MAGNET STATUS: IMPLICATIONS FOR QUALITY OF PATIENT CARE

Kelly Scott, BSN

Submitted to the School of Nursing in partial fulfillment of the requirements for the Nursing Honors Program

Faculty Mentor: Nancy Dunton, PhD

University of Kansas School of Nursing

ABSTRACT

Research has shown that hospital structure, e.g. nursing characteristics, affects patient outcomes. Nursing characteristics have been shown to be better in Magnet® hospitals. Previous studies have found that nursing workforce characteristics such as nurse-to-patient ratio, job satisfaction, and skill mix correlate with lower incidence of nosocomial infection and higher nurse-reported and patient-reported quality of care. Little research has been done, however, on the correlation between Magnet status and patient outcomes. The purpose of this study was to determine if patients have fewer nosocomial infections in Magnet hospitals than non-Magnet hospitals. The Donabedian structure-processes-outcomes model for assessing quality of health care was the underlying conceptual framework for the study. The study design employed a descriptive correlational design. Over 500 critical care units from hospitals participating in the National Database of Nursing Quality Indicators® contributed data for the analysis. T-tests indicated that there was a higher number of total nursing hours per patient day (TNHPPD), percentage of RNs with a bachelor's degree, and higher job satisfaction scores, on critical care units in Magnet accredited facilities than those without Magnet status ($p < 0.001$). The mean rates of three types of nosocomial infections were similar for Magnet and non-Magnet hospitals, and no significant correlations were found between these workforce characteristics and patient outcomes. The analysis conducted for this study did not support the hypothesis that Magnet hospitals would have lower nosocomial infection rates because they have superior nursing workforce attributes. Further research is indicated to determine why the workforce characteristics that contribute to Magnet accreditation do not lead to a higher quality of care, and to find what factors do determine higher quality of patient care.

INTRODUCTION

Quality of patient care in hospitals is a topic of concern as we debate the organization of the healthcare system and the economics of healthcare. How can hospitals provide the best care for the best value? Hospital-acquired infections are an indication of a quality concern and an avoidable cost to hospitals. Because they are reasonably preventable, the Centers for Medicare and Medicaid services (CMS) hospitals no longer receive Medicare reimbursement for costs incurred because of these hospital-acquired infections (Centers for Medicare and Medicaid Services, 2008). Aside from the obvious economic value in preventing infections, patients have the right to expect the highest possible quality of care (American Hospital Association, 2003). It is the hospital's responsibility to determine the factors that influence patient outcomes and develop plans to improve outcomes, in this instance, avoidable infections.

The quality of nursing care has been found to be instrumental in preventing patient falls, pressure ulcers, ventilator-assisted pneumonia (VAP), central line associated blood stream infection (CLABSI), and catheter associated urinary tract infections (CAUTI) (Hugonnet, Harbarth, Sax, Duncan, & Pittet, 2004; Whitman, Kim, Davidson, Wolf, & Wang, 2002). Several studies have shown associations between hospital nurse staffing characteristics, e.g. nurse-to-patient ratio, nursing hours per patient day, RN educational level, and job satisfaction, and individual patient outcomes and nurse-reported quality of patient care (Aiken, Clarke, Cheung, Sloan, & Silber, 2003; Hugonnet et al, 2004, Aiken, Havens, & Sloane, 2000; Whitman et al, 2002). In the interest of providing the highest quality of care while keeping healthcare costs reasonable, administrators need to consider what measures can be taken to improve nursing workforce characteristics that contribute to the prevention of hospital-acquired infections. Studies by Aiken et al (1999, 2000) have shown that nursing workforce attributes are higher in Magnet hospitals.

Magnet accreditation is awarded by the American Nurses Credentialing Center (ANCC) to hospitals that achieve excellence in nursing. The Magnet model was designed to recognize hospitals that provide a supportive working environment for nurses and seek to develop and implement best practices in nursing care. The Magnet program "requires hospitals to demonstrate nursing excellence in patient, nurse, and organizational results" (ANCC, 2010). According to the ANCC website (2010), the Magnet Model includes five areas of focus:

- Transformational Leadership: strong nurse leaders have the vision, knowledge, and influence to guide their team to where it needs to go, not just where it wants to go.
- Structural Empowerment: strong nurse leaders create an environment where the hospital's mission and vision come to life, and all nurses are encouraged to achieve desired results.
- Exemplary Professional Practice: nurses practice, work together, communicate, and develop professionally to achieve the highest quality of care for patients and the community.
- New Knowledge, Innovations & Improvements: nurses take the lead in research efforts, and have an ethical and professional responsibility to contribute new findings, evidence, and quality improvement to the nursing profession.
- Empirical Outcomes: strong nursing structures and processes are in place to achieve good outcomes, but nurses go further to show results and the impact of those results. Empirical outcomes move beyond what nurses do and how they do it to focus on: "What difference have you made?"

