

Do RNs in British Columbia Work Excessive Hours? A Registry Data Study

Anne Logie, RN, MA, FRE, and Jeanne Geiger-Brown, PhD, RN, FAAN

Excessive work hours may increase fatigue in registered nurses and reduce performance and fitness to practice. The purpose of this study is to assess the prevalence of excessive work hours among College of Registered Nurses of British Columbia registrants as reported during their licensure renewal as well as the factors associated with excessive hours, including age, sex, Canadian or foreign education, area of specialization, and multiple jobs. The authors found that 6.5% of nurses (2,090 of 32,142) worked more than 2,000 hours during the study year and that 1.4% (466 of 32,142) exceeded 2,500 hours. Males; older nurses; foreign-educated nurses; critical care, operating room, geriatric, administration, education, and research nurses; and nurses with multiple jobs worked excessive hours more frequently than their counterparts. The potential for collaboration between employers and regulators is discussed.

Keywords: Fatigue, excessive hours, fatigue impairment, fitness to practice, nursing fatigue, self-reported hours

Excessive work hours produce safety hazards for registered nurses (RNs) and their patients (Geiger-Brown, Lee, & Trinkoff, 2012; Wagstaff & Sigstad, 2011). Nurses already experience increased acuity and complexity in patient care, and the effects of excessive work hours have the potential to reduce performance and fitness to practice (Caruso, 2006; Geiger-Brown & Lipscomb, 2011; Rogers, Hwang, Scott, Aiken, & Dinges, 2004). Besides causing fatigue, additional hours on duty reduce the time to rest, sleep, and recover from work, thus increasing the risk of impaired performance (Geiger-Brown et al., 2012).

An increasing body of research on nurse fatigue exists (Smith-Miller, Shaw-Kokut, Curro, & Jones, 2014), but the role and responsibility of the nurse regulator in managing fatigue risk are not clear. Employers, not regulators, permit excessive work hours, which can take the form of shift overruns, voluntary or mandatory overtime, and on-call hours. Employers are often unaware of and unable to monitor or control how nurses spend their time away from their primary jobs, which can include a second job (Trinkoff, Geiger-Brown, Brady, Lipscomb, & Muntaner, 2006). When a nurse has two jobs, neither the primary nor secondary employer knows how many hours the nurse is working. Given this situation, do professional regulatory agencies have the responsibility to protect public safety by monitoring hours of service as a proxy for fatigue risk? The first step in understanding the role of regulators is to determine if data collected at the time of license renewal give any indication of patterns of nursing practice and potential red flags that these data might provide.

The College of Registered Nurses of British Columbia (CRNBC) collects data about self-reported hours of work per

year, number of employers, and area of practice from registrants upon license renewal. These data have not yet been used to examine excessive hours. If Canadian nurses do, indeed, report excessive hours in large numbers, then this study serves as an initial step in examining the implications our results have for nursing care quality and safety as well as a need for additional research and study into staffing, scheduling, and oversight. The purpose of this study is to assess the prevalence of excessive work hours among registrants as reported during license renewal. Based on the available licensure data, the authors examined differences in self-reported work hours in the past year based on number of employers, age, sex, place of education, and nursing specialty. An unexpected association of excessive work hours with professional conduct reviews is also described.

Excessive Hours

The U.S. government regulates the number of hours of work that employers in the rail, aviation, commercial motor carrier, maritime, and nuclear power industries permit. These regulations began in 1908, so such regulation is not a new phenomenon (Geiger-Brown, Lee, & Trinkoff, 2012).

No standard definition of excessive work hours exists for nurses. In 2004, the Institute of Medicine's report "Keeping Patients Safe: Transforming the Work Environment of Nurses" opined that nurses should work no more than 12 hours per day and no more than 60 hours per week (Page, 2004). In 2014, the American Nurses Association's "Position Statement on Fatigue" suggested that nurses should work no more than 12 hours per

24-hour period and no more than 40 hours per week (American Nurses Association, 2014).

For the purposes of this study, the authors used two case definitions. The first is a cut point of 2,500 hours of work per year, which is based on a study by Dembe, Erickson, Delbos, and Banks (2005), who examined longitudinal data from more than 10,000 workers over more than 89,000 person-years. They found that for every 5 hours per week over 40 hours, an average increase of 0.7 injuries per 100 worker-hours occurred, and for every 2 hours per day over 8 hours, an average increase of 1.2 injuries per 100 worker-hours occurred. Their definition of extended hours was more than 60 hours per week and 12 hours per day, which they defined as 2,500 hours or more per year. Most full-time nurses work between 1,700 and 1,900 hours per year counting vacation, personal, and holiday time. The authors arbitrarily elected to have a second cut point of 2,000 hours per year to capture the equivalent of working a normal schedule but taking no vacation.

Excessive work can come in the form of longer hours per day, additional shifts per week at a single job, or work at two or more jobs. Although self-reported data about hours worked can be used, a better source for nurses with a single job is time-clock data because of greater precision and a lack of reporting bias. RN time-clock data from two hospitals for a total of 118,984 shifts were examined by Geiger-Brown (2014). The mean duration of shifts (nominally 12 hours) was 12.2 hours ($SD = 2.0$), with a median of 12.7 hours. Over the course of 12 months, nurses worked an average of 138 shifts ($SD = 26$), ranging from 69 to 336 shifts. These data point to considerable overwork among some nurses, even assuming that they worked only a single job.

