The Incidence of Upper Extremity Injuries in Canadian Endoscopy Nurses

The work that endoscopy nurses do is very physical and calls for rapid and repetitive movements performed in varied and often-challenging settings. The job frequently calls for nurses to work longer than normal work days and characteristically requires on-call services by these nurses. With repeated exposure to the challenges of the job comes the potential for physical injury.

Upper extremity injuries occur in endoscopy nurses. This study is the second study to be done in this population of nurses. The findings of the initial research study on this topic (Drysdale, 2007) indicated that the group of endoscopy nurses in that study experienced an average upper extremity disability score of 21.47 when a score of 1–100 was employed and the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire was implemented. Working full-time was a significant predictor of increased injury. Many of the factors that were explored in the study indicated only trend relationships between the factors explored and an increased level of injury. Because the initial research study was conducted on a fairly small sample of nurses (n = 38) working in only one city in Canada (Winnipeg), it was felt that some of the findings were perhaps related to that specific geographical location and were characteristic of that small group only. The findings indicated that the group of nurses working at one of the two large centers in the study group had twice as many injuries as the nurses working in the second comparative center.

ABSTRACT

Work-related musculoskeletal injuries occur at an epidemic rate in Canada. Many thousands of workers are temporarily or permanently removed from the workforce annually because of this type of injury. Workers who are most susceptible to this type of injury are those who perform physical, repetitive work involving sustained activity in awkward positions and cramped environments. Workers in the healthcare sector experience one of the highest rates of this type of injury annually. Injury prevention programs are being developed and instituted by government agencies and employers in an attempt to reduce the frequency of occurrence of this type of injury. In spite of attempts to prevent these injuries, musculoskeletal injuries of the upper extremity, neck, and back continue to occur in healthcare workers including nurses. Endoscopy nurses experience upper extremity injuries at work. The purpose of this study was to explore whether the occurrence of upper extremity injuries is common in this population of nurses and to identify factors that may be associated with these injuries. Results reveal that for this sample of Canadian nurses, older endoscopy nurses are at greater risk of injury. Nurses with injuries tended to self-prescribe treatment of their injuries. They also took anti-inflammatory medications and painkillers for their symptoms and saw their doctors for their conditions. Physiotherapist involvement was not common. Thirty-two percent of the endoscopy nurses in this study missed work because of upper extremity pain. Considering the number of nurses working in Canada, this percentage suggests a significant number of sick days, indicating a cause for concern, exploration, and further prevention measures.

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This current study was instituted to expand the findings of the initial Drysdale (2007) study.

**Literature Review**

Other than the study by Drysdale (2007), no new additional published research on the incidence of upper extremity injuries in endoscopy nurses was found before performing this study. In the Canadian literature, the study by Bible (2001) continues to stand as an example of how injuries in endoscopy nurses can be prevented through a multidisciplinary and proactive nursing approach. Because Bible’s (2001) study involved Canadian workers, every effort was made to obtain statistical information regarding injuries in Canadian nurses, and in Canadian endoscopy nurses in particular. Information was obtained from nine provincial workers compensation board annual reports as well as from the statistician at the Workers Compensation Board of Manitoba and the Statistics Canada Web site.

Because of the manner in which data collection and reporting varies, it was difficult to draw any consistent trends among the provinces. A few observations, however, were derived from the data review. In British Columbia, 13,348 claims first paid in 2008 were awarded to healthcare and social assistance workers. The overall cost of claims paid in this sector in 2008 was $56,323,889. A total of 66% of all serious injuries for all work categories involved musculoskeletal injuries (back strain and other strains, traumatic tenosinovitis, bursitis, contusions, and dislocations). General construction workers were the only occupation that outnumbered healthcare and social assistance workers in workdays lost between 2004 and 2008. While less than half of the claims were for female workers, 34% of all serious injuries occurred in women (Workers Compensation Board of British Columbia Annual Report, 2008).

