

## Health and safety of older nurses

By: Susan Letvak, PhD, RN

[Letvak, S.](#) (2005) Health and safety of the older registered nurse. *Nursing Outlook*, (53)2, 66-72. doi:10.1016/j.outlook.2004.09.005

Made available courtesy of Elsevier:

[http://www.elsevier.com/wps/find/journaldescription.cws\\_home/623105/description#description](http://www.elsevier.com/wps/find/journaldescription.cws_home/623105/description#description)

**\*\*\*Note: Figures may be missing from this format of the document**

### **Abstract:**

The nursing workforce is aging at an unprecedented rate yet little is known about the health and safety of older registered nurses (RNs). The survey reported here examined the relationships between demographic variables, job attributes (job satisfaction, control over practice, and job demands) and the physical and mental health and job-related injuries and health disorders of 308 nurses over the age of 50. Findings indicate that nurses with higher job satisfaction, higher control over practice, and lower job demands experienced increased physical health. Increasing age was positively correlated with mental health. Almost a quarter of older RNs experienced a job-related injury within the past 5 years, and over a third experienced job-related health problems. Nurses with higher job demands and those employed in hospital settings were more likely to have an injury. Overall, older RNs reported higher levels of physical and mental health than the national norm. Efforts must be made to keep older RNs healthy so we can retain them in the workforce.

### **Article:**

The average age of a registered nurse in the United States is now 44.5 years.<sup>1</sup> The aging of the RN workforce has added to an already acute nursing shortage. Heavier workloads and longer hours are being required. Staffing shortages, in turn, may lead to poorer quality of care and an increase in errors.<sup>2,3</sup> A shortage of skilled nurses is a serious issue. With large enrollment increases unlikely, additional efforts must be made to retain older nurses in the workforce. Retention of older RNs is imperative given that analyses of the nurse labor market indicate poor prospects for recruiting adequate numbers of RNs.<sup>4</sup> However, employers are ill-prepared for the aging workforce. While health care administrators are aware of the aging nursing workforce, they have no policies in place to address the needs of older workers.<sup>5</sup> Older RNs possess much-needed experience, and the loss of this may adversely impact patient care and outcomes. While the nursing shortage and organizational restructuring have contributed to increased workloads and higher rates of job dissatisfaction, information is needed on the actual effects of these trends on the health and safety of older nurses. Research has been conducted on the nursing workforce, and older nurses have been included in study samples. However, this study is unique in that the sample was limited to nurses > 50 years of age. The research questions asked were: (1) What is the relationship between demographic variables and physical and mental health of older RNs? (2) Do job attributes (job satisfaction, control over practice, and job demands) influence the physical and mental health of older RNs? (3) What are the job-related injuries and job-related

health disorders of older RNs? (4) Do job attributes (job satisfaction, control over practice, and job demands) influence job-related injuries and job-related health disorders of older RNs?

## ***REVIEW OF THE LITERATURE***

### **Job Attributes**

Much has been written about nursing job satisfaction. The 2000 National Sample of Registered Nurses found that only 69.5% of RNs were at least moderately satisfied with their jobs.<sup>6</sup> Aiken et al<sup>7</sup> reported that 43% of hospital nurses were dissatisfied with their jobs and 23% planned to leave the job within the next year. By contrast, 85% of workers in other industries and 90% of professionals are satisfied with their jobs.<sup>8</sup> A study conducted by the Nursing Executive Center found that job satisfaction was not related to age, with 30.5% of nurses > age 55 reporting job dissatisfaction.<sup>9</sup> However, other studies have found older RNs to be more satisfied than younger nurses. <sup>10-12</sup> While older nurses may look more satisfied because many dissatisfied nurses have already left the workforce, research suggests that satisfied nurses stay in their jobs. <sup>13,14</sup> Satisfaction in nurses has also been directly correlated with patient satisfaction. <sup>15</sup>

One job attribute measured in this study is control over practice, which can be described as “nursing work autonomy or control over issues within the nurse’s scope of practice.”<sup>16</sup> Research has shown a positive relationship between control over practice and job satisfaction <sup>17</sup> and increased productivity. <sup>18</sup> It has also been shown that control over practice makes nurses feel good about themselves and what they are able to accomplish.<sup>19</sup>

