

Bridging the Knowledge Gap

An Innovative Surveillance System to Monitor the Health of British Columbia's Healthcare Workforce

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ABSTRACT

Objective: Healthcare workers are exposed to a variety of work-related hazards including biological, chemical, physical, ergonomic, psychological hazards; and workplace violence. The Occupational Health and Safety Agency for Healthcare in British Columbia (OHSAH), in conjunction with British Columbia (BC) health regions, developed and implemented a comprehensive surveillance system that tracks occupational exposures and stressors as well as injuries and illnesses among a defined population of healthcare workers.

Intervention: Workplace Health Indicator Tracking and Evaluation (WHITE™) is a secure operational database, used for data entry and transaction reporting. It has five modules: Incident Investigation, Case Management, Employee Health, Health and Safety, and Early Intervention/Return to Work.

Outcomes: Since the WHITE™ database was first introduced into BC in 2004, it has tracked the health of 84,318 healthcare workers (120,244 jobs), representing 35,927 recorded incidents, resulting in 18,322 workers' compensation claims. Currently, four of BC's six healthcare regions are tracking and analyzing incidents and the health of healthcare workers using WHITE™, providing OHSAH and healthcare stakeholders with comparative performance indicators on workplace health and safety. A number of scientific manuscripts have also been published in peer-reviewed journals.

Conclusion: The WHITE™ database has been very useful for descriptive epidemiological studies, monitoring health risk factors, benchmarking, and evaluating interventions.

Key words: Healthcare; surveillance; occupational health; evidence; evaluation; health and safety

La traduction du résumé se trouve à la fin de l'article.

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Healthcare workers (HCWs) face numerous ergonomic stressors: patient lifting and transfers leading to upper extremity injuries; needlestick injuries and splashes increasing exposure to blood/body fluids (BBF), HIV, hepatitis B and C viruses; exposures to chemical agents; work-related stress; and workplace violence.¹⁻⁴ Injury rates in the healthcare industry in BC have been consistently higher than the average in the province.⁵ In 2006, the healthcare and social assistance sector accepted 12,419 workers compensation claims which resulted in 297,491 days lost from work and \$52,397,554 in claims costs.⁵ The aging of staff and patients, high workloads, staff shortages, mobile nature of the workforce, and complex work environments are among many other factors that make HCWs vulnerable to occupational hazards.^{6,7} Yet, many work-related injuries may not be reported to compensation systems as a result of discouragement by supervisors and coworkers, job insecurity, legal work status, procedural complications, unawareness regarding the compensation system, seriousness of injuries, and social stigma.⁸⁻¹² Additionally, workers' compensation does not accept all filed claims.^{10,13}

The surveillance of work-related injuries and illnesses of HCWs is important for health facility managers, occupational health and safety professionals and researchers to develop injury/illness prevention policies. Such a system involves the identification and characterization of a variety of work-related exposures and stressors that include chemical, biological and physical agents, ergonomic hazards, and job stress.¹⁴ The surveillance of occupational injury makes it possible to estimate the size of a problem; characterize injury trends; design, implement and evaluate preventive programs; improve knowledge of injury among health professionals, policy-makers and the public; and identify research needs.¹⁵ Workers' compensation claims data represent an important source of information on work-related injuries.¹⁶ In addition to workers' compensation claims data, other surveillance methods have been explored,¹⁷⁻²² none of which have fully linked the gap between predictors of injury and the resulting costs. In 2002, the British Columbia Auditor General's Report urged the British