Although the reports indicate no statistics specific to injuries in nurses, the British Columbia Workers Compensation Board Web site offers research articles about musculoskeletal injuries in healthcare workers, care aides, and licensed practical nurses (Workers Compensation Board of British Columbia Annual Report, 2008). That research was at least partially funded by the British Columbia Workers Compensation Board. The fact that money is being spent to explore the situation is an indication that the incidence of injury in this group is significant and is being taken seriously by the body responsible for monetary compensation of these injuries.

In 2008, the Workers Compensation Board of Alberta reported that sprains and strains were consistently the highest injury in health units since 2005. Overexertion injuries accounted for 39.4% of injuries in this sector since 2005. In a separate classification for the hospitals and acute care sectors, overexertion injuries rated as the number 1 type of injuries incurred. No statistics specific to nursing were available for either of these healthcare-related sectors (Workers Compensation Board of Alberta Annual Report, 2008).

In 2008, 31,600 workers were employed in health occupations in Saskatchewan (Statistics Canada, 2010). The Workers Compensation Board of Saskatchewan captured and presented data for nurses in their annual report for 2008 (Workers Compensation Board of Saskatchewan Annual Report, 2008). For the health authority, hospitals, and care homes sector, 13,774 claims involved injuries of the upper extremity; this sector had the highest incidence of shoulder injuries compared to injuries incurred in all other sectors. The healthcare sector also showed the highest incidence of back injury claims. Of the 889 claims for registered nurses and supervisors, 315 claims involved time lost from work and 272 of these claims were for upper extremity injuries. Forty of these claims were for shoulder injuries. The category of “assisting occupations in support of health” indicates a total of 2,071 injuries with 635 of those injuries involving the upper extremity.

In 2008, 43,000 workers were employed in health occupations in Manitoba (Statistics Canada, 2010). A request for statistical data resulted in information being obtained from the statistician at the Workers Compensation Board of Manitoba. The data showed that Manitoba nurses claimed injuries of the arms, hands, wrists, and shoulders between the years 2000 and 2008. The number of claims for upper extremity injuries that were awarded in 2008 was 70, and 43 of these claims were for shoulder injuries. The average number of days off work because of upper extremity injuries was 53.2 in 2008. The average number of days off work for injured nonnurses with upper extremity injuries was 29 (Workers Compensation Board of Manitoba Annual Report, 2008).

The Ontario Workers Compensation Board statistics report for 2008 indicates no statistics reported specific to the nursing occupation (Workers Compensation Board of Ontario Annual Report (2008). Of all overall injury claims, 50.5% involved strains and sprains. The average duration of wage loss benefits in days in 2008 was 14.3. The Prince Edward Island Workers Compensation Board reports that the highest percentage of workplace injuries occurs in the health and social services industries and sprains and strains comprise 58% of injuries (Workers Compensation Board of Prince Edward Island Annual Report, 2008).

The Yukon Workers Compensation Board report indicates that upper extremity injuries occurred at a higher rate than any other injury in 2008. Health occupations upper extremity injuries were reported as 11%
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of all injuries in that sector (Workers Compensation Board of Yukon Annual Report, 2008). Newfoundland and Labrador reported no statistics specific to work sector or occupation in 2008. A total of 7,417 claims were accepted. Soft tissue injuries occurred at a rate of 1.2 per 100 workers employed (Workers Compensation Board of Newfoundland and Labrador Annual Report, 2008).

The Nova Scotia Workers Compensation Board reported for 2008 that 26.8% of all injuries with loss time involved the upper extremity and 66% of all injuries involved the neck, upper extremity, or back. The highest number of injuries occurred in the health/social services sector with a total of 1,687 (Workers Compensation Board of Nova Scotia Annual Report, 2008).

