost-benefit of implementing a "no lift" policy was evaluated in the extended care unit of a B.C. hospital that had installed 65 mechanical ceiling-mounted lifts and implemented the training and policy aspects of the best practices identified. The evaluation of the ceiling lift and training intervention revealed that both staff and residents preferred the lifts to manual methods, fewer staff members reported working in pain following the intervention, the incidence of lift/transfer injuries decreased by 58% [42], and the costs were reduced by 69% [43]. A follow-up evaluation using three years of additional data revealed a 40% reduction in total claims costs, an 82% reduction in lift and transfer claims costs, and an 83% reduction in lost hours due to lift and transfer injuries, demonstrating the longer term effectiveness of ceiling lift systems [44, 45]. A separate OHSAH intervention involved implementing a ceiling lift program in an extended care

unit of a hospital, to corroborate, in a prospective study in a controlled setting, the evidence from the retrospective analysis of the 65-bed study of Spiegel et al. [43], and similar findings of others [46, 47]. In addition, OHSAH attempted to measure the impact of ceiling lifts on staff satisfaction as well as resident safety and comfort.

Based on the results, a "no manual lifting" policy was implemented provincewide, complete with a training program and funds dedicated for the purchase of mechanical lifting devices where needed [48]. The Association of Unions and the Health Employers Association of BC signed a memorandum of understanding to formalize the new policy. Both the provincial Ministry of Health Services and the WCB of BC agreed to work collaboratively to provide funding for the purchase of mechanical lifting devices and electric beds in facilities, and $15 million was in fact earmarked for this purpose in 2001–2002. The program exemplifies a merging of the paradigms, working with the workplace to implement solutions and work tasks, and training the worker in new work practices. Management and staff played a role facilitating and acquiring worker testimonials, which demonstrated that worker discomfort and sense of being able to provide good care were as important as the reduction in costs which occurred with the installation of ceiling lifts.

The SARS outbreak, and its rapid global transmission, also underscored the need to protect healthcare workers. OHSAH became involved as healthcare workers were developing the disease at alarming rates [49] and there were no consistent guidelines for work practices or personal protective equipment requirements, thereby creating considerable anxiety for healthcare workers. OHSAH played a lead role in providing evidence-based expertise, providing 'train-the-trainer' sessions, and disseminating materials online. A multi-stakeholder provincial SARS Scientific Committee and SARS Best Practices Working Group were formed, wherein the importance of understanding the concerns and perceptions of front-line workers, good communication, and the other key principles of health promotion, have guided this occupational health effort.

Improving access to information is another collaborative and cost-effective OHSAH application. Databases have been created to provide access to thousands of healthcare material safety data sheets, through product name, chemical names and exposure control details, and another that is devoted to finding alternatives to products that contain latex, a substance widely used in healthcare, but to which many healthcare workers have developed allergies. The latex database contains 12,000 products, and alternative latex-free choices where available. In 1999, a new Regulation came into effect that workers be better trained on health and safety issues, and that healthcare workplaces improve workplaces from a worker health and safety perspective, including the adoption of policies and procedures to promote a healthier and safer workplace. Joint occupational health and safety committee education and development offered through OHSAH allows for economies of scale in addressing these Regulations. It also provides a bipartite approach, where worker and management representatives are jointly trained in joint decision-making. Issues of worker safety are closely linked to both the worker and the workplace, and this thus serves to merge the worker versus workplace approach. OHSAH provides a central provincial resource accessible to all healthcare facilities, and has expanded the program to better meet stakeholder needs, and now offers a range of other modules: Incident Investigations, Inspections, Hazard & Risk Identification, Prevention of Violence in the Workplace, and Interest Based Problem Solving [44].

In response to the directives and needs of healthcare, OHSAH has developed a web-based incident tracking system. The Workplace Health Indicator Tracking and Evaluation (WHITE)® Database system provides healthcare stakeholders with comparative performance indicators on workplace health and safety. This will facilitate the analysis of incidents and injuries, with a view to preventing recurrence, preventing disability, and providing a safer working environment for healthcare workers. The Auditor General, (in his report entitled "Information Use by the Ministry of Health in Resource Allocation Decisions for the Regional Health Care System")[50], urged the Ministry of Health to make information management a priority. The Ministry cited the need for data standards for Health Authorities. Ever-increasing payments incurred as a result of healthcare worker injury provide a further incentive. The biggest factor, however, is the need to improve the health and safety of the healthcare workforce. Requests for the system from health authorities and the private sector confirm the usefulness of the system as a solution to understanding and acting on workplace injury and injury prevention. The expected savings in healthcare costs directly attributable to the introduction of the WHITE database are expected to be considerable (many millions of dollars) [44].

