



# ISSUE BRIEF

The Massachusetts Health Policy Forum

## Nurse-to-Patient Ratios: Research and Reality

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**Paper**                      **Katharine Kranz Lewis**, RN, MSN, MPH, Research Associate  
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**Welcome and Introduction**                      **Philip Johnston**, Chairman, Board of Directors,  
Massachusetts Health Policy Forum

**Cathy E. Minehan**, President and CEO,  
Federal Reserve Bank of Boston

**Session I**                      **Research**  
Moderator: **Stuart Altman**, PhD, Sol C. Chaikin Professor of  
National Health Policy, The Heller School, Brandeis University

**Luncheon**                      Keynote Speaker: **Joyce C. Clifford**, PhD, RN, FAAN, President  
and CEO, The Institute for Nursing Healthcare Leadership, Inc.

**Session II**                      **Reality**  
Moderator: **Robert Tannenwald**, PhD, Assistant Vice President  
and Economist, Federal Reserve Bank of Boston

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# **Nurse-to-Patient Ratios, by Katharine Kranz Lewis, RN, MSN, MPH**

## **Executive Summary**

The Massachusetts state legislature is considering a number of approaches to address patient safety including a law establishing minimum registered nurse (RN) staffing ratios in the hospital setting. California is the only state that requires specific minimum nurse-to-patient ratios in acute care hospitals, but regulations are less stringent than those proposed in Massachusetts.

Proponents argue that minimum staffing ratios will improve patient safety and the ability to recruit and retain nurses, while opponents warn that the costs associated with mandated ratios could reduce patient access to care. Policy makers and legislators feel compelled to address the very real problem of patient safety and are considering whether minimum nurse-to-patient ratios are a feasible solution.

Researchers have found that an increased number of RNs is associated with lower mortality, shorter length of hospital stay, and lower rates of urinary tract infections, upper gastrointestinal bleeding, pneumonia and shock/cardiac arrest, as well as fewer adverse outcomes for surgical patients. Nevertheless, research is limited by available data and the difficulty of identifying patient outcomes sensitive to nursing care. Consequently, researchers have been unable to identify the ideal nurse-to-patient ratio, which may be dependent upon a host of variables including patient, nurse, and hospital characteristics.

Increasing the number of RNs appears to be most beneficial to hospitals with fewer nurses per patient, whereas increases of RN staffing in hospitals with better RN to patient ratios has a diminishing marginal effect. Better RN staffing may also improve nurse satisfaction and reduce job burnout. This is increasingly important during a national nursing shortage.

The cost of implementing the proposed minimum RN staffing regulations in Massachusetts is unclear. A study commissioned by the Massachusetts Nurses Association estimates the cost at \$268 million, but the MHA says it could be as high as \$450 million.

Alternatives to minimum nurse-to-patient ratios include optimization techniques, staffing formulas that incorporate variables that affect patient outcomes, and Magnet Status hospitals that have achieved excellence according to the American Nurses Credentialing Center. Legislation has also been introduced in Massachusetts to increase the supply of nurses and ensure that hospitals develop staffing formulas with publicly reported data on patient outcomes.

Massachusetts is on the brink of making a monumental decision about hospital nurse staffing that could impact patient safety and the quality of care patients receive in Massachusetts hospitals. The research provides mixed evidence about the costs and benefits for a range of RN staffing levels. Nevertheless, the time to take action has never seemed more urgent. Mandating RN-to-patient ratios may have significant and far-reaching unintended consequences, while the status quo could be jeopardizing patient outcomes. Legislators and others should proceed with caution on this road to improving patient safety and the quality of care.

# Nurse to Patient Ratios, *Katharine Kranz Lewis, RN, MSN, MPH*

## Introduction

The Massachusetts state legislature is considering a number of approaches to address patient safety, including a law establishing minimum registered nurse (RN) staffing ratios in the hospital setting.<sup>1</sup> Minimum nurse-to-patient ratios are heralded by proponents as one way to ensure that patients are safer and that nurses will be more easily recruited and then remain on the job longer.<sup>2</sup> Opponents warn that mandating ratios will place undue fiscal burdens on hospitals that could lead to bed closures and interrupted access to health care services.<sup>3</sup> Both sides recognize the need to improve patient safety in the wake of the Institute of Medicine (IOM) report, “To Err is Human.”<sup>4</sup> However, the road to improvement in quality is not well mapped out, and whether or not mandated nurse staffing ratios are the best way to make patients safer is an ongoing debate.

This paper describes proposed legislation in Massachusetts that would require minimum nurse staffing levels and other legislation aimed at improving patient safety. To date, California is the only state that has passed a law requiring specific nurse-to-patient ratios in the hospital setting.<sup>5</sup> The California law is described in some detail, followed by a review of the latest research on nurse staffing and patient outcomes and the costs and implications of minimum staffing ratios. The paper ends with a discussion and some conclusions about this complex issue.

## Background

Determining the appropriate nurse staffing level has been and continues to be a complex task that depends upon many variables: the patient; the nurse; the hospital environment; support staff availability; information technology; and the interaction of all these factors with one another within a rapidly changing healthcare system.<sup>6</sup>

Currently, RN staffing levels are determined unit by unit and hospital by hospital, according to the needs of patients, the expertise of the nurse and other factors such as availability of support staff. There are also legal requirements, regulations, and accreditation standards that guide hospital staffing decisions. Many programs and organizations such as Medicare, Medicaid, Department of Public Health and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) have established standards with which hospitals must comply.<sup>7</sup>

The impetus behind the movement for minimum staffing ratios appears to be the significant restructuring in health care delivery through the 1990s. In an attempt to increase efficiency through redesign, the IOM reports that hospitals have in large measure lost the trust of the nurses in their employ. The study reports that a reduction in nurse leadership within the hospital structure and the limited voice of nursing has negatively affected “nurses’ ability to fix problems in their work environments that threaten patient safety.”<sup>8</sup>

The same report goes on to say “no single action can, by itself, keep patients safe from health care errors.”<sup>9</sup> However, the study suggests that hospitals should establish “nurse staffing practices that identify needed nurse staffing for each patient care unit per shift.”<sup>10</sup>

While *inadequate* staffing can result in a decline in the number of direct patient care hours, it is unclear what constitutes *adequate* staffing,<sup>11 12</sup> by what type of nurse,<sup>13 14</sup> to which patients,<sup>15</sup> and in what kind of environment.<sup>16</sup> Legislators, hospitals, nursing organizations, patient advocacy groups, and interest groups are justifiably concerned with this issue, particularly following the IOM report which concluded that as many as 98,000 deaths occur annually as a result of errors committed in the hospital.<sup>4</sup> These errors, some argue, could be greatly reduced with adequate nurse staffing.<sup>17</sup> The question of what represents adequate staffing is at the crux of the mandated nurse-to-patient ratio debate.

