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Factors Influencing Work Productivity and Intent to Stay in Nursing

EXECUTIVE SUMMARY

- ▶ The researchers document the individual and workplace characteristics associated with decreased work productivity and intent to stay in nursing for nurses employed in direct patient care in the hospital setting.
- ▶ Factors associated with decreased work productivity were age, total years worked as a RN, quality of care provided, job stress score, having had a job injury, and having a health problem.
- ▶ Nurse leaders must place additional efforts on changes needed to improve the hospital workplace environment to decrease job stress, improve RNs' ability to provide quality care, and to assure the health and safety of nurses.
- ▶ Reducing job stress and providing adequate staffing so quality of care can be provided will enhance job satisfaction which will also encourage RNs to stay at the bedside.
- ▶ Improved work environments may delay older RNs' retirement from the workforce.

THERE CONTINUES TO BE A shortage of registered nurses (RNs) with a possible predicted short fall of 36% by 2020 (U.S. Department of Health and Human Services [DHHS], 2006). Despite recent improvements in the hospital nursing shortage, the average hospital vacancy rate for RNs in the United States is 8.5% to 14% with vacancy rates of over 14% in medical-surgical and critical care areas (American Hospital Association [AHA], 2004, 2006). Much of the employment growth of RNs employed in hospitals has been in nurses over age 50 (Buerhaus, Auerbach, & Staiger, 2007). However, 49% of hospitals surveyed stated it was more difficult to recruit RNs in 2005 than it was in 2004 (AHA, 2006). Hospital nurse staffing is a concern because of the effects a shortage has on patient safety and quality of care (Buerhaus, Donelan, Ulrich, Norman, & Dittus, 2005; Ulrich, Buerhaus, Donelan, Norman, & Dittus, 2005).

An aging workforce has contributed to the nursing shortage in the United States. The average age of a practicing RN is currently 46.8 years (Health Resources and Services Administration [HRSA], 2004) and it is predicted that by 2010 over 40% of the RN workforce will be over age 50 (Norman et al., 2005). Inconsistent information has been reported on job sat-

isfaction in older versus younger nurses. Additionally, research is lacking on the capabilities, limitations, and needs of older workers, especially as they relate to the health and safety risks which may affect productivity and labor supply (Wegman & McGee, 2004).

While a shortage of practicing nurses is a significant issue, the work productivity of those nurses who remain at the bedside is just as important. Work productivity is not well understood and hospitals do not reliably report work productivity data, if they report it at all (O'Brien-Pallas, Meyer, & Thomson, 2004). Additionally, little is known about how workplace and individual characteristics affect productivity in nurses. Thus, the purpose of this study was to determine factors which influence the work productivity and intent to stay of hospital nurses employed in direct patient care in hospital settings.

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Background

Recurrent nursing shortages have resulted in numerous studies of nurse retention and intent to stay. Nursing retention is directly associated with job satisfaction and workplace variables (Coomber & Barriball, 2007; Ulrich et al., 2005). Nursing is inherently stressful. Job stress can adversely affect employee health and well-being as well as worker turnover (Greiner, Krause, Ragland, & Fisher, 2004; Hall, 2004). According to one estimate, because of job stress, one in five nurses plan to leave the profession within the next 5 years, and almost 50% often think about leaving (Federation of Nurses and Health Professionals, 2001). Job stress is felt more severely by nurses employed in the hospital setting than in nurses employed outside of hospital settings (Sveinsdottir, Biering, & Ramel, 2006). The effect of job stress on the health of nurses is under-appreciated, and little research has been conducted on the effects of workplace stress on nurse turnover (McNeely, 2005).