What all provincial bodies have in common is that high rates of musculoskeletal injuries in workers continue to occur, not all injury claims are accepted and awarded compensation, the cost of injury at work is high, and prevention of injury is stressed as a primary concern. Numerous provincial injury prevention programs are in place. The way the statistical data are presented for all provinces differs and the extent of data reporting varies. Some provinces report detailed information, whereas others have more information related to the financial health of their programs than to the claims of their workers.

The work of Pransky, Benjamin, Hill-Fotouhi, Fletcher, and Himmelstein (2002) addresses the issue of workers’ compensation benefits and upper extremity injuries. The researchers report that only 10% of work-related upper extremity injuries received workers’ compensation benefits. Their work also says that of the 90% of workers who return to work after injury, 27% reported pain exacerbated by work activities.

Bongers’ (2001) study supports the findings of Pransky et al. (2002). In her work, Bongers (2001) found that shoulder pain is a widespread phenomenon that causes strain on the individual as well as on society. Hildebrandt, Bongers, Dul, van Dijk, and Kemper (2000) found a relationship between leisure time, job demands, and musculoskeletal symptoms. They concluded that physical activity in leisure time might be an important factor in reducing the incidence of soft tissue injuries in all workers and especially in those performing sedentary work.

Further support for the importance of investigating this type of injury is found in the work of Owen, Keene, and Olson (2002). They found that shoulder discomfort among nursing personnel is as prevalent as back pain, and shoulder and neck problems interfere with functional capacity and the ability to work more than do back problems. Soto-Quijano and Riveratavarez (2005) also studied risk factors for shoulder injuries. In this paper, the authors indicate that some factors associated with shoulder disorders include female gender, female gender and smoking habit, female gender and living alone with children, the consumption of alcohol, pushing and pulling actions, duration of employment, low support from colleagues and supervisors, symptoms of depression, a diminished level of control over the job, and biomechanical constraints. They also found a possible correlation between rotator cuff tendonitis and increased body mass index.

Trinkoff, Lipscomb, Geiger-Brown, and Brady (2002) studied work-related factors and musculoskeletal disorders in registered nurses. Their research explored work-schedule characteristics and reported musculoskeletal disorders of registered nurse. Their study showed a significant association between reported musculoskeletal disorders of the neck, shoulders, and back and a demanding work schedule. These same researchers (Lipscomb, Trinkoff, Brady, & Geiger-Brown, 2004) studied the effects of healthcare changes on the health of registered nurses. They found that healthcare changes are related to musculoskeletal disorders in this group. They also concluded that healthcare system changes compromised the quality of care and patient safety as well as the health of the nurses. More recent research was performed by Alexopoulos, Burdorf, and Kalokerinou (2006). They studied risk factors for musculoskeletal disorders among nursing personnel in Greek hospitals. They found that physical load handling seems to put nurses at risk for the occurrence of musculoskeletal disorders.

While not specifically studying the nursing population or endoscopy nurses in particular, the recent work of Roquelaure et al. (2009) explored the incidence of clinically diagnosed upper extremity musculoskeletal disorders in the general working population. They concluded that personal and work-related physical and psychosocial factors show a strong association with injuries in this category. They found that upper extremity musculoskeletal disorders increased with age, regardless of gender. In the male population, upper extremity musculoskeletal disorders were associated with obesity, high physical demand, high repetition of tasks, postures with arms at or above shoulder level, or with full flexion of the elbow. In females, the researchers found that upper extremity musculoskeletal disorders were associated with diabetes mellitus, postures with extreme bending of the wrist, the use of hand tools that vibrate, and low level of decision authority.

