

**Statement  
of  
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Department of Veterans Affairs  
before the  
House of Representatives  
Committee on Veterans' Affairs  
Subcommittee on Oversight and Investigation**

**October 2, 2003**

Chairman Buyer, Ms Hooley, and members of the Subcommittee: I want to thank you for this opportunity to present testimony regarding the impact of the national nursing shortage on the Veterans Health Administration, the nation's largest employer of registered nurses. Today I will share with you the aggressive actions VA is taking to combat the shortage and ensure ongoing quality care for veterans.

Background

National nursing leaders and health care organizations project a shortage of registered nurses that will be unlike any experienced in the past (AACN, 1998). In addition to registered nurses, the nursing workforce includes practical nurses and nursing assistants. However, the registered nurse is at the center of the nursing workforce; the registered nurse coordinates care for the individual veteran patient as well as for the population of veteran patients in our communities. Given the aging of the current registered nurse workforce, the decreasing number of students who choose nursing as a career, and the ever increasing demand for professional nursing services, the current and future number of professional registered nurses (RN) will be insufficient to meet our national health care needs (Janiszewski (2003) Buerhaus, Staiger, & Auerbach, 2000; Carpenter, 2000). Noted nursing economist Dr. Peter Buerhaus wrote that the total number of nurses per capita will likely peak in 2007 and decline steadily thereafter (1998). This is consistent with a Bureau of Labor Statistics estimate that the need for registered nurses is expected to exceed one million by 2010. The nursing shortage is already challenging hospitals to provide safe care in certain areas. (Stechmiller 2002). At the same time, changes in healthcare delivery will require larger numbers of well-educated nurses who perform increasingly complex functions in hospitals and the community. Market demand will also drive an increased need for nurses. (Peterson 2001). By 2020, the United States RN workforce is forecast to be roughly the same size as it is today, declining nearly 20 percent below RN workforce requirements. (Buerhaus, Staiger, & Auerbach, 2000). A modest increase in enrollment in generic nursing programs was experienced in 2002; however, far larger increases are needed if the trends noted above are to be reversed.

The projected shortage will result in part from a number of substantial changes that continue to take place in the profession. Factors identified that will intensify a nursing shortage are (AACN, 2000; Bednash, 2000; Carpenter, 2000; Curren, Horner, & Eldridge, 2000; Havens & Aiken, 2000):

- A decline in enrollment in schools of nursing;
- Aging of the nursing workforce (average age nationally, 45.2 yrs, VA 47.4 yrs);
- Average age of a new graduate in nursing has climbed to 30.5 in 1995 - 2000 versus 24.3 in 1985 or earlier;
- Neither racial nor ethnic minorities nor men enter nursing in numbers that reflect the national population;
- Young women, who in the past made up the preponderance of nursing students, now have a wide range of alternative career options available;
- Poor image of nursing as a career choice. In a 2001 Gallup Poll of public perceptions of the professions, nurses ranked number one in honesty and high ethics for the second, consecutive year. However, in the same poll, nursing ranks 137 out of 250 professions in desirability;
- Pay inequities between nurses and other occupations that require less education and have less responsibility;
- Perceived negative work environments, such as: undesirable work schedules, lack of respect and lack of nursing involvement in patient care decisions;
- Inadequate numbers of qualified faculty to educate the numbers of nurses needed.

#### Impact of the Shortage on VA

Registered nurses comprise the largest segment of healthcare workers within the Veterans Health Administration (VHA N=36,000). VA nursing workforce data support the conclusion that the average age of VA nurses will continue to rise and the number of nurses who are retirement eligible will continue to rise. Based on current trends, retirements will not be abrupt or sudden, but rather a prolonged, gradual, manageable wave of retirements that should extend well beyond 2005. Retirements will require a consistent influx of nurses and ancillary personnel. Difficulties have arisen and will continue as the shortage results in increased time and efforts required to fill registered nurse vacancies.

- The Average age of an RN nationally is 45.2 (DHHS 2000); Average age of VA RN is 47.4 (2002)
- Average age of a VA RN new hire in FY 2000 was 41.65 years;
- VA nurses will be eligible for retirement in large numbers through 2005 (RNs 35 percent, LPNs 29 percent, Nursing Assistant 34 percent).
- 55 percent of all VA Nurse Executives are eligible to retire in 2005; 69 percent will be eligible in 2008

VA's nurse turnover rate at 8.3 percent is less than the national average, which is estimated at 20 percent.

VA is an employer of choice for men and ethnic minorities, hiring higher percentages than are reflected in the general population of nurses.

<i>Minority Category</i>	<i>National-RN only (DHHS, 2000)</i>	<i>VA-RN only (FY2000)</i>
Males	5.4	13.8
African American	4.9	14.62
Hispanic	2.0	5.85
Asian	3.5	9.58

Based on VA PAID data files-- FY 2000 and US Dept of Health and Human Services' Findings from the National Sample Survey of Registered Nurses, March 2000. VA Nurse Anesthetist data are excluded from this analysis.

The Veterans Health Administration convened the Future Nursing Workforce Planning Group in August 2000 to critically review the impact of the national nursing shortage on the Department of Veterans Affairs (VA), Veterans Health Administration (VHA). Members represented a variety of clinical and administrative roles within VA as well as organized labor. This group published its findings and recommendations *A Call to Action—VA's Response to the National Nursing Shortage* in November 2001. This critical report provided a foundation for VA's retention, recruitment, and outreach activities.

#### VA Registered Nurse Workforce Requirements

In VA's evolving healthcare environment, nurses must possess clinical decision-making and critical thinking skills, and must have professional preparation in community health, patient education, and nursing management/leadership. Professional nurses use a breadth and depth of knowledge to care for veteran patients in multiple health care settings—from the rapid patient assessments and complex care provided during critical stages of an acute illness through the compassionate attention to detail that enhances quality of life for veterans who are making the transition into a long-term care environment.

VA's nurses must be utilized appropriately, provided a safe working environment and provided with sufficient resources to capitalize on their skills and expertise. Reflective of this, VA does offers BSN and MSN prepared nurses more complex clinical and organizational responsibilities. Technological advances in health care treatment and equipment, evolving health care trends, modifications in delivery settings, and consumer expectations will require nurses to constantly adapt to change and varied roles. VA is committed to maintaining an appropriate mix of qualified registered nurses to respond to healthcare trends and will continue to hire and value the contribution of nurses prepared at the associate, baccalaureate, master's and doctoral level.

Based on the intense and complex healthcare environment, the National Advisory Council on Nursing Education and Practice (1996) has recommended that by the year 2010 two-thirds of all practicing nurses must possess a baccalaureate degree if optimal care is to be provided. VA's registered nurse qualification standard requires specific educational degrees precisely to meet these clinical contributions to the delivery of care and since its inception, the percentage of nurses prepared at the bachelors level or higher has risen to 64 percent. Through the adoption of VA's Nurse Qualification Standard and with continued commitment to funding academic education for nurses, VA

will be well positioned to attain this recommended educational mix and provide optimal care to veterans.

<i>Fiscal Year</i>	<i>% VA RN's with AD/Diploma</i>	<i>% VA-RN's with Bachelors's or higher</i>
1998	41	59
2001	39	61
2002	36	64

Based on VA PAID data files-- FY 1998-2002. VA Nurse Anesthetist data are excluded from this analysis.