A large body of literature explores this issue.<sup>18</sup> Some of this research shows that certain patient outcomes which are sensitive to the quality of nursing care could be improved with better nurse-to-patient ratios.<sup>19</sup> At the same time, economists have attempted to determine how nurse-to-patient ratios affect the bottom line and at what point and under what conditions increased nurse staffing leads to diminishing returns.<sup>20</sup> Furthermore, others have considered what alternative means there might be, aside from ratios, to improve patient outcomes and the satisfaction of nurses.<sup>21</sup> Despite all the research, it is not yet clear what the ideal nurse-to-patient ratio would be, or even if one exists.

California now mandates specific nurse-to-patient ratios in the hospital setting.<sup>22</sup> Proponents of legislation argue that

minimum nurse-to-patient ratios are the best way to ensure safe patient care in hospitals and that, without legislation, hospitals will continue to be understaffed and unsafe.<sup>2</sup> Opponents warn that mandating ratios is a “one size fits all solution” that will so negatively affect hospitals’ fiscal soundness as to interfere with their ability to provide care to patients.<sup>3</sup> In the midst of this debate, patient safety is a very real problem that policy makers and legislators feel compelled to address. Whether or not minimum nurse-to-patient ratios are an integral or realistic part of the solution will be debated in this forum.

### *Legislation*

While there has been some increased activity in state legislatures over the past five years,<sup>23</sup> only California has enacted a law requiring minimum nurse-to-patient ratios. In Massachusetts similar legislation is being considered, with requirements that are even more stringent than those specified in the California legislation.<sup>24</sup>

**California:** The *Safe Staffing Law* was signed in 1999 by then-governor Gray Davis.<sup>5</sup> The California State Department of Health Services (DHS) was given the challenging task of establishing nurse-to-patient ratios for hospitals, according to the unit and the type of nurse. The difficulty for the DHS was the lack of studies and data that identify appropriate ratios, inadequate staffing level data, and the great diversity among nurses, patients, facilities, and support services available. As a result, the deadline for establishing minimum ratios was extended from 2001 to 2002 and then again to 2003. Not until January 1, 2004, were all acute care hospitals within the state of California required to comply with the regulations.<sup>25</sup>

These ratios were established based upon two separate studies conducted by University of California researchers and recommendations made by the California Nurses Association, the California Healthcare Association, the United Nurses Association of California and the Service Employees International Union. Several professional organizations, including the American Academy of Pediatrics, the Association of Women's Health, Obstetric and Neonatal Nurses, also provided recommendations. During development period of the regulations, the DHS also reviewed, analyzed and considered comments from the public.<sup>26</sup>

The final ratios are described in terms of nurse per patient and vary for each type of acute care unit in the hospital. For instance, within the recovery room, one nurse is responsible for no more than two patients, while in the emergency department, nurse-to-patient ratios cannot exceed 1:4. On medical/surgical units, one nurse cannot be assigned more than six patients. The law's regulations allow that 50 percent of nurse staffing can be achieved by licensed vocational nurses or LVNs (the equivalent of LPNs in Massachusetts) except in specific areas like the newborn intensive care unit and emergency room triage.<sup>27</sup>

California also has a Patient Classification System (PCS), in place since 1996, which requires hospitals to have systems in place that determine what nurse staffing levels are necessary based upon the severity of illness for each patient. The PCS is to remain in effect under the current legislation and must be adhered to even if the ratios required by the PCS are more stringent than those specified in the current legislation.<sup>28 32</sup> Therefore, if patients require staffing levels of 1:4 under the PCS and the Safe Staffing

Law requires ratios of 1:6, then PCS guidelines must be followed.<sup>29</sup>

Immediately before implementation of the Safe Staffing Law, the California hospital industry sued the state in objection to language requiring that staffing ratios be met "at all times." Specifically, the regulations require that a "licensed nurse be included in the calculation of the nurse-to-patient ratio only when the nurse has a patient care assignment, is present on the unit, and is not on a meal break or other statutorily mandated work break." Hospitals argued that this provision would mean that the ratios had to be maintained even when nurses were temporarily away from the floor. The court upheld the provision and ruled that patients must be reassigned to other nurses in order to maintain the ratios set forth by the DHS, which went into effect on January 1 of 2004.<sup>30</sup>

To date, the DHS has not policed hospitals to ensure that these ratios are maintained, but rather assumes compliance. Complaints are filed with DHS and exemptions or waivers can be requested. As of December 16, 2004, DHS had received 80 complaints from the 450 acute care hospitals across the state. Fifty hospitals requested program flexibility for meeting compliance, which means that these "hospitals believe that an alternate concept, method, procedure, technique, equipment or personnel will meet the intent of the law, if not its letter." The DHS approved 14 of these program flexibility requests after agreeing that these alternatives met the intent of the regulations.<sup>31</sup>

Rural hospitals and hospitals that want flexibility for staffing can request waivers from the DHS. The DHS does not have the authority to waive regulations except in

cases of small rural hospitals and only when specific criteria are met: patient safety and well-being is not compromised; and these small rural hospitals require such flexibility in order to “increase operational efficiency.”<sup>31 32</sup> Waivers were requested by 16 hospitals qualifying as small rural institutions, and 11 were granted.