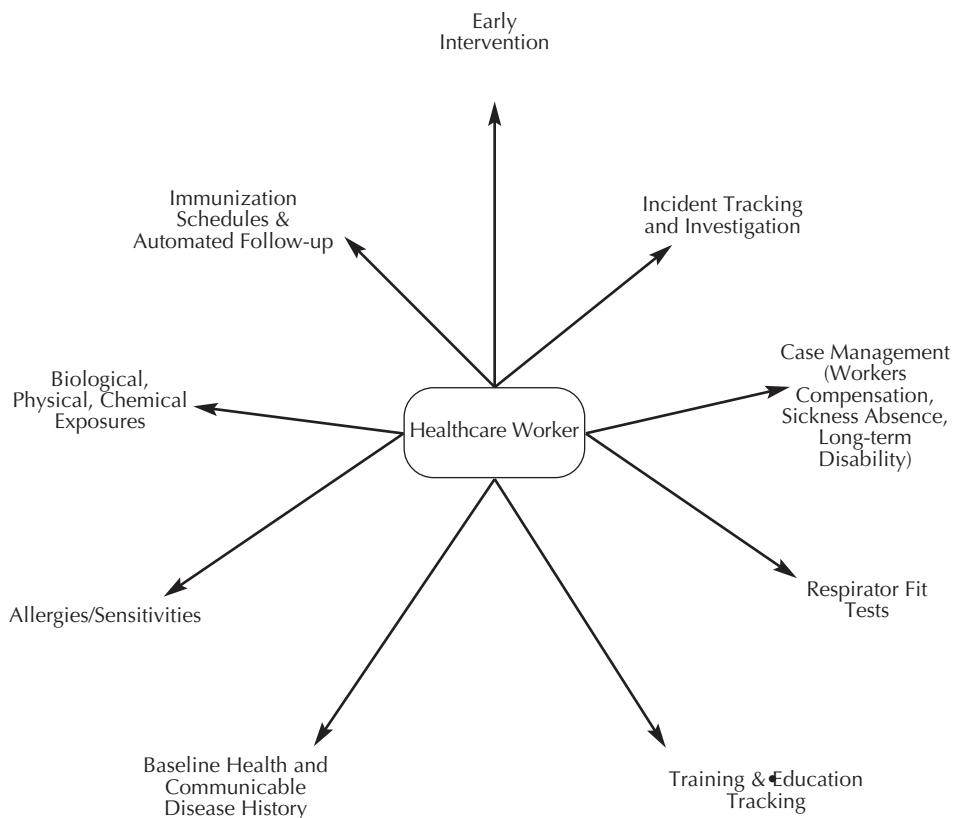


Figure 1. Data associated with each healthcare worker

TABLE I

Overview of WHITE™'s Five Modules

Module	
Incident Investigation	<ul style="list-style-type: none"> • Incident details reported by worker and written on triPLICATE form by supervisor/manager • Form forwarded to occupational health & safety department of appropriate healthcare region • Designated staff verify details and complete document • Medical care or loss of time at work required → collected information used to complete workers' compensation board (WorkSafeBC) Form 7
Case Management	<ul style="list-style-type: none"> • Contains all information relating to Form 7, long- and short-term disabilities • Module used to electronically submit and receive WorkSafeBC data, including Form 7 submission and claims costs • Allows identification of costs per incident by healthcare worker
Employee Health	<ul style="list-style-type: none"> • Return-to-work programs also monitored • Managed by Occupational Health Nurses • Monitors healthcare worker health records • Includes immunization history, exposures (blood-borne pathogens, needlestick, chemical, physical, biological), communicable diseases, baseline health and screening (e.g., TB)
Health and Safety	<ul style="list-style-type: none"> • Monitors training and education records for healthcare workers, respirator fit and audiometric testing
Primary and Secondary Prevention	<ul style="list-style-type: none"> • Monitors/evaluates OHSAH's Prevention and Early Active Return-Work Safely (PEARS) program, implemented in each health authority • Focuses on MSIs, tracking workplace and worker assessment details • Provides ability to link work programs developed in case management module

Columbia Ministry of Health to appoint information management as a priority.²³

This paper will present the development and implementation of a comprehensive system for health, injury and hazard sur-

veillance for BC's healthcare workers, and illustrate the practical applications and research potential of the system with focus on incident tracking.

METHODS

Need for the development and implementation of a healthcare surveillance system

In 2002, the Occupational Health and Safety Agency for Healthcare in BC (OHSAH) launched a data collection process to evaluate the effectiveness of overhead ceiling lifts to transfer patients.²⁴ Due to the multiple geographical locations and nature in which data were stored, the process required considerable investment of time and resources. The analysis was further complicated by the lack of denominator data linkages (full time equivalent/ productive hours) with payroll data systems.

That project further highlighted that each health authority maintained different injury coding schemes and forms (i.e., incident and investigation form). Though consensus was reached for the standardization of incident and investigation forms, this was not possible for occupation and department codes as health authorities relied on different legacy systems for human resources, payroll and finance. Coding schemes within a particular dataset changed between years, and a limited number of code numbers for occupational titles were recycled and reused for multiple jobs.

Following an extensive review of BC's healthcare authority systems and processes, it was evident that the development of a surveillance system required broad scope, including incident tracking, case management (disability prevention, workers' compensation claims), employee health records, and health and safety concerns.