To date 367 hospitals have been recognized as Magnet institutions. According to the ANCC, organizations must meet several eligibility requirements in order to apply for Magnet recognition. The organization must have a Chief Nursing Officer who has a Master's degree and is responsible for maintaining nursing standards of practice. Administrators must implement the *American Nurses Association's Scope and Standards for Nurse Administrators*. The organization must have in place a

method for nurses to provide feedback without fear of retribution. A method must be in place to collect data on nurse-sensitive quality indicators at the unit level. Among other requirements, these factors are designed to ensure excellence in nursing care. (ANCC, 2010).

LITERATURE REVIEW

Aikens, Havens, and Sloane (2000) compared nursing characteristics and patient outcomes in the original American Academy of Nursing (AAN) magnet hospitals and ANCC Magnet hospitals. According to this study, the RN staff on medical-surgical units in both types of Magnet hospitals were more likely to have bachelor's degrees than RNs in non-magnet hospitals (50% in Magnet hospitals vs. 34% in non-magnet hospitals, $p < 0.001$). ANCC Magnet hospitals also had a higher RN-to-patient ratio than AAN magnet hospitals (ANCC Magnet 190:100, Original Magnet 128:100, non-magnet 109:100). Furthermore, Aikens, Havens, and Sloan (2000) utilized the Nursing Work Index (NWI-R) to determine that RNs at ANCC facilities were more likely than nurses in the original Magnet hospitals to report having greater autonomy (average score 3.01 vs. 2.86, $p < 0.001$), more control over the practice setting (average score 2.95 vs. 2.65, $p < 0.001$), and better relations with physicians (average score 3.03 vs. 2.98, $p < 0.10$). Burnout was measured by the Maslach Burnout Inventory, and nurses in ANCC hospitals were less likely to report feeling burned out than nurses in the AAN hospitals (16% vs. 28%, $p < 0.001$). ANCC nurses also reported a higher quality of patient care than those in the AAN hospitals (43% rated quality of care as "excellent" vs. 21%). Aikens, Havens, and Sloane (2000) compared this with a national convenience sample of nurse-reported quality of patient care in non-magnet facilities in which only 10% of nurses rated quality of care as "excellent." If the goals of Magnet hospitals include providing supportive working environments for nurses and providing quality care for patients using best evidence-based practice, then research should examine indicators of both, e.g. job satisfaction and rates of nosocomial infection.

A systematic review of literature by Hugonnet, Harbarth, Sax, Duncan, and Pittet (2004) found several research studies that correlate nurse staffing data and nursing staff demographics, with patient outcomes. A study by Needleman et al (2002) using data from 799 hospitals across 11 states, and a study by Unruh et al. (2003) of 211 hospitals per year for seven years, found that an increase in the number of RNs was associated with a decrease in urinary tract infections and pneumonia. Cho et al (2003) also found that an increase in the proportion of RNs was associated with a 9.5% decrease in the chance for pneumonia infections, and that an increase in nursing hours per patient day was associated with a 8.9% decrease in the chance of pneumonia infection. Both Alonso-Echanove et al (2003) and Roberts et al (2000) found that patients on critical care units were more likely to develop central line blood stream infections when the majority of their care was performed by nurses from the float pool. Fridkin et al (1996) found in a retrospective case-control and a cohort study that nurse-to-patient ratios decreased just before outbreaks of central line blood stream infections.

A systematic review of the literature by Lankshear, Sheldon, and Maynard (2005) covers 61 studies conducted in the 1990s on the association between nurse staffing and patient outcomes in acute care settings. Due to the heterogeneity of the data, the authors chose to perform a qualitative synthesis of the data, rather than a meta-analysis. The authors summarized the data into tables and included summaries of the studies determined to be of the highest quality. Lankshear et al (2005) converted various measures of staffing data from each study into a common metric of hours per patient day, so the findings could be compared across the studies. Lankshear et al (2005) outlines a longitudinal study by Mark et al (2004) that found an association between increased RN staffing levels and a decrease in rates of pneumonia, urinary tract infections, decubitus ulcers, and mortality. The Lankshear et al review also cites a cross-sectional study by Aiken et al (1999) that found an inverse relationship between the number of RNs and 30-day mortality and failure-to-rescue rates. Further research by Aiken found that mortality rates are lower when a higher