In a population-based sample survey of more than 2,200 nurses in 2002 and 2003, 19% of nurses held more than one job (Trinkoff, Geiger-Brown, et al., 2006). Of these nurses, 15% worked 13 or more hours per day, 23.7% worked 50 or more hours per week, 18% worked 6 or 7 days per week, and 12% worked all four weekends in a month. Data from the U.S. Department of Health and Human Services' 2008 RN Population Survey, a stratified random sample of RNs ($n \geq 55,000$ RNs), provide stable national point prevalence estimates of multiple employers for RNs (U.S. Department of Health and Human Services, 2010). These data show that more than 12% of nurses reporting working a full-time job had more than one nursing job, and 14% of nurses working part time had more than one nursing job. Of all full- and part-time nurses who reported multiple positions, more than 58% held a regular position with an employer. The rest worked per diem, were self-employed, worked in a travel nurse position, or were in a nontravel agency position. The most common workplace for multiple positions was the hospital setting. With approximately 2.7 million RNs in the United States (Bureau of Labor Statistics, 2016), the number of nurses with multiple employers is large.

Fatigue

Fatigue is a complex phenomenon that takes many forms. *Acute fatigue* can result from the physical and psychosocial demands of the job (Bultmann, Kant, van den Brandt, & Kasl, 2002). In workers surveyed as part of the Maastricht Cohort Study of Fatigue ($n = 8,521$), emotional demands, impaired decision latitude, lack of supervisor support, and job insecurity contributed most to the experience of fatigue. Of greater concern is *chronic fatigue*, a maladaptive condition that occurs when acute fatigue is not relieved after periods of rest (Winwood, Winefield, Dawson, & Lushington, 2005). These rest periods must be of sufficient frequency and duration to allow the body to recover from acute fatigue, or a cascade of neuroendocrine processes begins and develops into a vicious circle of suboptimal psychophysiological states that require significant effort to prevent performance breakdown (Sluiter, de Croon, Meijman, & Frings-Dresen, 2003). This chronic occupational fatigue can reduce personal productivity. Winwood, Winefield, Dawson, and Lushington (2005, p. 294) characterize chronic fatigue as "inefficient action patterns; declining interest, involvement, and commitment; reduced concentration and motivation; and negative emotions." Such characteristics are incompatible with a highly functioning professional nurse.

Winwood et al. (2005) describe the potential consequences of work-related fatigue as a loss of personal productivity and a risk of reduced occupational health and safety, among other disadvantages. For nurses, the consequences may include patient-care errors, missed care, nurse injuries, and drowsy driving.

Neurobehavioral Effects

Fatigue, especially fatigue produced by sleep deficiency, has the potential to cause impaired nursing practice. Geiger-Brown et al. (2012) found that nurses who work 12-hour shifts obtain only 5 hours of sleep between shifts on average. Of course, some nurses get less sleep than the average. Sleep deficiency affects the ability to perform with accuracy, especially when concentration is needed (Colten & Altevogt, 2006; Durmer & Dinges, 2005). In addition, short-term memory and information processing are impaired, so patient handovers may be incomplete or inaccurate, and medication errors may occur. The ability to self-monitor performance deteriorates when fatigue sets in (Dorrian, Lamond, & Dawson, 2000). More critically, cognitive flexibility deteriorates so nurses can perseverate on ineffective solutions to problems, even when a readily available, effective solution is at hand. A loss of situational awareness can cause an inability to reorder priorities to accommodate changes in patient acuity or to respond appropriately to situations. A loss of empathy for patients and their families and impaired communication with members of the health care team can also develop.

In an often-cited paper, Arnedt, Wilde, Munt, and MacLean (2001) compared the decrements caused by prolonged wakefulness with equivalent concentrations of blood alcohol to determine the point at which sustained wakefulness is equivalent

to driving drunk. They found that when wakefulness is prolonged by as little as 3 hours, the ability of research participants' to maintain their speed and road position deteriorated to the legal limit of alcohol consumption.

Patient Care Errors

Medication errors are a risk for patients when nurses are sleepy or fatigued. This is particularly true for night-shift nurses: 20% to 35% of these nurses involuntarily nod off at work at least once per week (Gold et al., 1992). Those who struggle to remain awake have 1.8 times the odds of making a medication error and twice the odds of a near-miss medication error (Dorrian et al., 2008). A landmark study of 393 nurses who provided anonymous data using a log book over 28 days provides convincing evidence that extended work hours are associated with threats to patient safety (Rogers et al., 2004). The researchers demonstrated that nurses left on time on less than 20% of their shifts, and the extent of overtime was generally 55 minutes longer than the contractual shift length. According to Rogers (2004), two-thirds of nurses worked overtime 10 times during the 28-day period, and one-third worked overtime on every shift. One-fourth worked more than 50 hours week for 2 or more weeks. The likelihood of making an error was three times higher for shift durations of 12.5 hours or more. Extended hours per week also increased the risk of a patient care error.

Missed Care

Missed nursing care (errors of omission) have been found to mediate the relationship between reduced staffing levels and patient falls (Kalisch, Tschannen, & Lee, 2012). Missed care also has an effect on patient satisfaction, nurse-reported medication errors, patient falls, nosocomial infections, and pressure ulcers (Schubert et al., 2008). Although no evidence of a relationship between measured fatigue and missed nursing care exists, reduced levels of nurse staffing and an inadequate number of assistive personnel were common reasons cited for missed care (Kalisch, Landstrom, & Williams, 2009). Fatigue may play a role in missed care. In some cases, reduced staffing may preclude care being delivered; in others, fatigue may make nurses feel unable to deliver care in the face of reduced staffing (Kalisch & Lee, 2012).