Research has been conducted on perceived work ability in nurses. Fischer et al. (2007) conducted a descriptive study of factors impacting work ability among 696 nursing personnel (RNs and nurse aides) employed at a hospital in Brazil. Factors associated with decreased work ability included high home responsibilities (sole breadwinner, financial concerns, and raising children), poor working conditions (heat, poor work organization, and verbal abuse), and health concerns (high body mass index, sleep problems, and fatigue). Of note, in this study RNs were not separated as a group and 78% of the respondents were nurse aides. Camerino and colleagues (2006) conducted a cross-sectional study of 25,976 nurses in 10 European countries. While there were differing socio-demographic characteristics in nurses across countries, most of the respondents were employed in

hospitals. Study findings demonstrated lower perceived work ability among older nurses. Importantly, a significant relationship was found between low perceived work ability and intent to stay in nursing, especially among younger nurses. AbuAlRub (2004) investigated the relationship between job stress and perceived job performance in an international sample of 303 nurses surveyed via the Internet. Respondents were all employed at the bedside in hospital nursing. Findings demonstrated that nurses with higher job stress had lower perceived job performance.

Most research on job productivity relates to absenteeism or perceived work ability and performance. However, productivity should include absenteeism, presenteeism (work effectiveness), work productivity loss (altered workload), and activity impairment (Reilly, 2005). Little is known about how specific workplace and individual variables, including worker health, impacts productivity in nurses when considering these factors. Thus, in this study, work productivity was examined by measuring other attributes of productivity, such as work effectiveness, altered workload, and activity impairment as determined by individual and workplace characteristics of RNs employed in direct patient care.

The Study

The purpose of this study was to determine the relationships between individual characteristics (demographic variables as well as years worked in nursing and body mass index), workplace characteristics (to include hours worked, shifts worked, and unit type), job stress, and health (perceived overall health as well as health problems and job-related injuries) to work productivity and intent to stay in nursing among RNs employed in direct patient care in the hospital setting.

A cross-sectional survey de-

sign was conducted. Data were collected by questionnaire between October 2005 and May 2006. Three hospitals in a southern U.S. state were selected to recruit RNs employed at the bedside. One hospital was a 1,000-bed tertiary care medical center which employed approximately 1,700 RNs. The other two hospitals were community-based hospitals, each with approximately 200 beds and 400 RNs. RNs employed in direct patient care at the selected hospitals ranged from 82% to 86%. Fully completed questionnaires were received from 187 RNs at the largest hospital (13% response rate), 136 from the second hospital (39% response rate), and 100 from the third hospital (31% response rate). The total number of participants was 323 RNs.

Data Collection

Packets, which included an introductory letter asking RNs to participate as well as the five-page questionnaire, were placed in the mail folders of all RNs who practiced at the bedside in each of the three participating hospitals. A sealed box was placed on each unit for surveys to be returned and a member of the research team collected surveys weekly. Email reminders to participate were sent at 2 weeks and 4 weeks after questionnaires were delivered.

Measurement Instruments and Study Variables

The survey instrument was refined from a previous study by the investigator and a review of the literature. Individual characteristics included age, sex, ethnicity/race, marital status, the total number of years worked as a RN, and height and weight which were converted to a body mass index score. Workplace characteristics included employment status at the hospital (full time or part time/per diem), facility, type of unit (by medical specialty), average number of hours worked (per day and per week), average num-

ber of patients cared for, perceived quality of care provided (measured on a five-point Likert scale), and inability to meet patient care needs (recorded as a percentage of time). Overall job satisfaction was measured on a four-point Likert scale. The Health Professions Stress Inventory (HPSI) (Wolfgang, 1988), which has been used to measure job stress in pharmacists and RNs, was used to measure job stress. The HPSI consists of 30 five-point Likert-style questions pertaining to stressful job situations. Each of the 30 five-point Likert-scale items is scored from 0 to 4, producing a possible total job stress score range of 0 (no stress) to 120 (highest stress). Studies utilizing the HPSI to measure job stress in RNs have reported Cronbach's alpha coefficients of 0.85 and 0.90 (Erlen & Sereika, 1997; Fletcher, 2001). Job-related injuries were measured by a dichotomous variable asking whether the RN has had any job-related injuries in the past 2 years (yes/no). Data on specific injuries were also obtained by determining the number of participants who checked each box in a list of specific job-related injuries. Other injuries that were not on the list were also solicited as an open ended-question. The injuries listed were determined by the U.S. Department of Labor's (2002) list of major occupational injuries experienced by RNs. Health problems were measured by a dichotomous variable (yes/no). For descriptive purposes, we determined the proportion of RNs who had been diagnosed with each of a list of specific health disorders described by the U.S. Department of Labor, Centers for Disease Control, and National Institute for Occupational Safety and Health as risk factors for job-related injuries and job-related health problems. An "other" open-ended item was also given for respondents to list health problems not on the list. A five-item global rating scale (excellent to poor) was used to