Another important job attribute is job demands. With the nursing shortage and health care system restructuring, increasing job demands have been placed on RNs. Job demands, which include demanding patient contacts, time pressures, and work overload, sometimes overwhelm nurses’ personal limits and abilities. <sup>20</sup> Perceived high job demand has been shown to be associated with job dissatisfaction, physical and mental exhaustion, staff turnover, and job-related illnesses and injuries. <sup>21-23</sup>

### **Physical and Mental Health**

Aging is associated with progressive decline in aerobic power, reaction speed, and acuity of senses.<sup>24</sup> Shift work poses particular risks for the older nurse. Aging decreases the speed of circadian adaptation to night work, increasing the risk of sleep disorders and negative health effects<sup>25</sup> and even threatening safety in work environments designed for younger employees.<sup>26</sup> While considerable research has been conducted on the health of people > 65, we know much less about the health of middle-aged people, such as the nurses studied here.<sup>27</sup>

There is individual variability in age-related changes in older workers,<sup>26</sup> but more information is needed on relationships of job conditions to older workers’ health, especially older nurses. The Harvard Nurses’ Health Study has documented adverse physical and mental health outcomes for women in jobs with high job demands and low job control.<sup>28,29</sup> Other investigators have found that women are more likely to experience negative psychosocial conditions at work, which leads to increased job stress. <sup>30-32</sup> Work status,<sup>33</sup> work schedules,<sup>34</sup> exhaustion, and high work demands<sup>35</sup> have been linked to nurses’ mental health.

### **Job-related Injuries and Job-related Health Disorders**

A Centers for Disease Control (CDC) report indicates that occupational injuries and illnesses are increasing in health care workers while 2 of the most hazardous industries (agriculture and construction) are safer than 10 years ago.<sup>36</sup> Nurses in the healthcare workforce face a wide range of occupational hazards, including musculoskeletal disorders, latex allergy, needlestick injuries, and job-related stress.<sup>37</sup> In fact, RNs rank sixth among US occupations at risk for strains and sprains, having had 24 528 injuries resulting in time away from work in 1999.<sup>38,39</sup> Research has shown that recent health care organizational change is associated with musculoskeletal disorders in nurses.<sup>40</sup> Researchers also report an almost 200% increase in the likelihood of a needlestick injury when workloads are high.<sup>41</sup>

The CDC reports that nearly 600 000 RNs sustain a needlestick injury each year, and under-reporting rates are thought to be between 40%-90%.<sup>42</sup> The majority of injuries to RNs are due to overexertion (45%), having contact or being struck by an object (19%), or falls (16%).<sup>39</sup> While the majority of job-related injuries in RNs are in younger nurses, 46% of injuries occur in RNs > age 45, and 40% of injuries occur in RNs who have been with their employer > 5 years.<sup>39</sup> Workplaces designed to provide an optimal match for tasks and work capacity of younger workers may eventually become stressful or “unsafe” for older employees. While employment has been found to be positively associated with health among older workers,<sup>43</sup> understanding the links between workplace variables and older workers’ health and safety may help to reduce both health costs and loss of productivity.<sup>44</sup>

## CONCEPTUAL FRAMEWORK

The conceptual framework chosen for this study was Karasek and Theorell’s Demand-Control model.<sup>45</sup> The Demand-Control model purports that heavy job demands and limited control or decision-making latitude contributes to job strain and leads to negative health consequences. The model has been useful in demonstrating a relationship between job stress and depression,<sup>46</sup> describing the relationship between health care workers’ job characteristics and their physical health,<sup>47</sup> and in examining differences in work characteristics on emotional exhaustion and job involvement in general and mental health nurses.<sup>48</sup> The Demand-Control model has also linked job strain with work satisfaction.<sup>49</sup> The model has been used in studies on older workers<sup>50</sup> and was used in this study to guide the selection of job attributes which may impact worker health and safety.

## METHODS

### *Sample*

This survey was conducted with older RNs in the Southeastern US. The names of all the Southeastern states identified by the US Census Bureau were written on paper and placed in a bag and 2 states were randomly selected to participate in the study. Both states provided randomized name lists of nurses > age 50. Nquery Advisor determined that sample sizes of 120 (N = 240) per state would achieve 80% power at  $\alpha = .05$ . To ensure an adequate number of responses, given an anticipated response rate of 40%, 300 surveys were sent to older RNs in each state. Eighteen surveys were returned as undeliverable; complete surveys were returned by 308 participants (162 from 1 state and 146 from the other), for a response rate of 53%.