Injuries

Excessive hours of work have been associated with an almost 100% increase in musculoskeletal disorders of the neck, shoulder, and back and a 60% to 70% increase in the relative risk of needlestick injuries among RNs (Trinkoff et al., 2006; Trinkoff, Lipscomb, Brady, & Geiger-Brown, 2007). In one compelling study that pooled the results of several epidemiologic studies to form a risk index, Folkard and Lombardi (2006) determined that the risk of injury increased by 13% for 10-hour shifts and by 28% for 12-hour shifts compared with 8-hour shifts. People who work multiple jobs have an increased risk of fatigue and injury

(Marucci-Wellman, Lin, Willetts, Brennan, & Verma, 2014) because they spend less time sleeping, and they work irregular hours to fit these jobs into their work week.

Marucci-Wellman et al. (2014) examined data from American Time Use Survey from 2003 to 2011. They used these years of probability-based household surveys data to estimate the prevalence of single versus multiple job holders, and the association of multiple jobs with excessive hours of work and reduced sleep. Although single job holders were more common (weighted sample size of 131.5 million workers), there were 14.3 million multiple job holders in the weighted sample. These data showed that when workers were asked about their employment in the past 2 weeks before the survey, 9.8% of workers held two jobs.

Of those with two jobs who worked excessive hours, 46% worked 41 to 50 hours, 10% worked 51 to 60 hours, and 6% worked more than 60 hours per week. Of those working a single job who worked excessive hours, 13% worked 41 to 50 hours, 51% worked 51 to 60 hours, and 11% worked more than 60 hours per week. Hours spent sleeping were lower when multiple job holders worked both jobs during the day (6.96 hours, 95% CI 6.85, 7.07) compared with when they worked only their primary job (7.55 hours, 95% CI 7.44 to 7.67) or were off and used the time to catch up on sleep (9.06 hours, 95% CI 8.75, 9.37) or when compared with single job holders during a work day (7.73 hours, 95% CI 7.70, 7.75) (9.20 hours, 95% CI 9.12, 9.28). Thus, data from workers who work two jobs point to the role of a secondary employer in producing excessive hours of work, the potential for fatigue, and a higher risk of injury.

Drowsy Driving

Drowsy driving accounts for 37,000 injury crashes and between 3,000 and 5,000 motor vehicle fatalities per year on average (Tefft, 2010). Night-shift workers have 5.5 times the odds of a crash compared with day-shift workers. The strongest predictor of drowsy driving is drowsiness at work (Scott et al., 2007; Stutts, Wilkins, Scott Osberg, & Vaughn, 2003). Fatigue- and sleepiness-related crashes peak between 6 and 8 a.m. when most night-shift workers are leaving work. Among the drowsy driving fatalities were nurses who were fatigued and fell asleep at the wheel on the way home from work.

The Role of the Regulator

CRNBC is required by law to regulate the nursing profession (RNs and nurse practitioners [NPs]) in British Columbia (College of Registered Nurses of British Columbia, 2015). This includes setting the standards, assessing education programs, addressing complaints, and taking action when standards are not being met (CRNBC 2016). As part of the annual registration renewal requirements, CRNBC registrants must self-report the hours they work annually. Nurses are required to meet a minimum of 1,125 eligible practice hours in a 5-year period; however, no cri-

terion exists for maximum practice hours per year. The role of CRNBC is to ensure that the public is protected from incompetent, unethical, or impaired nursing practice and that nurses do not practice unless they can do so safely. CRNBC does not currently track excessive hours of work or multiple employers, and the authors are unaware of other regulators who track these data. CRNBC receives complaints through their professional conduct review department about the conduct or competence of a nurse from patients and their families, employers, and colleagues. They also receive complaints alleging that a nurse has a health ailment impairing their ability to practice safely. Complaints must be submitted in writing and describe a specific concern about the conduct, competence, or health ailment (impairing practice) of an individual nurse. CRNBC does not have jurisdiction to review complaints that are not related to an individual nurse's practice, such as health care facility policies. During the discipline review, process fatigue was less likely to be the primary reason for a complaint to the regulator. Issues related to fatigue would most often only arise during the course of the investigation of the complaint (Logie, 2016).

Methods

This descriptive study uses variables that were available to the investigators from the licensure renewal process. Some variables associated with fatigue were not in the dataset, including indicators of two or more jobs held concurrently and the duration for which they were held; primary shift worked; whether shifts rotated; indicators for direction and frequency of rotation; whether overtime was voluntary or mandatory; whether on-call was considered a duty hour and how often the nurse was called in; whether overtime took the form of shift overruns or additional shifts; the controllability of work schedules; and the usual number of hours per day and hours per week.

Sample and Data Collection Procedure

A cross-sectional analysis of secondary data was conducted after obtaining Western Institutional Review Board approval. Data from the CRNBC license renewal database were downloaded from March 1, 2012, to February 28, 2013, which included data from more than 35,000 RNs. Only data from nurses who worked during the previous year were included in the analysis ($N = 32,142$).

Study Variables

Study variables included demographics, registrant type, area of primary responsibility (specialty), and place of education (Canadian or foreign education). The employment status for the previous year included the number of employers, the status (full-time or part-time), and the hours worked at each employer.