proportion of nurses were educated at the baccalaureate level. Other cross-sectional studies cited by Lankshear et al (2005) found inverse relationships between nursing hours per patient day and percent of RNs on the nursing staff and rates of mortality and nosocomial infections. A common problem in data collection was that the data were collected hospital-wide, so specific relationships between the nursing staff and the patient population in question could not be determined; overall a hospital may have had more RNs, but they did not report specifically on the number of RNs working on a specific unit in which the nosocomial infections were reported. Some studies also did not differentiate between nurses in direct patient care roles and nurses involved in administration. The author further notes that only one study took the hospitals' organizational characteristics into account and that most studies did not include data on doctors. The author suggests that future research should be broad and experimental, and that it should attempt to determine exactly why nurse staffing and skill levels affect these outcomes.

An observational study by Stone et al (2007) focuses on the effects of working conditions on elderly patients. The study was designed based on the Donabedian theoretical framework of quality healthcare. The hypothesis was that elderly patients in ICUs would have better outcomes in organizations with comparatively better working conditions. Variables associated with working conditions were organizational climate, staffing, overtime hours, wages, profit margin of the institution, and Magnet status. Patient outcomes studied were central line associated bloodstream infections (CLSBI), ventilator associated pneumonia (VAP), catheter-associated urinary tract infections (CAUTI), decubitus ulcers, and 30-day mortality rates. Not enough data were obtained regarding 30-day mortality, so those data were not analyzed. Additionally, due to the infrequent employment of nurse aides and LPNs in ICUs, not enough data was obtained to analyze the effect of skill mix on patient outcomes. In organizations in which nurses perceived a positive organizational climate, researchers found an increased incidence of CLBSI but a decrease in CAUTI. The authors suggest this contradiction may be due to the fact that the medical staff, rather than the nursing staff,

insert central lines. An increased number of RN hours per patient day was associated with a decrease in all outcomes. An increase in overtime hours was associated with an increase in CAUTI and decubiti; a decrease in overtime was associated with a decrease in CLBSI. Magnet status and nurse wages were not found to be independently related to any of the outcomes measured. The sample size of the Stone study was limited and it did not take into account nurses who float. The author suggests that future studies include educational and experience level, a larger sample size, and should be longitudinal in nature. Further research should be conducted on the relationship between working conditions and patient outcomes.

A correlational study by Whitman, Yookyung, Davidson, Wolf, and Wang, (2002) examined the relationship between nurse staffing levels in terms of hours worked per patient day and central line infection rates, pressure ulcer rates, fall rates, restraint rates, and medication errors. The study attempted to determine relationships at a unit level, rather than a hospital level, because: (1) this data would be more useful to administrators in developing staffing plans, and (2) hospital-level data do not specify on which units or for which patients more staffing hours are needed. The study was a secondary statistical analysis of staffing hours and patient data from 95 units (cardiac intensive care, n = 15; noncardiac intensive care, n= 7; cardiac intermediate care, n = 18; noncardiac intermediate care, n = 12, and medical–surgical, n = 43) in 10 hospitals. Staffing hours were obtained from each hospital's finance department. Infection control staff for the hospital reported nosocomial infection data, which were entered into a central database that was managed by the school of nursing. Data were analyzed using SPSS 10.0, and summarized using means and standard deviations with 0.05 levels of significance.

The study found significant variance in patient outcomes among the units. With the exception of central line infection (CLI) rates, when relationships were found between nurse hours and patient outcomes, staffing and infection rates were inversely related, as would be expected. On the other

hand, CLI rates were found to increase with nurse hours worked. The author notes that other studies have found an inverse relationship between CLI and hours worked, and that methodological differences may account for the different results.

One limitation of this study is that because the hospitals in the study had no patient classification or acuity system, risk stratification could only be completed at the unit level, rather than the patient level (Whitman et al, 2002). Furthermore, infection rates may have been underreported or incorrectly assigned to a unit. The author suggests that further research is needed on the effect of staffing on disease-specific patient outcomes.

The above studies provide evidence that nursing workforce characteristics are associated with patient outcomes and that nursing workforce characteristics are better in Magnet hospitals. Aiken et al (2000) found that nurses in Magnet hospitals were more likely to report being satisfied with their jobs than nurses in non-Magnet hospitals. This study also found a higher nurse-to-patient ratio in Magnet hospitals. Other studies as outlined in the review by Hugonnet, Harbarth, Sax, Duncan, and Pittet (2004), found inverse relationships between nurse-to-patient ratio and patient outcomes. Furthermore, the studies by Lankshear et al (2005) and Stone et al (2007) found inverse relationships between other nursing workforce characteristics, such as total nursing hours per patient day and skill mix to be inversely related to patient outcomes. Given the body of literature providing evidence of an inverse relationship between nursing workforce attributes and patient outcomes, it was determined that further research was indicated regarding Magnet status and its potential effect on patient outcomes.