### *Procedures*

Institutional Review Board (IRB) approval was obtained from the University of North Carolina at Greensboro. A license was purchased for administration of the SF-36 by mail. Participants were mailed a letter explaining the purpose of the study (which included a statement that only those working at least part-time in nursing should return a survey), the survey itself, and a stamped, self-addressed return envelope. No incentives were provided though participants were offered study results by contacting the researcher or providing their name and address. Confidentiality and anonymity were assured by not requesting participants' names or names of employers. Responses from the 2 states were identified by using 2 different colored surveys (yellow and green). Follow-up post cards were not used, as an adequate sample size was obtained from the first mailing.

### *Measures*

The survey tool measured demographic variables, job attributes (job satisfaction, control over practice, and job demands), physical and mental health, job-related injuries, and job-related health disorders of the older RN. Demographics included age, gender, years as a registered nurse, and job characteristics such as employer, hours, and shift worked. Job satisfaction was measured by 1 item, "How satisfied are you in your current position?", which was answered on a 4-point scale, ranging from highly satisfied to highly dissatisfied. Research has shown that a global rating of overall job satisfaction is an inclusive measure of job satisfaction.<sup>51</sup> Control over practice was measured by several questions which were answered on a 5-point Likert scale. Questions asked if workload was manageable, if the nurse had control over his or her practice, and if overtime was frequently required. An alpha reliability of .78 was obtained. Job demands were measured by several questions on a 5-point Likert scale by asking if the nurse was physically able to meet the demands of the job, if work was carried out under pressure, and if the nurse felt burned out. An alpha reliability of .82 was obtained. The SF-36 was used to measure physical and mental health. The SF-36 was developed for use with general populations and is considered to be the most reliable instrument for measuring health-related quality of life in community-living adults.<sup>52</sup> The SF-36 was chosen over the SF-12 and SF-8 because more items permit better representation of each health domain. Eight health concepts are assessed: (a) physical functioning; (b) role limitations because of physical health problems; (c) bodily pain; (d) social functioning; (e) general mental health (psychological distress and psychological well-being); (f) role limitations because of emotional problems; (g) vitality (energy/fatigue); and (h) general health perceptions. The median alpha reliability for all scales exceeds .80, except for the 2-item social functioning scale which has an alpha coefficient of .76.<sup>52</sup> Validity has also been established, with survey scales discriminating between types and levels of disease as well as being sensitive to change.<sup>52</sup> The SF-36 has a scoring manual which includes norms for the general US population presented for 7 age groups. Data on job-related injuries and job-related health disorders were provided by 2 open-ended questions asking if the nurse had suffered a job-related injury in the past 5 years, and if the nurse suffered from any job-related health problems.

### *Data Analysis*

Data were analyzed using SPSS 10.1. For the regression analyses, categorical variables were dummy-coded. Race was coded as Caucasian or non-Caucasian, employment status was coded as a hospital or nonhospital setting, marital status was coded as married or unmarried, and employment was coded as full time or part time. For the logistic regression analyses, job-related injury and job-related illness were coded as present or absent.

## RESULTS

The average age of the respondents was 57.2 (range 50-80); nearly all (96%) were female and 88% were Caucasian. Most respondents were married (74%) and worked full-time (64.5%). Almost half (47%) worked in a hospital and 67% worked the day shift. The majority of the respondents were satisfied with their jobs (24.6% highly satisfied, 63.3% generally satisfied). The average hours a day worked was 9.3 (range of 5-16 hours) and the average hours a week worked was 36.4 (range of 3-68 hours) (Table 1).

Multivariate linear regression analyses of the effects of demographic variables on physical health demonstrated no predictor variables ( $r^2 = 0.30$ ). Multivariate linear regression analysis of the effects of demographic variables on mental health demonstrated 1 predictor variable: years as a RN. Age was positively correlated with mental health—the older the RN, the higher the mental health score. Table 2 presents these analyses.