On the license renewal application, nurses were asked to identify the number of hours and employers:

- Please tell us when you started your employment at this place of work.
- Full time?
- Please tell us how many hours you worked as an RN at this work site.
- Finished (date). Please leave blank if still employed.
- Regular?
- Please tell us how many hours you worked as an NP at this work site.

Thirty areas of primary responsibility were recoded into 10 specialty categories:

- Community health (ambulatory care, community health, home care, public health, and telehealth)
- Critical care (critical care and emergency care)
- Geriatrics (long-term care, and rehabilitation)
- Education and research (nursing education administration; nursing research; teaching employees, patients, clients, and students; other educational and research jobs)
- Family (maternal-newborn and pediatrics)
- Medical-surgical (medical-surgical nurses and nurses delivering oncologic, palliative, and other direct care)
- Administrators (nursing service administration, occupational health, and other administrators)
- Operating (operating room nurses)
- Psychiatric (psychiatric nurses)
- Multiple specialties (nurses classifying themselves as having multiple responsibilities).

Patterns of employment were coded using the number of employers per nurse as the primary variable. The numbers of full-time and part-time jobs were secondary variables. Hours worked per year were divided into two categories: more than 2,500 hours per year and more than 2,000 hours per year. Any referral for a professional conduct review during the index period was coded as an event, irrespective of the judicial outcome.

Data Analysis

Demographic and response variables were described based on the level of measurement. The bivariate odds of sex, age, Canadian or foreign education, number of employers in the past year, and nursing specialty by two categories of excessive hours were computed using logistic regression, with reference categories indicated in Table 1.

Results

A description of the sample appears in Table 2. Nurse participants were largely female, older, and educated in Canada. More than three-fourths had only one employer in the past year; of those nurses, nearly two-thirds worked part time. However, 17.6% worked for two employers, less than 5% worked for three employers, and less than 1% worked for four or more employers. Whether

TABLE 1

Hours Worked per Year by Nurse Characteristics and Odds (95% CI) of Excessive Hour by Predictor

Characteristics	Hours Worked per Year Mean (SD)	N (%) With Annual Hours > 2,000	Odds Ratio (95% CI)	N (%) With Annual Hours > 2,500	Odds Ratio (95% CI)
<i>Sex^a</i>					
Males	1,641 (500)	288 (12.8)	1.0	68 (3.0)	1.0
Females	1,376 (553)	1,802 (6.0)	0.43 (0.38, 0.50)	398 (1.3)	0.42 (0.33, 0.55)
<i>Age (years)^b</i>					
< 30	1,413 (531)	166 (7.1)	1.0	29 (1.2)	1.0
30-39	1,354 (571)	483 (6.6)	0.93 (0.77, 1.12)	82 (1.1)	0.93 (0.60, 1.44)
40-49	1,457 (503)	589 (7.8)	1.10 (0.92, 1.32)	134 (1.8)	1.50 (0.99, 2.27)
50-59	1,371 (577)	571 (6.3)	0.86 (0.72, 1.03)	136 (1.5)	1.25 (0.82, 1.90)
60 or older	1,394 (554)	281 (4.8)	0.66 (0.54, 0.80)	85 (1.5)	1.22 (0.79, 1.90)
<i>Registrant type^c</i>					
British Columbia, Canadian graduate or applicant	1,371 (545)	1,563 (5.7)	1.0	328 (1.2)	1.0
Foreign-educated nurse	1,523 (582)	527 (10.7)	1.96 (1.76, 2.17)	138 (2.8)	2.35 (1.91, 2.88)
<i>Number of employers in past year^d</i>					
1	1,363 (518)	864 (3.5)	1.0	130 (< 1)	1.0
2	1,541 (645)	889 (18.0)	6.10 (5.52, 6.74)	263 (5.3)	10.71 (8.66, 13.24)
3	1,549 (614)	217 (19.9)	6.92 (5.87, 8.14)	43 (4.0)	7.82 (5.51, 11.10)
4 or more	1,600 (627)	42 (18.2)	6.17 (4.39, 8.68)	12 (5.2)	10.42 (5.68, 19.09)
<i>Area of practice^e</i>					
Community health (n = 4,607)	1,339 (527)	222 (4.8)	1.0	62 (1.3)	1.0
Critical care (n = 4,715)	1,507 (518)	431 (9.1)	2.00 (1.69, 2.38)	77 (1.6)	1.25 (0.89, 1.77)
Geriatrics (3,116)	1,441 (554)	233 (7.5)	1.52 (1.25, 1.85)	60 (1.9)	1.42 (0.98, 2.06)
Education and research (2,534)	1,455 (579)	244 (9.6)	2.18 (1.80, 2.64)	47 (1.9)	1.46 (0.99, 2.15)
Family (3,237)	1,394 (543)	207 (6.4)	1.37 (1.12, 1.67)	44 (1.4)	1.06 (0.71, 1.56)
Medical-surgical (8,288)	1,405 (522)	508 (6.1)	1.30 (1.10, 1.53)	104 (1.3)	0.97 (0.70, 1.34)
Administrators (1,186)	1,465 (545)	75 (6.3)	1.30, (0.98, 1.71)	21 (1.8)	1.34 (0.81, 2.24)
Operating room (675)	1,625 (495)	44 (6.5)	1.37 (0.97, 1.93)	10 (1.5)	1.08 (0.53, 2.19)
Psychiatric (1,229)	1,317 (498)	31 (2.5)	0.54 (0.37, 0.79)	8 (0.7)	0.52 (0.25, 1.08)
Multiple specialties (214)	1,508 (468)	11 (5.1)	1.03 (0.54, 1.98)	5 (2.3)	1.52 (0.55, 4.22)