Pre-existing evidence-based best practices have been implemented in an injury prevention and early return to work program in the BC healthcare sector. The scientific literature is clear that workplace-based safe early return-to-work (RTW) programs are feasible, highly effective, and provide cost benefits when conducted in conjunction with primary prevention efforts, and when based on sound principles. The Prevention and Early Active Return-to-work Safely (PEARS) program provides funding to integrate primary and secondary prevention, and combines local best practices with what has been shown to work in other jurisdictions. It is based upon 20 key principles that were jointly developed by healthcare unions and employers, and which are consistent with the best available scientific knowledge. The parties work together with the common mission of decreasing injuries and time loss, and while formal evaluation is now underway, the preliminary results were impressive enough that the program has been expanded from two pilot sites to include facilities across the province. Vancouver General Hospital (VGH) had a 29% reduction in total MSI time loss, while Royal Columbian Hospital (RCH) experienced a 21% reduction. In total claims costs, there was an overall reduction of 39% at one pilot site, while the other experienced a 37% reduction, both exceeding OHSAH's target of reducing workers' compensation costs by 30%. Using a conservative cost factor of "three", the indirect cost savings at VGH during the pilot could be estimated at $1.7 million; this is an

almost threefoldreturn-on-investment of the $600,000 estimated cost of the PEARS program. (Indirect costs are those associated with overtime, employee turnover, recruiting, training, and decreased employee morale, for example. Direct costs are a result of wage replacement and healthcare costs that are paid by the WCB and affect employers through premium rates.)

Occupational health hazards for community health workers include MSI, and physical/environmental conditions like poor lighting, broken stairs, locations of the worksite, small working areas, and the potential of violence from clients and others. Exposure to chemical, biological and environmental hazards is also less controlled than in an institutional setting. Education and training for supervisors and front-line workers, and a resource guide are parts of a multi-pronged homecare intervention initiated by OHSAH, along with a risk assessment tool and trials of patient lifting equipment in the home setting. Evaluation is now underway, and the tools will be modified based on results and feedback.

Promotion of a safety culture requires a workplace culture that makes safety a priority for everyone. Critical factors that have been shown to make some workplace healthier than others include good occupational health and safety practices, functional joint committees and return to work programs, compliance with safety regulations, and senior management commitment and worker participation [51]. These components are the foundation of all OHSAH programs and initiatives. A successful application of the critical factors was the gathering of healthcare leaders, policy makers, researchers and healthcare workers to discuss and collaborate on efforts to address spiralling injury rates and costs associated with patient handling. A province-wide no manual lifting policy and a collaborative effort to provide funding for electric equipment resulted. Other meetings of the key stakeholders dealt with the impact of downsizing on the mental and physical health of healthcare workers, and discussion on how to increase the focus on health and safety. Bipartite cooperation is being used as the axis for a paradigm shift around better health and safety initiatives.

The collaborative approach has received the national spotlight in health research. In 1999 the Canadian Institutes of Health Research (CIHR) (the main funding body for health research in Canada) established a funding program called the Community Alliance for Health Research (CAHR), with aims to foster high-quality research relevant to community groups and agencies; enhance mutual learning and collaboration among community organizations and researchers about health and healthcare issues; contribute to the development of healthy lifestyles, improved health and quality of life in the community; and to provide opportunity for training of health researchers in all disciplines, in an environment characterized by community interaction [38].

In order to accomplish these objectives, OHSAH became the vehicle for researchers in BC to join forces with healthcare unions and employers, and hosted the CAHR. It developed a five-year research program entitled "Making Healthcare a Healthier Place to Work: A Partnership of Partnerships". A research council comprising union leaders, employer representatives, researchers, and representatives from both the Workers' Compensation Board (WCB) and the insurance carrier for long-term disability governs this program. The CAHR incorporates the joint labour-management problem-solving approach crucial to success in addressing the sector's challenges [17, 52, 53]. Both management and union decision makers were included to increase the relevance of the research. Furthermore, including research in policy making increases the likelihood of reaching a consensus [40, 54].