After the law was implemented, there were many allegations that the minimum nurse staffing ratios were having adverse unintended consequences. Anecdotal reports indicated that hospitals were unable to fill beds for lack of nurses, emergency rooms were diverting patients due to understaffing, and hospital units were closing because there were not enough nurses to meet ratio requirements. In addition, home health agencies complained that they could not compete with the financial incentives hospitals were offering to recruit nurses.<sup>33</sup>

The DHS has not determined to what extent these allegations are real, since they have not received formal complaints. Nevertheless, the DHS considered these allegations and on November 14, 2004, four emergency regulations went into effect: the language “at all times” was clarified to mean that, as long as a nurse remained on the floor, patients did not have to be reassigned to meet the ratios; the medical/surgical ratio of one nurse per five patients which was to be implemented in January of 2005 has been postponed until January of 2008; the language used for emergency room staffing was changed to reflect the special circumstances in that department; and documentation of staffing ratios for the emergency room is not as stringent as for other units in the hospital.<sup>31</sup>

In response to these emergency regulations, the California Nurses Association filed suit against the Schwarzenegger administration

for unilaterally changing the regulations without sufficient evidence. On March 14, 2005, Sacramento Superior Court Judge Judy Holzer Hersher ruled against the emergency regulations that had postponed the implementation of 1:5 nurse-to-patient ratios in medical/surgical units and the special documentation of assignment for emergency department nursing staff. In effect, these emergency regulations were repealed and the 1:5 nurse-to-patient ratios for medical/surgical units must go into effect immediately. Emergency departments must also comply with the original regulations.<sup>34 35</sup>

DHS has appealed to the Court of Appeals.<sup>36</sup> In the meantime, the DHS has determined that nothing else will change at this time. The department will go ahead with an evaluation study of the ratios in order to have some results available by 2007, before the 2008 regulations go into effect. The study will look at patient outcomes and mortality, workforce issues of supply, demand, skill mix, registry and travel nurses, and impacts on the healthcare industry such as access to care and financial stability. The results will be compared to the original study commissioned by the DHS.<sup>26</sup>

**Massachusetts:** In January of 2003, two bills were filed in the state legislature that would mandate minimum nurse staffing levels in Massachusetts acute care hospitals.<sup>37 38</sup> Later in 2003, Senator Richard Moore introduced legislation that would require all licensed health care facilities to implement a formula for determining appropriate RN staffing levels in order to improve patient outcomes.<sup>39</sup>

One of the two staffing bills, entitled “An Act Ensuring Patient Safety,” introduced by Representative Christine Canavan, describes specific RN staffing levels for various units and areas within acute care hospitals. This

bill passed through the Joint Committee on Health Care and was sent to the House Committee on Ways and Means. The bill was reintroduced this session.

This patient safety bill would guarantee that medical/surgical nurses and pediatric nurses would not be responsible for more than four patients, while nurses working in intensive care units would not be assigned more than two. The bill sets ratio requirements for 13 different areas and units within the hospital. The bill also requires that the DPH establish a patient classification system that would adjust staffing levels based upon the needs

of patients. It would be the responsibility of the Department of Public Health (DPH) to enforce the regulations set forth in the bill.<sup>37</sup>

Table 1 provides a side-by-side comparison of ratios proposed in Massachusetts and those already in place in California. The most significant differences are in the area of medical/surgical units, labor and delivery and postpartum. It is also significant that the Massachusetts legislation specifies that only RNs may fulfill the ratio requirements, whereas in California staffing up to 50 percent of the nurses needed to meet the ratios may be LVNs.

**Table 1: California Ratios and Proposed Ratios in Massachusetts (by Acute Care Hospital Unit)**

<i>Hospital Unit</i>	<i>California</i>	<i>Massachusetts **</i>
<i>Critical Care</i>	1:2	1:2
Intensive Care Unit	1:2	1:2
Neonatal Intensive Care	1:2*	1:2
Burn Unit	1:2	1:2
Step Down/Intermediate Care	1:4 (1:3 in 01/08)	1:3
Operating Room (under anesthesia)	1:1	1:1
Post Anesthesia	1:2	1:2
Post Anesthesia Care (under anesthesia)	1:2	1:1
Emergency Department	1:4	1:3
Emergency Critical Care	1:2	1:2
Emergency Trauma	1:1*	1:1
Labor and Delivery (active labor)	1:2	1:1
Immediate Postpartum	1:3 (one couplet, one active labor)	1:2 (one couplet)
Postpartum	1:4 (4 couplets)	1:6 (3 couplets)
Intermediate Care Nursery	-	1:4
Well-Baby Nursery	1:8 (including mother)	1:6
Pediatrics	1:4	1:4
Psychiatric	1:6	1:4
Medical and Surgical	1:6 (1:5 in 01/05)	1:4
Telemetry	1:5 (1:4 in 01/08)	1:4
Observational/Outpatient Treatment	-	1:4
Transitional Care	-	1:5
Rehabilitation Unit	-	1:5
Specialty Care Unit (other than above)	1:5 (1:4 in 01/08)	1:4

Sources: Lexis-Nexis State Capital; www.ca.gov; www.mass.gov

\* requires staffing by RN only; Emergency Room triage must be performed by an RN; otherwise, California legislation allows that 50% of staffing ratios may be accomplished by staffing with LVNs

\*\* all of ratios in Massachusetts legislation must be accomplished by staffing with RNs only

### ***Opposition to Minimum Staffing***

***Requirements:*** The Massachusetts Hospital Association (MHA) and other organizations including but not limited to the Home and Health Care Association, the Massachusetts Extended Care Federation, the Conference of Boston Teaching Hospitals and Associated Industries of MA, oppose minimum staffing ratios. The MHA cautions that mandated ratios do not take into account individual patient needs or nurse and hospital characteristics, but rather “threaten patient access and erode the quality of care...by taking a nurse’s professional judgment out of the patient care equation.”<sup>40</sup>

The MHA has testified in opposition to the patient safety bill, declaring that hospitals, like nurses, are committed to providing “quality care while employing safe staffing levels and a skilled workforce.” Although overall operating performance and profitability improved for Massachusetts’s hospitals through fiscal year 2004, nearly one-third of hospitals continued to experience total losses.<sup>41</sup>

Added to fiscal constraints is the concern that the state is experiencing average RN vacancy rates of 6.7 percent in FY04, projected to increase in the coming years. The Massachusetts Organization of Nurse Executives (MONE) also opposes the bills, arguing that a “one size fits all solution” is not appropriate for addressing the issues facing nurses, hospitals and patients. Measures to advance the recruitment and retention of nurses, they suggest, are a more prudent way to address staffing needs and improve patient outcomes.