Note. ^a $t = 22.1, p < .001$; ^b $F = 167.8, p < .001$, no difference between 40-49 and 50-59, otherwise all between group differences at $p < 0.001$; ^c $t = 17.7, p < 0.001$; ^d $F = 73.5, p < .001$, single job < two job < 3 jobs with $p < .001$, four or more jobs no difference in means between groups; ^e $F = 47.2, p < 0.001$, all significantly different from each other except the following: community health not different from psychiatric; critical care not different from multiple specialties; geriatric not different from education/research, administration, multiple specialties; medical-surgical not different from family; administration not different from multiple specialties.

those with multiple jobs held them sequentially or simultaneously is unknown. Of the 32,142 nurses, 466 (1.4%) worked 2,500 hours or more per year, and 2,090 (6.5%) worked 2,000 hours or more per year.

Male nurses worked in excess of 200 more hours per year ($t = 22.1, p < 0.001$) than female nurses. (See Table 1.) The proportion of nurses working excessive hours was higher among those age 40 and older; however, no statistically significant difference pairwise existed between the age brackets. Foreign-

educated nurses worked significantly more hours per year than Canadian-educated nurses—an average of 152 extra hours ($t = 17.7, p < 0.001$)—and have twice the odds of working more than 2,000 hours per year. Hours per year increased with the number of employers per nurse, and the odds of working excessive hours with additional employers were 6 to 10 times that of nurses working for a single employer. Nurses in the specialty categories of critical care, operating room, multiple specialties, and administrators had the highest mean hours per year; those in the specialty

categories of psychiatric, family, and community health had the lowest average ($F = 47.2, p < 0.001$). Although fewer than 1% of nurses were referred for a professional conduct review during the year of data collection (See Table 3) the odds of such a referral was increased (OR 3.35, 95% CI 1.70, 6.58) with excessive hours, but this was attenuated by one third by adding a factor for number of hospitals of employment in the past year.

Discussion

The data showed that many of the variables routinely collected during license renewals can provide information about nurses who may be at risk for working excessive hours. On average, male nurses worked more hours per year than female nurses. This finding is consistent with U.S. Bureau of Labor Statistics data that showed that men worked an hour longer per day than women who were full-time employees but that women were more likely to work part time (Bureau of Labor Statistics, 2006). The study data also showed that nurses ages 40 to 49 years had more hours worked per year than those in other age categories, although not significantly so. The authors speculate that this may be related to the predominance of female nurses in their 30s who choose part-time work while caring for young children but return to full-time employment when their children are more self-sufficient. Foreign-educated nurses in British Columbia worked more than 150 additional hours per year on average than Canadian-educated nurses. The authors speculate that this finding may result from several factors, including worker remittances to their home countries (Packer, Labonte, & Runnels, 2009) and employment in less well-staffed facilities or lower wage jobs where the need to over-work is intrinsic to the employment setting.

The authors found that hours worked per year increased with the number of employers. The data did not allow a determination of how many jobs were held simultaneously and how many job changes occurred per year. Negative job histories such as frequent job changes are a red flag for substance abusing workers (Zhong & Thomas, 2012), so this data point may be an important indicator for regulators to observe, especially when it occurs with excessive hours of work per year. Excessive work hours have two sources: an organization practice such as overtime requirements and planned excessive shift duration (e.g. 24-hour shifts by nurse practitioners), and a personal choice by the nurse to moonlight. Although the data showed that excessive work hours are associated with increased odds of a professional conduct review, this area requires more study. Nurses working in the categories of critical care, operating room, geriatrics, administration, and education and research had the highest proportion of working excessive hours. For academics, the imperative to write for publication often requires work during evenings and weekends. The authors speculate that the reasons critical-care nurses work excessive hours may be reduced hours of house staff and on-call hours.

TABLE 2

Characteristics of the Study Sample (N = 32,142)

Characteristic	N (%)
Sex—female	29,893 (93.0)
Age (Mean [SD])	47.3 (11.9)
<i>Registrant type</i>	
British Columbia or Canadian graduate or applicant	27,198 (84.6)
Foreign-educated nurse	4,944 (15.4)
<i>Employment pattern (% of total sample of working nurses)</i>	
<i>One job only</i>	
Full time	15,297 (47.6)
Part time	9,381 (29.2)
<i>Two jobs</i>	
Two full time	1,047 (3.3)
One full time, one part time	2,197 (6.8)
Two part time	2,411 (7.5)
<i>Three jobs</i>	
Three full time	57 (< 1)
Two full time, one part time	187 (< 1)
One full time, two part time	453 (1.4)
Three part time	595 (1.9)
Four or more jobs	297 (< 1)

Administrators also have on-call hours as well as many meetings that extend into the evening.

