

Employee Absenteeism Based on Occupational Health Visits in an Urban Tertiary Care Canadian Hospital

Tara L. Donovan, Kieran M. Moore, and Elizabeth G. VanDenKerkhof

ABSTRACT (1) To merge Occupational Health (OH) and Human Resources (HR) administrative data to describe reasons for absenteeism among hospital employees and (2) to consider the advantages and disadvantages of using these combined data for surveillance of health care workers. This study utilized a retrospective cohort design, involving a record linkage of two administrative databases at a Canadian general hospital: OH and HR. Data were included for the period of June 1, 2004, to May 31, 2005. Data linkage was performed using sex, postal code, and date of birth. The most common self-reported reasons for absence were respiratory illness (31%), gastrointestinal illness (17%), and musculoskeletal injuries/disabilities (15%). Employees working in the Department of General Medicine experienced the highest number of times absent—1.9 per 1,000 work hours. The department with the highest percentage of staff not reporting to OH was General Medicine (43%). This research highlights the issue of absenteeism among health care workers and the need to improve reporting of illness and injury to OH for surveillance efficacy. Further, a public health surveillance system that monitors OH visits among health care workers can facilitate public health practice.

Key words: absenteeism, infection control, occupational health, public health, surveillance.

Health Care Worker Absenteeism

Absenteeism is a major concern within the health care workforce, considering that job demands and work environment expose workers to an increased risk of illness and injury (Eriksen, Bruusgaard, & Knardahl,

2003; Thomson, 2005). The health care workforce, including, physicians, registered nurses (RNs), patient care assistants, therapists (especially respiratory), and front-line administrative staff, have an increased exposure to infectious diseases compared with the typical working population, but with varying degrees depending on the work conditions and the level of patient contact (Sepkowitz, 1996; Stone, 2000). For the purpose of this document, health care workers (HCWs) include all hospital employees who have the ability to acquire or transmit infectious agents during the course of their work (e.g., physicians, nurses, therapists, cleaning/maintenance staff, patient care assistants, clerks, and technologists).

According to *Canada's Health Care Providers: 2005 Chartbook* (2005), published by the Canadian Institute for Health Information (CIHI), absenteeism and on-the-job injuries are high among Canadian HCWs. In fact, they are one and a half times more likely to miss work due to illness and disability compared with other individuals not employed in health care (CIHI, 2005; Government Canada, 2006; Pauly et al.,

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2002). The annual average duration of absenteeism due to illness and disability was longer for HCWs (11.8 days) than all other workers (6.7 days) in the year 2000 (CIHI, 2005).

The Whitehall II study conducted in the United Kingdom considered reasons for sickness absence, specifically socioeconomic and sex differentials, among a general working population (Feeney, North, Head, Canner, & Marmot, 1998). The study involved administrative absence records of nonindustrial civil servants' reasons for absence from 1985 to 1990, and found that 50–60% of all absence events were due to respiratory disorders and gastroenteritis. A further 20–30% of reasons for absence were due to headache/migraine, musculoskeletal disorders, injury, and neurosis ill-defined (Feeney et al., 1998).

A retrospective analysis involving 1 year of administrative absence records among employees (i.e., nursing, pharmacists, medical and dental, allied medical professionals, etc.) of four National Health Service trusts in Lanarkshire in Central Scotland revealed the main causes of absence to be respiratory disorders (38.5%), digestive disorders (15.7%), and musculoskeletal disorders (8.4%) (Ritchie, Macdonald, Gilmour, & Murray, 1999). Fifty-nine percent of the population did not have an absence, and approximately 20% had only one absence event. The overall sickness absence rate was 4 days absent per staff year.

