

**DEADLY CONSEQUENCES: THE HIDDEN IMPACT OF  
AMERICA'S NURSING SHORTAGE**

**BY STUART ANDERSON**

**EXECUTIVE SUMMARY**

The aging U.S. population and low domestic production of nurses in the United States has created a nursing shortage that carries deadly consequences for U.S. hospital patients. An extensive review of the medical literature finds that a shortage of nurses at U.S. hospitals is leading to increased death and illness for Americans.

- A Journal of the American Medical Association (JAMA) study on general, orthopedic and vascular surgery patients at hospitals implied "the odds of patient mortality increased 7 percent for every additional patient in the average nurse's workload in the hospital." The study found that increasing a nurse's workload from 4 to 8 patients would be accompanied by a 31 percent increase in patient mortality. It concluded: "These effects imply that, all else being equal, substantial decreases in mortality rates could result from increasing registered nurse staffing, especially for patients who develop complications."
- A 2004 Health Services Research study, authored by North Carolina University at Chapel Hill Professor Barbara Mark (and others), concluded: "Our findings indicate the clear benefit of increasing nurse staffing to reduce hospital mortality . . ." The authors of the paper noted, "In an environment of a progressively severe nursing shortage, policy decisions related to effective and efficient deployment of an increasingly scarce resource – registered nurses – and how change in nurse staffing affects change in quality of care could not be more important."
- A 2007 Health and Human Services report, prepared by the Minnesota Evidence-based Practice Center, concluded, "Higher registered nurse staffing was associated with less hospital-related mortality, failure to rescue, cardiac arrest, hospital acquired pneumonia, and other adverse events. The effect of increased registered nurse staffing on patients safety was strong and consistent in intensive care units and in surgical patients. Greater registered nurse hours spent on direct patient care were associated with decreased risk of hospital-related death and shorter lengths of stay."
- A study of Canadian hospitals found a 10 percent increase in registered nurse staff caring for acute medical patients was associated with 5 fewer deaths in 1000 discharged patients.
- An August 2006 *Archives of Pediatrics and Adolescent Medicine* paper on neonatal intensive care units reported: "Our findings suggest that registered nurse staffing is associated with the risk of bloodstream infection among infants." The findings suggested, "Increasing registered nurse staffing by 1 full-time equivalent could possibly reduce the risk of bloodstream infection by 11 percent."

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Health analysts David Auerbach, Peter Buerhaus and Douglas Staiger recently estimated that the current nursing shortage would grow to 340,000 by 2020. "A shortage of 340,000 is three times larger than the size of the current shortage when it was at its peak in 2001," note the authors. "At that time, many hospitals closed patient programs and nursing units, and the national average hospital RN vacancy rate was 13 percent." They note the shortage "continues to constitute a serious threat to access and efforts to improve the quality and safety of health care."

Wage increases alone are unlikely to solve the nursing shortage. Even with substantial increases in salaries and nurse graduation rates, the nursing gap is likely to persist for another decade, analysts note. Financial considerations are likely to constrain wage growth, while capacity issues bedevil nursing schools.

For policymakers it is best to focus on the two most practical solutions to alleviate the impact of the nursing shortage on U.S. patients. 1) Increasing nursing faculty and school infrastructure and 2) Raising immigration quotas to facilitate the entry of foreign nurses.

So far, U.S. nursing schools have shown they do not have enough capacity to accommodate significant increases in their graduation rates. "In 2005, schools of nursing were forced to reject 147,000 qualified applicants because of shortages of faculty, classroom space, and clinical placement sites for students." Given that even optimistic projections assume a continued nurse shortage lasting a decade or more, policymakers concerned about the shortage's impact on U.S. hospital patients must consider relaxing current immigration quotas.