Fatigue reduces attention, concentration, motivation, and empathy (Czeisler, 2011). The authors were unable to determine whether organizational practices or choices by the nurse are the source of excessive hours in this study; however the attenuation of the effect by an increased number of jobs suggests that the latter may be a more important contributor. Labor studies have shown that overtime increases during poor economic periods so families can maintain their lifestyle when one partner's hours are reduced or eliminated (Golden & Jorgensen, 2002). Labor economists have also shown that hospitals elect to use overtime rather than hiring to cover shortages so they can reduce the fixed costs of hiring (Heiler, 1998). Golden and Jorgensen (2002) posit that the only solution is to regulate the upper limits of overtime hours per week and to provide workers with the right to refuse mandatory overtime unless a natural disaster or another emergency occurs. Yet a survey by the Texas Board of Nurse Examiners (BNE) on a proposed position statement for nursing work-hour limitations found that 95% of nurse respondents believed that the BNE should not impose such limitations. Respondents believe that each nurse should monitor his or her work and that no one has a right to impose limits (Texas Board of Nursing, 2007). Thus, nurses may be unwilling to give up overtime and additional shifts, and their

TABLE 3

Odds of a Professional Conduct Review by Excessive Hours in Past Year

	<i>N</i> (%)	95% CI Model 1	95% CI Model 2*	95% CI Model 3**
<i>Excessive hours > 2,500</i>				
PCR No	31,921 (99.3)			
Yes	221 (0.7)	3.35 (1.70, 6.58)	2.21 (1.11, 4.39)	2.22 (1.12, 4.42)
<i>Excessive hours > 2,000</i>				
PCR No				
Yes		2.59 (1.75, 3.83)	1.85 (1.23, 2.77)	1.81 (1.21, 2.73)

Note. PCR = professional conduct review.
* Controlling for number of employers
** Controlling for number of employers and specialty

self-monitoring of work hours may not be the best way to reduce fatigue.

Limitations

As with any secondary analysis of data, the study has limitations. The main variable of interest, hours of employment, was collected to determine whether the nurse is working sufficient hours to maintain a competent nursing practice. The authors do not have, nor have they seen from others, any data that assess the validity of self-reported hours per year from nursing registry data, but the U.S. Bureau of Labor Statistics suggests that self-reported hours of work may have several sources of inaccuracy (Jacobs, 1998), including miscalculation, increased hours reported with higher work intensity, and confusion about which hours are actually to be included. In the current study, this confusion may account for the higher number of hours reported by critical-care nurses, who may include on-call hours. However, whether these nurses counted on-call hours as hours worked or whether they were called into work is unknown. In addition, excessive work has gained a certain cachet, and social desirability bias may affect the findings.

The authors were also unable to assess fully the meaning of the patterns of employment data because they were unable to determine how many jobs were held simultaneously or how many times a nurse changed jobs during the year. If these data are to be used in the future, adding data points to the licensure renewal data request would be helpful.

Finally, as with any large dataset, the meaning of statistical significance must be critically evaluated because small differences can be significant but irrelevant. However, the authors believe that this descriptive study is the first of its kind, and they inter-

preted significant values cautiously, knowing that future research is needed to validate these findings and provide meaning to them.

Conclusion

Findings have implications for nursing practice as well as pointing to the need for further study and research. While the fact that a small percentage of Canadian nurses work excessive hours (by their own report) is interesting, it does reveal what actions have been taken to maintain patient and worker safety among that population. Perhaps the colleagues of the nurses working excessive hours recognize that their peers are working hours at one job, or working more than one job. Do nurses cover for the overworked nurses, assigning them less acute patients, when they appear for duty fatigued? Do their managers know of this, and if so, what actions have been taken to ensure that patient safety is not compromised? Is there data regarding nurses' work hours and patient care incidents, and if so, where are these data examined, reported, acted upon? Is there a possibility that the main employer pays a wage that is lower than most others, forcing the nurse to work a second job to make up the difference? Is there discrimination in hiring of foreign born workers, so that the higher wage jobs are out of reach for them and they are forced to take lower wage nursing positions? Is it possible that the nurse is not accurate in his or her report of excessive hours, since only minimum hours are of interest to the board, so the nurse is not keeping accurate track of hours? What role does staffing, scheduling, and the fiscal health of institutions play in creating the need for nurses to work excessive hours? Do nurses work excessive hours voluntarily, or is there some coercion involved, even if no mandatory overtime is in place? Numerous questions arise from this cross-sectional glimpse into data from license renewals in one Canadian province.

Additional research is clearly needed to address these points, but one action could immediately shed light on the validity of these self-reported data. The data from this study point to the need for cooperation between employers (who have a fiduciary interest in patient safety as well as a moral one) and regulators (who have legislative authority for public protection). Rather than relying on nurses to self-report their work hours, regulators should rely on employers to report beginning and end employment dates and hours worked per week for 52 weeks. This approach would not be a perfect solution because nurses can work across state or provincial boundaries. However, it would capture nurses who have a high risk of fatigue and sleepiness because of excessive hours of work. Objections to this plan would be the cost of extracting and processing the data and privacy concerns. Although one author's experience is that time-clock data are somewhat difficult to process initially, these data can be automated even with different styles of data inputs. Hendriksen and Dayton (2006) state that organizational silence to avoid addressing known problems is one of the biggest threats to patient safety.

Only a small percentage of nurses work excessive hours, but the consequences of excessive hours may still put patients and nurses at risk. Both employers and regulators desire safe nursing practice. Together, they may be able to assess job changes and actual hours of work, which could help detect nurses at risk for unsafe practice from fatigue.