International evidence further supports the impact of HCW absenteeism on public health. According to a survey of hospital wards across the United Kingdom, it was determined that nursing ward staff take more sick days than majority of public sector workers (Paton, 2005). In the United States, nursing injury rates have been linked to the nursing shortage, which has been associated with negative patient outcomes (Charney & Schirmer, 2007). The increased absenteeism among HCWs poses problems due to disruption in health care services, especially during outbreak situations—this effect has been shown in North America (Bridges, Kuehnert, & Hall, 2003; Sepkowitz, 1996; Varia et al., 2003), Europe (Johnson, Croghan, & Crawford, 2003; O'Reilly & Stevens, 2002; Reis et al., 2003), and Asia (Chen et al., 2004; Low & Wilder-Smith, 2005). It is a concern for all health care communities. HCW absenteeism is a valuable area of research, considering its impact on employees, patients, and health care costs (Pauly et al., 2002). This study intends to compare and

contrast the employee absenteeism among hospital employees in an urban tertiary care Canadian hospital in order to provide additional evidence regarding absence reporting.

Occupational Risks

By definition, an occupational disease is one that is caused by or worsens as a result of exposure to risk factors at work (Benavides et al., 2005; Cherry, 1999). HCWs that are primarily responsible for front-line patient care in both acute care and long-term care facilities are at an increased risk of acquiring infectious diseases as a result of their direct patient contact, and consequently, HCWs who go to work will risk infecting patients (Bridges et al., 2003; Thomson, 2005). In addition, there is greater risk of exposure to contaminated human blood and body fluids (Dement, Epling, Ostbye, Pompeii, & Hunt, 2004; Sepkowitz, 1996). More than 15 airborne infections are reported to have been transmitted to HCWs, including influenza, tuberculosis, measles, varicella, respiratory syncytial virus infection, and severe acute respiratory syndrome (SARS) (Bridges et al., 2003; Dement et al., 2004; Low & Wilder-Smith, 2005; Sepkowitz, 1996).

National trends of workplace-related illnesses have generally increased among the provinces. For example, one of the provinces' infectious disease claim rate increased from 0.2 in 2001 to 1.40 in 2002, mostly attributed to a Norovirus outbreak (Health Canada, 2004). In addition, the SARS experience highlighted the universal vulnerability of HCWs to the threat of infectious disease exposure and infection, particularly with respect to respiratory illnesses (Low & Wilder-Smith, 2005; Varia et al., 2003).

In response to the existing threat at a national level, Health Canada's Division of Nosocomial and Occupational Infections responded by developing various documents and guidelines to aid in the prevention and management of infectious diseases (Division of Nosocomial and Occupational Infections, 2002). In particular, the *Prevention and Control of Occupational Infections in Health Care* (2002) was developed primarily to improve the quality of health care and to provide recommendations to assist in the prevention and management of HCWs exposures and infections in health care settings (Health Canada, 2002).

In addition to infectious disease-related absenteeism among HCWs, musculoskeletal injuries and disorders are prevalent among this working population. Strains and sprains, and especially back pains, are musculoskeletal issues associated with lifting and transferring of patients (Trinkoff, Storr, & Lipscomb, 2001; Yassi, Gilbert, & Cvitkovich, 2005). Canadian statistics indicate that between 1996 and 2002, the average number of injuries per year to HCWs increased by 7.8%, although the labor force increased by 18.5% during this time period. The Canadian time-loss due to injury rate thus actually decreased from approximately 4.1 injuries per 100 FTE in 1996 to 3.7 injuries per 100 FTE in 2002, probably as a consequence of many policy changes and interventions. Despite this decreased rate of injury, according to statistics from the Workers Safety and Insurance Board (WSIB), the health care industry was ranked sixth out of 17 categories for having the highest percentage of WSIB claims for the years 1997–2006 (Workplace Safety and Insurance Board, 2007). Evidently, HCWs are at an increased risk of experiencing injuries as a consequence of their profession.