## Strategies to Combat the National Nursing Shortage

### Utilization Strategies

- VA uses its current Nurse Qualification Standards to model those facilities found to have the best patient outcomes such as Magnet Hospitals and Academic Health Centers. These facilities have a significantly higher percentage of baccalaureate prepared nurses than other facilities (average = 59% vs. 34% for all hospitals). Research has shown that patients live longer and that nurse retention and job satisfaction are higher in these institutions and others that differentiate nursing practice based on education. This is substantiated in an article by Dr. Linda Aiken published in the September 24, 2003 issue of the Journal of the American Medical Association (attached), which provides data demonstrating that mortality and failure-to-rescue rates were 19% lower in hospitals where 60% of nurses had BSNs or higher than in hospitals where only 20% had BSNs. This research also shows that a 10% increase in the proportion of hospital staff nurses with BSNs or higher degree was associated with a 5% decrease in mortality rates and a 5% decrease in failure-to-rescue rates.

The Nurse Qualification Standard is focused on both the standard of care provided by nurses as well as the level of education. In keeping with this, VA has a waiver of the educational requirements available for associate degrees nurses who have demonstrated that they meet the performance standards of a higher grade.

- VA's Barcode Medication Administration System, Computerized Patient Record, VistA Imaging System and nationally recognized Patient Safety programs provide state of the art technology to enable nurses to make efficient use of their skills and time while providing exceptional safety for both patients and their caregivers. The Nursing Integrated Information System is an attempt to draw data from disparate computer sources and combine it in such a way as to be useful in managing nursing practice. Since the computer systems are being transferred to a different programming language, it is an opportune time to create a computer environment that contributes to nursing care. This effort is a line item in the budget for FY 04.
- VA is actively encouraging medical centers to attain Magnet Recognition Status. As noted above, these hospitals have excellent patient outcomes and higher rates of nurse retention and job satisfaction. VA Medical Center Tampa has the distinction of being the first Magnet facility in our system. Four VA facilities—

Houston, San Diego, Washington, DC and New York—are in the process of filing their initial applications. Approximately 11 other facilities report that they have begun the staff education and planning process that will lead to the application process in the future.

- VA's Office of Nursing Services has created a Program Director position devoted to Workforce Development. The individual in this role will direct and coordinate programs directly impacting recruitment, retention, succession planning and quality of the work environment.
- VA Nursing Outcomes Database Project (VANOD) is a 16-month project for creating a database of nursing sensitive quality indicators that will enable exploration of relationships between nurse staffing and patient outcomes, evidence-based decision-making, and benchmarking for testing best practices. The nursing sensitive quality indicators include falls, pressure ulcers, skill mix, staffing, staff musculoskeletal injuries, patient satisfaction, and RN satisfaction. Twelve randomly selected VA hospitals are included in this pilot project. Two VA Health Services Research teams are participating in the building of the database: VA Puget Sound in Seattle is creating data submission methods and database structure while the Management Decision and Research Center in Boston is creating reporting formats from the data. Future planning is underway to establish nation-wide VA roll out, development of more indicators, and expansion to other care settings such as long term care and ambulatory care.

#### Retention/Recruitment Strategies

- VA's educational requirements have resulted in significant education opportunities that have enhanced both retention and recruitment of registered nurses. The National Nursing Educational Initiative (NNEI) and Employee Incentive Scholarship programs have provided nearly 50 million dollars to enable 1103 registered nurses and non-nurse VA employees to complete degrees in nursing. Funding for education through the NNEI is likely one reason that VA has little difficulty recruiting associate degree nurses.
- In response to nurses identifying a need for better communication and stronger collaboration between nurses and physicians, VA is implementing a Nurse-Physician Collaboration Breakthrough Series designed to foster greater awareness/knowledge of retention, succession planning and nurse-physician interactions as related to quality patient care.
- Wide disparity in the utilization of pay and hiring authorities resulted in the publication of *VA Pay and Hiring Authorities* an annotated reference for clinical and human resources professionals designed to eliminate confusion, encourage flexibility and support recruitment and retention endeavors. This document is available in both electronic and print versions.
- VA's newly implemented web-based entrance and exit interviews will allow uniform data collection specific to registered nurses regarding factors that influence nurses to seek or to leave VA employment. The data collected can be aggregated to display facility, network, or national trends and will be of great use

to the planning and implementation of future nurse recruitment and retention strategies.

- VA has forwarded proposed legislation to the House Veterans Affairs Committee containing initiatives that will have significant impact on our ability to recruit and retain a highly qualified workforce. These initiatives, designed to correct impediments to retention and recruitment identified by VA administrators and nurse leadership, will provide VA medical centers a more competitive edge in hiring and retention. The proposals are as follows:

1. Enable VAMCs to offer flexible tours. Specifically we are proposing the following:
  - A) Three 12-hour tours (36 hours) paid as 40 hours;
  - B) 9 months of work with 3 months off, with pay apportioned over a 12-month period;
  - C) 7 ten-hour days/7 days off, with pay for 80 hours; and

Inflexibility in work schedules is a major cause of dissatisfaction in nurse employment. A 2000 survey conducted by the American Organization of Nurse Executives (AONE), found that after salary, the top benefit sought by nurses was “flexible scheduling and control over shifts.” Providing different options for scheduling would be a way of bringing more nurses into the workplace and retaining their services.

2. Establish a Nurse Executive Special Pay Program  
We are recommending that the Secretary be authorized to approve special pay of \$10,000 up to \$25,000 per year to the nurse executive at each VA medical center and nurse executive positions in the VACO Nursing Service,

The special pay would range from a minimum of \$10,000 to a maximum of \$25,000, based on factors such as the grade of the nurse executive, the scope and complexity of the nurse executive position, the nurse executive’s personal qualifications, the characteristics of the healthcare facility, e.g., tertiary, single site or multi-site, nature and number of specialty care units, demonstrated recruitment and retention difficulties, and such other factors as the Secretary deems appropriate. The special pay would not make VA a pay leader; it would however allow medical centers to compete with private sector pay levels and/or to relieve pay compression at the highest levels.

Approximately 55 percent of all VA Nurse Executives are eligible for retirement by 2005; 69 percent will be eligible by 2008. In addition, 35 percent of all current VA registered nurses are eligible to retire by 2005. When coupled with the national shortage, this potential loss of nurses could jeopardize VA’s ability to accomplish its healthcare mission.

- The Veterans Affairs Learning Opportunity Residency (VALOR) Program recruits nursing students with outstanding scholastic records for structured summer clinical learning experiences; part-time employment during the school year followed by special hiring incentives for permanent employment at graduation. The program is geared to meet the most frequently identified issue of nursing education for both faculty and students—the need for productive clinical learning.

## Outreach Strategies

- In collaboration with our academic and community partners, VA encourages innovative actions to increase shared faculty arrangements—moving nursing education toward a model in which nurse clinicians are more actively involved in classroom as well as clinical teaching. Such arrangements offers a “win-win” strategy to VA medical centers as well as our academic partners by addressing the shortage of nursing faculty and providing VAMC’s with outstanding opportunities to recruit graduating nurses already inclined to work for VA based on their positive student experiences. One example of a successful shared-faculty collaborative is that between the VA Puget Sound Health Care System and the University of Washington. A video highlighting this initiative has been provided to the Committee.
- VA medical centers across the country are taking active roles in community outreach, encouraging youth, teens and adults seeking a second career to enter the nursing professions. A video highlighting this initiative has been provided to the Committee.

The Department of Veterans Affairs Health Care Programs Enhancement Act of 2001 (Public Law 107-35), which took effect on January 23, 2002, established the National Commission on VA Nursing (NCVAN) to, among other things, “consider legislative and organizational policy changes to enhance the recruitment and retention of nurses and other nursing personnel” by the VA. That Act requires the NCVAN to report its findings and recommendations to Congress by May 2004. VA looks forward to the Commission’s report.