PURPOSE

A review of literature found only two studies (Aiken et al 2000 and Stone et al, 2007) that examined whether there is a direct link between Magnet accreditation and a reduction in specific adverse

patient outcomes. Based on the existing evidence that patient outcomes improve when nursing workforce characteristics improve, the following research question was addressed by this study: Do patients develop fewer hospital-acquired infections in Magnet hospitals than in non-Magnet hospitals? The theoretical framework for this study was the Donabedian structure-processes-outcomes model for assessing quality of health care.

METHODS

This was a descriptive correlational study utilizing data from over 500 critical care units from hospitals participating in the National Database of Nursing Quality Indicators®. The National Database of Nursing Quality Indicators (NDNQI) at the University of Kansas Medical Center collects data from hospitals across the country on nursing-sensitive outcomes as well as nursing staff characteristics including staff mix, nursing hours per patient day (NHPPD), RN education and certification, nurse turnover, and RN job satisfaction. A representative of each participating facility, known as a Site Coordinator, collects data from the hospital's risk management and staffing systems and reports this data to NDNQI each quarter. Site Coordinators are trained to collect data in accordance with NDNQI guidelines. Job satisfaction is measured by nurses' response to a job-enjoyment survey. It is reported in the form of a T-score in which 50 represents the midpoint and 10 is the standard deviation (NDNQI, 2010).

Statisticians at NDNQI retrieved data on the following quality indicators: ventilator-associated pneumonia (VAP) rates, catheter associated urinary tract infection (CAUTI) rates, and central line associated blood stream infection (CLABSI) rates. Data on VAP, CAUTI, and CLABSI rates were only available from critical care units. Data were also retrieved on the following types of unit characteristics: total nursing hours per patient day (TNHPPD), percentage of RNs with a bachelor's degree, job satisfaction, and percentage of nursing hours supplied by RNs. T-tests were performed using Excel software to determine if each of the patient outcomes and nursing workforce

characteristics were higher in Magnet hospitals than in non-Magnet hospitals; $p < 0.05$ was considered statistically significant. A Pearson correlation matrix was developed to look for correlations between the nursing workforce characteristics and the three outcomes.

RESULTS

The results of the t-tests are shown in table 1 below. The t-tests indicated that there was a significantly ($p < 0.05$) higher rate of total nursing hours per patient day (TNHPPD), percentage of RNs with a bachelor's degree, and higher job satisfaction scores, on critical care units in Magnet accredited facilities than those without Magnet status. The results of the Pearson Correlation Matrix are shown in tables 2 and 3 below. None of the hospital-acquired infections studied were found to be correlated with nursing workforce characteristics in either Magnet or non-Magnet hospitals.

Table 1 T-tests of nursing workforce characteristics

Nursing characteristic	Magnet mean estimate	Non-magnet mean estimate	p-value from t-test assuming equal variances	p-value from t-test assuming unequal variances	Conclusion on the difference in the means
TNHPPD	17.614	16.792	0.000	0.000	$p < 0.05$
% BSN	0.531	0.463	0.000	0.000	$p < 0.05$
Job Enjoyment Score	53.436	51.229	0.000	0.000	$p < 0.05$

Table 2 Pearson Correlation Matrix-Magnet

	VAP	CAUTI	CLABSI
TNHPPD	-0.0762	0.1081	-0.2039
% BSN	-0.0377	-0.0972	-0.0679
Job Enjoyment Score	0.1205	-0.1430	0.0377

Table 3 Pearson Correlation Matrix-Non-magnet

	VAP	CAUTI	CLABSI
TNHPPD	0.0391	-0.0392	-0.0511
% BSN	-0.0406	0.1014	-0.0853
Job Enjoyment Score	0.0056	-0.0230	0.0190

DISCUSSION

The Aiken et al study (2000) found that nursing workforce characteristics were significantly higher in ANCC Magnet hospitals than in AAN magnet or non-magnet hospitals. Aiken also found that patient satisfaction and nurse-reported quality of care were higher in ANCC Magnet hospitals. Many studies as discussed in the literature review above have found evidence that nursing workforce characteristics influence patient outcomes. Nursing hours worked, higher educational preparation, and job satisfaction, have all been correlated with lower rates of hospital-acquired infections and higher nurse-reported and patient-reported quality of care. Therefore, it is a logical hypothesis that Magnet hospitals would have lower rates of hospital-acquired infections than non-Magnet hospitals. Analysis of data from NDNQI did not support this assumption.