Due to inadequate green card quotas, a skilled foreign professional could wait 5 years or more to immigrate legally to the United States. In the high tech sector, some professionals and researchers can gain entry on temporary visas, particularly H-1B visas, although the supply of those has been exhausted before the start of the past four fiscal years. Today, the vast majority of nurses cannot enter the United States and work on temporary visas. Congress recognized the labor supply problems with nurses when in 2005 it allocated 50,000 extra green cards (for permanent residence) with a priority for foreign nurses and others who qualified under Schedule A (DOL designation of shortage occupations) to be sponsored by employers in the United States. That extra green card allocation has been exhausted. Immigration alone cannot solve the nursing shortage but it can alleviate many of its most damaging impacts on patients.

## **THE CURRENT NURSING SHORTAGE**

“The United States is in the midst of a nursing shortage that is expected to intensify as baby boomers age and the need for health care grows,” according to the American Association of Colleges of Nursing (AACN).<sup>1</sup> The Bureau of Labor Statistics projects that more than 1.2 million new and replacement nurses will be needed by 2014, with the 703,000 new Registered Nurse positions representing approximately 40 percent of all new jobs in health care.<sup>2</sup> The Health Resources and Services Administration (HRSA), a part of the U.S. Department of Health and Human Services, has projected the nursing shortage to grow to over one million nurses by 2020, hitting all 50 states.<sup>3</sup>

Since that Health Resources and Services Administration projection, other analysts have lowered estimates on the magnitude of the shortage, though the forecasts remain substantial. Health analysts David I. Auerbach, Peter I. Buerhaus and Douglas O. Staiger recently estimated that the current nursing shortage would grow to 340,000 by 2020. Although a lower figure, it still represents a formidable shortfall. “A shortage of 340,000 is three times larger than the size of the current shortage when it was at its peak in 2001,” note the authors. “At that time, many hospitals closed patient programs and nursing units, and the national average hospital RN [registered nurse] vacancy rate was 13 percent.” They note the revised forecast “continues to constitute a serious threat to access and efforts to improve the quality and safety of health care.”<sup>4</sup>

Research indicates that the nursing shortage is more severe in rural areas. “Rural areas are faced with a unique set of circumstances that exacerbate the ongoing RN shortage,” concludes a detailed analysis of the health care situation in Nebraska. “Rural areas of the state consistently exhibited significantly greater RN shortages than did the urban area.” One suggestion is to employ to register nurses the concept of Health Professional Shortage Areas and Medically Underserved Areas, which now help with funding for physicians.<sup>5</sup>

While one can debate the extent of the nursing shortage, there is less doubt in health circles as to the nursing shortage's severe and sometimes deadly consequences for patients.

## **PATIENT MORTALITY**

While much of the information in this report may surprise members of the general public, a consensus is forming among health experts that nurse understaffing leads to greater hospital deaths. The issue goes to the core of a nurse's function as a “hands on” monitor of a patient's health during a hospital stay. As a *Journal of the American Medical Association* (JAMA) study explained, “Registered nurses constitute an around-the-clock surveillance system in hospitals for early detection and prompt intervention when patients' conditions deteriorate. The effectiveness of nurse surveillance is influenced by the number of registered nurses available to assess patients

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on an ongoing basis. Thus, it is not surprising that we found nurse staffing ratios to be important in explaining variation in hospital mortality.”<sup>6</sup>

The results of the JAMA study on general, orthopedic and vascular surgery patients at hospitals implied “the odds of patient mortality increased 7 percent for every additional patient in the average nurse’s workload in the hospital.” In other words, the study found that increasing a nurse’s workload from 4 to 8 patients would be accompanied by a 31 percent increase in patient mortality. “These effects imply that, all else being equal, substantial decreases in mortality rates could result from increasing registered nurse staffing, especially for patients who develop complications.”<sup>7</sup>

The authors of the JAMA study noted the results do not indicate the precise optimal ratio of patients per nurse. “Our major point is that there are detectable differences in risk-adjusted mortality and failure-to-rescue rates across hospitals with different registered nurse staffing ratios.” The study also found that “nurses in hospitals with the highest patient-to-nurse ratios are more than twice as likely to experience job-related burnout and almost twice as likely to be dissatisfied with their jobs compared with nurses in the hospitals with the lowest ratios.”<sup>8</sup> In other words, the shortage of nurses can lead to job dissatisfaction and nurses leaving the profession, thus exacerbating existing shortages.