In conclusion, VA’s healthcare workforce is critical to the success of our mission “to care for him who shall have borne the battle, and for his widow, and his orphan”; as such, VA will engage in a growing program of assessing nursing workforce needs and implementing innovative strategies to address them.

Thank you, again, Mr. Chairman, for this opportunity to address the impact of the national nursing shortage on the Veterans Health Administration. I will now be happy to answer any questions that members of the Subcommittee might have.

Attachment 1



**EMBARGOED: Not for release until September 23 at 4 pm**

**EDT**

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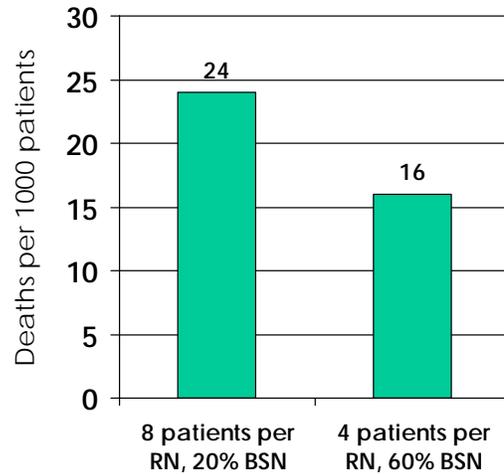
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## **Penn Research Finds More Patients Die after Everyday Surgeries In Hospitals Where Fewer RNs Hold Bachelor's Degrees (BSN)**

**(Philadelphia, PA)**— The education level of hospital nurses may be as important as how many RNs are at the bedside in determining whether patients survive common surgeries, according to a University of Pennsylvania School of Nursing study released today in *The Journal of the American Medical Association (JAMA)*.

In a study of 232,342 patients, researchers from the Center for Health Outcomes and Policy Research found that raising the percentage of bedside RNs with bachelor's degrees from 20 to 60 percent would save four lives for every 1,000 patients undergoing common surgeries. Surprisingly, of 168 hospitals studied in Pennsylvania, the percentage of university-trained RNs varied from 0 to 77 percent.\* A conservative estimate suggests the difference between best and worst staffing and education scenarios could translate to 1,700 preventable deaths in Pennsylvania annually.

Patient deaths after surgery are highest in hospitals where nurses with lower levels of education care for more patients

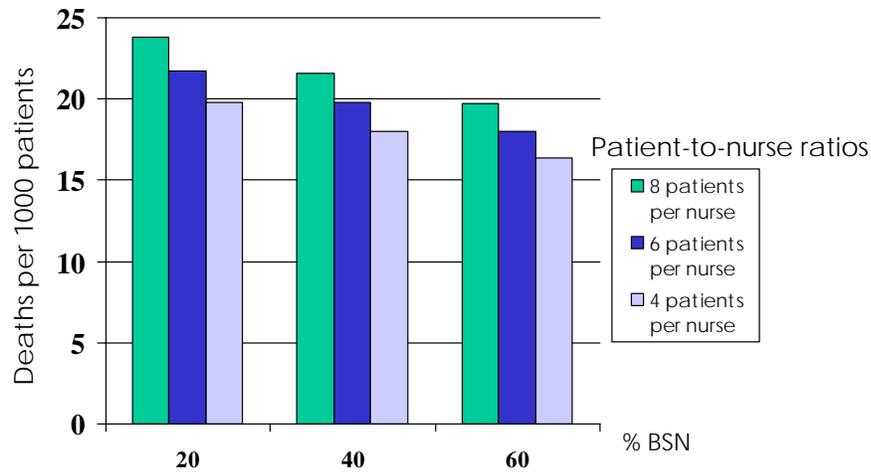


**\*There are three ways to become a registered nurse: hospital-based “diploma schools,” associate degree programs, and Bachelor of Science in Nursing (BSN) or baccalaureate programs at universities.**

JAMA/BSN  
Take 2 of 3

The study builds on earlier work from the research center on patient deaths from common orthopedic, general, and vascular surgeries—most considered elective—which found adding one patient to nurses’ workloads increased patients’ risk of dying by seven percent. The latest findings show patients have the highest risk in hospitals where nurses with less education care for more patients: 24 deaths per 1,000 patients when 20% of nursing staffs have BSNs care for an average of 8 patients, to 16 deaths when hospital staffs with 60% BSNs care for four patients.

Patient deaths after surgery are highest in hospitals where nurses with lower levels of education care for more patients

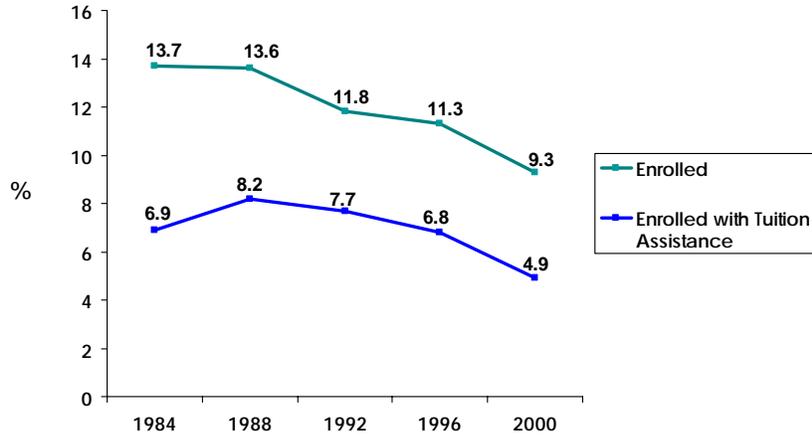


“Despite calls for quick fixes to ease the current shortage of nurses, the public would be better served by increasing nurses’ education as well as their numbers,” said University of Pennsylvania nursing and sociology professor Linda H. Aiken, PhD, RN, who directed the study. Nationally, 43 percent of hospital nurses have at least a bachelor’s degree.

Specifically, the researchers found that:

- A 10% increase in the proportion of hospital staff nurses holding a bachelor’s degree is associated with a 5% decrease in post-operative mortality.
- Twenty-three percent of patients developed a complication following admission and 8.4% of them died. Fourteen out of every 1,000 of these patients could be expected to die in hospitals where 20 percent of the nurses had BSNs compared to 60%.
- The findings are independent of the qualifications of patients’ surgeons, the availability of technology, hospital teaching status, and nurse experience.
- Almost one in four baccalaureate-prepared hospital nurses received a degree through continuing education following initial schooling, often facilitated by employer educational benefits, yet the trend is decreasing.

### Declining Proportions of Hospital Nurses in Higher Education and Getting Tuition Assistance



Source: US Department of Health and Human Services

“Nursing education policy reports published in the past decade concluded that the United States has an imbalance in the educational preparation of its nurse workforce with too few RNs with BSN and higher degrees. Our findings provide sobering evidence that this imbalance may be harming patients,” the study’s authors wrote.

The study was funded by the National Institutes of Health, the Agency for Healthcare Research and Quality, and The Robert Wood Johnson Foundation. The researchers surveyed 10,184 nurses in 168 Pennsylvania hospitals caring for 232,342 patients from April 1, 1998 to November 30, 1999.

