

NOVEMBER 2007 • Volume 55, No. 11

AAOHN

JOURNAL

aaohnjournal.com

PROFESSIONAL PRACTICE

Health Care Workers' Perceptions of Occupational Hazards

Asking Questions to Guide Practice

Competencies in Occupational and Environmental Health Nursing

Physical Activity Intervention in an Academic Setting
Focus Group Results

Ergonomics and Patient Handling

Controlling Chronic Pain in the Workplace
Nerve Stimulation and Intrathecal Drug
Delivery Systems



BUSINESS AND LEADERSHIP

Nursing Injury Rates and Negative Patient Outcomes

Connecting the Dots

HEALTH UPDATES

Sources of Noise-Induced Hearing Loss

Official Journal of the
**AMERICAN ASSOCIATION OF
OCCUPATIONAL HEALTH NURSES, INC.**

Published for the Association by SLACK Incorporated

BUSINESS AND LEADERSHIP

Patricia B. Strasser, PhD, RN, COHN-S/CM, FAOHN

Nursing Injury Rates and Negative Patient Outcomes— *Connecting the Dots*

by William Charney, DOH, and Joseph Schirmer, MS

The connection between nursing injury rates and patient outcomes has not been totally grasped in the health care occupational health setting. This article concludes that nursing injury rates are linked to the nursing shortage and less nursing time at the bedside, both of which have been scientifically linked to negative patient outcomes. Because nurses' working conditions affect patients' outcomes, more funding and changes are needed to improve these conditions.

Since an Institute of Medicine report describing nurses' work environments as a potential threat to patient safety, legislative campaigns focusing on nurses' working conditions have been successful in Washington, Texas, Maryland, Rhode Island, and Minnesota (Institute of Medicine, 2004). Despite this progress, most of the ongoing work to improve safety in health care continues to focus on the patient side of the equation. Substantial research confirms the association between hospital nursing capacity and patient outcomes (Aiken, 2005; Aiken, Clarke, Cheung, Sloane, & Silber, 2003; Aiken, Clarke, & Sloane, 2002; Aiken, Clarke, Sloane, Sochalski, Busse, Clarke, et al., 2001; Aiken, Clarke, Sloane, Sochalski, & Silber,

2002; Estabrooks, Midodzi, Cummings, Ricker, & Giovannetti, 2005; Rafferty, Ball, & Aiken, 2001).

Also, many studies associate current nursing working conditions with medication errors, falls, mortality, and spread of infection (Alonso-Echanove et al., 2003; Amaravadi, Jacobson, Solomon, & Fischer, 2002; Andersen et al., 2002; Archibald, Manning, Bell, Baneljee, & Jarvis, 1997; Arnow et al., 1982; Fridkin, Peear, Williamson, Gagliani, & Jarvis, 1996; Haley et al., 1995; Harbarth, Sudre, Dharan, Cadenas, & Pittet, 1999; Knauf, Lichtig, Risen-McCoy, Singer, & Wozniak, 1997; Kovner & Gergen, 1998; Kovner, Jones, Zhan, Gergen, & Basu, 2002; Lichtig, Knauf, Risen-McCoy, & Wozniak, 2002; Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002; Robert et al., 2000; Stegenga, Bell, & Matlow, 2002; Vicca, 1999).

Another Institute of Medicine report concluded that nursing is inseparably linked to patient safety, emphasizing that poor working conditions for nurses and inadequate staffing levels increase the risk for

error (Institute of Medicine, 2000). Nurses' working conditions are related to the risk of health care-associated infections among patients and occupational injuries and infections among staff (Centers for Disease Control and Prevention, 2004). The Sidebar contains general categories of hazards nurses face in health care.

This article suggests that nursing injury rates contribute both directly and indirectly to negative patient outcomes. Nursing staff injuries (A) influence staff ratios (B) which influence patient outcomes (C); therefore, nursing staff injuries influence patient outcomes. Algebraically stated, if A changes B and B changes C, then A changes C. Negatively affected staff ratios produce negative patient outcomes. If nursing injury rates negatively affect patient outcomes, more resources and energy must be devoted to enhancing working conditions, reducing the physical demands of the job, and building a culture of safety.