A 2004 Health Services Research study, authored by North Carolina University at Chapel Hill Professor Barbara Mark (and others), reviewed a variety of research related to the impact of nurse staffing and hospital patient mortality. Mark and her colleagues concluded: “Our findings indicate the clear benefit of increasing nurse staffing to reduce hospital mortality . . .”<sup>9</sup> The authors of the paper noted, “In an environment of a progressively severe nursing shortage, policy decisions related to effective and efficient deployment of an increasingly scarce resource—registered nurses—and how change in nurse staffing affects change in quality of care could not be more important.”<sup>10</sup>

A 2007 Health and Human Services report prepared by the Minnesota Evidence-based Practice Center, concluded, “Higher registered nurse staffing was associated with less hospital-related mortality, failure to rescue, cardiac arrest, hospital acquired pneumonia, and other adverse events. The effect of increased registered nurse staffing on patients safety was strong and consistent in intensive care units and in surgical patients. Greater registered nurse hours spent on direct patient care were associated with decreased risk of hospital-related death and shorter lengths of stay.”<sup>11</sup>

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A study of Canadian hospitals confirmed the research on nurse staffing and patient mortality in U.S. hospitals. The Canadian study found a 10 percent increase in registered nurse staff caring for acute medical patients was associated with 5 fewer deaths in 1000 discharged patients.<sup>12</sup>

A 2002 study in the *New England Journal of Medicine* examined administrative data for over 5 million medical patients and more than 1 million discharges of surgical patients. The research covered 799 hospitals in 11 states. The study concluded, "A higher proportion of hours of nursing care provided by registered nurses and a greater number of hours of care by registered nurses per day are associated with better care for hospitalized patients." The study found that "a higher proportion of hours provided by registered nurses was associated with lower rates of pneumonia, shock or cardiac arrest, and 'failure to rescue.'"<sup>13</sup> Failure to rescue is defined as death from pneumonia, shock or cardiac arrest, upper gastrointestinal bleeding, sepsis, or deep venous thrombosis.<sup>14</sup>

A 1999 study on AIDS patients found "an increase of 0.25 nurse per patient day would produce a 20 percent decrease in 30-day mortality."<sup>15</sup>

Finally, a study in *Health Services Research* found the fewer registered nurse hours per patient, the greater the likelihood of patients developing pneumonia. The paper controlled for hospital characteristics and examined data on patients 18 years and older and staffing levels for 9 states between 1990 and 1996. "An inverse relationship was found between RN hours per adjusted inpatient day and pneumonia for routine and emergency patient admissions," concluded the study. "The inverse relationship between pneumonia and nurse staffing are consistent with previous findings in the literature."<sup>16</sup>

Fewer nurses on the night shift resulted in "an increased risk of complications, increased costs to the organization, and longer lengths of stays," according to a 2001 study of on the impact of intensive care unit nurse-to-patient ratios on patients receiving liver excision (hepatectomy).<sup>17</sup>

## **THE NURSING SHORTAGE'S IMPACT ON CHILDREN**

What about the impact of the nursing shortage on infants, perhaps the most vulnerable patients? A significant cause of death among infants in neonatal intensive care units is health-care related infections. Research has shown a link between nurse staffing and infections in infants.

In the August 2006 *Archives of Pediatrics and Adolescent Medicine*, researchers examined nurse staffing levels and 2,675 infants admitted to neonatal intensive care units for more than 48 hours at New York hospitals. "Our findings suggest that registered nurse staffing is associated with the risk of bloodstream infection among infants," concluded the study's authors. "We hypothesize that inadequate nurse staffing and increased nurse workload in a

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critical care environment results in poor hand hygiene compliance, breaks in aseptic technique, or compromises in practice that might increase the risk of transmitting infection.” The findings suggested “increasing registered nurse staffing by 1 full-time equivalent could possibly reduce the risk of bloodstream infection by 11 percent.”<sup>18</sup>