## Attachment 2

# Educational Levels of Hospital Nurses and Surgical Patient Mortality

[Linda H. Aiken, PhD, RN; Sean P. Clarke, PhD, RN; Robyn B. Cheung, PhD, RN; Douglas M. Sloane, PhD; Jeffrey H. Silber, MD, PhD](#)

*JAMA*. 2003;290:1617-1623.

### ABSTRACT

**Context** Growing evidence suggests that nurse staffing affects the quality of care in hospitals, but little is known about whether the educational composition of registered nurses (RNs) in hospitals is related to patient outcomes.

**Objective** To examine whether the proportion of hospital RNs educated at the baccalaureate level or higher is associated with risk-adjusted mortality and failure to rescue (deaths in surgical patients with serious complications).

**Design, Setting, and Population** Cross-sectional analyses of outcomes data for 232 342 general, orthopedic, and vascular surgery patients discharged from 168 nonfederal adult general Pennsylvania hospitals between April 1, 1998, and November 30, 1999, linked to administrative and survey data providing information on educational composition, staffing, and other characteristics.

**Main Outcome Measures** Risk-adjusted patient mortality and failure to rescue within 30 days of admission associated with nurse educational level.

**Results** The proportion of hospital RNs holding a bachelor's degree or higher ranged from 0% to 77% across the hospitals. After adjusting for patient characteristics and hospital structural characteristics (size, teaching status, level of technology), as well as for nurse staffing, nurse experience, and whether the patient's surgeon was board certified, a 10% increase in the proportion of nurses holding a bachelor's degree was associated with a 5% decrease in both the likelihood of patients dying within 30 days of admission and the odds of failure to rescue (odds ratio, 0.95; 95% confidence interval, 0.91-0.99 in both cases).

**Conclusion** In hospitals with higher proportions of nurses educated at the baccalaureate level or higher, surgical patients experienced lower mortality and failure-to-rescue rates.

## INTRODUCTION

Nurse understaffing is ranked by the public and physicians as one of the greatest threats to patient safety in US hospitals.<sup>1</sup> Last year we reported the results of a study of 168 Pennsylvania hospitals showing that each additional patient added to the average workload of staff registered nurses (RNs) increased the risk of death following common surgical procedures by 7%, and that the risk of death was more than 30% higher in hospitals where nurses' mean workloads were 8 patients or more each shift than in hospitals where nurses cared for 4 or fewer patients.<sup>2</sup> These findings are daunting given the widespread shortage of nurses, increasing concern about recruiting an adequate supply of new nurses to replace those expected to retire over the next 15 years,<sup>3</sup> and constrained hospital budgets. These findings also raise questions about whether characteristics of the hospital RN workforce other than ratios of nurses to patients are important in achieving excellent patient outcomes.

Nurses constitute the surveillance system for early detection of complications and problems in care, and they are in the best position to initiate actions that minimize negative outcomes for patients.<sup>4</sup> That the exercise of clinical judgment by nurses, as well as staffing adequacy, is key to effective surveillance may explain the link between higher nursing skill mix (ie, a higher proportion of RNs among the nursing personnel of a hospital) and better patient outcomes.<sup>5-10</sup>

Registered nurses in the United States generally receive their basic education in 1 of 3 types of programs: 3-year diploma programs in hospitals, associate degree nursing programs in community colleges, and baccalaureate nursing programs in colleges and universities. In 1950, 92% of new RNs graduated from hospital diploma programs,<sup>11</sup> whereas by 2001, only 3% graduated from hospital diploma programs, 61% came from associate degree programs, and 36% were baccalaureate program graduates.<sup>12</sup> Surprisingly little is known about the benefits, if any, of the substantial growth in the numbers of nurses with bachelor's degrees. Indeed the conventional wisdom is that nurses' experience is more important than their educational levels.

Despite the diversity of educational programs preparing RNs, and a logical (but unconfirmed) connection between education and clinical judgment, little if anything is known about the impact of nurses' education on patient outcomes.<sup>13</sup> Results of some studies have suggested that baccalaureate-prepared nurses are more likely to demonstrate professional behaviors important to patient safety such as problem solving, performance of complex functions, and effective communication.<sup>14-16</sup> However, few studies have examined the effect of nurse education on patient outcomes, and their findings have been inconclusive.<sup>17</sup>

The 168 Pennsylvania hospitals included in our previous study<sup>2</sup> of patient-to-nurse staffing and patient mortality varied substantially in the proportion of staff nurses holding baccalaureate or higher degrees. This variability provides an opportunity to conduct a similar study examining the association between the educational composition of a hospital's RN staff and patient outcomes. Specifically, we tested whether hospitals with higher proportions of direct-care RNs educated at the baccalaureate level or above have lower risk-adjusted mortality rates and lower rates of failure to rescue (deaths in patients with serious complications). We also examined whether the educational backgrounds of hospital RNs are a predictor of patient

mortality beyond factors such as nurse staffing and experience. These findings offer insights into the potential benefits of a more highly educated nurse workforce.

## METHODS

### Data Sources, and Variables

We analyzed outcomes data derived from hospital discharge abstracts that were merged with information on the characteristics of the treating hospitals, including unique data obtained from surveys of hospital nurses.<sup>2</sup> The institutional review board of the University of Pennsylvania approved the study protocol.

**Hospitals.** The sample consisted of 168 (80%) of the 210 adult acute-care general hospitals operating in Pennsylvania in 1999 that (1) reported surgical discharges to the Pennsylvania Health Care Cost Containment Council in the specific categories studied here, (2) had data on structural characteristics available from 2 external administrative databases (American Hospital Association [AHA] annual survey<sup>18</sup> and Pennsylvania Department of Health Hospital Questionnaire<sup>19</sup>), and (3) had at least 10 nurses responding to our questionnaire, which previous empirical work demonstrated was sufficient to provide reliable estimates of survey-based organizational characteristics of the hospitals. Six of the excluded hospitals were Veterans Affairs hospitals, which do not report discharge data to the state. Twenty-six hospitals were excluded because of missing data, most often because their reporting to external administrative sources was done as aggregate multihospital entities. Ten small hospitals, most of which had 50 or fewer beds, had an insufficient number of nurses responding to the questionnaire to be included.

A 50% random sample of RNs residing in Pennsylvania and on the rolls of the Pennsylvania Board of Nursing received questionnaires at their homes in the spring of 1999. Surveys were completed by 10 184 nurses, an average of more than 60 nurses per hospital, and the 52% response rate compares favorably with other voluntary, anonymous surveys of health professionals.<sup>20</sup> We compared our data with information from the AHA annual survey and found that the number of nurses from each hospital responding to our survey was directly proportional to the number of RN positions in each hospital. This suggests similar response rates across hospitals and no response bias at the hospital level. Moreover, demographic characteristics of the respondents paralleled those of Pennsylvania hospital nurses in the National Sample Survey of Registered Nurses.<sup>21</sup> For example, the mean ages of Pennsylvania hospital nurses in our sample and in the National Sample Survey of Registered Nurses were 40 and 41 years, respectively; the percentages of Pennsylvania hospital nurses working full-time were 66% and 69%, respectively; and those having earned bachelor of science in nursing (BSN) degrees were 30% and 31%, respectively.

Hospital staff nurses were asked to indicate whether their highest credential in nursing was a hospital school diploma, an associate degree, a bachelor's degree, a master's degree, or another degree. The proportion of nurses in each hospital who held each type of credential was computed. Because the educational preparation of the 4.3% of nurses who checked "other" was unknown, their answers were not included in our hospital-level measures of educational qualifications. It was later verified that this decision did not bias the results. Because there was no evidence

that the relative proportions of nurses holding diplomas and associate degrees affected the patient outcomes studied, those 2 categories of nurses were collapsed into a single category and the educational composition of the hospital staff was characterized in terms of the percentage of nurses holding bachelor's or master's degrees.