In 2002, OHSAH began the development of a surveillance system for BC named Workplace Health Indicator Tracking and Evaluation-WHITE™. Funding for some equipment and staff time was provided by grants held by Dr. Annalee Yassi at the University of British Columbia. Development was finalized in 2004 with five modules: Incident Investigation; Case Management; Employee Health; Health and Safety; and Early Intervention/Return to Work. OHSAH has implemented WHITE™ in four of BC's six health authorities. WHITE™ can report at multiple levels: health authority, health service delivery area, workplace facility, department, occu-

TABLE II

Number of Incidents, Claims and Healthcare Workers by Health Authority (ending March 31st, 2007)

Health Authority	Number of Facilities	# of b/fwd* Incidents	# of Incidents	# of b/fwd Claims	# of Claims	Date Started Collecting	# of HCWs
Fraser Health	95	91	10,303	83	5930	2004-07-27	27,185
Interior Health	257	2906	11,862	1671	5343	2004-07-17	25,844
Northern Health	110	149	3345	121	1795	2004-11-24	11,038
Vancouver Island Health	105	658	10,417	507	5254	2004-07-26	20,251

* b/fwd (Brought Forward) incidents and claims that were active yet occurred before the launch of WHITE™ in 2004 were transferred into WHITE™

pation, etc. Figure 1 illustrates types of data that are associated and collected for each healthcare worker.

Module overview

OHSAH conducted reviews on the injury management needs of each health authority and identified five main modules needed to translate injury reports and payroll data into preventive efforts. The goal was to capture detailed injury trends which could be utilized by interventionists to identify information for return to work and disability management programs, evaluate effectiveness of preventive programs, and conduct health and safety assessments. Table I summarizes these five chosen modules. The Incident Investigation Module identifies the causes and details of each incident that can later be linked to its compensatory outcome contained in the Case Management Module. The Employee Health Module is important for tracking the health of each HCW to better develop disability management programs. The primary and secondary Prevention Modules are used specifically for MSI incidents, which constitute the greatest proportion of injuries for HCWs and result in high compensation costs.⁵ The Health and Safety Modules are used for risk assessments with respect to specific tasks. The future plans of OHSAH are to include the development of specific workplace assessments using this module.

Demographic and payroll fields

To facilitate the analysis and production of provincial reports, OHSAH created a database to consolidate data from each health authority. This is commonly known as a data warehouse or Online Analytical Processing (OLAP) and is used as a repository to store all historical data. The data warehouse allows for multidimensional analysis and includes data from WHITE™, payroll and workers' com-