Regression analyses were then performed on the 8 subscales of the SF-36. Employment status was found to be a predictor of scores on 2 subscales: physical functioning ( $P = .031$ ) and role, emotional ( $P = .034$ ). Specifically, full-time nurses had lower scores on physical functioning and role, emotional than nurses employed part-time. Race and age were found to be predictors of the subscale general health ( $P = .019$  and  $.048$  respectively). Caucasians reported higher scores on health, and age was inversely correlated to general health. Hours worked per week was found to be a predictor of the subscales vitality ( $P = .026$ ) and social functioning ( $P = .05$ ). Number of hours worked per week was inversely correlated to vitality and social functioning. To understand if job attributes (job satisfaction, control over practice, and job demands) influenced the physical and mental health of older RNs, multivariate linear regression was run with an  $r^2$  of  $.275$ . All 3 attributes were predictive of physical health in older RNs ( $P < .05$ ). Nurses with higher job satisfaction, higher control over practice, and lower job demands had higher physical health. However, only job demands predicted mental health in these older RNs ( $r^2 = .375$ ,  $P < .05$ ) with lower mental health scores being associated with higher job demands.

This study documents the job-related injuries and job-related health disorders of older RNs. Seventy-two respondents (23.4%) reported a job-related injury within the past 5 years. The majority of injuries were needle sticks ( $n = 31$ ) and back injuries ( $n = 18$ ). Other injuries reported include musculoskeletal injuries to the neck, arm, and knee, exposure to body fluids, physical assault, and contracting Hepatitis C (Table 3).

Over a third of the respondents (35.5%) reported a job-related health problem. The most reported problems were back pain ( $n = 49$ ), anxiety ( $n = 21$ ), and depression ( $n = 11$ ) (Table 3). Logistic regression analyses found job demands ( $P = .05$ ), race ( $P = .041$ ), and employer ( $P = .04$ ) influenced job-related injuries. Specifically, those reporting higher job demands, race as non-Caucasian, and those working in hospital settings were more likely to report a job-related injury. Only job demands influenced the reporting of a job-related health disorder ( $P = .0001$ ), with a higher score on job demands resulting in increased reporting of a job-related health disorder.

Additionally, the physical and mental health of older RNs was compared with the physical and mental health of a US comparison group (by age and gender). Norm-based scores were provided

by Quality Metric, developers of the SF-36. T-tests determined there was a significant difference between the physical and mental health of older RNs and the norm-based comparison group ( $P < .05$ ). Older RNs in this study reported higher levels of physical and mental health than the national norm.

## DISCUSSION

This study examined the relationships between demographic variables and job attributes of older RNs and their physical and mental health, and job-related injuries and job-related health disorders. Participants reported higher levels of job satisfaction than participants in studies of nursing job satisfaction; however, findings are consistent with studies of older RNs and older workers. This may reflect the fact that older RNs had achieved more enjoyable positions late in their careers. Additionally, RNs who were dissatisfied may have already left the profession.

Multiple linear regression showed that years as a RN predicted better mental health in older RNs. This supports research on the positive psychological effects of employment on older workers' mental health.<sup>50</sup> Additionally, those with poor mental health may be unable to cope with the demands of nursing and have left the workforce.

Study findings support research on nurse and older worker health. Job attributes, including job satisfaction, control over practice, and job demands were found to influence older RN health. If we are to retain not only older RNs, but all RNs in the workforce, job redesign and improvements in the workforce will be necessary. Additionally, older RNs who were employed in a hospital were most likely to report job-related injuries. Older RNs had similar rates of back injury when compared to nurses in other studies.<sup>53-55</sup> Despite increased efforts by The Occupational Safety and Health Administration, nurses continue to suffer from needlestick and musculoskeletal injuries. Because injured nurses often leave the workforce,<sup>56</sup> increased efforts must be made for providing safe work environments for nurses. Recent legislation in many states requiring minimum staffing levels and limits on mandatory overtime for nurses may provide improved work environments.

**Table 1. Demographic Characteristics of Older RNs**

	Mean	SD	No. (%)
<b>Age</b>	57.2	4.8	
<b>Gender</b>			
Female			295 (96.0)
Male			13 (4.0)
<b>Race</b>			
African American			27 (8.8)
American Indian			1 (0.3)
Asian			7 (2.3)
Caucasian			270 (87.7)
Mixed			2 (0.65)
Missing			2 (0.65)
<b>Marital Status</b>			
Never Married			14 (4.5)
Married			229 (74.4)
Divorced/Separated			42 (13.6)
Widowed			22 (7.1)
Missing			1 (0.3)
<b>Years as a RN</b>	28.2	8.9	
<b>Hours Worked/Day</b>	9.4	2.3	
<b>Hours Worked/Week</b>	36.5	11.4	
<b>Usual Shift Worked</b>			
Days			205 (66.6)
Evenings			19 (6.2)
Nights			24 (7.8)
More than 1 shift			28 (9.1)
More than 2 shifts			5 (1.6)
Missing			27 (8.8)
<b>Employer</b>			
Hospital			145 (47.1)
Nursing Home			18 (5.8)
Home Care			21 (6.8)
State/Federal Government			25 (8.1)
School of Nursing			8 (2.6)
Hospice			5 (1.6)
Physicians Office			24 (7.8)
Other			46 (14.9)
Missing			16 (5.2)