Two further variables were derived from the nurse survey. Nursing workload was computed as the mean number of patients assigned to all staff nurses who reported caring for at least 1 but fewer than 20 patients on the last shift they worked. Because nurse experience was an important potential confounding variable related to both clinical judgment and education, the mean number of years of experience working as an RN for nurses from each hospital was also calculated and used in the analyses.

Three hospital characteristics were used as control variables: size, teaching status, and technology. Hospital-level data were obtained from the 1999 AHA annual survey and the 1999 Pennsylvania Department of Health Hospital Survey. Three size categories (<100 beds, 101-250 beds,  $\geq$ 251 beds) were used. Hospitals without any postgraduate medical residents or fellows (nonteaching) were distinguished from those with 1:4 or smaller trainee-to-bed ratios (minor teaching) and those with ratios higher than 1:4 (major teaching). High-technology hospitals were those that had facilities for either open-heart surgery, major organ transplantations, or both.

**Patients and Patient Outcomes.** Discharge abstracts for the universe of 232 342 patients aged 20 to 85 years who underwent general surgical, orthopedic, or vascular procedures from April 1, 1998, to November 30, 1999, in the 168 nonfederal hospitals were obtained from the Pennsylvania Health Care Cost Containment Council, which checks the data for completeness and quality. A list of the diagnosis related groups studied was provided previously.<sup>2</sup>

We examined the association between the educational attainments of nurses across hospitals and both deaths within 30 days of hospital admission (derived by linking discharge abstract data and Pennsylvania vital statistics data) and deaths within 30 days of admission among patients who experienced complications (failure to rescue). Patient complications were determined with *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* codes in the secondary diagnosis and procedure fields of discharge abstracts indicative of 39 clinical events using protocols drawing on expert consensus as well as empirical evidence to distinguish complications from preexisting comorbidities.<sup>22-24</sup>

The 2 patient outcomes studied were risk-adjusted by including 133 variables in our models, including age, sex, whether the admission was a transfer from another hospital, whether it was an emergency admission, a series of 48 variables indicating surgery type, dummy variables indicating the presence of 28 chronic preexisting conditions as classified by *ICD-9-CM* codes, and interaction terms chosen on the basis of their ability to predict mortality and failure to rescue in the present data set. Construction of the patient risk adjustment models used an approach similar to that reported by Silber and colleagues.<sup>22-26</sup> The *c* statistic for the mortality risk adjustment model was 0.89 and for the failure to rescue model, 0.81.

We also estimated and controlled for the effect of having a board-certified surgeon on risk for mortality and failure to rescue. For each patient, the license number of the

operating physician of record was matched to a physician's name using a public use file from the Pennsylvania Bureau of Professional and Occupational Affairs, and subsequently to records from the American Board of Medical Specialties directory of board-certified medical specialists.<sup>27</sup> A dummy variable was constructed to indicate whether or not the operating physician was board-certified in general surgery or another surgical specialty. A second dummy variable was used to identify patients (8% of all patients) with operating physicians whose license numbers could not be linked to names to determine board-certification status. Use of these 2 variables in tandem produced a reasonable way of controlling for surgeon qualifications in our models.

## Data Analysis

Descriptive statistics (means, SDs, and percentages) and significance tests ( $\chi^2$  and F tests) were computed to compare groups of hospitals that varied in terms of their educational composition on hospital characteristics, including nurse experience and nurse staffing, and patient characteristics. Logistic regression models were used to estimate the effects of a 10% increase in the proportion of nurses who had a bachelor's or master's degree on patient mortality and failure to rescue, and to estimate the effects of nurse staffing, nurse experience, and surgeon board certification. The associations of educational composition, staffing, experience of nurses, and surgeon board certification with patient outcomes were computed before and after controlling for patient characteristics (demographic characteristics, nature of the hospital admission, comorbidities, and relevant interaction terms) and hospital characteristics (bed size, teaching status, and technology).

To account for the clustering of patients within hospitals in our sample, all model estimates were computed using Huber-White (robust) procedures to adjust the SEs of the estimated parameters. Direct standardization estimates derived from the final model are presented to indicate the size of the effects of educational composition of nursing staff independently of and jointly with nurse staffing levels. With all patients and using the final fully adjusted models for predicting death and failure to rescue, the probabilities of poor outcomes were calculated for patients in hospitals assuming that 20%, 40%, and 60% of the hospital RNs held bachelor's or master's degrees and under various patient-to-nurse ratios (4, 6, and 8 patients per nurse), with all other patient and hospital characteristics unchanged.<sup>28</sup> All analyses were conducted using STATA version 7.0 (STATA Corp, College Station, Tex), using  $P < .05$  as the level of statistical significance.

## RESULTS

### Characteristics of Hospitals and Patients

[Table 1](#) provides information on characteristics of the 168 hospitals in our sample. About 19% of the hospitals had more than 250 beds, 36% were teaching hospitals, and 28% had high-technology facilities. Across all hospitals, nurses had a mean (SD) of 14.2 (2.7) years of experience and a mean (SD) workload on their last shift of 5.7 (1.1) patients. The proportion of staff nurses with bachelor's degrees or higher degrees ranged from 0% to 70% across the hospitals. In 20% of the hospitals (34/168) less than 20% of staff nurses had BSN or higher degrees, while in 11% of

the hospitals (19/168) 50% or more of the nurses had BSN or higher degrees. Hospitals with higher percentages of nurses with BSN or master's degrees tended to be larger and have postgraduate medical training programs, as well as high-technology facilities. Hospitals with higher proportions of baccalaureate- and master's-prepared nurses also had slightly less experienced nurses on average and significantly lower mean workloads. The strong association between the educational composition of hospitals and other hospital characteristics, including nurse workloads, makes clear the need to control for these latter characteristics in estimating the effects of nurse education on patient mortality.

**Table 1.** Characteristics of the Study Hospitals, Overall and by Educational Composition of the Nurse Workforce

Characteristic	All Hospitals (N = 168)	Percentage of the Hospital Nurse Workforce With BSN or Higher Degrees					P Value for Trend*
		<20% (n = 34)	20%-29% (n = 53)	30%-39% (n = 36)	40%-49% (n = 26)	≥50% (n = 19)	
Large (≥251 beds), No. (%)	32 (19.1)	1 (2.9)	3 (5.7)	9 (25.0)	8 (30.8)	11 (57.9)	<.001
Teaching hospitals, No. (%)	61 (36.3)	5 (14.7)	14 (26.4)	15 (41.7)	12 (46.2)	15 (78.9)	<.001
High technology, No. (%)†	47 (28.0)	2 (5.9)	10 (18.9)	12 (33.3)	10 (38.5)	13 (68.4)	<.001
Nurse experience, mean (SD), y	14.2 (2.7)	14.9 (3.6)	14.4 (2.1)	14.0 (2.3)	14.3 (2.6)	12.5 (3.1)	.19
Nurse staffing, mean (SD) ratio of patients per nurse	5.7 (1.1)	6.5 (1.1)	5.7 (1.0)	5.5 (1.1)	5.5 (1.0)	5.2 (1.1)	<.001

\*P values were derived from  $\chi^2$  and F tests.

†High technology was defined as hospitals that had facilities for open-heart surgery, major organ transplantations, or both.