measure the RNs' perceptions of their overall health.

Work productivity was measured by the Work Productivity and Activity Impairment Questionnaire: General Health (WPAI-GH). The WPAI-GH comprises absenteeism (the number of days missed from the workplace in the last 7 days), presenteeism (working when sick or not feeling well), work productivity loss (altered workload), and activity impairment (work missed in the last 7 days due to health problems). The scores of the tool are expressed in impairment percentages with higher numbers reflecting decreased productivity. The WPAI-GH is useful for research on workplace productivity and co-varies well with a variety of symptoms of ill health (Loeppke et al., 2003). The WPAI-GH was chosen because other tools that measure work productivity do not include both absenteeism and presenteeism. Finally, intent to stay in nursing was measured by using a 5-point Likert scale asking how likely the participant plans on staying employed for the next 5 years in hospital nursing. This measure has been used in other large scale studies on RNs' intent to stay on the job (Alexander, Lichtenstein, Oh, & Ullman, 1998; Boyle, Bott, Hansen, Woods, & Taunton, 1999; Ingersoll, Olsan, Drew-Cates, DeVinney, & Davies, 2002).

Ethical Concerns

Human subjects approval was granted from the three participating hospitals as well as the research team's university. Participants' names were not solicited and respondents were assured that all data were treated in confidence and that data between hospitals and units would be aggregated to assure further confidentiality of responses.

Data Analysis

Questionnaire data were analyzed using SPSS 13.0 statistical analysis package. The sample size

was large enough: using NQuery Advisor an estimate of the regression parameters using a 95% confidence interval for each variable was done to estimate the effect on the dependent variables (work productivity and intent to stay).

Results

Correlations and tests of association by location found differences only in ethnicity (a larger number of minority nurses) and longer hours worked per day in the large, tertiary care hospital. The majority of respondents were female (91.6%), Caucasian (81.4%), and married (68.8%). The mean age was 40.15 years (range 22-71, SD=10.9) and they worked a mean of 12.29 years in nursing (range 4 months to 50 years, SD=10.2). The mean BMI was 26.1.

An analysis of workplace characteristics found most nurses worked full time (87%), averaging 12.41 hours per day on a 12-hour day (57.9%) or 12-hour night shift (27.6%). The mean number of patients cared for was 4.5 (range 1-12, SD=1.95) on a medical-surgical unit (47.4%), intensive care unit (16%), maternity or pediatrics unit (6%), the operating or recovery room (2.8%), or psychiatric units (2.8%). The respondents were unable to meet the needs of their patients 12.7% of the time (range 0-85%) and the care provided was excellent (22%), very good (51%), good (21.7%), and fair (4.3%) with no respondents reporting poor care. Most respondents were satisfied with their jobs, with 29% highly satisfied, 64% generally satisfied, and only 7% dissatisfied.

In terms of health, on a scale of 1 to 8 (with 1 being the poorest health), RNs reported an average health score of 5.72 (range 1-8, SD=1.43); 22.4% reported having a health problem and 24.8% had experienced a job-related injury in the past 2 years. Of those with a reported health problem, the most frequently reported were headaches (23.8%), back pain (21.4%),

Table 1.
Linear Regression Analysis Work Productivity

Predictor	S Beta	t	Significance
Age	-0.202	-2.445	0.15
Total years as RN	0.188	2.194	0.029
Quality of care	-0.172	-2.676	0.008
Job stress score	0.151	2.430	0.016
Job injury	-0.172	-3.009	0.003
Health problem	-0.323	-5.966	0.000

joint pain (16.7%), anxiety (15.8%), stomach problems (14.9%), hypertension (13.9%), depression (12.4%), and insomnia (12.1%). Of those with job injuries, the most frequently reported were musculoskeletal injuries (23.2%), bruises (12.4%), needlesticks (12.4%), or a biohazard exposure (6.4%). Of interest, 12.1% of RNs worry about having a job injury often and an additional 63.2% worry occasionally.