Health Surveillance

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of health-related event data for utility of public health action to reduce morbidity and mortality and to improve health (Centers for Disease Control and Prevention, 2001). Occupational disease surveillance refers to monitoring disease-related events within a workplace. In order to decrease the impact of health care-associated infections, there must be a mechanism in place to identify an increase in baseline infection rates and a process to review the efficiency and effectiveness of interventions and control measures (Choi, Eijkemans, & Tennassee, 2001; Dement et al., 2004; Koh & Aw, 2003; Wright et al., 2004).

There is a lack of published research on HCWs absenteeism in North America, especially related to respiratory and gastrointestinal illness reporting. Therefore, the purpose of this research was to merge two administrative databases in order to describe absenteeism among full-time employees of a large Canadian hospital based on the frequency of absenteeism, duration of absence, reasons for absence, annual rate, and seasonal variability. In addition, this research considers the advantages and disadvantages

of using Occupational Health (OH) administrative data for surveillance of HCWs.

Methods

Design and sample

This study utilized a retrospective cohort design, involving a unique record linkage of two administrative databases at a large Canadian hospital. The OH database captures illness and injury data, and the Human Resources (HR) database collects absenteeism data. Research Ethics Board approval was obtained from the hospital and the affiliated university before study commencement. In addition, a privacy impact assessment (a questionnaire-based document) was completed to ensure compliance with the federal Personal Information Protection and Electronic Documents Act (PIPEDA), and a charter for privacy and confidentiality of health information was adhered to.

Study participants included 1,964 full-time hospital employees, including Registered Nurses, Patient Care Assistants, Respiratory Therapists, Physical/Occupational Therapists, Technicians, Clerks, Clinical Educators, Environmental Assistants, Technologists, Management, and Reception. The sample excluded physicians and any employees affiliated with other agencies due to limitations of the two databases.

Full-time employees are entitled to a sick bank of 562.5 hr for each medical condition they experience. If employees face reoccurring absences for the same medical condition, their sick bank depletes accordingly. When an employee returns to work post absence and works all scheduled shifts in a 21 calendar day period, their sick bank is restored to the total allotted time of 562.5 hr. Sick pay is determined based on union affiliation and years of employment.

The hospital is a university-affiliated major regional teaching tertiary care referral facility. There are 452 beds within the hospital, with an array of acute and ambulatory clinical services, including critical care, trauma, and in-patient overnight stays. There are approximately 2,500 full-time and 1,200 part-time employees at the study hospital. The OH department is open for walk-in visits from 7 a.m. to 5 p.m. The department's staff includes a director, physiotherapist, physician, administrative assistant, and four nurses on average working during these hours. In addition, an OH nurse is on call during evenings and weekends to record staff reasons for absence provided over the phone.

All employees within the hospital are strongly recommended to visit the OH department to report illnesses and injuries as noted under the Occupational Health and Safety Act. This recommendation was especially reinforced for infectious disease-related illnesses in response to the new issued directives from the Ministry of Health and Long Term Care (MOHLTC) to all health care facilities, community, and primary care providers with the intention of containing the spread of infectious disease (Ministry of Health and Long-Term Care, 2003). The study hospital has a particular process in place where, after 3 days of absence, an OH nurse diligently follows up with the employee to confirm that their symptoms are not febrile respiratory illness (FRI)-related. The implementation was reinforced in response to the SARS experience.

Measures

Administrative data were collected between June 1, 2004, and May 31, 2005. The OH department monitors the occurrence of illness and injury among all hospital staff and volunteers through reporting and recording of reasons associated with absence. The OH database is a Parklane software system originally owned and operated by an Australian company (Parklane systems, n.d.). The OH nurse selects from a predetermined list of "attributes" or symptoms (up to 6 attributes can be recorded) as self-reported by the employee, and based on this information labels the illness as one of 40 predetermined conditions of absence; however, definitive diagnoses are rarely recorded in the database. The OH nurses are trained to classify symptoms of illness and, when necessary, will send appropriate cultures to the laboratory or request a doctor's note before an employee returning to work.