**Table 1.** Characteristics of the Study Hospitals, Overall and by Educational Composition of the Nurse Workforce

[Table 2](#) describes characteristics of the patients in our sample and how they varied across hospitals with different nurse educational compositions. Of the patients studied, 43.7% were men and the mean (SD) age was 59.3 (16.9) years. Of the 232 342 patients, 53 813 (23.2%) experienced a major complication not present on admission, 4535 (2.0%) died within 30 days of admission, and the death rate among patients with complications (failure to rescue) was 8.4%. The 2 largest categories of surgical procedures patients underwent were orthopedic (51.2%) and digestive tract/hepatobiliary (36.4%) procedures.

**Table 2.** Characteristics of Surgical Patients in the Study Hospitals, Overall and by Educational Composition of Staff Registered Nurses\*

	All Hospitals (N = 168)	Percentage of the Hospital Nurse Workforce With BSN or Higher Degrees				
		<20% (n = 34)	20%-29% (n = 53)	30%-39% (n = 36)	40%-49% (n = 26)	≥50% (n = 19)
Total patients, No. (%)	232 342	24 766 (10.7)	54 366 (23.4)	58 329 (25.1)	47 955 (20.6)	46 926 (20.2)
Age, mean (SD), y	59.3 (16.9)	61.3 (16.9)	60.8 (16.7)	58.9 (17.1)	59.0 (16.9)	57.3 (16.8)
Men, No. (%)	101 624 (43.7)	10 350 (41.8)	23 298 (42.9)	25 369 (43.5)	20 891 (43.6)	21 716 (46.3)
Emergency admissions, No. (%)	63 355 (27.3)	4 691 (18.9)	15 495 (28.5)	16 535 (28.3)	13 583 (28.3)	13 051 (27.8)
Deaths within 30 days of admission, No. (%)	4 535 (2.0)	582 (2.3)	1 170 (2.2)	1 057 (1.8)	911 (1.9)	815 (1.7)
Patients with complications, No. (%)	53 813 (23.2)	5 731 (22.9)	12 439 (22.9)	13 278 (22.8)	10 551 (22.0)	11 814 (25.2)
Deaths among patients with complications (failure to rescue), No. (%)	4 535 (8.4)	582 (10.2)	1 170 (9.4)	1 057 (8.0)	911 (8.6)	815 (6.9)
Major diagnostic categories (MDCs), No. (%)						
Vascular surgery (MDC 5)	11 194 (4.8)	1 006 (4.1)	2 275 (4.2)	2 610 (4.5)	2 307 (4.8)	2 996 (6.4)
Digestive system (MDC 6)	54 919 (23.6)	6 728 (12.3)	13 159 (24.0)	13 377 (24.4)	10 898 (22.7)	10 757 (22.9)
Hepatobiliary system (MDC 7)	29 660 (12.8)	4 050 (13.7)	6 909 (12.7)	8 138 (14.0)	5 651 (11.8)	4 912 (10.5)
Musculoskeletal system (MDC 8)	118 945 (51.2)	11 124 (44.9)	28 515 (52.5)	30 256 (51.9)	25 019 (52.2)	24 031 (51.2)
Skin, subcutaneous tissue, breast (MDC 9)	12 771 (5.5)	1 390 (5.6)	2 634 (4.8)	3 156 (5.4)	3 015 (6.3)	2 576 (5.5)
Endocrine, nutritional, and metabolic diseases and disorders (MDC 10)	4 853 (2.1)	468 (1.9)	874 (1.6)	792 (1.4)	1 065 (2.2)	1 654 (3.5)
Comorbidities, No. (%)						
Hypertension	79 827 (34.4)	8 524 (34.4)	19 243 (35.4)	18 604 (31.9)	16 726 (34.9)	16 730 (35.7)
Diabetes mellitus	31 385 (13.5)	3 705 (11.8)	8 001 (14.7)	7 207 (12.4)	6 294 (13.1)	6 178 (13.2)
Insulin-dependent diabetes	3 607 (1.6)	420 (1.7)	785 (1.4)	949 (1.6)	700 (1.5)	753 (1.6)
Cancer	28 558 (12.3)	3 050 (12.3)	6 438 (11.8)	6 425 (11.0)	6 121 (12.8)	6 524 (13.9)
Chronic pulmonary disease	19 819 (8.5)	2 566 (10.4)	5 251 (9.7)	4 670 (8.0)	4 063 (8.5)	3 269 (7.0)
Congestive heart failure	11 795 (5.1)	1 445 (5.8)	2 899 (5.3)	2 688 (4.6)	2 313 (4.8)	2 450 (5.2)
Arrhythmia	3 965 (1.7)	444 (1.8)	973 (1.8)	886 (1.5)	856 (1.8)	806 (1.7)
Aortic stenosis	2 248 (1.0)	235 (0.9)	498 (0.9)	574 (1.0)	479 (1.0)	462 (1.0)
Board-certified surgeon	170 063 (73.2)	16 324 (65.9)	37 580 (69.1)	45 178 (77.5)	37 053 (77.3)	33 928 (72.3)

\*All characteristics differed significantly across the groups of hospitals at the  $P < .001$  level, according to an F test (in the case of age) and  $\chi^2$  tests (in all others).

**Table 2.** Characteristics of Surgical Patients in the Study Hospitals, Overall and by Educational Composition of Staff Registered Nurses\*

The most common patient comorbidities were hypertension (34.4%) and diabetes (13.5%). While the largest proportion of patients (58 329 or 25%) were cared for in hospitals in which 30% to 39% of the nurses were at least BSN-educated, the numbers ranged across the sample (Table 2). Moreover, characteristics of patients, including whether the operating physician was a board-certified surgeon, differed across the groups of hospitals defined by the percentage of nurses with BSN or higher degrees, although few of these characteristics varied across groups in a consistent pattern.

### Effects of Hospital RN Education on Mortality and Failure to Rescue

Table 3 presents odds ratios (ORs) representing the raw or unadjusted effects of nurse education, staffing, and experience, and the effect of a board-certified surgeon as operating physician. Also in Table 3 the adjusted ORs show the effects of those factors in a model controlling for all of these factors and for other hospital and patient characteristics. There was a statistically significant relationship between the proportion of nurses in a hospital with bachelor's and master's degrees and the risks of both mortality and failure to rescue, both before and after controlling for other hospital and patient characteristics.

**Table 3. Odds Ratios Estimating the Effects of Nurse and Physician Variables on Patient Mortality and Failure to Rescue\***

Outcome and Effect	Estimated Separately and Unadjusted, OR (95% CI)	P Value	Estimated Jointly and Adjusted, OR (95% CI)†	P Value
Mortality				
Nurse education	0.94 (0.89-0.99)	.02	0.95 (0.91-0.99)	.008
Nurse staffing	1.14 (1.08-1.19)	<.001	1.06 (1.01-1.10)	.02
Nurse experience	1.03 (1.01-1.06)	.009	1.00 (0.98-1.02)	.86
Board-certified surgeon	0.51 (0.41-0.63)	<.001	0.85 (0.73-0.99)	.03
Failure to rescue				
Nurse education	0.92 (0.89-0.96)	<.001	0.95 (0.91-0.99)	.02
Nurse staffing	1.11 (1.06-1.16)	<.001	1.05 (1.01-1.10)	.03
Nurse experience	1.03 (1.01-1.06)	.009	1.01 (0.98-1.03)	.52
Board-certified surgeon	0.61 (0.50-0.74)	<.001	0.80 (0.68-0.94)	.007

Abbreviations: CI, confidence interval; OR, odds ratio.