References

- American Nurses Association. (2014). *Position statement: Addressing nurse fatigue to promote safety and health. Joint responsibilities of registered nurses and employers to reduce risks*. Retrieved from www.nursingworld.org/MainMenuCategories/Policy-Advocacy/Positions-and-Resolutions/ANAPositionStatements/Position-Statements-Alphabetically/Addressing-Nurse-Fatigue-to-Promote-Safety-and-Health.html
- Arnedt, J. T., Wilde, G. J. S., Munt, P. W., & MacLean, A. W. (2001). How do prolonged wakefulness and alcohol compare in the decrements they produce on a simulated driving task? *Accident Analysis and Prevention*, 33(3), 337–344.
- Board of Nursing Texas (2007). Nurses offer feedback on proposed nursing work hours position statement. Retrieved from <http://www.bon.texas.gov/practice/pdfs/nwh-summary.pdf>
- Bultmann, U., Kant, IJ, Schroer C. et al. International Archives of Occupational and Environmental Health (2002) 75: 259. The relationship between Psychosocial work characteristics and fatigue and psychological distress.
- Bureau of Labor Statistics. (2006). *American Time Use Survey*. Retrieved from www.bls.gov/news.release/archives/atus_06032008.htm
- Bureau of Labor Statistics. (2015). *Occupational outlook handbook: Registered nurses*. Retrieved from www.bls.gov/ooh/healthcare/registered-nurses.htm
- Caruso, C. (2006). Possible broad impacts of long work hours. *Industrial Health*, 44, 531–536.
- College of Registered Nurses of British Columbia. (2015). *Registration*. Retrieved from www.crnbc.ca/crnbc/Documents/Centennial/registration.html
- Colten, H. R., & Altevogt, B. M. (Eds.); Committee on Sleep Medicine and Research; Board on Health Sciences Policy; Institute of Medicine. (2006). *Sleep disorders and sleep deprivation. An unmet public health problem*. Washington, DC: National Academies Press.
- Czeisler, C. (2011). Ethical considerations for the scheduling of work in continuous operations: Physicians in training as a case study. In F. P. Cappuccio, M. A. Miller, & S. W. Lockley (Eds.), *Sleep health and society. From aetiology to public health* (435–456). London: Oxford University Press.
- Dembe, A. E., Erickson, J. B., Delbos, R. G., & Banks, S. M. (2005). The impact of overtime and long work hours on occupational injuries and illnesses: New evidence from the United States. *Occupational and Environmental Medicine*, 62, 588–597.
- Dorrian, J., Lamond, N., & Dawson, D. (2000). The ability to self-monitor performance when fatigued. *Journal of Sleep Research*, 9, 137–144.
- Dorrian, J., Tolley, C., Lamond, N., van den Heuvel, C., Pincombe, J., Rogers, A. E., & Drew, D. (2008). Sleep and errors in a group of Australian hospital nurses at work and during the commute. *Applied Ergonomics*, 39, 605–613.
- Durmer, J. S., & Dinges, D. F. (2005). Neurocognitive consequences of sleep deprivation. *Seminars in Neurology*, 25, 110–129.
- Folkard, S., & Lombardi, D. A. (2006). Modeling the impact of the components of long work hours on injuries and 'accidents.' *American Journal of Industrial Medicine*, 49, 953–963.
- Geiger-Brown, J. (2014). Fatigue risk estimation during 12-hour nursing shifts based on worked schedules. Unpublished data.
- Geiger-Brown, J., Lee, C. J., & Trinkoff, A. (2012). The role of work schedules in occupational health and safety. In R. J. Gatchel & I. Z. Schultz (Eds.), *Handbook of occupational health and wellness* (pp. 297–322). New York, NY: Springer.
- Geiger-Brown, J., & Lipscomb, J. (2011). The healthcare work environment and adverse health and safety consequences for nurses. *Annual Review of Nursing Research*, 29, 195–237.
- Geiger-Brown, J., Rogers, V., Trinkoff, A., Kane, R., Bausell, R. B., & Scharf, S. M. (2012). Sleep, sleepiness, fatigue and performance in 12-hour shift nurses. *Chronobiology International*, 29(2), 211–219.
- Gold, D. R., Rogacz, S., Bock, N., Tosteson, T. D., Baum, T. M., Speizer, F. E., & Czeisler, C. A. (1992). Rotating shift work, sleep, and accidents related to sleepiness in hospital nurses. *American Journal of Public Health*, 82(7), 1011–1014.
- Golden, L., & Jorgensen, H. (2002). *Time after time. Mandatory overtime in the U.S. economy*. Economic Policy Institute. Retrieved from www.epi.org/publication/briefingpapers_bp120/
- Heiler, K. (1998). The 'petty pilfering of minutes' or what has happened to the length of the working day in Australia. *International Journal of Manpower*, 19, 266–280.
- Hendriksen, K., & Dayton, E. (2006). Organizational silence and hidden threats to patient safety. *HSR: Health Services Research*, 41, 1539–1554.
- Jacobs, J. A. (1998). Measuring time at work: Are self-reports accurate? *Monthly Labor Review*. Retrieved from www.bls.gov/mlr/1998/12/art3full.pdf
- Logie, A. M. (2016). *Fatigue and fitness to practice from a nursing regulatory perspective*. Unpublished project report, Institute of Regulatory Excellence Fellowship Program, National Council State Board of Nursing, Chicago, Illinois.
- Kalisch, B. J., Landstrom, G., & Williams, R. A. (2009). Missed nursing care: Errors of omission. *Nursing Outlook*, 57, 3–9.
- Kalisch, B. J., & Lee, K. H. (2012). Missed nursing care: Magnet versus non-Magnet hospitals. *Nursing Outlook*, 60, E32–E39.
- Kalisch, B. J., Tschannen, D., & Lee, K. H. (2012). Missed nursing care, staffing and patient falls. *Journal of Nursing Care Quality*, 27(1), 6–12.
- Marucci-Wellman, H. R., Lin, T. C., Willetts, J. L., Brennan, M. H., & Verma, S. K. (2014). Differences in time use and activity patterns when adding a second job: Implications for health and safety in the United States. *American Journal of Public Health*, 104(8), 1488–1500.
- Packer, C., Labonte, R., & Runnels, V. (2009). Globalization and the cross-border flow of health workers. In R. Labonte, T. Schrecker, C. Packer, & V. Runnels (Eds.), *Globalization and health: Pathways, evidence and policy* (p. 222). London: Routledge.
- Page, A. (Ed.); Committee on the Work Environment for Nurses and Patient Safety; Board on Health Care Services; Institute of Medicine. (2004). *Keeping patients safe, transforming the work of nurses*. Washington, DC: National Academies Press.
- Rogers, A. E., Hwang, W. T., Scott, L. D., Aiken, L. H., & Dinges, D. F. (2004). The working hours of hospital staff nurses and patient safety. *Health Affairs* 23(4), 202–212.
- Schubert, M., Glass, T. R., Clarke, S. P., Aiken, L. H., Schaffert-Witvliet, B., Sloane, D. M., & De Geest, S. (2008). Rationing of nursing care and its relationship to patient outcomes: The Swiss Extension of the International Hospital Outcomes Study. *International Journal for Quality in Health Care*, 20(4), 227–237.
- Scott, L. D., Hwang, W. T., Rogers, A. E., Nysse, T., Dean, G. E., & Dinges, D. F. (2007). The relationship between nurse work schedules, sleep duration, and drowsy driving. *Sleep*, 30, 1801–1807.

