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### Nurse Experience and Education: Effect on Quality of Care [Articles]

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#### Abstract

**Objective:** To describe the relationships between the quality of patient care and the education and experience of the nurses providing that care.

**Background:** There is a call for more nurses with baccalaureate degrees and more experienced nurses to work in hospitals. Previous research studies have examined the characteristics, abilities, and work assignments of nurses with and without baccalaureate degrees but have not examined the quality of the patient care delivered. It is generally believed that more experienced nurses provide higher-quality care, but again few studies have actually examined this issue.

**Methods:** A secondary analysis of data, collected in two previous studies of the relationship between nurse staffing (hours of care, staff mix) and the quality of patient care, was used to determine the relationship between nurses' education and experience and the quality of care provided. The data were collected at the patient care unit level (42 units in study 1 and 39 units in study 2). Quality of care was indicated by lower unit rates of medication errors and patient falls.

**Results:** Controlling for patient acuity, hours of nursing care, and staff mix, units with more experienced nurses had lower medication errors and lower patient fall rates. These adverse occurrence rates on units with more baccalaureate-prepared nurses were not significantly better.

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#### Recent History

Nurse Experience and Educ...

Healthcare is managing the latest swing in the supply of and demand for RNs. Nurse educators and regulatory bodies are struggling to balance the highly vocal demand for more nurses quickly with the recommendation for increasing the proportion of nurses with baccalaureate (BSN) education.<sup>1,2</sup> At the same time, nurse administrators in hospitals are reporting a dearth of experienced nurses and a general shortage of new graduates. Policies for funding nursing education should be based on knowledge of the relationship between nurses' educational background and the quality of care delivered. Further, knowledge of the impact that experienced nurses have on the quality of care is also needed to support strategic decisions regarding the allocation of scarce organizational resources between recruitment and retention.

Nurse scholars have attempted repeatedly to determine the differences in nurses' competence and performance based on their educational background. The results of these studies have been inconsistent. Fewer studies have been done examining the influence of nurses' length of experience on competence and performance; however, the prevailing thought is that more experienced nurses perform better than less experienced nurses. The purpose of this study was to describe the relationship between the quality of patient care and the education and experience of the nurses providing that care. This purpose is achieved through a secondary analysis of data from two studies of the quality of patient care.<sup>3,4</sup>

## Background

When the primary locus of nursing education shifted from hospitals to colleges and universities, nursing faculty were faced with widespread negative expectations about the clinical skills of their BSN graduates. At the same time, instructors at hospital diploma nurse training programs, although comfortable with the clinical skills of their graduates, dealt with negative expectations about their graduates' critical thinking skills. With the advent of associate-degree (ADN) programs and the intent to produce technical nurses, the waters were muddied even further.

There is an extensive body of work examining whether BSN nurses are used differently than ADN and diploma nurses in the work setting and whether the skills and abilities of BSN graduates are rated as better or worse than the skills and abilities of ADN and diploma nurses. However, little research directly examined the quality of care provided by these nurses. Also, few studies have examined the effect of increased nursing experience on the quality of care provided.

The body of research examining the differences between BSN and non-BSN nurses has been reviewed extensively. Johnson <sup>5</sup> conducted a meta-analysis of the 139 studies published by 1985. These studies addressed the issue of performance differences across educational levels. She concluded that baccalaureate nurses performed professional behaviors such as communication, knowledge, problem solving, professional role, and teaching better than ADN and diploma nurses, but diploma and ADN nurses performed technical skills better than baccalaureate nurses and were more bureaucratically oriented. Autonomy and leadership behaviors did not differ. Another review of this literature reached similar conclusions.<sup>6</sup> Baccalaureate nurses were shown to be more professional and to have less job satisfaction. The latter finding was corroborated in a meta-analysis of the job-satisfaction literature.<sup>7</sup>

A more recent study asked all respondents to the Illinois licensing survey, more than

68,000 RNs, how often they performed a series of tasks that were chosen to represent the continuum of low to high skill function complexity.<sup>8</sup> The findings showed that BSN nurses were more likely than ADN or diploma nurses to perform more complex functions.

Leaders in nursing education maintain strongly that baccalaureate nurses are prepared differently than nonbaccalaureate nurses and should be responsible for patients with more complex care. Newer practice models are based on the notion that baccalaureate nurses are better trained for leadership positions. Kovner and Schore<sup>9</sup> conducted a review of published literature to determine whether basic RN education is related to the jobs in which nurses are employed and the responsibilities the nurses have in those jobs. They concluded that empirical studies show that BSN nurses "held positions with more complex practice," but they also noted that the differences were small.