On a scale of 0 to 120 the mean job stress score was 47.9 (range 16-85, SD=14.9). Of note, higher job stress scores were significantly associated with sex (being female), hours worked per day (the greater the hours worked the higher the stress score), working the day shift, being worried about an injury, and being unable to meet patient needs.

In terms of work productivity, the mean work activity impairment measured by the WPAI-GH was 12.71% (range 0-90%, SD=18.56). Linear regression analysis determined predictor variables explained 26.8% of the variance ($F=16.73$, $p<0.001$). Significant variables included age, total years worked as a RN, quality of care provided, job stress score, having had a job injury, and having a health problem (see Table 1).

The analysis of intent to stay in hospital nursing determined that 60% of participants plan on staying in nursing over the next 5 years, 25% were unsure, and 15% plan on leaving. Predictor vari-

ables explained only 9% of the variance ($p<0.001$) and included age (0.214), total years worked in nursing (0.204), quality of care provided (-0.142), and job satisfaction (-0.138). The most frequently reported reason for leaving nursing for those who intended to leave was job stress (28.4%) and retirement (16.3%).

Discussion

In this study the individual and workplace characteristics associated with decreased work productivity and intent to stay in nursing for nurses employed in direct patient care in the hospital setting are documented. The RNs in this study were mostly working 12-hour day or night shifts. This is concerning, as research shows that 28% of bedside nurses report working longer than 12 hours per day (Trinkoff, Geiger-Brown, Brady, Lipscomb, & Muntaner, 2006). A synthesis of the literature demonstrated that long hours contribute to illness and work absence (Michie & Williams, 2003) as well as an increase in nurse errors (Rogers, Hwang, Scott, Aiken, & Dinges, 2004).

More than half (58%) of the nurse respondents were overweight. This percentage is lower than the national average of 66% of adults being overweight in the United States (Ogden et al., 2006). However, while research has found that excess weight is associated with decreased productivity in U.S. workers (Ricci & Chee,

2005), BMI was not associated with decreased work productivity or intent to stay in nursing in this study.

Interestingly, despite RN participants' reporting an inability to meet patient care needs (mean 12.7% of the time) and moderate job stress, most were still satisfied with their jobs (93%). While this supports claims by the DHHS (2004) that 78% of RNs are satisfied in their positions, it refutes research by Aiken, Clarke, Sloane, Sochalski, and Silber (2002), Lacey and Shaver (2002), and Press Ganey (2006) which report nurses as dissatisfied with their jobs. In this study, job satisfaction was not associated with work productivity or intent to stay in nursing when accounting for other demographic and work situation variables.

To our knowledge, this is the first study to measure work productivity in RNs at the bedside as an expression of work impairment. The percentage of work impairment was determined by assessing absenteeism, presenteeism, work productivity loss, and activity impairment. Factors associated with decreased work productivity were age, total years worked as a RN, quality of care provided, job stress score, having had a job injury, and having a health problem. Of note, the RNs in this study were younger than the national average in the United States (40.2 years vs. 46.8 years). It is known that aging may change the human resources for work (Ilmarinen, 2003) and is associated with progressive decline in aerobic power, reaction speeds, and acuity of senses (Shephard, 2000). Research conducted with workers other than nurses found reductions in workforce production in those over age 50, and reductions were especially strong for work tasks where problem solving, learning, and speed are needed (Skirbekk, 2003). However, jobs where personal experience and verbal abilities are needed demon-

strate continued high productivity levels. Nursing requires problem-solving skills and continued learning; however, research is needed on how experience buffers declines in cognitive abilities, physical strength, and endurance.