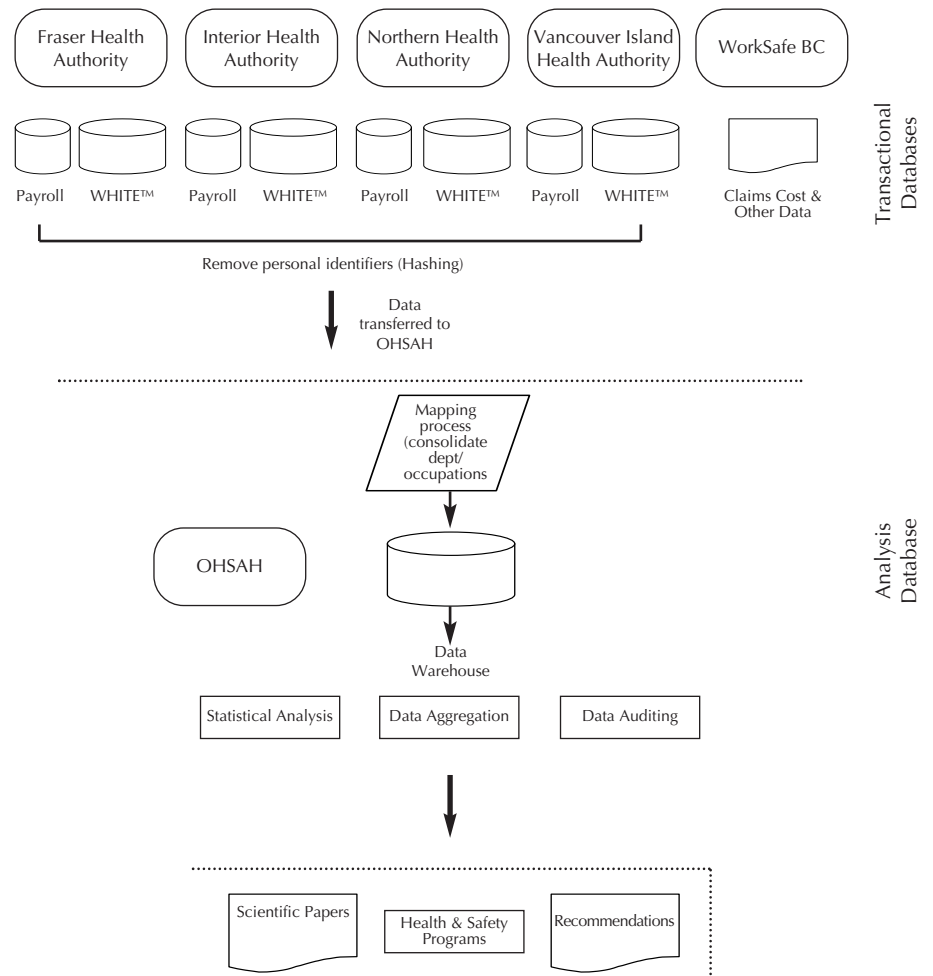


Figure 2. Data mapping process

pensation (i.e., claims costs). The addition of payroll data (e.g., productive hours) allows for more accurate reporting, such as injury and incident rates. Payroll/human resources information includes employment status (casual, full time, part time, etc.), job start date, union, pay type (hourly, salaried, etc.), hourly rate, pay period start and end date, sick hours, workers' compensation paid hours, long-term disability hours, vacation, union leave, overtime hours, etc.

To facilitate the consolidation of data at OHSAH (for provincial analysis), a programmatic mapping table was created to

systematically group health authority departments. Figure 2 reflects the data mapping process used to map occupations and departments.

Security/Privacy

The design of WHITE™ required careful consideration regarding the security of confidential data including personal identifiers (name, date of birth, social insurance number, and employee ID), incident and workers' compensation details, and health records (e.g., immunizations, exposures). From a software perspective, WHITE™ uses encryption and multiple security lev-

els. Users of the database meet eligibility requirements before being provided with a user ID and password.

Each health authority worked in conjunction with OHSAH to develop a Privacy Impact Assessment (PIA). The PIA identifies the types of collected data, all who have access to the database, and how the data are used. The PIA follows the *Freedom of Information and Protection of Privacy Act* and internal privacy/confidentiality regulations. Furthermore, while WHITETM has its own built-in security, each health authority takes additional measures (firewall, digital certificates) to further complement the security.

To facilitate provincial analysis, each health authority periodically provides OHSAH with access to core datasets (WHITETM and Payroll). Before data are transferred from the confines of the health authority to OHSAH, it undergoes a “hashing” (one-way encryption) process that programmatically strips personal identifiers/information and replaces them with an alphanumeric code. The personal identifiers are replaced with unique key identification algorithms that can link each injury report to its workers’ compensation claim. The health authorities retain the original files with identification, while the research units are able to identify records for specific, yet anonymous data analysis.

RESULTS

Since WHITETM was introduced to BC healthcare in 2004, it has tracked the health of 84,318 (up to March 2007) healthcare workers, representing 35,927 recorded incidents, resulting in 18,322 filed workers’ compensation claims (Table II). All unresolved incidents and claims occurring before the launch of WHITETM were included in the database as “brought forward (b/fwd) incidents”.

WHITETM data and payroll information have led to the publication of multiple research articles pertaining to the occupational health and safety of BC healthcare workers.²⁵⁻³⁰

DISCUSSION

WHITETM was assembled and is maintained by utilizing occupational health and

safety data systems already established for administrative and financial purposes. The BC health departments lacked a standardized coding mechanism for healthcare worker information and a common database to store this information in a comparative way. Therefore, the knowledge gap that existed in the characterization of injury risks was rectified using WHITETM. As the project required the use of data collected through various departments, stakeholders within each department willing to collaborate were identified. Collaboration with human resources was critical to the project’s success as the demographic data required to define the populations-at-risk are collected and managed through this department.

The WHITETM database was also developed as a surveillance system to bridge the knowledge gap between injury trend details and cost patterns over time. The development follows guiding principles that require timely reporting and processing of all incidents to the workers’ compensation agency. The guidelines also call for relevant data regarding the determinants of and trends in workplace injuries. These reports can in turn provide occupational health professionals with up-to-date injury/claims information. Furthermore, various performance indicators can be developed for healthcare stakeholders in addition to the cost-benefit and effectiveness analysis of health and safety initiatives.