\*Odds ratios indicate the change in the risk of mortality or failure to rescue (deaths in patients with serious complications) associated with a 10% increase in the proportion of nurses with bachelor's or master's degrees (nurse education), an increase in workload of 1 patient per nurse (nurse staffing), a 1-year increase in average staff nurse experience, and having an operating physician holding board certification in surgery or a surgical specialty. Significance of all effects assessed using z statistics.

†Odds ratios and CIs were derived from robust logistic regression models that accounted for clustering of observations within hospitals. Adjusted for patient's age, sex, diagnosis related group, comorbidities, and significant interactions between them. Also adjusted for hospital characteristics including high technology, teaching status, and number of beds.

**Table 3. Odds Ratios Estimating the Effects of Nurse and Physician Variables on Patient Mortality and Failure to Rescue\***

Each 10% increase in the proportion of nurses with higher degrees decreased the risk of mortality and of failure to rescue by a factor of 0.95, or by 5%, after controlling for patient and hospital characteristics. This adjusted OR of 0.95 (95% confidence interval, 0.91-0.99) is a multiplicative parameter. To estimate how much of a difference would be expected between hospitals in which 20% vs 60% of the nurses had at least BSNs, it should be taken to the fourth power (since the difference between 20% and 60% is equivalent to four 10% intervals). The resultant ratio ( $0.95^4 = 0.81$ ) indicates that all else being equal, the odds of 30-day mortality and failure to rescue would be 19% lower in hospitals where 60% of the nurses had BSNs or higher degrees than in hospitals where only 20% of nurses did.

All 3 of the other clinician characteristics studied (nurse staffing, experience, and board-certified surgeon as operating physician) had significant associations with mortality before controlling for each other, the educational composition of RNs, and all other patient and hospital characteristics. The final model indicates only very slight changes in the parameters estimating the nurse staffing effect that we previously reported<sup>2</sup> when nurse education is added (from a 7% increase in risk of both negative outcomes with a 1 patient-per-nurse increase in mean workload originally reported to a 6% increase in mortality risk and a 5% increase in risk of failure to rescue).

Nurses' years of experience were not found to be a significant predictor of mortality or failure to rescue in the full models. The strong and significant decrease in mortality associated with having a board-certified surgeon as operating physician is largely explained by the tendency of patients with board-certified surgeons to be treated at hospitals with other characteristics associated with better outcomes. None of the interaction terms created by combining these 4 variables achieved statistical significance, suggesting that nurse education, nurse staffing, and surgeon board certification operate independently of each other in predicting mortality and failure to rescue.

These effects imply that altering the educational background of hospital nurses by increasing the percentage of those earning a BSN would produce substantial decreases in mortality rates for surgical patients generally and for patients who develop complications. Direct standardization techniques were used to predict the excess deaths in all patients and patients with complications that would be expected with varying levels of nurse educational levels and workloads. As [Table 4](#) shows, if the proportion of BSN nurses in all hospitals was 60% rather than 20%, 3.6 fewer deaths per 1000 patients (21.1 - 17.5) and 14.2 fewer deaths per 1000 patients with complications (failure to rescue) would be expected. Moreover, [Table 4](#) indicates that the effect on mortality of a 20% increase in the percentage of BSNs in the workforce would be roughly equivalent to the effect of a reduction in mean nurse workload of 2 patients, and that both the mortality and failure-to-rescue rates would be decidedly lower if both the workloads were lighter and the workforce were composed of higher percentages of BSN-prepared nurses.

**Table 4. Estimated Rates of Mortality and Failure to Rescue per 1000 Patients, by Levels of Nurse Education and Staffing**

Education, % With BSN	Staffing (Patients per Nurse)			Overall
	8	6	4	
<b>Mortality</b>				
20	23.8	21.6	19.7	21.1
40	21.7	19.8	18.0	19.2
60	19.8	18.0	16.4	17.5
Overall	22.0	20.0	18.2	19.5
<b>Failure to Rescue</b>				
20	100.2	92.6	85.4	90.4
40	92.2	85.0	78.4	83.1
60	84.7	78.0	71.8	76.2
Overall	93.4	86.2	79.5	84.3

Abbreviation: BSN, bachelor of science in nursing degree.

**Table 4. Estimated Rates of Mortality and Failure to Rescue per 1000 Patients, by Levels of Nurse Education and Staffing**

## COMMENT

To our knowledge, this study provides the first empirical evidence that hospitals' employment of nurses with BSN and higher degrees is associated with improved patient outcomes. Our findings indicate that surgical patients cared for in hospitals in which higher proportions of direct-care RNs held bachelor's degrees experienced a substantial survival advantage over those treated in hospitals in which fewer staff nurses had BSN or higher degrees. Similarly, surgical patients experiencing serious complications during hospitalization were significantly more likely to survive in hospitals with a higher proportion of nurses with baccalaureate education.

When the proportions of RNs with hospital diplomas and associate degrees as their highest educational credentials were examined separately, the particular type of educational credential for nurses with less than a bachelor's degree was not a factor in patient outcomes. Furthermore, mean years of experience did not independently predict mortality or failure to rescue, nor did it alter the association between educational background or of staffing and either patient outcome. These findings suggest that the conventional wisdom that nurses' experience is more important than their educational preparation may be incorrect. The improved outcomes associated with higher levels of BSNs in a hospital was found to be independent of and additive to the associations of superior outcomes in hospitals with better nurse staffing we reported previously.<sup>2</sup> Thus, both lower patient-to-nurse ratios and having a majority of RNs educated at the baccalaureate level appear to be jointly associated with substantially lower mortality and failure-to-rescue rates for patients undergoing common surgical procedures.

In our sample of 168 Pennsylvania hospitals in which the proportion of nurses with bachelor's degrees and mean patient-to-nurse ratios varied widely, 2% (4535/232 342) of the surgical patients undergoing the procedures we studied died within 30 days of hospital admission. Our results imply that had the proportion of nurses with BSN or higher degrees been 60% and had the patient-to-nurse ratio been 4:1, possibly 3810 of these patients (725 fewer) might have died, and had the proportion of baccalaureate nurses been 20% and had staffing uniformly been at 8:1 patient-to-nurse ratios, 5530 (995 more) might have died. While this difference of more than 1700 deaths across 2 educational and staffing scenarios is approximate, it represents a conservative estimate of preventable deaths potentially attributable to nurses' education and RN staffing levels because our patient sample represents only about half of all surgical cases in the study hospitals.

One limitation of our analysis is the potential for response bias in the education and staffing measures derived from the nurse survey, given a 52% response rate. However, examining the Pennsylvania respondents in the probability-based National Sample Survey of Registered Nurses conducted in 2000,<sup>21</sup> we found no evidence of overall differences between our sample and Pennsylvania hospital staff nurses at large in terms of job satisfaction or demographic characteristics, including education.

A second limitation relates to study design. Longitudinal data sets, preferably including hospitals from more than 1 state, will be essential for establishing the generalizability of these findings as well as establishing whether and how levels of baccalaureate-prepared nurses and nurse staffing in a hospital are causally related to

patient outcomes. Also, as in any research drawing on administrative patient outcomes data, there is a potential for differences in completeness and consistency of diagnostic coding across hospitals to influence risk adjustment.<sup>29</sup>

A number of checks on the validity of these findings were completed. Allowing nurse education to have a nonlinear effect and testing whether the effect of education varied across levels of educational composition using quadratic and dummy variables did not significantly improve model fit, suggesting that incremental increases in more educated nurses in a hospital were associated with progressively better outcomes. Including the small proportion of nurses who checked "other" as their highest degree with nurses in the baccalaureate or higher category or in the associate degree or diploma category rather than omitting them from calculations yielded no change in the estimated associations between education and patient outcomes. In an attempt to determine whether unobserved variables that distinguished patients treated in hospitals with different levels of nurse education, we computed propensity scores<sup>30</sup> representing the likelihood that patients with various characteristics were treated in hospitals with high and low levels of baccalaureate nurses. These scores were not a significant predictor of mortality or of failure to rescue, nor did they significantly alter our estimates of the association between education and outcomes.