The HR database contains all absence events experienced during the study period. It is limited to only full-time employees (excludes part-time and casual employees as well as physicians) but is the only source of absenteeism data. The database used by HR is a SAP system, a product developed and marketed by a German company, SAP AG (SAP Global, n.d.). HR collects information such as absenteeism reporting, demographic information, wage, position, time-related data, department, and job identification. The system is directly integrated with other hospital systems, including finance.

The HR database involved a merger of two databases: "Attendance Awareness report" and "Flex report." The Attendance Awareness report provides absenteeism information, date of birth, sex, and postal code. The Flex report provides demographic and job-specific information.

The OH database (which includes all full- and part-time employees and volunteers) was then linked to the complete HR database, and matched on sex, postal code, and date of birth, providing OH visits for employees who reported their absence events. Therefore, the final master database includes only full-time employees (from the HR database) who visited OH database to report their absence but excludes physicians and any employees affiliated with other agencies due to HR database limitations. Datasets had the employee name removed, but to ensure data confidentiality and individual privacy in the linked dataset, a unique identification number was given to each participant and the OH and HR identification numbers were removed. After consulting with OH staff, we only reported the first (primary) reason for absence in this study. Nonreporting was determined when a recorded absence event was indicated in the HR data, but no corresponding visit to OH existed.

Extensive data manipulation was conducted. First, a total of 21,022 records were obtained from HR, containing 1,964 full-time employees' records in monthly increments, from June 1, 2004, to May 31, 2005. A total of 13,759 OH visit records of all employees were collected for the same time period. Since volunteers and external staff were not included in the HR database, their visits were removed from the OH database before the merger. There was no method of determining the full- or part-time status of employees in the OH database; the linking of the two databases was the only method of isolating full-time staff, and thus a total count of full-time employees in OH alone was not possible. These two databases (OH and HR) were then linked to create 25,617 records consisting of all monthly HR records for 1,964 full-time employees for the study period, with any corresponding OH visits linked to the employees. This total was derived as a result of some HR records not containing an absence event and some HR records were missing an OH visit due to employees not reporting to OH. In addition, when an employee visited OH more than once for a single absence event, an additional HR profile record for that absence event was created to match the multiple OH visits. Two employees were incorrectly

matched; these were corrected. From this merged database, there were 7,632 records of absence and 17,985 records without absence.

The 7,632 absence records were cleaned due to multiple reporting to OH for one absence event, with consultation from OH and evaluation of each record, resulting in the removal of 2,929 multiple OH visits for one absence event, leaving 4,703 absence records. Often employees will revisit or recall OH to update their symptoms and status; therefore, multiple OH visits can be associated with only HR absence event. Some employees experienced more than one absence event during the study period; thus, multiple absence events were included in the 4,703 remaining records.

Finally, these records were then remerged with HR records of 553 full-time employees who had no absence events, resulting in 5,256 (4,703+553 = 5,256) records for 1,964 employees. Of these records, 1,310 represented continued absences that had already been counted in the previous months' absence events (i.e., employees reporting absenteeism from 1 month continued into the next). Therefore, there were 3,946 primary absence records from the HR database and 2,680 of these had OH records associated with the absence event.

New variables were created and existing variables were modified for the purpose of this study. Departments were grouped into 10 categories. Number of work hours was determined based on full-time work status as 1,950 hr per year. There were 1,581 (80%) participants employed for the full duration of the study (Table 1).

TABLE 1. Total Number of Months Worked by Full-time Employees in a Canadian Tertiary Care Hospital (for Duration of Study) (Human Resources Data)

# of months worked	# of participants who worked
12	1,581
11	11
10	29
9	22
8	18
7	31
6	113
5	19
4	21
3	30
2	44
1	45

Absence is the primary outcome variable and is reported in two ways depending on the database used. The HR database captures all employee absenteeism, while the OH database captures the reason for absence (conditions) for the subset of employees who report to OH. Reasons for absence were grouped by categories of interest and the remaining conditions were classified under "other." "Inflammatory conditions" were included in musculoskeletal reporting. The attribute variables (i.e., cough-dry, runny nose, nasal congestion, etc.) were used to verify the associated condition(s) (i.e., respiratory-upper) for employees' OH visits.