NURSING INJURY RATES

When health care industry acute care lost time injury rates are added to long-term care injury rates using the health care Standard Industrial Classification (SIC) and North American Industry Classification (NAIC) codes in each state, health care is one of the most dangerous industries (Bureau of Labor Statistics [BLS], 2002). National data compiled by the BLS indicate that the rates of work-related injury or illness requiring treatment or lost work time were 8.8 per

ABOUT THE AUTHORS

Mr. Charney is Safety Coordinator, Washington Hospital Services, Seattle, WA. Mr. Schirmer is Epidemiologist, Wisconsin Division of Public Health, Madison, WI.

Dr. Strasser is President, Partners in Business Health Solutions, Inc., Toledo, OH; and Adjunct Assistant Professor, University of Michigan School of Nursing, Occupational Health Nursing Program, Ann Arbor, MI.

BUSINESS AND LEADERSHIP

100 full-time hospital workers and 13.5 per 100 full-time nursing home workers in 2001. These rates contrast with national data indicating annual rates of 4.0 per 100 in mining, 7.9 in construction, and 8.1 in manufacturing. With approximately 2.8 million nurses and 2.3 million nursing assistants in the United States, these rates constitute a national epidemic (Institute of Medicine, 2004).

Psychiatric facilities are a subset of dangerous health care organizations with high rates of nursing injury due to violence. In New York State mental health facilities, the nursing injury rate was 24 per 100 full-time equivalent employees in 2005. Therapy aides had a rate of 35 injuries per 100 full-time equivalent employees in 2005 and secure hospital treatment aides (those working with the criminally insane) had a rate of 94 per 100 full-time equivalent employees (anecdotal data from J. Rosen, personal communication, 2006).

Musculoskeletal injuries often occur among nursing staff while they are moving and transferring patients and result in substantial losses to employers and employees in terms of time and money. In the private health care industry, 435,180 lost time musculoskeletal injury claims were filed in 2005. Although this number includes all health care workers, based on other studies, it can safely be assumed that a high percentage of these claims were nursing injuries. A median of 10 days away from work per injury, or 4,351,800 lost days, was reported in 2003 (BLS, 2003). In addition, the underreporting of these injuries, which has been reported to range from 50 to 76 per 100 annually (Nelson & Baptiste, 2004), must be considered.

The authors suggest these high rates of injury are linked to the national nursing shortage and also to the high turnover rates experienced in both acute and long-term care facilities. The national vacancy rate for registered nurses (RNs) stood at 13.6% in 2003, more than twice the rate of 5.6% in 1998 (American Health Care Association, 2003). The national turnover rate for RNs was

General Categories of Hazards Nurses Face in Health Care

Communicable diseases: Blood-borne pathogen exposures, human immunodeficiency virus, hepatitis C virus, and hepatitis B virus due to percutaneous needlestick injury. Between 600,000 and 800,000 such injuries occur each year, with injections (21%), suturing (17%), and blood draws (16%) being the top three exposures (Perry, Parker, & Jagger, 2003).

Musculoskeletal injuries: Patient movement and handling. Thirty-eight percent of all nurses experience back injuries, 98% of which are due to lifting patients manually (Meier, 2001).

Violence: An estimated 9.5% of nurses in general nursing are assaulted annually (Gerberich et al., 2004; Wells & Bowers, 2002). The Minnesota Nurses' Study (Gerberich et al., 2004) reported that both physical (13.2) and nonphysical (38.8) violence rates are on the rise for emergency department, long-term care, intensive care, and psychiatric-behavioral care nurses.

Chemicals: Related to patient treatment and maintenance of proper environment (e.g., formaldehyde, glutaraldehyde, and waste anesthesia gases).

Stress: In a recent American Nurses Association survey, nurses cited stress and overwork as their top safety concerns (American Nurses Association, 2004).

14.6% in 2003. Nationally, certified nursing assistant turnover was estimated at more than 71% in 2002. Harrington (2005) testified that turnover is directly related to heavy workloads and poor working conditions. She cited at least two Institute of Medicine studies to support her claim (Wunderlich & Kohler, 2001). Staff shortages increase the risk of injuries.

Trinkoff and Johantgen (2005), examining the relationship between staffing and worker injuries, concluded that nursing homes with fewer nursing hours per resident-day were associated with significantly increased worker injury rates. Several studies equate a lack of nursing staff hours with negative patient outcomes, but studies evaluating the relationship between staffing levels and nursing injury rates are rare (Needleman et al., 2002).