- Sluiter, J. K., de Croon, E. M., Meijman, T. F., & Frings-Dresen, M. H. W. (2003). Need for recovery from work-related fatigue and its role in the development and prediction of subjective health complaints. *Occupational and Environmental Medicine*, 60(suppl 1), i62–i70.
- Smith-Miller, C., Shaw-Kokut, J., Curro, B., & Jones, C. B. (2014). Fatigue among nurses in acute care settings. An integrative review. *Journal of Nursing Administration*, 44(9), 487–494.
- Stutts, J. C., Wilkins, J. W., Scott Osberg, J., & Vaughn, B. V. (2003). Driver risk factors for sleep-related crashes. *Accident; Analysis and Prevention*, 35(3), 321–331.
- Tefft, B. C. (2010, November). *Asleep at the wheel: The prevalence and impact of drowsy driving*. Washington, DC: AAA Foundation for Traffic Safety. Retrieved from www.aaafoundation.org/sites/default/files/2010DrowsyDrivingReport_1.pdf
- Texas Board of Nursing. (2007). *Nurses offer feedback on proposed nursing work hours position statement*. Retrieved from www.bon.texas.gov/practice/pdfs/nwh-summary.pdf
- Trinkoff, A., Geiger-Brown, J., Brady, B., Lipscomb, J., & Muntaner, C. (2006). How long and how much are nurses now working? *American Journal of Nursing*, 106(3), 40–51.
- Trinkoff, A., Le, R., Brady, B., Geiger-Brown, J., Lipscomb, J., Lechtzin, L., & Lang, G. (2006) The longitudinal relationship of long work hours and mandatory overtime to MSD in nurses. *American Journal of Industrial Medicine*, 49(11), 964–971. PMID:16691609
- Trinkoff, A., Lipscomb, J., Brady, B., & Geiger-Brown, J. (2007). Work schedule, needle use, and needlestick injuries in registered nurses. *Infection Control and Hospital Epidemiology*, 28(2), 156–164. PMID:17265396
- U.S. Department of Health and Human Services Health Resources and Services Administration. (2010, September). *The registered nurse population: Findings from the 2008 National Sample Survey of Registered Nurses*. Retrieved from <http://bhpr.hrsa.gov/healthworkforce/rnsurveys/rnsurveyfinal.pdf>
- Wagstaff, A. S., & Sigstad Lie, J. A. (2011). Shift and night work and long work hours—A systematic review of safety implications. *Scandinavian Journal of Work, Environment and Health*, 37(3), 173–185.
- Winwood, P. C., Winefield, A. H., Dawson, D., & Lushington, K. (2005). Development and validation of a scale to measure work-related fatigue and recovery: The Occupational Fatigue Exhaustion/Recovery Scale (OFER). *Journal of Occupational and Environmental Medicine*, 47, 594–606.
- Zhong, E. H., & Thomas, M. B. (2012). Association between job history and practice error: An analysis of disciplinary cases. *Journal of Nursing Regulation*, 2(4), 16–18.

Anne Logie, RN, MA, FRE, is Standards Dissemination and Quality Assurance Advisor for Policy, Practices, and Quality Assurance, College of Registered Nurses of British Columbia, Vancouver, British Columbia. **Jeanne Geiger-Brown, PhD, RN, FAAN**, is Dean and Professor, Sandra R. Berman School of Nursing and Health Professions, Stevenson University, Owings Mills, Maryland.