Years worked as a RN was associated with a decline in work productivity. While there was a direct correlation between age and years worked as a nurse, it must be noted that RNs are older when entering the profession in the United States. In 2004, only 8% of the RN population was under the age of 30, a decrease from 9% in 2000 and 25.1% in 1980 (HRSA, 2004).

The inability to provide quality of care was also associated with work productivity. In this study, RNs reported they were unable to meet the needs of their patients on average 12.7% of the time. This finding supports research conducted in Finland which found that an increase of 15% in workload increased sickness absence in nurses, and a 30% increase in workload resulted in 12 extra sick days per nurse per year (Rauhala et al., 2007). Improved staffing would assist RNs, as research has shown quality of care is improved when staffing is adequate (Tourangeau, Cranley, & Jeffs, 2006). An aging workforce, combined with a deepening nursing shortage, creates great concern that workload may continue to increase for those nurses at the bedside. Older RNs are increasingly reporting they are unable to manage hospital workloads (O'Brien-Pallas, Duffield, & Alksnis, 2004). Older nurses, who are often the most experienced, may leave hospital employment entirely. Nurse leaders must work to create new assignments and job roles for experienced older nurses who are unable to meet the demands of bedside nursing.

Findings from this study support research that high levels of job stress contribute to a decrease in perceived worker productivity (AbuAlRub, 2004; Weyers, Peter,

Boggild, Jeppesen, & Siegrist, 2006). Additionally, older workers may be more susceptible to the effects of job stress (Schnall, Landsbergis, & Baker, 1994). Increasing acuity of hospitalized patients and staffing shortages make it unlikely that job stress will decrease for RNs at the bedside. Research is needed on interventions that decrease job stress and enhance coping in RNs. While bedside nursing is inherently stressful, hospital executives and nurse managers must provide resources for the early recognition of job stress and opportunities for enhanced social and organizational support for all RNs employed at the bedside.

Finally, having a health problem or job injury was associated with work productivity. In this study, almost one in four RNs with a health problem reported back pain. In a national sample of U.S. workers, over 70% who experienced back pain reported lost productive time (absenteeism and presenteeism) (Ricci et al., 2006). Additionally, in this study, one in four nurses experienced a work injury within the last 2 years. Research of hospital nurses conducted by Stone, Du, and Gershon (2007) also found occupational injury was associated with lost work days. In the United States, hospitals rank in the top five industries generating job-related injuries and illnesses (Institute of Medicine, 2003; Leigh, Yasmeen, and Miller, 2003), and they are third in total costs for injuries and illnesses (Leigh, Waehrer, Miller, & Keenan, 2004). RNs now rank sixth in occupations at risk for occupational injury (Centers for Disease Control, 2002; U.S. Department of Labor, 2002). While strides have been made to decrease injury, such as the creation of lift-free policies and improved lifting equipment, additional efforts are clearly needed to protect RNs from occupational injury and resulting health problems. Nurse managers must continually assess

hazards within their work environments as well as provide needed support for those nurses who have been injured.

Health problems were also associated with work productivity. In addition to back and joint pain, nurses in this study reported depression and anxiety as health issues. Research on the effects of depression in RNs is lacking. However, research demonstrated that two-thirds of those with depression do not seek treatment, and those who come to work may be impaired physically, mentally, or emotionally which may impact their safety as well as the safety of patients (Jacob, 2006). Additionally, it is felt that while depression and anxiety may be the most common disorders in the working population, these illnesses may result in more presenteeism (decreased productivity) than absenteeism (Sanderson & Andrews, 2006). RNs must be provided screening for mental health conditions and early intervention must be available if we are to assure RN health and work productivity.