**NURSES’ PERCEPTIONS OF THE SHORTAGE’S IMPACT ON PATIENT CARE**

A survey of registered nurses found approximately two-thirds (65 percent) believed the shortage of nurses has caused a major problem in the “early detection of complications.” Table 1 shows 78 percent believed the nursing shortage has negatively affected the “quality of patient care,” while 91 percent say it has impacted the time nurses can spend with patients.<sup>19</sup>

**Table 1**  
**Impact of Nurse Shortage on Nurses’ Ability to Provide Care**

<b>From what you know, how much of a problem do you think the shortage of nurses has been for ...?</b>	<b>Percent of Registered Nurses Reporting Major Problem</b>
<b>Quality of patient care</b>	78 percent
<b>Time for collaboration with teams</b>	55 percent
<b>Ability of nurses to maintain patient safety</b>	69 percent
<b>Early detection of complications</b>	65 percent
<b>Nurses’ time for patients</b>	91 percent
<b>Quality of nurses’ work life</b>	82 percent

Source: Buerhaus et al, “Impact of the Nurse Shortage on Hospital Patient Care: Comparative Perspectives,” *Health Affairs*, May/June 2007, p. 857. Survey results from 2004.

**POLICY IMPLICATIONS**

Policymakers seeking to address the nursing shortage and its impact on patient health possess a limited set of options. Simply mandating different patient-to-nurse ratios does not increase the supply of available registered nurses.

**WAGE INCREASES**

Would wage increases alone solve the problem of a nursing shortage? One answer is whether one hopes to address the issue in the short term or long term. Unfortunately, even an optimistic assessment of whether wage increases could eventually eliminate the shortage of registered nurses anticipates such salary increases will take a long time to solve the problem. “The shortage will not end without sizable RN wage and graduation growth every year for at least the next ten years. Achieving such continuous growth will be difficult and might not even be possible,” concludes Joanne Spetz, associate director of the Center for California Workforce Studies at the

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University of California, San Francisco, and Ruth Given, director of health care research at Deloitte Consulting in Los Angeles.<sup>20</sup>

Writing in 2003, Spetz and Given concede to utilizing several strong assumptions in forecasting a potential end to the nursing shortage by 2015 – if wage and graduation growth are significant. One assumption is that if wages rise, then the demand for registered nurses will decline, meaning hospitals simply won't need as many nurses. But as Spetz and Given point out, "There are numerous barriers to employers' reducing their demand for RNs."<sup>21</sup>

At least one reason discussed in this paper for why hospitals may not decrease their demand for nurses is the potential impact of insufficient nurses on patient health. There are also financial constraints limiting salary increases for registered nurses. Payroll costs represent a significant part of hospital budgets. Wage increases for personnel that would create losses for a hospital would also likely lead to cutbacks elsewhere in the hospital. Hospitals are also often constrained financially by reimbursements for care, including from Medicare.

Medicare is set to begin forcing hospitals to pay for medical errors committed, whether or not those are created by shortages of personnel. Under proposed new rules, "Medicare will not pay hospitals for the costs of treating certain 'conditions that could reasonably have been prevented,'" reported the *New York Times*.<sup>22</sup> This potentially could place new cost pressures on hospitals.

As discussed below, it is clear that consistent graduation growth at U.S. nursing schools is not yet achievable given faculty shortages and other capacity issues.

## **PRACTICAL SOLUTIONS**

For policymakers it is best to focus on the two most practical solutions to alleviate the impact of the nursing shortage on U.S. patients.