Kovner and Schore<sup>9</sup> and Young et al.<sup>8</sup> also assessed the influence of nurses' experience on practice characteristics, with mixed findings. Young et al. found that nurses with more experience reported performing more complex functions than those with less experience. Kovner and Schore's review of the literature did not find that the nurses' experience influenced their practice. McCloskey,<sup>10</sup> in her study of differences across educational levels, reported that nurses who were rated the most highly were those who had completed an ADN or diploma basic education and also a baccalaureate degree. Although she did not draw this inference, it is likely that the high ratings were an effect of more experience as well as the years of formal education.

Although the issue of educational preparation of nurses generated many studies comparing skills, abilities, and scope of practice, no studies were found that examined directly the quality of patient care delivered by nurses with different educational backgrounds. It is commonly believed that more experienced nurses (experts compared with novices) provide better care, but little research has been reported that systematically related the nurses' level of expertise to the quality of patient care.

A study of 117 patient care units in the Chicago area<sup>11</sup> examined the quality of care and asked patients to report their satisfaction with several aspects of that care. Patients on units with a higher proportion of baccalaureate-prepared RNs reported more satisfaction with the teaching they had received. Patients on units with more experienced RNs were less satisfied with the teaching. Effects of nurses' education and experience on other aspects of patient care were not statistically significant. Another study of 583 hospitals reported that hospitals with higher levels of experienced RNs had lower personnel costs<sup>12</sup>; the effects on quality of more experienced RNs were not studied. A study comparing the death rates of magnet hospitals with those of nonmagnet hospitals found that magnet hospitals had lower death rates, higher staff mix levels, and higher proportions of RNs with baccalaureate degrees.<sup>13</sup> Medication knowledge and medication administration errors have been examined in relationship to nurses' education and experience. Baccalaureate graduates were more likely to pass medication tests than nonbaccalaureate nurses, and nurses with more experience made fewer medication errors but reported a larger proportion of them.<sup>14,15</sup>

The research reviewed did not show a consistent relationship between nurses' educational background and their abilities. With one exception,<sup>11</sup> it did not address directly the effectiveness of the care delivered. In addition, the research did not show a consistent relationship between the length of nurses' professional experience and their abilities or the quality of care they deliver.

In the past decade, there has been an increasing focus on quality and the outcomes of hospital care, specifically the effect of nurse staffing on those outcomes. This increasing interest led to the creation of Nursing Care Report Card projects. The two most prominent of these—the American Nurses Association National Database of Nursing Quality Indicators [16](#) and the California Nursing Outcomes Coalition [17](#)—include nurses' educational levels in their sets of quality indicators.

The current study examined empirical data to assess the relationships between the quality of patient care and the educational background and experience of the nurses providing that care.

## Methods

Two research questions guided this analysis: Does education affect the quality of care delivered in acute-care hospitals? Does experience affect the quality of care delivered in acute-care hospitals? The data used to answer these questions came from two recent studies addressing the issue of nurse staffing and quality of care.[3,4](#) Data were also collected that characterized patient care units with regard to educational background (BSN, non-BSN) and years of experience in nursing.

Individual patient care and the outcomes of that care cannot be attributed clearly to one specific nurse, because the care patients receive is provided by teams of nurses and nursing assistants throughout the day, evening, and night shifts. Therefore, no attempts were made to link an individual nurse's education or experience levels with the quality of care individual patients received. Instead, data were aggregated to the patient care unit level, and the patient care unit was used as the unit of analysis.

The basic model explaining quality included patient acuity, total hours of nursing care per patient day, and the proportion of those hours delivered by RNs (staff mix). Quality of care was measured with indicators of adverse occurrences, including the patient care unit rates of medication administration errors, patient falls, nosocomial infections, patient complaints, pressure ulcers, cardiopulmonary arrests, and death (standardized by patient-days or doses of medication). The lower the adverse occurrence rate, the higher the quality of care.

The dependent variables for the analyses reported in this paper were the two outcome measures that were collected in both studies: medication errors per 10,000 doses and patient falls per 1,000 patient-days. RN education and RN experience were added to the basic model to determine the net effect of these variables on the quality of patient care. In both studies nurse education was measured by using the proportion of RNs on the unit with BSN education. Nurse experience was measured using either the proportion of RNs on the unit with more than 5 years' experience (study 1)[3](#) or the average years of nursing experience of RNs on the unit (study 2)[4](#).

Data from 42 inpatient units from one large tertiary-care hospital were used in study 1. The data were gathered for each of the units for one fiscal year. This hospital used one acuity system, nursing care intensity, for determining staffing levels for all inpatient units. Nursing care intensity scores for individual patients were obtained from computerized nursing documentation. These scores were averaged for the patients on each nursing care unit in the study to arrive at patient care unit acuity scores. The nurse staffing and nurse characteristic data (education and experience) were obtained from human resource records. The adverse

occurrence measures were obtained from quality assurance and risk management data files.