Predictor variables explained only a small amount (9%) of the variance for intent to stay in nursing. It is not surprising that those who are older and have spent more years in nursing are more likely to leave the workforce. However, while 16% of those planning to leave nursing reported retirement as the reason, 28% reported job stress as the reason. Inability to provide quality of care and poor job satisfaction also was associated with a lack of intent to stay in nursing. Nurse leaders must advocate for needed changes in the work environment which will allow for decreased job stress, improved ability to provide quality care, and enhanced job satisfaction if we are to retain RNs at the bedside.

Study Limitations

The cross-sectional design used for this study does not allow for the establishment of causal relationships. Limitations of this

study also include a low response rate, especially from the large tertiary hospital. However, incentives were not provided for participating and low response rates are typical for surveys conducted in workplace settings. Additionally, self-report measurements may be limiting; however, the researchers assume respondents were honest and open with their reporting, especially concerning job injuries and health problems.

Conclusion

A deepening nursing shortage combined with an aging RN workforce dictates that urgent efforts be made to address nursing retention as well as the productivity of those nurses who work at the bedside. This study documents the specific individual and workplace characteristics that may influence productivity and intent to stay in nursing for RNs employed in direct care nursing. Nurse leaders must place additional efforts on changes needed to improve the hospital workplace environment to decrease job stress, improve RNs' ability to provide quality care, and assure the health and safety of nurses. Reducing job stress and providing adequate staffing so quality of care can be provided will enhance job satisfaction which will also encourage RNs to stay at the bedside. Improved work environments may delay older RNs' retirement from the workforce. To assure quality of care for hospitalized patients an adequate and productive workforce is critical. \$

REFERENCES

AbuAlRub, R.F. (2004). Job stress, job performance, and social support among hospital nurses. *Journal of Nursing Scholarship, 36*, 73-78.

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 [Electronic version]. *Journal of the American Medical Association, 288*(16), 1987-1993.

Alexander, J., Lichtenstein, R.L., Oh, H.J., &

Ullman, E. (1998). A causal model of voluntary turnover among nursing personnel in long-term care psychiatric settings. *Research in Nursing and Health, 21*, 415-427.

American Hospital Association (AHA). (2004). *Status of the workforce*. Retrieved February 24, 2007, from <http://www.aha.org>

American Hospital Association (AHA). (2006). *AHA 2006 survey of hospital of hospital leaders*. Retrieved March 14, 2007, from <http://www.aha.org/aha/content/2006/PowerPoint/StateHospitalsChartPack2006>

Boyle, D.K., Bott, M.J., & Hansen, H.E., Woods, C.Q., & Taunton, R.L. (1999). Managers' leadership and critical care nurses' intent to stay. *American Journal of Critical Care, 8*(6), 361-371.

Buerhaus, P.L., Donelan, K., & Ulrich, B.T., Norman, L., & Dittus, R. (2005). Is the shortage of hospital registered nurses getting better or worse? Findings from two recent national survey of RNs. *Nursing Economics, 23*(2), 61-96.

Buerhaus, P.L., Auerbach, D.I., & Staiger, D.O. (2007). Recent trends in the registered nurse labor market in the U.S.: Short-run swings on top of long-term trends. *Nursing Economics, 25*(2), 59-66.

Camerino, D., Conway, P.M., Van der Heijden, B.I.J.M., Estryn-Behar, E., Consonni, D., Gould, D., et al. (2006). Low-perceived work ability, ageing and intention to leave nursing: A comparison among 10 European countries. *Journal of Advanced Nursing, 56*(6), 542-552.

Centers for Disease Control, National Institute of Occupational Safety and Health. (2002). *Staffing shortages and quality of care*. Retrieved March 20, 2007, from <http://www.cdc.gov/niosh>

Coomber, B., & Barriball, K.L. (2007). Impact of job satisfaction components on intent to leave and turnover for hospital-based nurses: A review of the research literature. *International Journal of Nursing Studies, 44*(2), 297-314.

Erlen, J.A., & Sereika, S.M. (1997). Critical care nurses, ethical decision making and stress. *Journal of Advanced Nursing, 26*, 953-961.