Analytic strategy

Crude statistics and Tukey's five-number summary were conducted. The primary conditions associated with all periods of absenteeism ($n = 2,680$) are described using frequencies and percents. The number of employees, total hours worked, the number of incidents, the number of times absent, and the percent of absence not reported to OH are described for the study period. Finally, OH reporting of primary conditions for respiratory and gastrointestinal illnesses and musculoskeletal injuries/disabilities associated with absenteeism was plotted by month.

Results

Among the 1,964 full-time employees, there were 3,946 periods of absence (HR data), but 1,266 (32%) did not have an associated OH visit. Reasons for absence reported in this study were based on 2,680 (68%) of primary absence events during the study period (Table 2). Respiratory illness (31%) and gastrointestinal illness (17%) accounted for approximately half of the primary reasons for new absence events reported to OH (Table 2), followed by musculoskeletal injuries/disabilities (15%). There were one hundred and three visits (4%) to OH with no recorded condition. These visits were not categorized as nonreporting since the employee did visit OH, but a conclusive reason was not recorded upon visit.

Demographic characteristics and overall absenteeism of hospital employees were retrieved from the HR database (Table 3). A total of 1,964 employees, 1,598 (81%) females, 366 (19%) males, were included in the analysis. According to the HR data, there were 1,411 (72%) employees reporting an absence during the study period, including 423 employees experiencing

TABLE 2. *Primary Reason(s) for Absenteeism for 2,680 Reported Visits to Occupational Health Among 1,964 Full-Time Employees in a Canadian Tertiary Care Hospital (n = 1,964) (Occupational Health Data)*

Primary conditions reported to OH	Number of absences	% of absences
Respiratory	872	31
Gastrointestinal	463	17
Musculoskeletal (Inflammatory)	401	15
Undefined (no condition associated with OH visit)	226	8
Neurological	172	6
Psychological	119	4
No reason provided at occupational health visit	103	4
Obstetrical/Gynaecology	79	2
Other ^a	245	2
Total	2,680	
Absence not reported to occupational health	1,266	32

^aOther includes abdominal, cardiovascular, deep tissue, ear, ocular, post surgery, skin, trauma, urinary, other.

one absence event (22%), 311 employees with two absences (16%), 248 employees with three absences (13%), 216 employees with four or five absences (11%), and six or more absences among 193 employees (10%). Of those reporting an absence, the median number of absence events was 2 and the median duration of absence was 7 days. The average total number of days absent was 17 (Table 3). There are 19 employees excluded from the absence results due to a missing value for number of incidents, despite them having sick hours/days recorded. Some employees reported multiple reasons for absence.

Absenteeism by department is presented in Table 4. The largest departments (based on number of employees) were Administration and Support, General Medicine, and Diagnostic Imaging. The General Medicine department experienced the highest absenteeism, with employees being absent on average 1.9 times per 1,000 hr worked, followed by the critical care department employees, who were on average absent 1.8 times per 1,000 hr worked. Departments with the highest percentage of staff not reporting to OH were General Medicine (43%) and Critical Care (39%), Obstetrics/Gynaecology (39%), Resource Pool (38%), and Paediatrics (36%).

Figure 1 illustrates the three main reasons for absence: respiratory (including upper/lower and FRI), gastrointestinal, and musculoskeletal/inflammatory conditions. A total of 1,736 absence events reported to OH had one of the three illnesses as the primary reason for absence. Each employee absence is represented; therefore, some employees contributed more than one absence event to the analysis. Respiratory illness absenteeism reporting increased in December, remained elevated during January, and decreased in February 2005. Gastrointestinal illness reporting had two less obvious peaks, in December and February, while the reporting of musculoskeletal conditions remained fairly stable over the year.