Mandated ratios do not take into account the illness of the patient and the variation among nurses and hospitals. All of these variables, according to the MONE, must be

considered by nurse executives, who then should be given the flexibility to determine appropriate staffing levels within the confines of hospital budgets.<sup>42</sup>

***Support for Minimum Staffing Ratios:*** The Massachusetts Nurses Association (MNA) argues that such “flexibility” is written into the language of the bill, providing several different ratios intended to meet the needs of specific hospital units. To account for variations in patients’ needs and other factors, the bill also requires the creation of a patient classification system. If staffing decisions are left up to hospitals and nursing leaders, MNA warns, nurses will continue to receive assignments based upon the average daily patient census and will therefore not be guaranteed a maximum number of patients for which they will be responsible. Patient safety, they argue, must be guaranteed and minimum ratios are a proper way to do this.<sup>43</sup>

Supporters of minimum staffing levels do not believe that it will be an economic burden on hospitals and point to studies showing that higher RN staffing levels are associated with improved patient outcomes and cost savings. Further, they do not see the nursing shortage as a reason to delay these requirements—just the opposite. They believe that better working conditions for nurses will help attract and retain nurses to the profession.<sup>44</sup>

This legislation is also supported by the Coalition to Protect Massachusetts Patients, an organization of 83 advocacy and health groups, including: the Alzheimer’s Association of Massachusetts; the American Heart Association; Health Care for All; the Latin American Institute; the Massachusetts Association of Older Americans; the Massachusetts Nurses Association; and others. The coalition cites concerns about inadequate nurse staffing and increased

injuries in hospitals as reasons for supporting this legislation.<sup>45</sup>

Many groups testified before the Joint Health Care Committee and spoke to the association between RN staffing and patient outcomes. Safe staffing is essential, it was argued, because “patients are being harmed and patients are dying because their nurse has too many patients to care for, and nurses, burned out with high patient loads, are leaving the bedside practice.”<sup>46</sup>

**Senator Moore’s Bill:** An alternate bill, numbered SB 1260 in this legislative session, includes all “licensed health care facilities” and does not specify hospitals only. In order to establish appropriate staffing levels, this bill requires that healthcare facilities must take into account the number of patients and the number of RN hours. Both RN and patient characteristics are considered in the calculations, which are completed by all facilities. The RN staffing ratios achieved using these formulas would be published annually and then made available to the public.<sup>39</sup>

The Moore bill also provides a number of incentives to increase the supply of nurses and nursing faculty. The Clara Barton Nursing Excellence Trust Fund (for which \$30 million will be appropriated) offers student loan repayment programs, payment for faculty positions, nursing scholarships, mentoring services for new nurses and grants that will “foster partnerships that promote the recruitment and retention of nurses.”<sup>47</sup>

The bill would also enhance the collection and dissemination of nursing workforce data, would charge the Executive Office of Economic Development with promoting the health care professions, and would make hospitals accountable for staffing levels

based upon patient, nursing and hospital characteristics. Finally, pending passage of the bill, a commission would be established to study the findings of the IOM report *Keeping Patients Safe: Transforming the Work Environment of Nurses*. This commission would make recommendations based on current trends in Massachusetts’s hospitals.

The Massachusetts Hospital Association and the Massachusetts Organization of Nurse Executives “strongly endorse Senator Moore’s Patient Safety Act (SB 1260) because it addresses the critical shortage of nurses in Massachusetts and because it is a reasonable and effective way to provide accountability and transparency regarding nurse staffing and improvement of safe patient care.

The bill recognizes that when it comes to something as important and complex as patient safety, one size does not fit all.

The bill recognizes that there is variation amongst hospitals, patients and components of the care giving team and focuses on what is most important: healthcare outcomes.”<sup>48</sup>

The MNA opposes the bill because they believe it fails to set any minimum standard of care. Language in the bill would allow the industry to continue to establish staffing plans since there is no requirement of minimum RN-to-patient ratios. They argue that reporting requirements do not go beyond those of JCAHO and are therefore simply an “endorsement of the status quo.”<sup>49</sup>

### ***What the Research Shows***

Recent research has focused on three possible effects of nurse staffing levels: patient outcomes, nurses’ job satisfaction, and the cost to hospitals.

**Patient outcomes:** One of the difficulties in describing how nurse staffing levels affect patient outcomes is defining which outcomes are actually sensitive to nursing care. To address this important issue, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has organized a task force charged with defining the specific elements of patient care that are sensitive to changes in nurse-to-patient ratios. To date, the task force has identified 35 indicators in the Commission’s “Staffing Effectiveness Standards” that are sensitive to nurse staffing.<sup>50</sup> Included in this list are both clinical and staffing indicators, some of which are described in the literature (*see Table 2*).

JCAHO has identified as one of its indicators the “failure to rescue.” This is defined as the failure of the nurse to recognize life-threatening complications that result in the death of a patient.<sup>51</sup> Many researchers have described the association between mortality rates of hospitalized patients and nurse staffing levels. The California researchers identified 11 studies that detail the impact of nurse staffing on patient mortality. They report that four of these studies found an inverse relationship between RN staffing and patient death: the more RNs, the fewer patient deaths. The authors conclude, however, that “the literature offers no support for specific, minimum nurse-patient ratios for acute care

**Table 2: JCAHO Staffing Effectiveness Approved Indicators for Hospitals**

<i>Clinical/Service Indicators</i>	<i>Human Resource Indicators</i>
<i>Patient/family complaints/satisfaction</i>	Overtime
Adverse drug events	Staff vacancy rate
Injuries to patients	Staff satisfaction
Skin breakdown	Staff turnover
Pneumonia	Understaffing as compared to organization’s staffing plan
Restraint prevalence	Staff injuries on the job
Postoperative infections	On-call or per diem use
Urinary tract infections	Sick time
Upper gastrointestinal bleeding	Agency staff use
Shock/cardiac arrest	Skill mix
Length of stay	Nursing care hours per patient day
Death among surgical patients/failure to rescue	Practice environment scale-nursing work index
Pressure ulcer	
Falls prevalence	
Falls with injury	Voluntary turnover
Urinary catheter-associated UTI (ICU setting)	
Central line catheter-associated bloodstream infection rate (ICU)	
Ventilator-associated pneumonia for ICU and HRN patients	
Smoking cessation counseling for AMI	
Smoking cessation counseling for HF	
Smoking cessation counseling for pneumonia	

hospitals, especially in the absence of adjustments for skill and patient mix, although total nursing hours and skill mix do appear to affect some important patient outcomes.”<sup>52</sup>