The CAHR research program consists of nine projects and was developed with extensive input from stakeholder partners in community agencies, health employers (via the Health Employers' Association of BC) and the four major healthcare unions in BC (the Hospital Employees' Union, BC Nurses' Union, Health Sciences Association, and BC Government and Services Employees' Union). The initial research program included the creation of a cohort of healthcare workers for longitudinal study; a series of studies exploring work organizational factors and their influence on injury rates in acute, extended and long-term care settings; an evaluation of ceiling-mounted lifting devices and other lifting aids to reduce musculoskeletal injuries; an intervention study to address risks faced by homecare workers; a study of decision-making regarding substitution of toxic chemical substances; and implementation of a regional occupational health and safety program. Several of these projects are complete, with follow-up projects underway. While there were challenges in developing collaboration between the various stakeholders and partners, all partners recognized the importance of the research agenda, and remained committed to co-operating and working towards the goal of making healthcare a healthier place to work [55].

Cost-benefit of this Approach and Conclusions

Bringing evidence to bear to decrease injuries and improve the work environment was the linchpin to the creation of the very successful partnership described above. Since this partnership began its work, injury rates have fallen 28%, time loss due to injuries fell 38%, and the cost to the healthcare sector, in terms of dollars saved compared to what would have had to be paid in workers' compensation costs alone had the rates not fallen, totalled over $51 million for the last two years alone. The importance of an integrated approach, combining attention paid to the individual's needs (education and training), environmental factors such as proper equipment, and organisational factors (e.g. a culture of respect and concern for worker well-being, perceived fairness) is one key conclusion. The need for bipartite decision-making in which unions are seen as partners not adversaries, is a second important lesson. And lastly, collaboration between researchers and decision-makers to facilitate evidence-based solutions is crucial.

A merged paradigm in which the individual empowerment focus of health promotion, combined with the addressing of social and physical environmental factors which, at the workplace, had been the tradi-

tional domain of occupational health personnel, allows workplace health promotion to be the territory and vested interest of all the players – and, as shown here, can be extremely successful.

Acknowledgements
The research program reported was largely funded by the Canadian Institutes for Health Research, with subsidiary funding from the Occupational Health and Safety Agency for Healthcare (OHSAH) in British Columbia, the Canadian Health Services Research Foundation, the Workers' Compensation Board of British Columbia and the Michael Smith Foundation for Health Research. Thanks to all partners, including researchers and staff at the Institute of Health Promotion Research including Claire Sidebottom and Henrie de Boer, the Department of Healthcare and Epidemiology and others based at the University of British Columbia, and OHSAH.