In 2002, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) reported that low nursing staff levels in 1,609 hospitals were a contributing factor in

24% of patient deaths and injuries (JCAHO, 2002). This same report also concluded that "physical working conditions" are key contributors to turnover and burnout associated with nursing shortages, but did not quantify the relationship.

Shamian et al. (2001) found that 44% of nurses reported missing work due to illness at least once in the preceding 3 months. This article concluded that injuries among nurses are costly to hospitals in terms of lost productivity and are implicated in the loss of qualified nursing personnel from the work force and the delivery of quality patient care.

Clarke, Sloane, and Aiken (2002) found that nurses working on hospital units with compromised organizational climates and lower staffing levels were substantially more likely to report risk factors associated with needlestick injuries. Nurses on units with lower staffing levels, less nurse leadership, and higher levels of emotional exhaustion were twice as likely to report staff carelessness and inexperience.

BUSINESS AND LEADERSHIP

Currently, 90% of long-term care facilities lack sufficient nursing staff to provide even the most basic care (JCAHO, 2005). Long-term care facilities also have one of the highest injury rates (13.8 per 100 full-time equivalent employees) and one of the highest annual turnover rates (50% to 75%) in the nation due largely to heavy workloads, poor working conditions, and low wages (Harrington, 2005).

The American Society of Safety Engineers reported that a critical nursing shortage loomed nationally (Ramsey, 2005). Several factors, including the strong likelihood of experiencing severe occupational injury or illness (e.g., blood-borne pathogens) and workplace violence, are suspected causes.

The Workplace Safety and Insurance Board (2002) reported that nurses' injuries are costly to hospitals in terms of lost productivity, work flow disruption, and claims paid and costly to nurses in terms of pain, stress, and possible employment loss. Protecting nurses from disabling injury will be key to recruitment and retention.

PATIENT OUTCOMES

Many studies have examined the impact of nursing care on patient outcomes. The American Nurses Association (ANA) identified 10 patient outcome indicators particularly sensitive to the quality of nursing care (e.g., nosocomial infection rates, patient injury rates [falls], pressure ulcers, and patient satisfaction with overall care and with pain management) (Trossman, 2000).

As RNs deliver less direct care, patient outcomes suffer. For example, Lichtig, Knauf, and Milholland (1999) found a statistically significant inverse relationship between the percentage of patient care delivered by RNs and the incidence of urinary tract infections, pressure ulcers, and postoperative infections. Blegen, Goode, and Reed (1998) found an inverse relationship between RN hours per patient and medication errors, decubitus, and patient complaints. Shamian, Hagen, Hu, and Fogarty (1994) found that more nursing hours

per patient resulted in shorter stays for patients in 10 of 11 units studied.

Needleman et al. (2002) examined nurse staffing levels and their association with risk to patients as measured by fatalities or complications. They studied 799 hospitals in 11 states to determine the relationship between the level of care provided by nurses in the hospital and patient outcomes. Among adult nonsurgical patients, a higher number of hours of care per day provided by RNs was associated with shorter stays and lower rates of urinary tract infections, upper gastrointestinal tract bleeding, pneumonia, shock or cardiac arrest, and failure to rescue (i.e., lower rates of failure to resuscitate).

DISCUSSION

Due to more than 10% of nurses nationally submitting workers' compensation claims for injuries (based on adding NAIC codes 622 and 623) and millions of days lost to injury, less nursing hours are spent at the bedside and a national nursing shortage exists, both of which have been shown to result in negative patient outcomes. High nursing injury rates continue under the prevailing system, making it difficult to replace nurses and increase nursing hours at the bedside. Thus, nursing injury rates also result in negative patient outcomes.

Clarke and Aiken (2006) pointed out that a substantial body of research exists confirming an association between hospital nursing capacity and patient outcomes both within and across countries having differently organized and financed health care. They reported that recent studies conducted in the United States, Canada, England, Switzerland, and New Zealand revealed that the adequacy of nurse staffing and the quality of the work environment were associated with the quality of patient care. They found that patients tended to be at heightened risk in hospitals with poor work environments.