Discussion

The majority of employees at the study hospital were absent at least once during the year, with most experiencing two absences, contrary to the findings of Ritchie et al. (1999), where 59% of NHS employees of

TABLE 3. *Demographic Characteristics of Full-time Employees in a Canadian Tertiary Care Hospital (Human Resources Data)*

Variable	Mean	Minimum	25th percentile	Median	75th percentile	Maximum
All employees (n = 1,964)						
Age	43	18	36	43	50	64
Annual pay	\$50,594	\$27,409	\$33,782	\$52,378	\$59,063	\$332,051
Months worked	1,737	160	1,950	1,950	1,950	1,950
# of times absent	2	0	0	1	3	23
Hours absent	85	0	0	23	87	1,212
Days absent	11	0	0	3	12	162
Employees with an absence (n = 1,411)						
# of times absent	3	0	1	2	4	23
Hours absent	118	2	23	51	124	1,212
Days absent	16	0.2	3	7	17	162

Note: Age of employee calculated at start of study period (i.e., June 1, 2004).

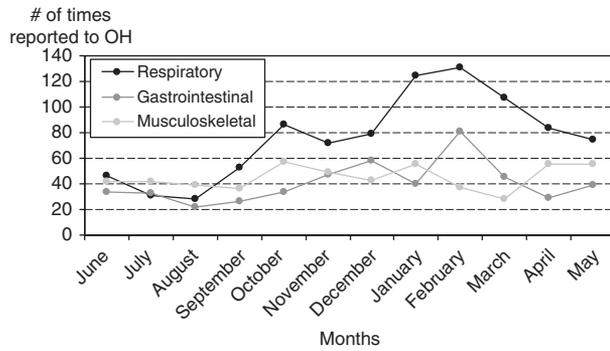


Figure 1. A Total of 1,736 Primary Reasons for Absence among Full-time Employees in an Ontario Tertiary Care Hospital Reporting to Occupational Health (Occupational Health Data).

four trusts in Lanarkshire did not experience an absence and only 20% of staff experienced one absence event. The median duration of absence among staff at the study hospital was 7 days, higher than the 6.7 days' average duration of absence documented for the general Canadian workforce but lower than Canadian HCW absenteeism, where the average duration of absence was 11.8 days (CIHI, 2005). Our findings based on the median absence were higher than the 4.0 days among NHS employees reported by Ritchie et al. (1999). The differences may be explained by the hospital types included (i.e., three acute hospitals, one community care) and the inclusion of both part- and full-time employees in the analysis of employees of four NHS trusts (Ritchie et al., 1999). The total average of 17 days absent among the Canadian study hospital population was higher than previous literature (11.8 days absent) (CIHI, 2005); however, the duration of

absences was highly varied due to extremely long periods of absence for some employees.

The analysis of OH visits among employees at a Canadian tertiary care hospital brings attention to the advantages of routine surveillance of this data source and provides baseline data for this working population.

The primary reasons associated with absence reporting (i.e., respiratory [31%] and gastrointestinal [17%]) support prior research on the topic of HCWs absenteeism and maintain the need to conduct further investigations into infectious disease-related illness among hospital employees (Feeney et al., 1998; Ritchie et al., 1999). The percentage of respiratory and gastrointestinal illness absenteeism among all full-time employees is slightly lower (48%) than previous findings in the Whitehall II study (50–60%) (Feeney et al., 1998). These effects could be a result of the differing work environments and/or the large percentage of missing OH visits (32%), some of which could be associated with infectious-disease absence. The high reporting of musculoskeletal (15%) reasons for absence and the longer absence durations attributed to injuries are a concern due to increased disability claims and absenteeism, staff shortages, and reduced physical wellness of hospital employees. The benefit of evaluating the OH visits highlighted the importance of public health nursing interventions for reducing HCWs' risk of injury and potential long-term disability. Health promotion initiatives such as workplace wellness programs may be an appropriate method to address this burden on employees.