Federation of Nurses and Health Professionals. (2001). *Survey: Nurse shortage will be worse than current estimates*. Retrieved February 15, 2007, from <http://www.nysut.org/fnhp/reports.html>

Fischer, F.M., Da Silva Borges, F.N., Rotenberg, L., Latorre, M.R., Soares, N.S., & Rosa, P.L. (2007). Work ability of health care shift workers: What matters? *Chronobiology International, 23*(6), 1165-1169.

Fletcher, J. (2001). Hospital RN's job satisfactions and dissatisfactions. *Journal of Nursing Administration, 31*, 324-331.

Greiner, B.A., Krause, N., Ragland, D., &

Fisher, J.M. (2004). Occupational stressors and hypertension: A multi-method study using observer-based job analysis and self-reports in urban transit operators. *Social Science and Medicine, 59*, 1081-1094.

Hall, D. (2004). Work related stress of registered nurses in hospital settings. *Journal for Nurses in Staff Development, 2*(1), 6-14.

Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services. (2004). *Projected supply, demand, and shortages of registered nurses: 2000-2020*. Retrieved March 29, 2007, from <http://bhpr.hrsa.gov/healthworkforce/reports/rnproject/report.htm>

Ilmarinen, J.E. (2003). Aging workers. *Occupational and Environmental Medicine, 58*(8), 546-552.

Ingersoll, G.L., Olsan, R., Drew-Cates, J., DeVinney, B.C., & Davies, J. (2002). Nurses' job satisfaction, organizational commitment, and career intent. *Journal of Nursing Administration, 32*(5), 250-263.

Institute of Medicine. (2003). *Keeping patients safe: Transforming the work environment of nurses*. Washington, DC: National Academy Press.

Jacob, I.G. (2006). Depression's impact on safety. *Occupational Health and Safety, 75*(10), 32-40.

Lacey, L.M., & Shaver, K. (2002). *Nursing workforce planning regions. North Carolina trends in nursing: 1982-2000*. Raleigh, NC: The North Carolina Center for Nursing.

Leigh, J.P., Waehrer, G., Miller, T.R., & Keenan, C. (2004). Costs of occupational injury and illness across industries. *Scandinavian Journal of Work Environment and Health, 30*(3), 199-205.

Leigh, J.P., Yasmeen, S., & Miller, T.R. (2003). Medical costs of fourteen occupational illnesses in the U.S., 1999. *Scandinavian Journal of Work Environment and Health, 29*(4), 304-313.

Loeppke, R., Hymel, P.A., Lofland, J.H., Pizzi, L.T., Konicki, D.L., Anstadt, G.W., et al. (2003). Health-related workplace productivity measurement: General and migraine-specific recommendations from the ACOEM Expert Panel. *Journal of Occupational and Environmental Medicine, 45*, 349-359.

McNeely, E. (2005). Consequences of job stress for nurses' health: Time for a check up. *Nursing Outlook, 53*(6), 291-299.

Michie, S., & Williams, S. (2003). Reducing work related psychological ill health and sickness absence: A systematic literature review. *Occupational and Environmental Medicine, 60*, 3-9.

Norman, L.D., Donelan, K., Buerhaus, P.L., Willis, G., Williams, M., Ulrich, B., et al. (2005). The older nurse in the work-