**Increasing nursing faculty and school infrastructure.** Contrary to earlier concerns, Americans continue to be interested in becoming nurses. The trend is for individuals to turn to nursing at a later age than in the past. The issue remains whether such numbers are sufficient in light of the aging U.S. population and whether nursing schools have sufficient capacity to educate the needed nurses. So far, nursing schools have shown they do not have enough capacity. "In 2005, schools of nursing were forced to reject 147,000 qualified applicants because of shortages of faculty, classroom space, and clinical placement sites for students."<sup>23</sup> Almost three quarters (71 percent) of nursing schools responding to a 2006 American Association of College of Nursing survey listed faculty shortages as a reason for not accepting all qualified applicants into their academic programs.<sup>24</sup>

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In Congressional testimony, Dr. Beverly Malone, PhD., chief executive officer of the National League for Nursing, reported that “new admissions fell by more than 27 percent in 2004-05 after two years of reported increases. The significant dip in admissions seems to mark a turning point, reinforcing that a key priority in tackling the nurse shortage has to be scaling up the capacity to accept qualified applicants.” Dr. Malone noted, however, that according to its survey results “almost two-thirds of full-time nurse faculty members were 45- to 60-years old and likely to retire in the next five to 15 years.”<sup>25</sup>

**Increasing immigration quotas to facilitate the entry of internationally-educated nurses.** Given that even optimistic projections of raising wages and increasing domestic nurse production assumes a continued shortage of a decade or more, policymakers concerned about the impact of the nursing shortage on patient deaths and illnesses must consider relaxing current immigration quotas.

Due to inadequate green card quotas, a skilled professional could wait 5 years or more to immigrate legally to the United States. In the high tech sector, some professionals and researchers can gain entry on temporary visas, particularly H-1B visas, although the supply of those has been exhausted before the start of the past several fiscal years. Such professionals can work in the United States while waiting for a green card (permanent residence), although it entails much hardship and uncertainty.

Today, the vast majority of nurses cannot enter the United States and work on temporary visas. Foreign nurses are ineligible for H-1B temporary visas. Nurses from Canada and Mexico may enter on temporary TN visas (under NAFTA), while an H-1C visa allows some nurses to work on a temporary basis (limited to 500 annually and restricted to about 14 hospitals under the statute). Congress recognized the labor supply problems with nurses when in 2005 it allocated 50,000 extra green cards (for permanent residence) with a priority for foreign nurses and others who qualified under Schedule A (DOL designation of shortage occupations) to be sponsored by employers in the United States. That extra green card allocation has been exhausted.

Immigration measures should be a sensible component of any policy package that seeks to alleviate the nursing shortage and its impact on U.S. hospital patients.

## CONCLUSION

Immigration alone cannot solve the nursing shortage but it can alleviate many of its most damaging impacts for patients, particularly in the near term. A recent study by the Kaufman Foundation found that the lack of green cards harmed American competitiveness by encouraging many bright foreign-born professionals to abandon plans to build a career in the United States.<sup>26</sup> In the case of nurses, current immigration restrictions exacerbate the nursing shortage, contributing to increased death and illness for U.S. patients.



**END NOTES**

<sup>1</sup> <http://www.aacn.nche.edu/Media/FactSheets/NursingShortage.htm>.

<sup>2</sup> Ibid.; <http://www.bls.gov/opub/mlr/2005/11/art5full.pdf>.

<sup>3</sup> Ibid.; <http://bhpr.hrsa.gov/healthworkforce/reports/behindrnprojections/index.htm>.

<sup>4</sup> David I Auerbach, Peter I. Buerhaus and Douglas O. Staiger, "Better Late Than Never: Workforce Supply Implications of Later Entry Into Nursing," *Health Affairs*, 26, no. 1 (2007), p. 184.

<sup>5</sup> Mary Cramer, Jill Nienaber, Peg Helget and Sangeeta Agrawal, "Comparative Analysis of Urban and Rural Nursing Workforce Shortages in Nebraska Hospitals," *Policy, Politics & Nursing Practice*, vol. 7, no. 4, November 2006, pp. 256, 258.

<sup>6</sup> Linda H. Aiken, Sean P. Clarke, Douglas M. Sloane, Julie Sochalski and Jeffrey H. Silber, (2002). "Hospital Nurse Staffing and Patient Mortality, Nurse Burnout, and Job Dissatisfaction," *JAMA*, 2002, 288: 1987-1993.

<sup>7</sup> Ibid.

<sup>8</sup> Ibid.