**Table 2.** Linear Regression of Demographic Variables and Physical and Mental

Variable	Physical Health			Mental Health		
	SE	$\beta$	P	SE	$\beta$	P
Age	.304	.013	.860	.241	.074	.309
Gender	5.345	-.033	.614	-.030	4.235	.645
Years as RN	.143	.091	.202	.114	.167	.018*
Employer (hospital or non-hospital)	.745	.021	.766	1.98	-.030	.666
Race (Caucasian or non-Caucasian)	3.419	3.42	.716	2.71	-.089	.163
Employment status (full-time or part-time)	1.685	-.085	.251	1.36	-.020	.787
Usual shift worked (day shift or other)	1.039	-.106	.114	.823	.056	.391
Hours worked/day	.741	.066	.383	.587	-.068	-.925
Hours worked/week	.119	-.078	.279	.094	-.042	.545

**Table 3.** Job-related Injuries and Job-related Health Disorders of Older RNs

Injury	No. (%)
Needlestick	31 (43.1)
Back pull/strain	18 (25.0)
Other MSD's	12 (16.7)
Falls	8 (11.1)
Body Fluid Exposure	4 (5.6)
Physical Assault	4 (5.6)
Hepatitis C	1 (1.4)
<b>Health Problem</b>	
Back pain	49 (45.0)
Anxiety	21 (19.3)
Depression	13 (11.9)
Stress	10 (9.2)
Knee/leg/foot pain	10 (9.2)
Shoulder/neck pain	6 (5.5)
Sleep problems	5 (4.6)
Tension headaches	4 (3.7)
Carpal Tunnel/wrist pain	4 (3.7)
Osteoarthritis	2 (1.8)
Fatigue	2 (1.8)
Hypertension	2 (1.8)
Hypoglycemia	1 (0.9)
Heartburn	1 (0.9)
Hepatitis C	1 (0.9)
Hip pain	1 (0.9)
Varicosities	1 (0.9)
Restless leg syndrome	1 (0.9)
Hepatitis C	1 (0.9)

\*Percentages do not add up to 100 as some participants listed more than one injury/problem.



The Institute of Medicine (IOM) Report states that hospital environments are impacting nurse performance, which may threaten patient safety.<sup>57</sup> Nursing administrators must be educated about the direct association between management practices and nurse safety. Nonhierarchical decision-making must be utilized for improved work process design. Staffing practices must account for patient acuity and volume, as well as limiting hours and shifts worked. Resources must be provided for the creation of environments that minimize errors and increase nurse safety. Cultures of safety must be implemented which specify safety objectives, review success in meeting these objectives, provide feedback, and reward employees accordingly. Specific to the older RN, the IOM Report recommends the use of experienced nurses for education of new nurses to address gaps in knowledge and skills.<sup>57</sup>

Limitations of this study include the use of a small sample, recruitment from only 2 states in the Southeast, and the reliance on self-reports in answering the survey. Additionally, because nurses employed in hospital settings reported the highest rates of injury, further research in this area should focus on these nurses and not a random selection of all RNs.

This study documents older RNs as satisfied and healthy. In addition to efforts to recruit new nurses, more attention must be given to retaining these experienced nurses. Efforts must be made to improve job attributes which impact health, especially high job demands. Research must be conducted which will provide health care organizations specific strategies to strengthen the environments in which nurses work. Increased support of the nursing workforce is imperative if we are to maximize RN and patient safety. Nurses must stay healthy to remain on the job.