- place: Does age matter? *Nursing Economic\$, 23*(6), 282-289.
- O'Brien-Pallas, L., Duffield, C., & Alksnis, C. (2004). Who will be there to nurse? Retention of nurses nearing retirement. *Journal of Nursing Administration, 34*(6), 298-302.
- O'Brien-Pallas, L., Meyer, R., & Thomson, D. (2004). Workload and productivity. In L. McGillis Hall (Ed.), *Quality work environments for nurse and patient safety* (pp. 9-38). Sudbury, MA: Jones and Bartlett.
- Ogden, C.L., Carroll, M.D., Curtin, L.R., McDowell, M.A., Tabak, C.J., & Flegal, K.M. (2006). Prevalence of overweight and obesity in the United States, 1999-2004. *Journal of the American Medical Association, 295*(13), 1549-1555.
- Press Ganey. (2006). *The loyalty connection – patient loyalty starts with employees*. Retrieved March 15, 2007, from <http://www.pressganey.com>
- Reilly, M. (2005). *Health outcomes research*. Retrieved March 25, 2007, from <http://reillyassociates.net>
- Ricci, J.A., & Chee, E. (2005). Lost productive time associated with excess weight in the U.S. workforce. *Journal of Occupational and Environmental Medicine, 47*(12), 1227-1234.
- Ricci, J.A., Stewart, W.F., Chee, E., Leotta, C., Foley, K., & Hochberg, M.C. (2006). Back pain exacerbations and lost productive time costs in United States workers. *Spine, 31*(26), 3052-3060.
- Rogers, A., 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), 202-208.
- Rauhala, A., Kivimaki, M., Fagerstrom, L., Elovainio, M., Virtanen, M., Vahtera, J., et al. (2007). What degree of workload is likely to cause increased sickness absenteeism among nurses? Evidence from the RAFAELA patient classification system. *Journal of Advanced Nursing, 57*(3), 286-295.
- Sanderson, K., & Andrews, G. (2006). Common mental disorders in the workforce: Recent findings from descriptive and social epidemiology. *Canadian Journal of Psychiatry, 51*(2), 63-74.
- Schnall, P.L., Landsbergis, P.A., & Baker, D. (1994). Job strain and cardiovascular disease. *Annual Review of Public Health, 15*, 381-411.
- Shephard, R.J. (2000). Aging and productivity: Some physiological issues. *International Journal of Industrial Ergonomics, 25*, 535-545.
- Skirbekk, G. (August, 2003). *Age and individual productivity: A literature survey*. Retrieved March 31, 2007, from <http://www.demogr.mpg.de/papers/working/wp-2003-028.pdf>
- Stone, P.W., Du, Y., & Gershon, R.R.M. (2007) Organizational climate and occupational health outcomes in hospital nurses. *Journal of Occupational and Environmental Health, 49*, 50-58.
- Sveinsdottir, H., Biering, P., & Ramel, A. (2006). Occupational stress, job satisfaction, and working environment among Icelandic nurses: A cross-sectional questionnaire survey. *International Journal of Nursing Studies, 43*(7), 875-879.
- Tourangeau, A.E., Cranley, L.A., & Jeffs, L. (2006). Impact of nursing on hospital patient mortality: A focused review and related policy implications. *Quality and Safety in Health Care, 15*, 4-8.
- 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* (4), 60-71.
- Ulrich, B., Buerhaus, P., & Donelan, K., Norman, L., & Dittus, R. (2005). How RNs view the work environment: Results of a national survey of registered nurses. *Journal of Nursing Administration, 35*(9), 389-396.
- U.S. Department of Health and Human Services (DHHS). (2004). *The registered nurse population: National sample survey of registered nurses* [Brochure]. Retrieved March 25, 2007, from <http://www.hrsa.gov>
- U.S. Department of Health and Human Services (DHHS). (2006). *What is behind HRSA's projected supply, demand, and shortage of registered nurses?* Retrieved May 10, 2007, from <http://bhpr.hrsa.gov/healthworkforce/reports/behindrnprojections/behindshortage.htm>
- U.S. Department of Labor, Bureau of Labor Statistics. (2002). *Injuries, illnesses and fatalities*. Retrieved March 5, 2007, from <http://www.bls.gov>
- Wegman, D.H., & McGee, J.P. (2004). *Institute of Medicine committee on the adequacy of nurse staffing in hospitals and nursing homes*. Washington, DC: The National Academies Press.
- Weyers, S., Peter, R., Boggild, H., Jeppesen, H.J., & Siegrist, J. (2006). Psychosocial work stress is associated with poor self rated health in Danish nurses: A test of the effort-reward imbalance model. *Scandinavian Journal of Caring Science, 20*(1), 26-34.
- Wolfgang, AP. (1988). The health professions stress inventory. *Psychological Reports, 62*, 220-222.

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