The capability of WHITETM’s surveillance has thus far focused on certain targeted HCW concerns, yet the multitude of data sources allows for the examination of a broad range of end points, exposures, and outcomes, some of which have not – or have only to a limited extent – been considered for HCWs specifically. WHITETM data include descriptions of incidents, demographics of the injured worker, contributory factors related to the location, circumstances, nature and cause of the injury. Incidents of occupational injury resulting in lost time, medical care, or first aid treatment only can be extracted from WHITETM. With person-years obtained from payroll data, detailed analyses on various occupational injury indicators (injury rates, days lost, costs) in the BC healthcare sector can be conducted.

Before WHITETM, identifying occupational injury risk factors and their result-

ing costs was not possible across the BC Health Authorities. Since its development, multiple studies using WHITETM data have been able to examine the epidemiology of various exposures across healthcare settings, regions, occupations, etc. These findings have been published in internationally peer-reviewed journals to generate practical policy implications aimed at reducing workplace hazards and promoting safe work practices for healthcare workers.

The WHITETM database has several limitations, including lack of coverage of contract workers and temporary employees hired outside of human resources departments. Furthermore, information regarding absenteeism is available within WHITETM, but not in consistent computerized format for all employees. Further work is also required for data coding consistency which can be rectified with the development and implementation of a data dictionary. The upcoming challenges for OHSAH and its stakeholders is to shift from focusing on the type and level of detail in data collection to improving methods in the use and presentation of information collected for healthcare professionals, safety committees, managers and executives.

The benefit of WHITETM as an effective surveillance tool has been demonstrated by the wealth of information processed from its data. Existing occupational health and safety programs and prevention strategies are crucial to enhance workplace safety through the utilization of an effective surveillance system.³¹ With limited funds and growing service demands from the healthcare sector, WHITETM data holds vital implications for resource allocation purposes. The patterns of injury and costs incurred over time will allow the appropriate design of interventions to target high-risk areas and reduce the human and financial costs of preventable injuries within the healthcare sector. The system will continue to be developed so that findings from the descriptive, analytical and prevention evaluation studies using WHITETM can be ideally generalized for broad application to additional industrial settings.

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RÉSUMÉ

Objectif : Les travailleurs de la santé sont exposés à toutes sortes de dangers (biologiques, chimiques, physiques, ergonomiques, psychologiques) liés à leur emploi, ainsi qu'à la violence au travail. Conjointement avec l'Université de la Colombie-Britannique (UBC) et les régions sanitaires de la province, l'OHSAH (l'agence de la sécurité et de la santé au travail de la Colombie-Britannique pour le milieu des soins de santé) a mis au point et instauré un système de surveillance intégré des cas d'exposition professionnelle, des agents stressants, des blessures et des maladies dans une population de travailleurs de la santé bien définie.

Intervention : Une base de données opérationnelles sécurisée, Workplace Health Indicator Tracking and Evaluation (WHITE^{MC}), sert à entrer des données et à produire des rapports d'opérations. Elle comprend cinq modules (enquête sur les incidents, gestion de cas, santé des employés, santé et sécurité, et intervention précoce/retour au travail).

Résultats : Depuis son lancement en Colombie-Britannique en 2004, la base WHITE^{MC} a suivi l'état de santé de 84 318 travailleurs de la santé (120 244 emplois), lesquels ont déclaré 35 927 incidents qui ont donné lieu à 18 322 demandes d'indemnisation. À l'heure actuelle, quatre des six régions sanitaires de la province suivent et analysent les incidents et l'état de santé des travailleurs de la santé à l'aide de WHITE^{MC}, ce qui offre à l'OHSAH et aux intervenants de la santé des indicateurs de rendement comparatifs sur la santé et la sécurité au travail. Des manuscrits scientifiques ont aussi été publiés dans des revues évaluées par des pairs.

Conclusion : La base de données WHITE^{MC} s'avère très utile pour les études épidémiologiques descriptives, la surveillance des facteurs de risque pour la santé, l'étalement, ainsi que l'évaluation des mesures d'intervention.

Mots clés : soins de santé; surveillance; santé au travail; preuves; évaluation; santé et sécurité