Boyer et al. (2009) studied ergonomic and socioeconomic risk factors for hospital workers’ compensation injury claims. They found that highest injury rates were in nurses, semiprofessionals, and the semiskilled. They also found that increased risk of injury was related to increased physical work, low job tenure, and psychological demands. They further found that risk decreased with psychosocial rewards and supervisor support. Their conclusion was that prediction of workers’ compensation injury claim risk was related to low
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job tenure and physical and organizational features of the hospital jobs. Kennedy et al. (2006) wrote about the importance of the prevention of upper extremity musculoskeletal disorders in relation to occupational health and safety and injury claims with associated time lost from work. Edlich et al. (2005) described the devastating state of affairs associated with back injuries occurring in the healthcare community and offered legislative solutions to the problem. O’Sullivan, Bridge, and Ponich (2003) found that endoscopists performing endoscopic retrograde cholangiopancreatography were not immune to musculoskeletal injuries. Shergill et al. (2009) studied the possible negative effects of pinch forces and forearm-muscle loads applied during routine colonoscopy. They concluded that these activities might lead to overuse injuries of the elbow and wrist.

Many articles have been written in numerous journals about musculoskeletal injuries in healthcare workers. Ninety-three research articles were reviewed in preparation for this article. Of the 93 articles reviewed, 38 articles in various scientific journals were specific to work-related musculoskeletal injuries in nurses. All of the articles reviewed indicate that nurses work in jobs that are associated with musculoskeletal injuries. Many differing research methods and statistical analyses have been implemented in the numerous studies that have been done.

A word of caution about studying this group comes from Menzel (2004). Menzel cautions that before using or developing any survey of musculoskeletal disorder symptoms for workplace surveillance or research, the survey should be proven to have adequate reliability, validity, responsiveness, and practicality. The research tool (The DASH Survey) used in this study is both reliable and valid.

Objectives

The objectives of this study are to discover the prevalence of upper extremity injuries in endoscopy nurses in Canada and factors in the workplace that may be associated with increased risk, and to determine whether certain subgroups may be at increased risk.

Methods

Approval to conduct this study was obtained from the University of Manitoba, Education/Nursing Research Ethics Board. A cross-sectional design was instituted. Correlational analysis was used to analyze data.

Instrumentation included a standardized, reliable, and valid survey called the DASH survey. This survey was jointly developed by and is the shared property of the Institute for Work & Health and the American Academy of Orthopaedic Surgeons. This research tool was used with the permission of the developers. Cronbach’s α coefficient reported by the developers of the DASH is .90. This score indicates the reliable internal consistency of this research tool, which is used by professionals worldwide in the assessment of upper extremity injuries.

A second instrument employed in this study was a quantitative and qualitative questionnaire designed by the principal investigator to elicit detailed information regarding the physical requirements of the job, routine practices, intensity and length of time spent doing the job, symptoms of upper extremity injury, and treatments relating to these symptoms. Any qualitative data gathered was converted to quantitative data for numerical manipulation. This questionnaire included the list of variables cited in Table 1. These variables formed the group of predictor variables used to predict the DASH outcome scores.

A convenience sample of endoscopy nurses working in endoscopy centers in Canada was obtained. Every effort was made to include nurses working in both urban and rural centers. Each consented subject was given a research package, which included the research tools, detailed informed consent forms, instructions, an incentive in the form of a voucher for a Tim Horton’s coffee and doughnut, and a stamped and self-addressed return envelope. Research packages were distributed to 220 nurses who had responded to the call for research participants. A total of 147 of the submitted packages were complete and usable for this study. The response rate was 66.8%.

Statistical methods used for data analysis were Pearson’s correlation and independent groups t test. The statistical analysis was performed with SPSS 16.0. Multiple regression analysis was also performed to provide an index of the relationship between the criterion variable (DASH score) and each of the predictor variables. Data analysis was reviewed and verified by a statistician who works for the University of Manitoba and who was independently hired by the principal investigator.

Results

The prevalence of upper extremity injuries in this group of endoscopy nurses is represented in Figure 1 (DASH). The descriptive statistics for continuous variables in the study are presented in Table 2.