## REFERENCES

1. Buerhaus PI, Staiger DO, Auerbach DI. Implications of an aging registered nurse workforce. *JAMA* 2000;283:2948-54.
2. Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Staffing shortages and quality of care Available at: <http://www.jcaho.org> (accessed 6 February 2004).
3. To err is human: building a safer system. Washington, DC: National Academy Press; 2001.
4. Aiken LH, Clarke SP, Sloane DM. Hospital staffing, organization, and quality of care: cross national findings. *Nurs Outlook* 2002;50:187-94.
5. Letvak S. Retaining the older nurse. *J Nurs Admin* 2002;32: 387-92.
6. Division of Nursing, Bureau of Health Professions, Health Resources and Services Administration (DHHS). The registered nurse population: findings from the national sample survey of registered nurses. Available at: <http://bhpr.hrsa.gov/healthworkforce.rnsurvey> (accessed 15 February 2004).
7. Aiken LA, Clarke SP, Sloane DM, Sochalski J, Silber JH. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA* 2002;16:1987-93.
8. National Opinion Research Center. General Social Survey, Data Information and Retrieval System. Available at: <http://www.icpsr.umich.edu> (accessed 5 November 2003).
9. Nursing Executive Center. Reversing the flight of talent: nursing retention in an era of gathering shortage. Washington, DC: The Advisory Board Company; 2000.
10. Ingersoll GL, Olsan T, Drew-Cates J, DeVinney BC, Davies J. Nurses' job satisfaction, organizational commitment, and career intent. *J Nurs Admin* 2002;32:250-63.

11. Letvak S. The experience of being an older staff nurse. *Western J Nurs Res* 2003;25:45-56.
12. McNeese-Smith DK, vanServellen G. Age, developmental, and job stage influences on nurse outcomes. *Outcomes Managem Nurs Prac* 2000;42:97-104.
13. Alexander JA, Lichtenstein RL, Oh HJ, Ullman E. A causal model of voluntary turnover among nursing personnel in long-term care psychiatric settings. *Res Nurs Hlth* 1998;32: 415-27.
14. Boyle DK, Bott MJ, Hansen HE, Woods CQ, Taunton RL. Managers' leadership and critical care nurses' intent to stay. *Am J Crit Care* 1999;8:361-71.
15. Kaldenberg DO, Regrut B. Do satisfied patients depend on satisfied employees? The satisfaction report. South Bend, Indiana: Press Ganey; 2001.
16. Laschinger HKS, Havens S. Staff nurse work empowerment and perceived control over nursing practice: conditions for work effectiveness. *J Nurs Admin* 1996;26:27-35.
17. Buckles-Prince S. Shared governance: sharing power and opportunity. *J Nurs Admin* 1997;27:28-35.
18. Nakata JA, Saylor C. Management style and staff nurse satisfaction in a changing environment. *Nurs Admin Quarterly* 1994;18:51-7.
19. Kramer M, Schmalenberg CE. Magnet hospital nurses describe control over nursing practice. *Western J Nurs Res* 2003;25:434-52.
20. Demerouti E, Bakker AB, Nachreiner F, Schaufeli WB. A model of burnout and life satisfaction among nurses. *J Adv Nurs* 2000;32:454-64.
21. Clarke SP, Sloane DM, Aiken LH. The effects of hospital staffing and organizational climate on needlestick injuries to nurses. *Am J Pub Hlth* 2001;92:1115-9.
22. Diaz RI, Carbrera DD. Safety climate and attitude as evaluation measures of organizational safety. *Accidents Annals Prev* 1997;29:643-50.
23. McNeese-Smith DK, Nazery M. A nursing shortage: building organizational commitment among nurses: practitioner application. *J Healthcare Mngmt* 2001;46:173-87.
24. Shephard RJ. Aging and productivity: some physiological issues. *Intl J Indust Ergon* 2000;25:535-45.
25. Harma M, Ilmarinen J. Towards the 24-hr society—new approaches for aging shift workers? *Scand J Work Environ Hlth* 1999;25:610-5.
26. Hansson RO, Robson SM, Limas MJ. Stress and coping among older workers. *Work* 2001;17:247-56.
27. Robertson A, Tracy CS. Health and productivity of older workers. *Scand J Work Environ Hlth* 1998;24:85-97.
28. Amick BC, Kawachi I, Coakley EH, Lerner D, Levine S, Colditz GA. Relationship of job strain and iso-strain to health status in a cohort of women in the United States. *Scand J Work Environ Hlth* 1998;24:54-61.
29. Cheng Y, Kawachi I, Coakley EH, Schwartz J, Colditz G. Association between psychosocial work characteristics and health functioning in American women: prospective study. *Brit Med J* 2000;320:1432-6.
30. Matthews S, Hertzman C, Ostry A, Power C. Gender, work role and psychosocial work characteristics as determinants of health. *Soc Sci Med* 1998;46:1417-24.