Nursing working conditions taken as a subset have a substantial effect on nursing injury rates, nursing shortages, and nursing hours at the bedside. On an ANA survey,

nurses cited a disabling back injury (60%) followed by contracting hepatitis from a needlestick injury (45%) as their top safety concerns (ANA, 2001). The survey also revealed that less than 20% of respondents felt safe in their current work environment.

For years the health care industry has been aware of the dangerous conditions nurses face on wards. Aiken, Clarke, Sloane, and associates (2001) reported that 1 in 3 nurses younger than 30 was planning to leave his or her job within the next year. Burnout, back injury, infectious disease exposure, stress, violence on the job, and verbal abuse all contribute to the physical demands of nursing.

The top reason nurses leave the profession, aside from retirement, is to seek a job that is less physically demanding (JCAHO, 2002). The ANA reported that more than 90% of the nurses surveyed indicated that health and safety concerns influenced the type of nursing work they chose to do and the probability that they would continue to practice nursing (ANA, 2001). In this same study, 18% of respondents indicated that safe needlestick devices were not made available by their facilities, and nearly 60% said that patient lifting and transfer devices to prevent disabling back injuries were not provided by their organizations.

In a national survey by the American Federation of Teachers, 56% of nurses and 64% of x-ray technicians suffered lifting-related injuries, chronic pain, or both (Hart, 2006). This study revealed their work has become so physically demanding that nurses and technicians report they have considered leaving patient care as a result.

Nelson found recruitment and retention of nurses to be an ongoing problem and the nursing shortage to have been exacerbated by occupational injuries (Collins, 2006). Physical workload and fear for their safety are major reasons nurses leave the profession.

The American Federation of State, County and Municipal Workers (2006) found that licensed nurses who are choosing to leave the pro-

BUSINESS AND LEADERSHIP

profession (19.7%) cite concerns over workplace safety as a reason.

The American Organization of Nurse Executives, on surveying 4,910 RNs, reported that 43% planned to leave the profession within the next 3 years due to the work environment (Moses, 1992). Moses (1992) found that 12% to 18% of RNs will eventually leave the profession due to chronic back pain.

In a recent Washington State survey, 55% of nurses reported they were so disheartened with the profession they would not recommend it to others as a career (W. Charney, unpublished data, 2005).

The hiring of temporary per-diem nurses who may be less familiar with standard procedures and inadequately trained in workplace polices may also contribute to an unsafe working environment.

Powell-Cope, Nelson, Tiesman, and Matz (2003) pointed out that an article on the nursing shortage by Berliner and Ginzberg (2002) did not address the physical demands of nursing. This has been the rule rather than the exception in the literature on the nursing shortage. Media coverage of the nursing shortage has mentioned pay, patient-nurse ratios, the aging nursing work force (average age of 46 years), and physician-nurse relationships as possible causes, often neglecting to mention occupational health and safety issues, risks that nurses face each shift, or national nursing injury rates.

Patient safety cannot be adequately addressed if employee safety is not being adequately addressed (Institute for Healthcare Improvement, 2007). However, this concept has not taken a firm hold in the health care industry, and in some instances, health care workers become patients due to on-the-job injury. Few Occupational Safety and Health Administration (OSHA) regulations have been written specifically for the health care industry, with the exception of the Bloodborne Pathogens Act, amended to include the Federal Needlestick Safety and Prevention Act (2001). OSHA conducted 413 inspections in SIC code 806 (acute

care) and 725 inspections in SIC code 805 (nursing homes) in 2005 (OSHA, 2007), less than 3% of its annual projected inspection total of 37,500 (Snare, 2005) in health care facilities. JCAHO, in its Environment of Care sections, has standards for waste handling, safety committees, emergency preparedness, and written safety programs, but its standards are generic at best.

CONCLUSION

The association between nursing injury rates and negative patient outcomes could lead to substantial changes in occupational health nursing as nurses seek to protect the industry's human investments. The average hospital spends one-tenth of 1% (0.0001%) of its total operational budget on health and safety programs and systems (W. Charney, unpublished data, 2005). This is much lower than expenditures on patient safety programs. If the health care industry accepts the association between dangerous working conditions for nurses resulting in high injury rates and negative patient outcomes and if building a culture of safety will protect both employees and patients, more resources must be allocated to these programs.