The results of this study show that subjects have a mean age of 49.8 years. These nurses have an average body mass index of 25.83 and work full-time (64.6%). The nurses are experienced in endoscopy with 11.08 years’ average of endoscopy experience. This group of nurses has a higher than average upper extremity disability score (mean = 15.77). The average DASH score for the normal population is 10.1 and the average DASH score for work-related disability is 8.8 (Hunsaker, Cioffi, Amadio, Wright, & Caughlin, 2002).
TABLE 1. Study Variables Organized Into Six Categories

<table>
<thead>
<tr>
<th>Subject Demographics</th>
<th>Organizational</th>
<th>Work-Related</th>
<th>Ergonomics and Preventive</th>
<th>Health-Related</th>
<th>Treatment-Related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Place of employment</td>
<td>Pushing patients in stretchers and wheelchairs</td>
<td>Workplace ergonomic assessment</td>
<td>Visited a doctor for upper extremity pain</td>
<td>Anti-inflammatory drugs used on occasion</td>
</tr>
<tr>
<td>Gender</td>
<td>Hours of work (full-time or part-time)</td>
<td>Minutes of steady application of abdominal pressure when assisting during endoscopy</td>
<td>Workplace physiotherapy assessment</td>
<td>Missed work for upper extremity pain</td>
<td>Takes pain medication regularly</td>
</tr>
<tr>
<td>Height</td>
<td>Hours in direct patient care per shift</td>
<td>Requirements to move and transfer heavy equipment</td>
<td>Instructed by the employer on exercises for the upper extremities</td>
<td>Surgery for upper extremity problems</td>
<td>Takes pain medication occasionally</td>
</tr>
<tr>
<td>Weight and body mass index</td>
<td>Floating to other areas or work primarily in endoscopy</td>
<td>Required to use full range of motion of upper extremities daily</td>
<td>Required to transfer sedated patients</td>
<td>Instituted self-prescribed treatment of upper extremity pain</td>
<td></td>
</tr>
<tr>
<td>Handedness</td>
<td>Level of sedation of patients (heavy, moderate, light)</td>
<td>Required to transfer sedated patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years working in endoscopy</td>
<td>Focus on procedure room turnaround time</td>
<td>Required to position and reposition patients</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This study group has a tendency to take analgesics for upper extremity pain (occasional use = 41.5%; regular use = 11.6%). They have seen a doctor for upper extremity symptoms (59.9%). The nurses missed work because of upper extremity symptoms at a rate of 32.7%. The variables representing injury (increased DASH score) and increased age were correlated ($r = .282$, $p < .001$). There was also a correlation between years spent working in endoscopy and injury (increased DASH score) ($r = .275$, $p < .001$).

No statistical significance was found between working full-time and increased injury. This is a new finding and may support the conclusions of the first study (Drysdale, 2007), which suggested that some of the findings in the original sample might have been characteristic of that small group only. This finding may also indicate that workers who have injuries decrease the amount that they work by working part-time to accommodate their physical disabilities. This finding may also suggest that too few of the injured endoscopy nurses working in Canada consented to participate in the study. Significantly higher DASH scores (i.e., increased injury) were found for doctor’s visits ($t[143] = 5.82, p < .001$), regular use of painkillers ($t[135] = 6.13, p < .001$), use of anti-inflammatory drugs ($t[143] = 5.95, p < .001$), and missing work ($t[143] = 4.638, p < .001$).

The outcome variable for multiple regression is the score that each participant achieved on the DASH questionnaire. Ten predictor variables were tested. Results of the multiple regression analysis showed that 10 variables were significant ($F = 12.075$, $p = .000$, $r^2 = .508$, standard error of estimate = 9.384). Regarding effect size, 50% of the variability in the dependent variable (DASH score) was explained, or accounted for, by the independent variables. Significant predictors of the DASH scores included whether subjects were using anti-inflammatory drugs regularly ($p = .000$), using painkillers regularly ($p = .001$), seeing the doctor for upper extremity pain ($p = .009$), and age of the subject ($p = .044$).