References

1. Yassi A, Ostry A, Spiegel J. Injury prevention and return to work: Breaking down the two solitudes. In: Sullivan T, Frank JW, editors. New Views on Preventing Work-Related Disability: Taylor & Francis Books Ltd; 2003. pp 75-86.
2. Poland B, Green L, Rootman I. Settings for health promotion: Linking theory and practice. 1st ed. Thousand Oaks: Sage; 2000.
3. World Health Organization. Chronicle of the World Health Organization: Development and constitution of the W.H.O.: Volume 1. Geneva: WHO; 1948.
4. LaLonde M. A new perspective on the health of Canadians: A working document. Ottawa: Ministry of Health and Welfare; 1974.
5. Marmor TR, Mashaw J. Strategy for survival: change and stability in the management of healthcare institutions. Health Management Quarterly 1994; 16 (4): 5-8.
6. World Health Organization. Ottawa charter for health promotion. In: First International Conference on Health Promotion; 1986 November 21; Ottawa; 1986.
7. Nutbeam D. Health promotion glossary (original health promotion glossary). Health Promotion 1986; 1 (1): 113-27.
8. Hancock T. Health, human development and the community ecosystem: three ecological models. Health Promotion International 1993; 8: 41-7.
9. Starfield B, Shi L. Determinants of health: Testing a conceptual model. In: Adler NE, Marmot M, McEwen BS, et al., editors. Socioeconomic Status and Health in Industrial Nations: Social, Psychological and Biological Pathways. New York: NY: New York Academy of Sciences; 1999. pp 344-6.
10. Hamilton N, Bhatti T. Population health promotion: An integrated model of population health and health promotion: Health Canada, Health Promotion Department Division; 1996.
11. Spiegel J, Labonte R, Hatcher-Roberts J, et al. Tackling the 10–90 gap: A report from Canada. Lancet 2003; 362 (9387): 917-8.
12. Labonte R, Spiegel J. Setting global health research priorities. British Medical Journal 2003; 326: 722-3.
13. Yassi A, Mas P, Bonet M, et al. Applying an ecosystem approach to the determinants of health in Centro Habana. Ecosystem Health 1999; 5 (1): 3-19.
14. Forget G, Lebel J. An ecosystem approach to human health. International Journal of Occupational and Environmental Health 2001; 7 (2): Supplement: S33-38.
15. Green LW, Kreuter MW. Health promotion planning: An educational and ecological approach. 3rd ed. Mountain View, CA: Mayfield; 1999.
16. Amick III BC, Habeck RV, Hunt A. Measuring the impact of organizational behaviours on work disability prevention and management. Journal of Occupational Rehabilitation 2000; 10 (1): 21-38.
17. Yassi A, Ostry AS, Spiegel J, et al. A collaborative evidence-based approach to making healthcare a healthier place to work. Hospital Quarterly 2002; 5 (3): 70-8.
18. Koehoorn M, Lowe GS, Kent VR, et al. Creating high quality healthcare workplaces. Vancouver: Canadian Policy Research Networks discussion paper; 2002.
19. Norman R, Wells R. Ergonomic interventions for reducing musculoskeletal disorders. In: Sullivan T, editor. Injury and the New World of Work. Vancouver: BC: UBC Press; 2000. pp 115-39.
20. Sullivan T, Kerr M, Ibrahim S. Job stress in healthcare workers: Highlights from the national population health survey. Hospital Quarterly 1999 (summer): 34-40.
21. O'Brien-Pallas L, Thomson D, Alksnis C, et al. The economic impact of nurse staffing decisions: Time to turn down another road? Hospital Quarterly 2001; 4 (3): 42-50.
22. Siegrist J. Adverse health effects of high effort – low reward conditions at work. Journal of Occupational Health Psychology 1996; 1: 27-43.
23. de Jong J, Bosma H, Peter R, et al. Job strain, effort-reward imbalance and employee well-being: a large scale cross-sectional study. Social Science & Medicine 2000; 50: 1317-27.
24. Lowe GS. High-quality healthcare workplaces: A vision and action plan. Hospital Quarterly 2002; 5 (4): 49-56.
25. Gleason SJ, Sochalski J, Aiken L. Review of magnet hospital research: Findings and implications for professional nursing practice. Journal of Nursing Administration 1999; 29: 32-42.
26. Yassi A, Ostry A. The impact of healthcare organizational factors on nurse health, well-being, recruitment and retention in the South Fraser health region of British Columbia. Vancouver, BC: British Columbia Nurses Union; 2003.
27. Shannon HS, Robson LS, Guastello SJ. Methodological criteria for evaluating occupational safety intervention research. Safety Science 1999; 31: 161-79.
28. WCB. Focus Report on Occupational Injury and Disease. Vancouver: Workers Compensation Board of British Columbia; 2002.
29. Hsu L-L, Lee C-C, Green JA, et al. Severe acute respiratory syndrome (SARS) in Singapore: Clinical features of index patient and initial contacts. Emerging Infectious Diseases 2003; 9 (6).
30. Centers for Disease Control and Prevention. Outbreak of severe acute respiratory syndrome – worldwide 2003. Morbidity and Mortality Weekly Report 2003; 52: 226-8.
31. Booth CM, Matukas LM, Tomlinson GA, et al. Clinical features and short-term outcomes of 144 patients with SARS in the greater Toronto area. Journal of the American Medical Association 2003; 289.
32. Lee N, Hui D, Wu A, et al. A major outbreak of severe acute respiratory syndrome in Hong Kong. New England Journal of Medicine 2003; 348: 1986-94.
33. Menzies D, Fanning A, Yuan L, et al. Hospital ventilation and risk for tuberculous infection in Canadian health care workers. Annals of Internal Medicine 2003; 133 (10): 779-89.
34. Jagger J, De Carli G, Perry J, et al. Occupational exposure to bloodborne pathogens: Epidemiology and prevention. In: Wenzel R, editor. Prevention and Control of Nosocomial Infections. 4th ed. Baltimore: Lippincott, Williams and Wilkins; 2003.
35. Yassi A, McGill ML, Khokhar JB. Efficacy and cost-effectiveness of a needleless intravenous access system. American Journal of Infection Control 1995; 23 (2): 57-64.
36. Yassi A. Managing chemical hazards in hospitals.In chapter: Health Care Facilities and service. In: Stellman JM, editor. The Encyclopaedia of Occupational Health and Safety. Geneva: International Labour Office; 1998. pp 97-9.
37. Weaver V. Chemical hazards in health care workers. Occupational Medicine 1997; 12 (4): 655-77.
38. Canadian Institute for Health Information. Canada's healthcare Providers. CIHI: Toronto 2001.
39. Workers' Compensation Board of British Columbia. Statistics 2002. Vancouver: WCB of BC; 2002.
40. Lomas J. Connecting research and policy. ISUMA 2000; Spring: 140.
41. Yassi A, Cohen M, Pollak N, et al. The relationship of work environment and injuries to resident care staff in intermediate care. Accepted to Nursing Research 2003.
42. Ronald LA, Yassi A, Spiegel J, et al. Effectiveness of installing overhead ceiling lifts. Reducing musculoskeletal injuries in an extended care hospital unit. American Association of Occupational Health Nurses Journal 2002; 50 (3): 120-7.
43. Spiegel J, Yassi A, Ronald LA, et al. Implementing a resident lifting system in an extended care hospital. Demonstrating cost-benefit. American Association of Occupational Health Nurses Journal 2002; 50 (3): 128-34.