Crude rates of absence were the highest in the General Medicine and Critical Care departments.

TABLE 4. Total Number of Employees, Hours Worked and Number of Absences for Full-time Employees in a Canadian Tertiary Care Hospital as Reported by Human Resources and the Proportion of Absences not Reported to Occupational Health (n = 1,964) (Merged Human Resources and Occupational Health Databases)

Department	# of employees in each department	Total hours worked	Total number of incidents	# of times absent/1,000 hr worked	% of absenteeism not reported to OH
General Medicine	266	458,419	871	1.90	43
Critical Care	199	357,370	642	1.80	39
Paediatrics	28	50,349	88	1.75	36
Resource Pool	72	117,039	188	1.61	38
Obstetrics/Gynecology	53	96,382	148	1.54	39
Emergency Room	59	102,128	143	1.40	27
Surgery	83	146,809	204	1.39	32
Out-patient clinics	198	317,785	364	1.15	23
Administration and Support	750	1,326,013	1,233	0.93	24
Diagnostic Imaging	256	457,106	369	0.81	31

These findings may be due to increased risk associated with greater patient contact. The General Medicine department receives patients with complex medical illnesses and infectious diseases, thus allowing for increased exposure to these agents, which may translate into more disease transmission and, ultimately, increased illness reporting. This knowledge can inform OH staff and/or public health nurses to communicate and coordinate with appropriate authorities, in order to increase awareness of public health practices among these departments and reduce sickness absence rates. Examples include increasing infection control precautions, reiterating the importance of hand-washing, quarantine of infectious patients, and increasing environmental services/cleaning staff.

The seasonal variation associated with respiratory and gastrointestinal illness is apparent when contrasted with musculoskeletal reporting, which appears more constant over the year. The winter respiratory peak of illness occurring among full-time employees is consistent with other research (Sepkowitz, 1996) and supports the notion that the data obtained from OH reports are representative of reasons for absence, despite the number of missing OH visits. Given the seasonality of respiratory illness among HCWs, consistent surveillance of OH visits will enable hospital personnel to prepare for staff shortages and increased OH visits. Early warning can enhance surge capacity and help with preparing for the difficulties associated with increased emergency visits and decreased numbers of staff during the influenza season or other disease outbreaks.

There are some disadvantages to using OH visit data for surveillance of hospital employees' illness and injury reporting. Not all employee absences have a corresponding OH visit, despite the strong recommendations made by Occupational Health and Safety and the MOHLTC. General Medicine, Critical Care, and Obstetrics & Gynecology departments had the highest percentage of visits not reported to OH. Many factors may be contributing to this lack of absence reporting to OH, including the management of these departments, and delays associated with absence reporting in OH. Given the new guidelines and heightened awareness for reporting respiratory and gastrointestinal-related illness, it is expected that infectious disease reporting is more accurate and the missing OH visits may be due to other reasons for absence.

The evidence of missing visits can facilitate Nurse Managers and Hospital administration to ensure compliance with OH reporting among the necessary departments. This can be done through emphasizing the importance of reporting, providing incentives for OH visits associated with absence, or penalizing employees who do not report (i.e., withdrawing a paid sick day). Further, ensuring there is an adequate amount of OH nurses on duty to accommodate employees and maintaining an efficient visitation process may help reduce waiting times and alleviate those discouraged to report to OH.

These measures can improve the data utility of the health surveillance system. The completeness and accuracy of absence data records enables OH nurses and Hospital administrators to monitor employees' illnesses and injuries, in order to promote implementation of public health interventions and increase infection control when deemed necessary.

The strengths of this study include the novel application of using absenteeism data combined with reasons for absence to investigate the potential use for a public health surveillance system involving hospital employees. Also, the complete absenteeism data from all full-time employees in an acute care facility, with the majority of full-time workers maintaining employment for the entire duration of the study, are an asset. Many of the variables in the HR database provided valuable employment information facilitating comparisons between departments and job types. With the exception of age and sex, demographic variables and possible factors affecting absenteeism are not captured in the database, thereby decreasing the ability to control for other factors associated with absenteeism.