Research suggests that nurse executives in university teaching hospitals prefer a nurse workforce with approximately 70% prepared at the baccalaureate level and estimate that current levels average 51%. Also, community hospital nurse executives prefer to have 55% of their RNs educated at the baccalaureate level.<sup>31</sup> Data are not currently available to estimate the proportion of hospitals nationally that have 50% or more of their RN workforces prepared at the BSN level or higher, but since only 11% of Pennsylvania hospitals met this standard in our sample there appears to be a wide gap between the preferences of hospital executives and current staffing patterns.

Only 43% of all hospital staff nurses nationally in 2000 were prepared at the BSN level or higher. Enrollments in baccalaureate nursing programs declined by almost 10% from 1995 to 2000, although the past few years have seen an upturn.<sup>21, 32</sup> The return of diploma- and associate degree-prepared RNs to colleges and universities after their initial preparation has been an important source of baccalaureate-prepared nurses. About 22% of currently employed hospital RNs with BSN or higher degrees received them after their basic educations.<sup>21</sup> However, the proportion of hospital nurses pursuing further studies declined from 14% in 1984 to 9% in 2000, as did the proportion of hospital nurses who received tuition assistance from their employers (from 66% in 1992 to 53% in 2000).<sup>21, 33</sup> Meeting the demand for baccalaureate-prepared hospital nurses requires renewed support and incentives by employers to encourage nurses to pursue education to the level of baccalaureate and beyond.

In the current nurse shortage, as in previous ones, public policy discussion has centered on how to increase the supply of RNs. However, little attention has been paid to considering where investments in public funds in the 2 major educational pathways into nursing practice—associate or bachelor's degree programs—will best serve the public good and the interests of employers. Nursing education policy reports published in the past decade concluded that the United States has an imbalance in the educational preparation of its nurse workforce with too few RNs with BSN and higher degrees.<sup>34-36</sup> Our findings provide sobering evidence that this imbalance may be harming patients.

Our documentation of significantly better patient outcomes in hospitals with more highly educated RNs at the bedside underscores the importance of placing greater emphasis in national nurse workforce planning on policies to alter the educational composition of the future nurse workforce toward a greater proportion with baccalaureate or higher education as well as ensuring the adequacy of the overall supply. Public financing of nursing education should aim at shaping a workforce best prepared to meet the needs of the population. Finally, our results suggest that employers' efforts to recruit and retain baccalaureate-prepared nurses in bedside care and their investments in further education for nurses may lead to substantial improvements in quality of care.

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## Attachment 2

# VA NURSING DATA

FY2000-June 2003<sup>1</sup>

## VHA Nursing Personnel Statistics

Total VHA Employees (9-30-02)	
RN	36,648
LPN	9,943
NA	8,833
<b>Total</b>	<b>55,424</b>

Average Age of VHA GS Employees (9-30-02)	
Licensed Practical Nurses	45
Nursing Assistants	46

Advanced Practice Nurses (9-30-02)	
Nurse Practitioner	2,474
Clinical Specialists	685
<b>Total</b>	<b>3,159</b>

VHA RN Age Statistics	VHA	US Over-
	(9-30-02)	all (March 2000)
Average Age	47.4	45.2
Percent of Nurses under 40 yrs	17%	31.7%
Percent of Nurses under 35 yrs	8.1%	18%
Percent of Nurses under 30 yrs <sup>2</sup>	3.0%	9.1%

Note: VA rates include all settings—hospital, nursing home, clinics	RN Vacancy Rate	
	VHA	US Hosp <sup>6</sup>
2002	7.5%	--
2001	8.2%	--
2000	7.7%	10.2%
1999	6.2%	--
1998	4.9%	--

Note: VA rates include all settings—hospital, nursing home, clinics	RN Turnover Rates	
	VHA	US Hosp <sup>6</sup>
<b>6-30-03 (partial yr)</b>	9.6%	--
2002	8.3%	--
2001	8.6%	--
2000	9.1%	21.3%
1999	8.5%	--

## RETIREMENT

- VHA RN retirement eligibility through 2005 is projected as 35%<sup>3</sup>. "Based on best-judgment predictions now, it's not a large, violent, sudden wave, but rather a prolonged, gradual, manageable wave of retirements that should extend well beyond 2005." Other VHA retirement eligibility through 2005 is 29% LPN and 34% NA.
- RNs enrolled in CSRS equal 10,543 versus 24,348 in FERS. Retirement predictions regarding FERS-enrolled RNs is limited due to lack of historical trend data (as a result of its newness) and lack of data re the influence of the portability of FERS on overall recruitment and retention.
- Vacancy and Turnover rates for VA reflect all categories or nursing and all delivery sites (e.g., hospital, nursing home, outpatient clinic).*

## EDUCATION

- Average age at graduation from basic nursing education is increasing, i.e., 30.5 years in 1995-2000 versus 24.3 years in 1985 or earlier.
- 35%<sup>4</sup> of VA new RN hires would not advance beyond entry level with the new Qualification Standards. It is unclear if hiring these less than BSN-prepared nurses is a result of facility preference or indifference, and/or an inability to attract RNs with a BSN.
- As compared to the U.S. RN education distribution, VA has a greater proportion of higher educated RNs, 19% with more than a BS versus 10.2% in the general population and 40%<sup>5</sup> with less than a BS versus the nation's 56.6% [2000 data].
- As of 2002, VA's trend of higher educated RNs continues to grow, with 39% holding more than a BS degree and only 36% with less than a BS degree.

<sup>1</sup> Based on VA PAID data files-- FY 1998, 2000, 2002, 2003, and US Dept of Health and Human Services' Findings from the National Sample Survey of Registered Nurses, March 2000. VA Nurse Anesthetist data are excluded from this analysis.

<sup>2</sup> In 1980, US RNs under 30 = estimate 25.1%

<sup>3</sup> To place this in perspective though, for RNs, [other than the current year retirement percent rate, which because it includes retirement eligible RNs who have not as yet retired, is always larger than average, i.e., 12%] the retirement rate is incremental at a seemingly manageable 3.7 to 5.3 % per year. The new RN hires in 2000 comprises 9 % of total VA RNs. therefore, to date, new hires are replacing retirees.

<sup>4</sup> 41% in 1998

<sup>5</sup> 47% in 1998

<sup>6</sup> American Organization of Nurse Executives, *Acute Care Hospital Survey of RN Vacancy & Turnover Rates (Jan 2002)*

## FUTURE TREND

Dr. Peter Buerhaus predicts that the total number of nurses per capita is likely to peak by 2007 and decline steadily thereafter. By 2020, US RN workforce is forecast to be roughly the same size as it is today, declining nearly 20% below RN workforce requirements. This shortage – possibly large – is unprecedented because it will be driven by rapidly aging RN workforce that will not be replaced by younger cohorts.

From the data available, the average age of VA nurses will continue to rise. VA needs to focus more effort on increasing its desirability to younger nurses and maintaining a safe work environment with consideration to the needs of an older workforce.

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