In a recent study, Person and colleagues looked at nurse staffing levels in relation to deaths of Medicare patients who had suffered a heart attack. The authors found that increasing the number of RNs in relation to licensed practical nurses is associated with decreased patient mortality. Neither patient nor hospital characteristics could explain the lower mortality rates for patients in hospitals with higher RN staffing mix.<sup>53</sup>

Similarly, in a study referred to by other researchers as “one of the most recent and most rigorous” of its kind,<sup>54</sup> Needleman and his colleagues identified a positive association between higher RN staffing and shorter length of stay, as well as lower rates of urinary tract infection, upper gastrointestinal bleeding, pneumonia, and shock/cardiac arrest. Further, more registered nurses are associated with fewer adverse outcomes and lower rates of “failure to rescue” for surgical patients. The authors did not find that increasing the level of staffing by licensed practical nurses improved patient outcomes and did not identify any association between RN staffing and overall in-hospital mortality. More RNs, the authors conclude, are associated with fewer adverse outcomes for hospitalized patients.<sup>51</sup>

Aiken and her colleagues also found an association between nurse staffing levels and the likelihood that a patient will die while in the hospital. The study concludes that increasing patient-to-nurse ratios from four patients per nurse, to six patients per nurse, could increase the number of patient deaths by 2.3 per 1,000. For each patient

added to a nurse’s workload, the risk of death for that patient increases by seven percent. The authors conclude that “...California officials were wise to reject ratios...of 10 patients to each nurse on medical and surgical general units” but also admit that results of the study “...do not directly indicate how many nurses are needed to care for patients or whether there is some maximum ratio of patients per nurse above which hospitals should not venture.”<sup>55</sup>

Increases in RN staffing appear to have the greatest benefit for hospitals with fewer nurses per patient. For hospitals with better RN-to-patient ratios, increasing RN staffing seems to have limited or no positive effects on patient mortality rates. A 2004 study of the relationship between changes in staffing and changes in patient outcomes found increasing RN staffing reduces in-hospital mortality. However the researchers identified a diminishing marginal effect so that for already-well-staffed hospitals, increasing RN staffing seems to have no positive effects on patient mortality. This study did not find consistent significant effects of increasing RN staffing on other patient outcomes.<sup>56</sup>

Other complications besides mortality are described in the literature. There is some indication that patients could be more vulnerable to hospital-acquired infections and infections of the urinary tract where RN staffing levels are low.<sup>57</sup> Other studies report that lower nurse staffing increases the risk that patients will acquire infection while in the intensive care unit.<sup>58</sup>

In general, the research is limited by a number of conditions. First, although patients can develop complications while in the hospital, it is also possible that some of these conditions were present at the time of admission. Second, these analyses were

performed on data collected at the hospital level, rather than at the level of individual nursing units. Since there is tremendous variation between patients, hospital units and hospitals, this may not be an accurate reflection of what happens at the unit level. Researchers acknowledge that, for these reasons, there are significant limitations to these studies.<sup>52</sup>

In a 2001 survey done by the American Nurses Association (ANA), responding nurses cited “inadequate staffing” as the primary reason for their perception that there had been a decline in the quality of nursing care over the past two years.<sup>59</sup> A cross-national survey finds that nurses who are employed in hospitals with more patients per nurse are more likely to report poorer quality of patient care than nurses employed in hospitals with better ratios.<sup>60</sup>

In their review of the literature on the impact of nurse-to-patient ratios published in 2004, Lang and colleagues describe how nurse staffing levels affect patients, nurses, and hospitals. The authors conclude that better ratios can decrease hospital length of stay for medical patients and that inpatient mortality rates may be lowered in a “richer nurse staffing” environment.<sup>52</sup> Furthermore, better nurse staffing levels may improve the satisfaction of nurses, an important component of recruitment and retention.<sup>61</sup> However, the research has been unable to define what those levels should be and under what conditions minimum ratios are most appropriate.

**Nurses’ job satisfaction:** Recent research describes the effect that RN staffing levels have on the satisfaction of nurses. Nurses’ job satisfaction is especially important during this persistent national nursing shortage. Although the number of nurses employed in hospitals has increased by approximately 185,000 since 2001, there is

some evidence that a national nursing shortage persists, despite higher wages and “relatively high national unemployment.”<sup>62</sup> Therefore, the recruitment and retention of nurses (62 percent of whom are employed in the hospital setting)<sup>63</sup> is critical to maintaining safe staffing levels.

The workload of nurses may be essential in the drive to recruit and retain sufficient nursing staff. One study concludes that increasing the workload of nurses by one patient can subsequently increase the likelihood of job burnout by 23 percent and dissatisfaction by 15 percent. Furthermore, 23 percent of the same nurses who report burnout and job dissatisfaction report an intention to leave their job within the next year, compared with only 11 percent of nurses who are satisfied.<sup>55</sup>

These results are borne out in the ANA survey, in which 27 percent of respondents reported feeling “exhausted and discouraged” as they leave work and another 24 percent reported feeling “discouraged and saddened” by what they were unable to provide for patients.<sup>59</sup> Nurses who report feeling emotionally exhausted may also negatively affect patient satisfaction. For instance, patients cared for by nurses working on units in which the environment is defined by the researchers as being “poor” were more likely to report being dissatisfied with their care.<sup>64</sup>

In addition to staffing levels, however, research shows that better organizational support in the form of empowerment meted out by supervisors, improved administrative support, and good relations with physicians also positively influence nursing satisfaction.<sup>65</sup> Nurses are more likely to rate quality of patient care as being poor if the organization is not supportive. A strong relationship was found between organiza-

tional support and nurses' reports of dissatisfaction and job burnout. In fact, nurses in hospitals with both high and low levels of staffing were more likely to rate quality of care as poor if organizational support was low.<sup>60</sup>

**Hospitals:** For hospitals, nurse staffing is dependent upon many factors, including patient, hospital and nurse characteristics, and financial constraints.<sup>6</sup> In the past, hospitals have reduced the number of RN staff in order to decrease expenses.<sup>66</sup> This may not be prudent, however, according to researchers who looked at the effect of increased RN staffing on hospital operating costs and profit margins. While operating costs increase initially with increases in RN staffing, profit margins are not necessarily affected. Hospitals that have a higher proportion of LPNs than average have in fact improved profit margins when more RNs are added to the skill mix. Adding support staff other than RNs, however, tends to increase operating expenses without increasing profits.<sup>67</sup>

Aside from the expense of hiring RNs, hospitals also incur costs when patients suffer adverse events or complications. Some of these costs may be reduced when RN-to-patient ratios are improved. Although sicker and older patients are more likely to experience complications after surgery, according to one study, the incidence of pneumonia is higher for patients in an environment where the RN staffing level is lower.