31. Vermeulen M, Mustard C. Gender differences in job strain, social support at work, and psychological distress. *J Occup Hlth Psych* 2000;5:428-40.
32. Wilkins K, Beaudet MP. Work stress and health. *Hlth Reports* 1998;10:47-63.
33. Bourbonnais R, Vinet A, Meyer F, Goldberg M. Certified sick and workload. A case-referent study among nurses. *J Occup Med* 1992;34:69-74.
34. Skipper JK, Jung FD, Coffey LC. Nurses and shiftwork: effects on physical health and mental depression. *J Adv Nurs* 1990;15:835-42.
35. Bourbonnais R, Comeau M, Vezina M. Job strain and evolution of mental health among nurses. *J Occup Hlth Psych* 1999;4:95-107.
36. Centers for Disease Control, National Institute of Occupational Safety and Health. Health care workers (2002). Available at: <http://www.cdc.gov/niosh/healthpg/html> (accessed May 7, 2004).
37. Stellman JM. Women workers: the social construction of a special population. *J Occup Med* 1999;37:559-81.
38. American Nurses Association American. Nurses Association denounces OSHA ergonomics plan. Press Release for the American Nurses Association April 8, 2002. Available at: <http://www.nursingworld.org/rerealnews> (Accessed April 8, 2004).
39. US Department of Labor, Bureau of Labor Statistics. Lost work time injuries and illnesses: characteristics and resulting time away from work, 2000. Released April 10, 2002.
40. Lipscomb J, Trinkoff A, Brady B, Geiger-Brown J. Health care system changes and reported musculoskeletal disorders among registered nurses. *Am J Publ Hlth* 2004;94:1431-35.
41. Clarke SP, Sloane DM, Aiken LH. Effects of hospital staffing and organizational climate on needlestick injuries to nurses. *Am J Publ Hlth* 2002;92:1115-9.
42. National Institute for Occupational Safety and Health. Injuries, illnesses and fatalities. Cincinnati, OH: NIOSH Publications; 2002.
43. Ross CE, Mirowsky J. Does employment affect health. *J Hlth Soc Behav* 1995;36:230-43.
44. Marshall NL. Health and illness issues facing an aging work-force in the new Millennium. *Sociol Spect* 2001;21:431-9.
45. Karasek R, Theorell T. *Healthy work*. New York, NY: Basic Books; 1990.
46. Mausner-Dorsch H, Eaton WW. Psychosocial work environment and depression: epidemiological assessment of the demand-control model. *Am J Pub Hlth* 2000;90:1765-70.
47. deJonge J, Mulder MJG, Nijhuis FJN. The incorporation of different demand concepts in the job demand-control model: effects on health care professionals. *Soc Sci Med* 1999;48: 1149-60.
48. Tummers GER, Janssen PPM, Landeweerd A, Houkes I. A comparative study of work characteristics and reactions between general and mental health nurses: a multi-sample analysis. *J Adv Nurs* 2001;36:151-62.
49. Spence Laschinger HK, Finegan J, Shamian J. Promoting nurses' health: effect of empowerment on job strain and work satisfaction. *Nurs Econ* 2001;19:42-52.
50. Board on Behavioral, Cognitive and Sensory Sciences and Education, National Academy of Science. Health and safety needs of older workers. Washington DC: National Academies Press; 2004.

51. Wanous JP, Reichers AE, Hudy MJ. Overall job satisfaction: how good are single-item measures? *J Applied Psych* 1997; 82:247-52.
52. Ware JE, Snow KK, Kosinski M, Gandek B. SF-36 health survey manual and interpretation guide. Boston, MA: The Health Institute; 2000.
53. Geiger-Brown J, Trinkoff AM, Nielsen K, Lirtkmunlikaporn S, Brady B, Vasquez EI, et al. Nurses' perception of their work environment, health, and well being. *AAOHN J* 2004;52:16-22.
54. Trinkoff AM, Lipscomb JA, Geiger-Brown J, Brady B. Musculoskeletal problems of the neck, shoulder, and back and functional consequences in nurses. *Am J Industr Med* 2002;41:170-8.
55. Trinkoff AM, Brady B, Nielson K. Workplace prevention and musculoskeletal injuries in nurses. *JONA* 2003;33: 153-8.
56. Owen BD. Preventing injuries using an ergonomic approach. *AORN J* 2000;72:1031-6.
57. Institute of Medicine (IOM). Keeping patients safe: transforming the work environment of nurses. Washington, DC: National Academies Press; 2003.