IN SUMMARY

Nursing Injury Rates and Negative Patient Outcomes

Connecting the Dots

Charney, W., & Schirmer, J.

AAOHN Journal 2007; 55(11), 470-475.

- 1 Nursing injury rates are directly connected to the national nursing shortage.
- 2 Nursing injury rates are directly related to a reduction of nursing hours at the bedside.
- 3 Nursing injury rates are a major reason nurses leave the profession.
- 4 When all of the above are combined, nursing injury rates yield negative patient outcomes.

It is clear that the nursing injury rate contributes to the nursing shortage and, in turn, that the shortage contributes to the nursing injury rate. Investing in protecting the health and safety of nurses will in essence contribute to protecting patients. This means mechanizing patient lifting, reducing ergonomic stress through better architectural planning for both new construction and renovations, purchasing engineered needles to eliminate needlesticks, creating schedules that reduce fatigue and negative shift-work outcomes, and creating effective staffing ratios in nursing and ancillary departments.

The association between nursing injuries and patient outcomes is important to all health and safety departments including occupational health, risk management, safety, and infection control. The final "dot" to be connected in the process of analyzing how to better protect patients is safety. Protecting health care workers is directly connected to protecting patients, reducing nosocomial infection rates, reducing health care errors, and yielding a balanced approach to the overall safety systems and culture. Budgets for occupational health in health care institutions should be

BUSINESS AND LEADERSHIP

considered part of the overall plan for protecting patients.