Contrary to what would be expected, however, increases in RN staffing were associated with greater incidence of pressure ulcers. The authors suggest that this may have more to do with the patient risk factors than with the level of nursing care. Therefore, the research suggests patient's

length of stay in the hospital and infection rates can both be reduced when there are more RNs available to provide care. This has the potential to reduce hospital costs in the long run.<sup>68</sup>

Nevertheless, Peter Buerhaus suggests several reasons why mandatory nurse-to-patient ratios do not make good business sense and why they might even be counterproductive. Required ratios do not allow for fluctuations in the supply of nurses, nor do such mandates take into account improved technology or other forces that might "disregard these kinds of changes and negatively affect opportunities for employers to find new ways to combine capital and labor to improve health care delivery." Hospitals can no longer improve efficiencies through consideration of the effects of marginal costs on marginal benefits, since the requirements of such legislation leave no flexibility in terms of staffing levels.<sup>6</sup>

**Cost to Hospitals of Implementing Minimum Staffing Ratios:** Cost data on the impact of mandating nurse-to-patient ratios is scarce, despite the fact that approximately 30 percent of the total hospital budget is devoted to the costs of nurse staffing.<sup>67</sup> In California, it is estimated 20 to 51 percent of hospitals hired additional nurses in order to meet required minimum ratios, at a cost of approximately \$700,000 to \$800,000 per hospital.<sup>32</sup> The DHS estimated that the costs of implementing ratios statewide would be approximately "\$165 million in fiscal year 2003-04, \$408 million in fiscal year 2004-05, and \$486 million annually thereafter for non-state-operated hospitals."<sup>69</sup> The cost to the state Medicaid program is expected to be around \$43 million for fiscal year 2003-04, \$106 million for fiscal year 2004-05, and \$125 million in each following year. The costs incurred by acute care hospitals that

are state-run are expected to be \$1 million for fiscal year 2003-04, \$2.8 million for fiscal year 2004-05, and \$3.6 million in each following year.<sup>70</sup>

In Massachusetts, the financial impact of implementing minimum staffing ratios is in dispute. A survey of Massachusetts RNs working on medical/surgical units was done by the MNA. The survey results showed that 18 percent of RNs were caring for more than six patients, while approximately 27 percent cared for fewer than four patients. The average number of patients assigned to one RN in Massachusetts's hospitals is 5.1, with a range from 3.5 to 7.6. Staffing in larger Boston hospitals is generally better than staffing in other areas of Massachusetts.<sup>71</sup>

Cost estimates provided by the MNA and the MHA vary significantly. The study based on the MNA survey estimates that implementing minimum nurse-to-patient ratios would cost hospitals approximately \$143 million per year, or slightly less than one percent of patient revenue for 2003. Expanding these results to include all types of hospital units, the costs of meeting ratios would be \$268 million, or just under two percent of hospital revenue for Massachusetts's hospitals in 2003.<sup>71</sup> The Massachusetts Hospital Association estimates that the costs of implementing ratios are much higher, at \$450 million in 2003 dollars, when other factors such as wages and benefits are updated.<sup>72</sup>

***Alternatives to nurse-to-patient ratios:***

There are a number of alternatives to mandated nurse staffing levels that seek to achieve improved quality of care and nursing satisfaction. One stream of research has explored more flexible approaches to nurse staffing, to acknowledge the tremendous variation in nursing staff and

skill mix across hospital units. For instance, Seago proposes a formula that incorporates aspects of the environment and calculates nurse workload by determining RN expertise, patient illness, availability of a physician, work intensity, support staff and unit physical layout.<sup>73</sup>

Another approach has been the use of "optimization techniques." The purpose of such techniques is to balance the cost associated with staffing by RNs versus non-RNs against the impact on patients in terms of quality-adjusted life years (QALY). By quantifying the savings that result from greater RN staffing and comparing this to the cost, these models determine the "optimum" number of nurses. This formula does not fully take into account other variables that affect health outcomes.<sup>74</sup> Similarly, the Emergency Nurses Association has developed guidelines for nurse staffing based upon patient illness, support staff, and the total amount of nursing time needed to provide the required care to patients.<sup>75</sup>

Finally, there is a growing body of research that looks at hospitals that have attained Magnet Status, which is awarded by fulfilling criteria described by the American Nurses Credentialing Center. These hospitals have created environments in which nurses are more readily recruited and retained and in which patient outcomes appear to be improved. Magnet status has been recognized by Congress as a measure of attaining nursing care excellence, and by the Joint Commission on Accreditation of Healthcare Organizations as a means of improving working conditions for nurses.<sup>76</sup>

The studies that have looked at Magnet Status hospitals report that, although nursing skill mix and ratios are slightly better than those in non-magnet hospitals, improved

patient outcomes are due in part to the organization itself. Hospitals that have achieved Magnet Status have nurse leaders on major decision-making teams, and have flatter management structures in which nurses on the unit have a significant amount of discretion for providing optimal patient care. Good communication and support between management, nurses and physicians is fundamental to the magnet hospital mission.<sup>77</sup>

### ***Discussion***

Nursing organizations and others support minimum nurse-to-patient ratios as a means to improving patient safety and the “well-being of nurses and patients.”<sup>45</sup> Opponents view these ratios as arbitrary and even counter-productive in the mission to provide quality patient care and improve patient safety.<sup>6 40 42</sup> Although improved patient outcomes are associated with better RN staffing in some research, authors have been reticent to recommend specific ratios.<sup>15</sup> Some warn that such ratios could actually be detrimental to hospitals, nurses and ultimately patients.<sup>6</sup>