Discussion

From the statistical figures for Manitoba and Saskatchewan, a number of questions arise. Do women
experience more severe or chronic injuries of the upper extremity than men? Do nurses experience injuries of the upper extremity that are more severe than other workers' injuries? Is there any one group of nurses experiencing increased injuries in both number and severity? How many nurses who experience injuries at work actually report the injuries? Is the number of this type of injury in Manitoba characteristic of the number of injuries in other areas in Canada with comparable populations (272 nurses and supervisors with upper extremity injury claims were compensated with time lost in Saskatchewan in 2008, whereas 70 Manitoba nurses with upper extremity injury claims were compensated with time lost in the same time period). Are shoulder injuries occurring at a consistent rate in reference to the number of workers employed regardless of the number of claims filed? Manitoba and Saskatchewan who have fairly comparable numbers of workers in nursing both showed similar numbers of claims for shoulder injuries in nurses. Are the differences in rates of allowed claims for injuries in this category related to decision practices by the workers compensation boards in different provinces?

The number of participants in this study was fairly low, given the number of Canadian endoscopy nurses. One possible factor in the relatively low number of participants may be related to reluctance on the part of workers to disclose personal injury-related information out of fear of job-related reprisal. Although the participants are guaranteed that all information is numerical and confidential, they may still feel a potential risk to job security if they participate in injury-related research that is not sanctioned by their current employers.

**TABLE 2. Descriptive Statistics for Continuous Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of Subjects</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>147</td>
<td>49.80</td>
<td>8.09</td>
<td>25–66</td>
</tr>
<tr>
<td>DASH score</td>
<td>147</td>
<td>15.77</td>
<td>13.42</td>
<td>0–51.7</td>
</tr>
<tr>
<td>Years employed in endoscopy</td>
<td>147</td>
<td>11.08</td>
<td>8.18</td>
<td>0–35</td>
</tr>
<tr>
<td>Height (inches)</td>
<td>147</td>
<td>64.52</td>
<td>2.612</td>
<td>60–72</td>
</tr>
<tr>
<td>Weight (pounds)</td>
<td>143</td>
<td>152.91</td>
<td>30.074</td>
<td>105–320</td>
</tr>
<tr>
<td>Body mass index</td>
<td>143</td>
<td>25.826</td>
<td>4.3851</td>
<td>18.6–48.7</td>
</tr>
</tbody>
</table>

Note. DASH = Disabilities of the arm, shoulder, and hand questionnaire.
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Another limiting factor could be that the general population of endoscopy nurses may not grasp the importance of this type of research if they feel that they are not personally limited from working because they can function within any physical limitations that they may have. The fact remains that without direct answers from the population, no concrete data about any limitations to the decision to participate in injury-related research can be elucidated in a scientific way.

Limitations

A number of limitations were identified at the outset of this study. This cross-sectional study was limited to those nurses currently actively working in endoscopy and therefore did not include nurses who were recently relocated to alternate jobs because of injuries or changes in programs, staffing protocols, or department reorganization. This study was limited in subject number because of difficulties inherent in recruiting participants without easy access to the population.

Conclusions

For this sample of Canadian nurses, 32% of the endoscopy nurses in this study missed work because of upper extremity pain. Considering the number of nurses working in Canada, this percentage suggests a significant number of sick days indicating a cause for concern, exploration, and further prevention measures. Findings support the need for further investigation with a larger sample of endoscopy nurses as the number of participants in the study was fairly small given the large number of Canadian nurses working in endoscopy. In addition, the number of subjects from any particular geographical region was too small to elicit any reliable results based on geographical location or workplace.

The researcher plans to perform this study on a much larger group of nurses employed in the United States in order to see whether these findings are consistent across geographical borders and within a vast population. In addition, on the request of a significant number of previous research participants, it was determined that questionnaires exploring neck and back disability should be included in any future study.

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REFERENCES


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