<sup>9</sup> Barbara A Mark, David W Harless, Michael McCue, and Yihua Xu, "A Longitudinal Examination of Hospital Registered Nurse Staffing and Quality of Care," *Health Services Research*, 2004 April; 39(2): 279–300. The study goes on to note: "results are less clear for complications and the reasons for the differences are not immediately apparent. Improvements in risk-adjustment methodologies, increasing the availability of more complete and reliable data elements about nurse staffing in large secondary databases, and identification and development of quality measures that are more sensitive to variations in nursing care are critical to advancing knowledge in the field, and may yield more consistent findings in studies examining the relationships between nurse staffing and quality."

<sup>10</sup> Ibid., p. 296.

<sup>11</sup> Robert L. Kane, M.D., Tatyana Shamliyan, M.D., M.S., Christine Mueller, Ph.D., R.N.

Sue Duval, Ph.D., Timothy J. Wilt, M.D., M.P.H., "Nurse Staffing and Quality of Patient Care," Prepared for Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services, Evidence Report/Technology Assessment, Number 151, AHRQ Publication No. 07-E005, March 2007. The analysis pointed out it was not possible to definitively show a "causal" relationship.

<sup>12</sup> As cited in A. E. Tourangeau, L.A. Cranley, and L. Jeffs, "Impact of Nursing on Hospital Patient Mortality: A Focused Review and Related Policy Implications," *Quality and Safety in Health Care*, 2006; 15:4-8.

<sup>13</sup> Jack Needleman, Peter Buerhaus, Soeren Mattke, Maureen Stewart, and Katya Zelevinsky, *New England Journal of Medicine*, vol. 346, no. 22, May 30, 2002, p. 1715.

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<sup>14</sup> Ibid.

<sup>15</sup> As cited in Research in Action, AHRQ Publication No. 04-0029, March 2004, p. 5.

<sup>16</sup> Christine Kovner, Cheryl Jones, Chunliu Zhan, Peter J. Gergen, and Jayasree Basu, "Nurse Staffing and Postsurgical Adverse Events: An Analysis of Administrative Data from a Sample of U.S. Hospitals, 1990-1996," *Health Services Research*, 2002, June; 37(3): 611–629.

<sup>17</sup> In *Health Care at the Crossroads: Strategies for Addressing the Evolving Nursing Crisis*, Joint Commission on Accreditation of Health Care Organizations. <http://www.aacn.nche.edu/Media/pdf/JCAHO8-02.pdf>.

<sup>18</sup> Jeannie P. Cimiotti, DNS, RN, Janet Haas, MS, Lisa Saiman, MD, MPH, and Elaine L. Larson, PhD, "Impact of Staffing on Bloodstream Infections in the Neonatal Intensive Care Unit," *Archives of Pediatrics and Adolescent Medicine*, 2006, 160, p. 835.

<sup>19</sup> Peter I. Buerhaus, Karen Donelan, Beth T. Ulrich, Linda Norman, Catherine DesRoches, and Robert Dittus, "Impact of the Nurse Shortage on Hospital Patient Care: Comparative Perspectives," *Health Affairs*, May/June 2007, p. 857. Survey results from 2004.

<sup>20</sup> Joanne Spetz and Ruth Given, "The Future of the Nurse Shortage: Will Wage Increases Close the Gap?," *Health Affairs*, vol. 22, no. 6, November/December 2003, p. 205.

<sup>21</sup> Ibid., p. 204.

<sup>22</sup> Robert Pear, "Medicare Says It Won't Cover Hospital Errors," *New York Times*, August 19, 2007.

<sup>23</sup> David I. Auerbach et al, p. 184.

<sup>24</sup> American Association of College of Nursing, Nursing Shortage Fact Sheet.

<sup>25</sup> Testimony of Dr. Beverly Malone, CEO, National League for Nursing, before the Subcommittee on Labor, Health and Human Services, Education and Related Agencies, Committee on Appropriations, U.S. House of Representatives, March 29, 2007.

<sup>26</sup> "Tougher U.S. Immigration Leading to Reverse Brain Drain: Study," AFP, August 22, 2007.

## ABOUT THE AUTHOR

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