These concerns are echoed in a statement by the American Organization of Nurse Executives (AONE), advising that “because of the unpredictability of the patient care environment, mandatory staffing ratios are viewed by AONE as a static and ineffective tool with which to address the demands and constant fluctuations of patient care and nursing care needs.”<sup>78</sup>

On the other hand, the MNA alleges that the hospital industry “has endorsed the practice of understaffing of registered nurses to the detriment of patient care.”<sup>43</sup> Dana Weinberg warns that nurses have been ignored in past decision-making by hospital administrators and that nurses have left the profession because of dissatisfaction and the inability to provide the care that they deem necessary. Legislation requiring minimum nurse staffing ratios, she suggests, “ensures that heeding nurses’ professional judgment and maintaining patient care quality will not be voluntary.”<sup>79</sup>

Amid these cautionary statements is the reality that recruiting and retaining nurses is critical during a national nursing shortage.<sup>80</sup> While emotionally exhausted nurses are more likely to intend to leave their job, it is not just ratios that affect these intentions.

## Conclusions

Legislators, hospitals, nurses, doctors and patients are deeply concerned about healthcare quality and patient safety. The IOM report and others provide compelling evidence that much needs to be done to address these concerns. Patient safety and the provision of quality care are universal objectives and worthy goals.

However, are minimum nurse staffing ratios the most appropriate way to allocate healthcare resources across and within hospitals, in order to achieve these quality goals? Evidence reviewed here supports the notion that better RN staffing levels in general are associated with better patient outcomes, and that increasing nurse-to-patient ratios can improve patient safety and quality of care in hospitals that are currently less well-staffed. It is clear that adequate and appropriate levels of nurse staffing are critical to assuring patient safety, quality of care and nursing satisfaction.

Nevertheless, researchers have been unable to define the perfect nurse-to-patient ratio, and legislating minimum ratios comes with a complex mix of costs and benefits. California provides the ideal opportunity to study the impact of nurse staffing ratios on patient outcomes and on the broader healthcare system. Other states can learn valuable lessons from California, even as they consider alternative approaches to improving patient safety and quality of care.

Massachusetts is on the brink of making a monumental decision about hospital nurse staffing that could impact patient safety and the quality of care patients receive in Massachusetts hospitals. The research presented here provides mixed evidence about the costs and benefits of RN staffing levels. Nevertheless, the time to take action has never seemed more urgent. Mandating RN-to-patient ratios may have significant and far-reaching unintended consequences, while the status quo could be jeopardizing patient outcomes. Legislators and others should proceed with caution on this road to improving patient safety and the quality of care. ~

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## Endnotes

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<sup>1</sup> “An act to promote improved patient outcomes through registered nurse staffing in licensed health care facilities” was introduced by Senator Moore in 2003, a bill intended “to establish regulations for the calculation of a registered nurse staffing ratio...based on average case mix for the period of the report and weighted on registered nurse factors...;” in 2003, Representative Koutoujian introduced “An act relative to safe staffing for quality care;” and, also in 2003, Representative Canavan introduced “An act ensuring quality patient care and safe registered nurse staffing” which requires specific minimum registered nurse-to-patient ratios within the hospital setting.

<sup>2</sup> The Coalition to Protect Massachusetts Patients (available at [www.massnurses.org](http://www.massnurses.org)); Higgins, K. (June 18, 2003). Testimony: *The role of the registered nurse*. (available at [www.massnurses.org](http://www.massnurses.org)) Higgins is the president of the MNA, representing 22,000 + registered nurses and other health care professionals; McCabe, D. (June 18, 2003). Testimony: *Research makes clear – safe staffing saves lives* (available at [www.massnurses.org](http://www.massnurses.org)) McCabe is the Director of the Nursing Department for the MNA and works with Congress on nurse practice issues; Healy, P. (June 18, 2003) Testimony: Results of RN survey – a wake up call. (available at [www.massnurses.org](http://www.massnurses.org)) Healy is a member of the MNA Board of Directors and a critical care nurse at Brigham and Women’s Hospital; Weinberg, D. (June 18, 2003). Testimony. (available at [www.massnurses.org](http://www.massnurses.org)) Weinberg is author of the book “Code Green”

<sup>3</sup> What experts say about the nurse staffing ratio bill (available at [www.mhalink.org](http://www.mhalink.org)); Massachusetts Hospital Association (June 18, 2003). *Testimony on professional nursing workforce legislation* (available at [www.mhalink.org](http://www.mhalink.org)); Massachusetts Organization of Nurse Executives (June 18, 2003). *Testimony in opposition to House Bills 1282 and 2600 Mandatory Registered Nurse Staffing Legislation; Comments on Senate Bill 635, An Act*

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to Promote Improved Patient Outcomes Through Registered Nurse Staffing in Licensed Health Care Facilities, page 1. (available at [www.massone.org](http://www.massone.org) )

<sup>4</sup> Institute of Medicine (November, 1999). *To err is human: Building a safer health system.*

<sup>5</sup> California Health & Saf Code § 1276.4 (2004) *Nurse to patient ratios* Deerlings California Codes Annotated: Health and Safety Code; Division 2. Licensing provisions; Chapter 2 Health facilities; Article 3 Regulations (available at [www.lexis-nexis.com](http://www.lexis-nexis.com) and <http://www.leginfo.ca.gov/calaw.html> and [www.calregs.com](http://www.calregs.com) ).

<sup>6</sup> Buerhaus, P. (1997). *What is the harm in imposing mandatory hospital nurse staffing regulations?* Nursing Economics, 15(2), pp 66 – 72.

<sup>7</sup> Personal communication, Massachusetts Hospital Association, March 2, 2005.

<sup>8</sup> Institute of Medicine (2003). *Transforming the work environment of nurses: Executive summary* (available at [www.iom.edu](http://www.iom.edu)) page 3.