REFERENCES

- Aiken, L. H. (2005). Extending the magnet concept to developing and transition countries. *Reflections on Nursing Leadership*, 31, 16-18.
- Aiken, L. H., Clarke, S. P., Cheung, R. B., Sloane, D. M., & Silber, J. H. (2003). Educational levels of hospital nurses and surgical patient mortality. *JAMA*, 290(12), 1617-1623.
- Aiken, L. H., Clarke, S. P., & Sloane, D. M. (2002). Hospital staffing, organization, and quality of care: Cross-national findings. *International Journal for Quality Health Care*, 14(1), 5-13.
- Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J. A., Busse, R., Clarke, H., et al. (2001). Nurses' reports on hospital care in five countries. *Health Affairs*, 20(3), 43-53.
- Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J., & Silber, J. H. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA*, 288(16), 1987-1993.
- Alonso-Echanove, J., Edwards, J. R., Richards, M. J., Brennan, P., Venezia, R. A., Keen, J., et al. (2003). Effect of nurse staffing and antimicrobial-impregnated central venous catheters on the risk for bloodstream infections in intensive care units. *Infection Control and Hospital Epidemiology*, 24(12), 916-925.
- Amaravadi, R. K., Jacobson, B. C., Solomon, D. H., & Fischer, M. A. (2002). ICU nurse-to-patient ratio is associated with complications and resource use after esophagectomy. *Intensive Care Medicine*, 26, 1857-1862.
- American Federation of State, County and Municipal Workers. (2006). *Solving the nursing shortage*. Retrieved from www.afscme.org/publications/2237cfm
- American Health Care Association. (2003, February 12). *Health services research and evaluation*. Retrieved 2005 from www.ahca.org
- American Nurses Association. (2001). *Health and safety survey 2001*. Retrieved July 31, 2007, from www.nursingworld.org/hssurvey.htm
- American Nurses Association. (2004). *Nursing shortage factors*. Retrieved July 31, 2007, from www.nursingworld.org
- Andersen, B. M., Lindemann, R., Bergh, R., Nesheim, B., Syversen, G., Solheim, N., et al. (2002). Spread of methicillin-resistant *Staphylococcus aureus* in a neonatal intensive unit associated with understaffing, overcrowding and mixing of patients. *Journal of Hospital Infection*, 50(1), 18-24.
- Archibald, L. K., Manning, M. L., Bell, L. M., Baneljee, S., & Jarvis, W. R. (1997). Patient density, nurse-to-patient ratio and nosocomial infection risk in a pediatric cardiac intensive care unit. *Pediatric Infectious Disease Journal*, 16(11), 1045-1048.
- Arnow, P., Allyn, P. A., Nichols, E. M., Hill, D. L., Pezzlo, M., & Bartlett, R. H. (1982). Control of methicillin-resistant *Staphylococcus aureus* in a burn unit: Role of nurse staffing. *Journal of Trauma*, 22(11), 954-959.
- Berliner, H., & Ginzberg, E. (2002, April 4). Why this hospital nursing shortage is different. *JAMA*, 288(21), 2742-2744.
- Blegen, M., Good, C., & Reed, L. (1998). Nurse staffing and patient outcomes. *Nursing Research*, 47(1), 43-50.
- Bureau of Labor Statistics. (2002). *Survey of occupational injuries and illnesses*. Retrieved July 31, 2007, from www.bls.gov/iif/home.htm
- Bureau of Labor Statistics. (2003). *Counts and incidence rates of non-fatal injuries and illnesses involving days away from work involving MSDs by state and ownership*. Retrieved August 6, 2007, from www.bls.gov/iif/oshstat.htm
- Centers for Disease Control and Prevention. (2004). *Nurses' working conditions: Implications for infectious disease*. Retrieved July 31, 2007, from www.cdc.gov/niosh/topics/healthcare
- Clarke, S. P., & Aiken, L. H. (2006). *More nursing, fewer deaths*. Retrieved July 31, 2007, from http://qshe.bmj.com/cgi/content/extract/15/12
- Clarke, S., Sloane, D., & Aiken, L. (2002, July). Effects of hospital staffing and organizational climate on needlestick injuries to nurses. *American Journal of Public Health*, 92(7), 1115-1119.
- Collins, J. (2006). Scope of the problem. In A. Nelson (Ed.), *Safe patient handling and movement*. New York: Springer.
- Estabrooks, C. A., Midodzi, W. K., Cummings, G. G., Ricker, K. L., & Giovannetti, P. (2005). The impact of hospital nursing characteristics on 30-day mortality. *Nursing Research*, 54(2), 74-84.
- Fridkin, S. K., Peear, S. M., Williamson, T. H., Galgiani, I. N., & Jarvis, W. R. (1996). The role of understaffing in central venous catheter-associated bloodstream infections. *Infection Control and Hospital Epidemiology*, 17(3), 150-158.
- Gerberich, S. G., Church, T. R., McGovern, P. M., Hansen, H. E., Nachreiner, N. M., Geisser, M. S., et al. (2004). An epidemiological study of the magnitude and consequences of work related violence: The Minnesota nurses' study. *Occupational and Environmental Medicine*, 61(6), 495-503.
- Haley, R. W., Cushion, N. B., Tenover, F. C., Bannerman, T. L., Dryer, D., Ross, S., et al. (1995). Eradication of endemic methicillin-resistant *Staphylococcus aureus* infections from a neonatal intensive care unit. *Journal of Infectious Diseases*, 171(3), 614-624.
- Harbarth, S., Sudre, P., Dharan, S., Cadenas, M., & Pittet, D. (1999). Outbreak of *Enterobacter cloacae* related to understaffing, overcrowding, and poor hygiene practices. *Infection Control and Hospital Epidemiology*, 20(9), 598-603.
- Harrington, C. (2005, July 22). *Long term care staff and quality of care*. Retrieved July 31, 2007, from www.pascenter.org/news/harrington_LTC_Testimony.html
- Hart, P. D. (2006, March). *Safe patient handling: Injuries and pain from lifting patients causing nurses, x-ray techs to consider quitting. Could worsen nursing shortage*. Retrieved July 31, 2007, from www.aft.org/presscenter/releases/2006/032306.htm
- Institute for Healthcare Improvement. (2007). *How to improve*. Retrieved July 31, 2007, from www.ihl.org/ihl/topics/Improvement
- Institute of Medicine. (2000). *To err is human: Building a safer health system*. Washington, DC: National Academy Press.
- Institute of Medicine. (2004). *Keeping patients safe: Transforming the work environment*. Washington, DC: National Academy Press.
- Joint Commission on Accreditation of Healthcare Organizations. (2002). *Healthcare at the crossroads*. Oakbrook Terrace, IL: Author.
- Joint Commission on Accreditation of Healthcare Organizations. (2005). *Healthcare at the crossroads: Strategies for addressing the evolving nursing crisis*. Oakbrook Terrace, IL: Author.
- Knauf, R. A., Lichtig, L. K., Risen-McCoy, R., Singer, A. D., & Wozniak, L. (1997). *Implementing nursing's report card: A study of RN staffing, length of stay and patient outcomes*. Washington, DC: American Nurses Association.
- Kovner, C., & Gergen, P. J. (1998). Nurse staffing levels and adverse events following surgery in US hospitals. *Image: Journal of Nursing Scholarship*, 30(4), 315-321.
- Kovner, C., Jones, C., Zhan, C., Gergen, P. J., & Basu, J. (2002). Nurse staffing and postsurgical adverse events: An analysis of administrative data from a sample of U.S. hospitals, 1990-1996. *Health Services Research*, 37(3), 611-629.
- Lichtig, L., Knauf, R., & Milholland, D. (1999). Some impacts of nursing on acute care hospital outcomes. *Journal of Nursing Administration*, 29(2), 25-33.
- Lichtig, L. K., Knauf, R. A., Risen-McCoy, R., & Wozniak, L. (2002). *Nurse staffing and patient outcomes in the inpatient hospital setting*. Washington, DC: American Nurses Association.
- Meier, E. (2001). *Ergonomic standards and implications for nursing*. Retrieved from www.nursingeconomics.net/cgi-bin/WebObjects/NECJournal.wa/wa/viewSection?s_id=1073744464
- Moses, E. B. (1992). *The registered nurse population findings from the national sample and survey of registered nurses*. Washington, DC: Department of Health and Human Services.
- Needleman, J., Buerhaus, P., Mattke, S., Stewart, M., & Zelevinsky, K. (2002). Nurse-staffing levels and the quality of care in hospitals. *New England Journal of Medicine*, 346(22), 1715-1722.
- Nelson, A., & Baptiste, A. (2004). *Evidence based practices for safe patient handling and movement*. Retrieved 2006 from www.nursingworld.org/ojin/topic25/tpc25_