A limitation of this study is the lack of physicians and affiliated employees' records due to restrictions of the databases. In addition, data collected in the OH database consist of self-reported symptoms that may be provided inaccurately by the employee and may result in reporting bias. Employees may report illness when in fact they are missing work for some other noninjury/illness-related reason such as family emergencies, care-giver duties, etc. Also, this study may under-estimate the psychosocial reasons for sickness absence. A survey of employees would be a method of collecting personal absence information, and obtaining the essential reasons that may not be associated with illnesses but contributing to absence reporting. Further, validation of self-reported reasons for absence would be advantageous.

The participants' classified absence condition is based on the discretion of the OH nurse, possibly leading to observer bias based on the symptoms described by the employee to the nurse. This may be reduced as a result of the nursing staff being trained to determine probable illness category and reason for absence. Further, due to the nature of OH data collection, the reasons for absence are based on symptoms, not a true diagnosis. The data cannot be validated for this study's purposes, but future exploratory studies could collect laboratory results and physician diagnoses to validate employees' reported reasons for absence.

Because of the self-reporting of illness and injury among staff, missing data were unavoidable. Although in theory all employees are expected to report their illness to OH with details and reasons for their sickness absence, under-reporting of sickness absence occurred. In addition, those employees providing reasons for absence may differ from those not reporting, resulting in self-selection bias. Factors that affect nonreporting may include those experiencing shorter or less severe illness, those experiencing illness and/or injury but still attending work, or personality characteristics altering one's decision to report. In addition, nonreporting of illness and injury to OH may be impacted by timeliness of waiting to see an OH nurse. This nonreporting of illness and injury absenteeism provides an incomplete picture of reasons for absenteeism. However, considering the education and awareness of the importance of illness reporting (especially infectious disease-related), and the new policies and guidelines in place, this nonreporting issue should be alleviated.

Conclusions

The unique administrative record linkage of HR and OH department databases provided a source of data in which to conduct an investigation, although the data linkage process proved to be challenging. Surveillance systems collect health data that include symptoms, which are the initial determinants of illness, as opposed to laboratory results or physician diagnosis, which often arrives too late to provide early warning. Therefore, accuracy, efficiency, and early absence reporting to OH must be enforced among employees, in order to enhance the effectiveness of a surveillance system that is meant to monitor hospital

employees' absenteeism and reasons associated with sick time.

The use of administrative data for surveillance purposes limits us to the variables that are currently collected, and cannot be modified for our purposes, inhibiting the ability to consider other specific factors already known to be associated with absenteeism. Future studies could obtain and investigate other possible confounders and factors associated with absenteeism. Also, studies could investigate intervention procedures, particularly the utilization and effectiveness of the new directives and guidelines in place, and the impact they may have on absence among hospital employees. This can contribute to further knowledge of the occurrence of absenteeism within health care settings. The results of this study aim to provide a foundation for further public health surveillance activities within the hospital and other health care institutions.

Public health surveillance of hospital employee populations can provide early warning of unusual health events. This may facilitate the investigation of possible outbreaks and implementation of public health interventions, including increased infection control precautions and timely communication with health professionals, to ultimately reduce hospital employee absenteeism. Moving forward, there are plans to monitor OH reporting in a more timely manner. In addition, the findings of this paper will be presented to the HR and OH departments to increase their knowledge and awareness of absenteeism and the high rate of nonreporting among full-time employees, in hopes that they will implement their own methods and procedures to increase reporting to OH when necessary. Following improvements to the quality of the data, it has the capacity to be integrated with an existing electronic, automated public health surveillance system to be used for future pandemic planning and emergency preparedness. A retrospective review of the OH data has been performed and we are now moving forward with a prospective analysis involving the implementation and validation of an innovative, real-time OH syndromic surveillance system.

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