In study 2, data from 39 patient care units in 11 hospitals were used. Data were available for 10 quarters (2.5 years). These hospitals were members of the Institute for Quality Healthcare. As members of this consortium, they reported adverse outcome rates, using common definitions, to the consortium offices. In return they received periodic benchmarking reports. They granted the use of these data for the research project and also supplied the nurse staffing and nurse characteristic data to the investigators. These hospitals did not use a common acuity/nursing intensity measure; therefore, the Medicare CaseMix index for the hospital and the patient care unit type (medical/surgical, intensive care, obstetrics, skilled nursing) were used to control for varying levels of patient acuity.

## Procedures for Analysis

Procedures for analyzing the data for this report included two different aggregation approaches. In study 1, staffing and adverse occurrence rates varied little during the 1-year time period; therefore, average rates were calculated for each unit for the year. This provided 42 units for the analysis; there were no missing data. In study 2, there was variation in units' staffing levels during the 2.5 years represented in the data; therefore, the data were aggregated in 6-month periods. This provided a maximum of 195 observation periods: 39 units for five time periods, minus missing observations. Because of missing data, multivariate analyses for medication errors were conducted on 107 observations (54.9% of possible observations), and analyses for patient falls were conducted on 149 observations (76.4% of possible observations). Observations were missing for two primary reasons: first, some patient care units were organized after the study period began, and others were combined with other units after the beginning time; second, staffing or occurrence data were unavailable for some time periods.

Multiple regression was used to determine the effects of nurse education and nurse experience on the adverse occurrence rate, controlling for the effects of patient acuity, total hours of nursing care, and staff mix. As described above, in study 1 patient acuity was measured by the average nursing care intensity for the unit. In study 2, patient acuity was represented by the hospital Medicare CaseMix index value and dummy variables for unit type. The regression coefficients for unit type represented the difference for unit type compared with medical/surgical units (the omitted category). As reported initially for both studies, the relationships between medication errors and staff mix (proportion of care hours delivered by RNs) were not linear. The rate of medication administration errors decreased from the lowest staff mix to a staff mix of 85% to 87% RNs. As the staff mix continued to increase, medication administration errors increased. To correct for the nonlinearity, a dummy variable representing staff mix above this turning point was included in the multiple regression analyses.

## Results

The means, standard deviations, ranges, coefficients of variation, and bivariate correlations are presented in [Tables 1 and 2](#). Staffing levels were similar across the two studies, although the range of staff mix on the patient care units was greater in the study with multiple hospitals. The range of total hours per patient data was 6.9 to 26 in study 1 and 4.5 to 23.8 in study 2; the range of staff mix was 0.46 to 0.96 in study 1 and 0.21 to 1.0 in study 2. The patient care unit rates of medication administration errors per 10,000 doses were 0 to 26.5 for study 1 and 0 to 25 for study 2. Patient fall rates per 1,000 patient days were 0 to 16 for study 1 and 0 to 6.9

for study 2. No explanation was found for the difference in ranges of the patient fall rates between these studies. The proportion of nurses on patient care units who held baccalaureate degrees was 47% for study 1 (an academic health center) and 21% in study 2. Years of experience were measured differently in each study; on average, 35% of the unit staff nurses in study 1 had worked more than 5 years. The average years of experience on units in study 2 was 8.57.

Table 1. Study 1 Variable Means, Ranges, Coefficient of Variation and Correlations (N = 42 Units)

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Table 2. Study 2 Variable Means, Ranges, Coefficient of Variation, and Correlations (N = 39 Units, 5 Time Periods)

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Bivariate correlations showed some similarity across the studies; for example, staff mix was negatively correlated with medication errors and patient falls in both studies, and patient fall rates were negatively correlated with RN experience in both studies (although the relationship between staff mix and medication errors was not significant in study 1). There was no consistent pattern in the correlations among the rates of medication errors and the unit RN education and experience. In fact, the one relationship that was significant in both studies, between education level and medication errors, had a positive sign in study 1 and a negative sign in study 2.

The results of the multiple regression analyses are reported in [Tables 3 and 4](#). In study 1, medication error rates were partially explained (adjusted  $R^2 = 0.304$ ) by the terms in the model, but patient falls rates were not (adjusted  $R^2 = 0.014$ ). Patient care units with a higher proportion of experienced nurses had marginally lower medication error rates ([beta] = -0.259,  $P < 0.10$ ), but units with more BSN nurses had higher medication error rates ([beta] = 0.436,  $P < 0.05$ ).