BUSINESS AND LEADERSHIP

- 3.htm
Occupational Safety and Health Administration. (2007). *Inspection data*. Retrieved July 31, 2007, from www.osha.gov/inspectiondata
- Perry, J., Parker, G., & Jagger, J. (2003). EPI-Net report: 2001 percutaneous injury rates. *Advances in Exposure Prevention*, 6(3), 32-36.
- Powell-Cope, G., Nelson, A., Tiesman, H., & Matz, M. (2003). Nurses' working conditions and the nursing shortage. *JAMA*, 289(13), 1632-1633.
- Rafferty, A. M., Ball, J., & Aiken, L. H. (2001). Are teamwork and professional autonomy compatible, and do they result in improved hospital care? *Quality Health Care*, 10(Suppl 2), ii32-ii37.
- Ramsey, J. (2005). *A new look at nursing safety: The development and use of JHAs in the emergency department*. Retrieved July 31, 2007, from www.asnc.org/academics/journal/05_featurearticle03.php
- Robert, J., Fridkin, S. K., Blumberg, H. M., Anderson, B., White, N., Ray, S. M., et al. (2000). The influence of the composition of the nursing staff on primary bloodstream infection rates in a surgical intensive care unit. *Infection Control and Hospital Epidemiology*, 21(1), 12-17.
- Shamian, J., Hagen, B., Hu, T. W., & Fogarty, T. E. (1994). The relationship between length of stay and required nursing hours. *Journal of Nursing Administration*, 24(7/8), 52-58.
- Shamian, J., O'Brien-Pallas, L. L., Kerr, M. S., Koehoorn, M. W., Aiken, L., Solcholski, J., et al. (2001). Effects of job strain, hospital organizational factors and individual characteristics on work-related disability among nurses. *Workplace Safety and Insurance Board (Ontario)*.
- Snare, J. (2005, June 13). *Address presented to American Society of Safety Engineers, New Orleans, LA*. Retrieved July 31, 2007, from www.osha.gov/pls/oshaweb/owadisp
- Stegenga, J., Bell, E., & Matlow, A. (2002). The role of nurse understaffing in nosocomial viral gastrointestinal infections on a general pediatrics ward. *Infection Control and Hospital Epidemiology*, 23, 133-136.
- Trinkoff, A., & Johantgen, M. (2005). Staffing and worker injury in nursing homes. *American Journal of Public Health*, 95(7), 1220-1225.
- Trossman, S. (2000, May/June). *Nurses nationwide want to show link between RN care (working conditions) and quality patient care*. Retrieved from <http://198.65.150.247/tan/sepoct00/staff.htm>
- Vicca, A. F. (1999). Nursing staff workload as a determinant of methicillin-resistant *Staphylococcus aureus* spread in an adult intensive therapy unit. *Journal of Hospital Infection*, 43, 109-113.
- Wells, J., & Bowers, L. (2002). How prevalent is violence towards nurses working in general hospitals? *Journal of Advanced Nursing*, 39(2), 230-240.
- Workplace Safety and Insurance Board. (2002). *Effects of job strain, hospital organization factors and individual characteristics on work-related disability among nurses*. Retrieved July 31, 2007, from www.wsib.on.ca/wsib/wsibsite.nsf/public/researchresultseffects
- Wunderlich, G. S., & Kohler, P. (Eds.). (2001). *Improving the quality of long term care*. Washington, DC: National Academy Press.