44. OHSAH. OHSAH value report. Vancouver: Occupational Health and Safety Agency; 2003 September, 2003.
45. Engst C, Chokar R, et al. Effectiveness of overhead lifting devices in reducing the risk of injury to care staff in extended care facilities. Ergonomics 2005; 48 (2): 187-99.
46. Holliday PJ, Fernie GR, Plowman S. The impact of new lifting technology in long-term care. American Association of Occupational Health Nurses Journal 1994; 42: 582-9.
47. Villeneuve J. The ceiling lift: An efficient way to prevent injuries to nursing staff. Journal of Healthcare Safety, Compliance and Infection Control 1998: 19-24.
48. OHSAH. Meeting the challenge: Funding for lifts is on its way. Vancouver: Occupational Health and Safety Agency for Healthcare; 2001 August.
49. Yassi A, Noble MA, Daly P, et al. Severe acute respiratory syndrome. Guidelines were drawn up collaboratively to protect healthcare workers in British Columbia. British Medical Journal 2003; 326: 1394-5.
50. Office of the Auditor General of BC. Information Use by the Ministry of Health in Resource Allocation Decisions for the Regional Health Care System. Victoria: Government of British Columbia; 2001/02.
51. Shannon HS, Robson LS, Sale JEM. Creating safer and healthier workplaces: Role of organizational factors and job characteristics. American Journal of Industrial Medicine 2001; 40: 319-34.
52. Parker M, Gadbois S. Building community in the healthcare workplace, Part 4: Partnering with union members to create community. Journal of Nursing Administration 2000; 30 (11): 524-9.
53. Johansson M, Partanen T. Role of trade unions in workplace health promotion. International Journal of Health Services 2002; 32 (1): 179-93.
54. Baril R, Clarke J, Friesen M, et al. Management of return-to-work programs for workers with musculo-skeletal disorders: a qualitative study in three Canadian provinces. Social Science & Medicine 2003; 57: 2101-14.
55. Yassi A, Tomlin K, Sidebottom C, et al. Politics and partnerships: Challenges and rewards of partnerships in workplace health research in the healthcare sector of British Columbia, Canada. International Journal of Occupational and Environmental Health 2004; 10 (4): 360-7.

Correspondence to:
Claire Sidebottom
Institute of Health Promotion Research
Library Processing Centre Building, Rm 435
2206 East Mall
University of British Columbia
Vancouver, British Columbia
V6T 1Z3
Canada
E-mail: cls03@interchange.ubc.ca