	Medication errors standardized beta	Patient falls standardized beta
Acuity	.074	-.204
All hours of care	-.364	-.010
RN staff mix	-.499*	-.189
Staff mix > 87	.680*	.04
Nurse education	.436*	.113
Nurse experience	-.259*	-.112
Adjusted R2	.304	.014

\*p < 0.05  
\*p < 0.10

Table 3. Multivariate Analysis of Medication Errors and Patient Falls, Study 1 (N = 42 for Both Equations)

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	Medication errors standardized beta	Patient falls standardized beta
Case mix	-.720*	-.252*
ICU	-.263	-.138
OR/peds	.109	-.269*
Skilled nurse unit	-.277*	.046
All hours of care	.535*	-.050
RN staff mix	-.748*	-.281
Staff mix > 0.85	.492*	.04
Nurse education	-.054	-.130
Nurse experience	-.345*	-.373*
Adjusted R2	.651	.512

\*p < .05  
\*p < .10

Table 4. Multivariate Analysis of Medication Errors and Patient falls, Study 2 (N = 107 for Medication Errors Equation; N = 149 for Patient Falls Equation)

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For study 2, both the medication error rates and patient fall rates were explained by the terms in the model (adjusted  $R^2 = 0.651$  for medication errors and  $0.512$  for patient falls). Patient care units with a higher proportion of experienced nurses had lower medication error rates ([beta] =  $-0.345$ ,  $P < 0.05$ ) and lower patient fall rates ([beta] =  $-0.373$ ,  $P < 0.05$ ). The proportion of nurses on a unit with baccalaureate degrees did not have a significant impact on these rates. In study 2, units with more BSN nurses also had a higher staff mix ( $r = 0.54$ ,  $P < 0.05$ ) and nurses with less experience ( $r = -0.43$ ,  $P < 0.05$ ). Either of these relationships could have muted the effect of education.

## Conclusions

Results from this secondary analysis of data from two studies provide consistent support for the prevailing belief that nurses with more experience provide higher-quality care. Units with more experienced nurses had lower medication error rates in both studies and lower patient fall rates in study 2. Units with more BSN nurses delivered care similar in quality to those with fewer baccalaureate nurses, with one exception: only one of four effect coefficients for nursing education was significant, and it suggested that units with more BSN nurses have higher reported medication error rates.

This is the first study of these issues at the unit level and one of very few that have examined the direct effects of education and experience on the quality of patient care. In addition, these effects were identified after controlling for patient acuity, total hours of nursing care, and nursing staff mix. Thorough evaluation of a model of care as complex as this needs a larger study with more units representing hospitals across the United States. With more units and with a focus on the process of delivering quality care, it would be possible also to determine whether the events that increase with BSN nurses are the actual medication errors or the

proportion of those errors reported. The original studies were restricted in the indicators of quality of care to those routinely collected by hospitals. Future studies would benefit from positive indicators of quality rather than adverse occurrence rates. It is possible that the effects of baccalaureate nursing education would be stronger on quality defined as maximizing patient outcomes rather than minimizing threats to patient safety.

The results of this study support the concerns recently expressed by nurse administrators that there is a crucial need for experienced nurses in hospitals. The challenge for the nursing profession in the coming years will be to keep experienced nurses actively engaged in patient care. As McNeese-Smith reported,<sup>18</sup> there is a tendency for nurses with longer time on the job to become disengaged, less satisfied, and less committed to the institution. Greater investments in promotional ladders, higher salary differentials for more experienced nurses, and avenues for participation in organizational planning may help to achieve retention and prevent disengagement.

We examined the relationship between education and quality controlling for experience, and vice versa. We did not examine whether there are interactions between education and experience. It is possible that higher educational attainment is associated with faster and more continuous learning during the first few years of practice. This relationship may decrease over time, or it may remain constant. Understanding this relationship may be important for nursing executives deciding whether to focus their efforts on recruitment or retention.

Unfortunately, the implications of this research for nursing education are no more clear than those of previous studies. This study estimated the effect of baccalaureate education on the quality of patient care as indicated by adverse occurrences. Educational background may not have any impact on the nurses' ability to detect and prevent medication errors and patient falls. This study did not evaluate the impact of education on broader indicators of nursing care such as patient teaching, discharge preparation, case management, leadership, and evidencebased practice activities. It is more likely that those more complex activities would be improved with higher levels of education. Chief nursing officers in university teaching hospitals perceive that compared with diploma and ADN graduates, BSN nurses have greater critical thinking skills; are less task-oriented, are more professional, and are stronger leaders; and focus more on psychosocial components, communication, and patient teaching. Further study is needed to determine whether that impact is, in fact, there.

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