Statement of Ownership, Management, and Circulation: (Required by 39 U.S.C. 3685). Title of publication: AAOHN Journal. Publication no.: 879-180. Date of filing: October 1, 2007. Frequency of issue: Monthly. Number of issues published annually: 12. Annual subscription price: \$99.00. Complete mailing address of known office of publication: 6900 Grove Road, Thorofare, New Jersey 08086-9447. Complete mailing address of the headquarters of the general business offices of the publisher: PNS & WSS Inc., t/a SLACK Inc., 6900 Grove Road, Thorofare, New Jersey 08086-9447. Publisher: John C. Carter. SLACK Inc., 6900 Grove Road, Thorofare, New Jersey 08086-9447. Editor: Joy E. Wachts, PhD, APRN, BC, FAAONH, AAOHN, 2920 Brandywine Road, Ste 100, Atlanta, GA 30341. Managing Editor: Shirley P. Strunk, ELS, SLACK Inc., 6900 Grove Road, Thorofare, New Jersey 08086-9447. Owner: American Association of Occupational Health Nurses, 2920 Brandywine Road, Ste 100, Atlanta, GA 30341. Known bondholders, mortgagees, and other security holders: None. Issue date for circulation data: September 2007. Extent and nature of circulation: A. Total Number of Copies: Average number of copies each issue during preceding 12 months (hereinafter "Average"), 9,708. Actual number of copies of single issue published nearest to filing date (hereinafter "Most recent"), 9,586. B. Paid and/or requested circulation. B1. Mailed outside-county paid subscriptions stated on Form 3541: Average, 8,936. Most recent, 8,758. B2. Mailed in-county paid subscriptions stated on Form 3541: Average, 0. Most recent, 0. B3. Paid distribution outside the mail including sales through dealers and carriers, street vendors, counter sales, and other paid distribution outside USPS: Average, 0. Most recent, 0. B4. Paid distribution by other classes of mail through the USPS: Average, 0. Most recent, 0. C. Total paid distribution (sum of B1, B2, B3, and B4): Average, 8,936. Most recent, 8,758. D. Free or nominal rate distribution. D1. Outside-county copies included on Form 3541: Average, 63. Most recent, 63. D2. In-county copies included on Form 3541: Average, 0. Most recent, 0. D3. Copies mailed at other classes through the USPS: Average, 0. Most recent, 0. D4. Distribution outside the mail (carriers or other means): Average, 25. Most recent, 100. E. Total free or nominal rate distribution (sum of D1, D2, D3, and D4): Average, 88. Most recent, 163. F. Total distribution (sum of C and E): Average, 9,024. Most recent, 8,921. G. Copies not distributed: Average, 684. Most recent, 665. H. Total (sum of F and G): Average, 9,708. Most recent, 9,586. I. Percent paid (C divided by F times 100): Average, 99%. Most recent, 98%. This Statement of Ownership will be printed in the November 2007 issue of this publication. I certify that the statements made by me above are true and complete. John C. Carter, Chief Operating Officer (COO). Date: October 1, 2007.

CE Answers

Environmental Justice:
Implications for Occupational Health Nurses

November 2006

1. D	6. D
2. C	7. B
3. B	8. A
4. A	9. C
5. C	10. D