Contrary to Donbedian conceptual framework, better nursing workforce environments did not result in better patient outcomes in Magnet hospitals. The study did support research from previous studies that nursing work environments are better in Magnet hospitals. Nursing care is a complex process, and a more dynamic model of nursing workforce attributes and patient care processes may be needed to explain the relationships between the working environment, the processes, and patient outcomes. It is possible that it is not a linear relationship as suggested by the Donabedian framework.

This study provided further support to previous research that found better nursing work environments in Magnet hospitals. Due to the nursing shortage, it is important to provide a positive work environment to prevent burnout and reduce costly nurse turnover. Nursing administrators should take this into consideration when making the decision to apply for Magnet accreditation.

Limitations

- NDNQI not a random sample of hospitals, although it is one of the largest databases of it's type. Cannot generalize results to all US hospitals.
- Data only from critical care units.
- Did not have nurse and patient opinion of outcomes to compare to previous work. Although we had actual outcomes, some are under-reported and may not reflect true levels of occurrence.

CONCLUSIONS

In summary, this study did not find evidence to support the expectation that Magnet accreditation directly correlates to lower rates of hospital-acquired infections. There was evidence to support existing research indicating that nursing workforce characteristics are better in Magnet hospitals. While Magnet accreditation remains the gold standard for nursing work environments, this status does not automatically lead to better patient outcomes. This study indicates that producing high quality patient care is a complex process. Further work is needed that incorporates nursing care processes, using multivariate modeling to account for patient acuity and other structural measures not included in this analysis. Nursing administrators should look at the data for their unit on individual nursing characteristics that have been shown to affect each type of hospital-acquired infection, and identify ways to improve outcomes from the evidence based practice literature.

REFERENCES

Aiken, L. & Havens, D. (1999). Shaping systems to promote desired outcomes: The Magnet hospital model. *The Journal of Nursing Administration*, *29(2)*, 14-20.

Aiken, L., Havens, D., & Sloane, D. (2000). The Magnet nursing services recognition program: A comparison of two groups of magnet hospitals. *The American Journal of Nursing, 100(3)*, 26-36.

Aiken, I.H., Clarke, S.P., Cheung, R.B., Sloan, D.M., Silber, J.H. (2003). Educational levels of hospital nurses and surgical patient mortality. *Journal of the American Medical Association,* 290(12):1617-1623. doi:10.1001/jama.290.12.1617

American Hospital Association. (2003). The patient care partnership: Understanding expectations, rights, and responsibilities. Retrieved from the American Hospital Association website: http://www.aha.org/aha/issues/Communicating-With-Patients/pt-care-partnership.html

American Nurses Credentialing Center. (2010). Frequently asked questions about the ANCC's Magnet Recognition Program. Retrieved from: http://www.nursecredentialing.org/Magnet/Magnet-Program-FAQ.aspx.

Centers for Medicare and Medicaid Services. (2008). CMS improves patient safety for Medicare and Medicaid by addressing never events. Retrieved from Center for Medicare and Medicaid Services website: http://www.cms.gov/apps/media/press/factsheet.asp?Counter=3224&intNumPerPage=10&checkDate=&checkKey=&srchType=1&numDays=3500&srchOpt=0&srchData=&keywordType=All&chkNewsType=6&intPage=&showAll=&pYear=&year=&desc=false&cboOrder=date

Hayes, L., O'Brien-Pallas, L., Duffield, C., Shamian, J., Buchan, J., Hughes, F., et al. (2006). Nurse turnover: a literature review. *International Journal of Nursing Studies*, *43,* 237-263.

Hugonnet, S., Harbarth, S., Sax, H., Duncan, R., & Pittet, D. (2004). Nursing resources: a major determinant of nosocomial infection? *Infectious Diseases, 17*(4), 329-333.

Lankshear, A., SheUion, T., & Maynard, A. (2005) Nurse Staffing and Healthcare Outcomes: A Systematic Review of the International Research Evidence. *Advances in Nursing Science, 28*(2), 163-174.

National Database of Nursing Quality Indicators. (2010). *Frequently asked questions.* Retrieved from: https://www.nursingquality.org/FAQPage.aspx.

Stone, P., Mooney-Kane, C., Larson, E., Horan, T., Glance, L., Zwanziger, J., et. al. (2007). Nurse Working Conditions and Patient Safety Outcomes. *Medical Care 45*(6), 571-578.

Whitman, G., Kim, Y., Davidson, L., Wolf, G., Wang, S. (2002). The Impact of Staffing on Patient Outcomes Across Specialty Units. *Journal of Nursing Administration (32)*12, 633-639.