<sup>9</sup> Ibid, page 7

<sup>10</sup> Ibid, page 10

<sup>11</sup> Mark, B., Harless, D., McCue, M. & Xu, Y. (2004). *A longitudinal examination of Hospital registered nurse staffing and quality of care.* Health Services Research, 39(2), pp 279 – 300; Schnelle, J., Simmons, S., Harrington, C., Cadogan, M., Garcia, E., & Bates-Jensen, B. (2004) *Relationship of nursing home staffing to quality of care.* Health Services Research, 39(2), pp 225 – 250;

<sup>12</sup> Aiken, L., Clarke, S., Sloane, D., Sochalski, J., & Silber, J. (2002b) *Hospital nurse staffing and patient mortality, nurse burnout and job dissatisfaction.* JAMA, 288(16) pp 1987 – 1993

<sup>13</sup> Needleman, J., Buerhaus, P., Matke, S., Stewart, M., & Zelevinsky, K (2002). *Nurse-staffing levels and the quality of care in hospitals.* New England Journal of Medicine, 346(22), pp 1715 – 1722.

<sup>14</sup> Coffman, J., Seago, J., & Spetz, J. (2002). *Minimum nurse-to-patient ratios in acute care hospitals in California.* Health Affairs, 21(5) pp 53 – 64.

<sup>15</sup> Aiken, L., Clarke, S., Sloane, D., Sochalski, J., & Silber, J. (2002b) *Hospital nurse staffing and patient mortality, nurse burnout and job dissatisfaction.* JAMA, 288(16) pp 1987 – 1993; Person, S., Allison, J., Kiefe, C., Weaver, M., Williams, D., Centor, R., & Weissman, N. (2004). *Nurse staffing and mortality for Medicare patients with acute myocardial infarction.* Medical Care, 42(1), pp 4 – 12; Kovner, C. & Gergen, P. (1998). *Nurse staffing levels and adverse events following surgery in U.S. hospitals.* Image: Journal of Nursing Scholarship, 30(4), pp 315 – 321.

<sup>16</sup> Aiken, L, Clarke, S., & Sloane, D. (2002a). *Hospital staffing, organization, and quality of care: cross-national findings.* International Journal for Quality in Health Care, 14(1), pp 5 – 13; Laschinger, H., Finegan, J., Shamian, J., & Wilk, P.(2004). *A longitudinal analysis of the impact of workplace empowerment on work satisfaction.* Journal of Organizational Behavior, 25, 527 – 545; Havens, D., & Aiken, L. (1999) *Shaping systems to promote desired outcomes: The magnet hospital model.* JONA, 29(2), pp 14 – 20.

<sup>17</sup> Pinkham, J. (February 27, 2004). *The hospital industry's opposition to H. 1282 and why it is wrong.* The Massachusetts Nurses Association, page 2 (available at [www.massnurses.org](http://www.massnurses.org) ) Pinkham is the Executive Director of the MNA.

<sup>18</sup> Aiken, L., Clarke, S., Sloane, D., Sochalski, J., & Silber, J. (2002a) *Hospital nurse staffing and patient mortality, nurse burnout and job dissatisfaction.* JAMA, 288(16) pp 1987 – 1993; Cho, S., Ketefian, S., Barkauskas, V., & Smith, D. (2003). *The effects of nurse staffing on adverse events, morbidity, mortality and medical costs.* Nursing Research, 52(2), pp 71 – 79; Needleman, J., Buerhaus, P., Matke, S., Stewart, M., & Zelevinsky, K (2002). *Nurse-staffing levels and the quality of care in hospitals.* New England Journal of Medicine, 346(22), pp 1715 – 1722; Person, S., Allison, J., Kiefe, C., Weaver, M., Williams, D., Centor, R., & Weissman, N. (2004). *Nurse staffing and mortality for Medicare patients with acute myocardial infarction.* Medical Care, 42(1), pp 4 – 12; Vahey, , D., Aiken, L., Sloan, D., Clarke, S., & Vargas, D. (2004). *Nurse burnout and patient satisfaction.* Medical Care, 42(2), II-57 – II-66.

<sup>19</sup> Hodge, M., Lang, T., Sauve, M.J., Olson, V., Kravitz, R., & Romano, P. *Systematic Review of the Literature.* California Department of Health Services; Lang, T., Hodge, M., Olson, V., Romano, P., & Kravitz, R. (2004). *Nurse-patient ratios: A systematic review of the effects of nurse staffing on patient, nurse employee, and hospital outcomes.* JONA, 34(7), pp 326 – 337.

<sup>20</sup> Cho, S., Ketefian, S. Barkauskas, V., & Smith, D. (2003). *The effects of nurse staffing on adverse events, morbidity, mortality and medical costs.* Nursing Research, 52(2), pp. 71 – 79; Granneman, T. (2004) *Estimated cost of achieving 4:1 nurse staffing ratios on medical/surgical floors in Massachusetts Hospitals: Evidence from the MNA Nurse Staffing Survey, Andover Economic Evaluation;* McCue, M., Mark, B., & Harless, D. (2003). *Nurse staffing, quality and financial performance.* Journal of Health Care Finance, 29(4), pp 54 – 76.

---

<sup>21</sup> Budreau, G., Balakrishnan, R., Titler, M., & Hafner, M. (1999). *Caregiver-patient ratio: Capturing census and staffing variability*. *Nursing Economics*, 17(6), pp 317 – 324; Hall, L. M., & Doran, D. (2003). *Nurse staffing, care delivery model, and patient care quality*. *Journal of Nursing Care Quality*, 19(1), pp 27 – 33; Havens, D., & Aiken, L. (1999) *Shaping systems to promote desired outcomes: The magnet hospital model*. *JONA*, 29(2), pp 14 – 20; Hendrix, T. (2003). *Optimization techniques: Industrial production tools with applications in nurse staffing efficiency research*. *Outcomes Management*, 7(4), pp 194 –197; Ray, C., Jagim, M., Agnew, J., McKay, J., & Sheehy, S.- ENA’s Staffing Best Practices Work Group (2003). *ENA’s new guidelines for determining emergency department nurse staffing*. *Journal of Emergency Nursing*, 29, pp 245 – 253; Seago, J. (2002). *The California experiment: Alternatives for minimum nurse-to-patient ratios*. *JONA*, 32(1), pp 48 – 58.

<sup>22</sup> California Health & Saf Code; §1276.4 (2004) *Nurse to patient ratios* Deerlings California Codes Annotated: helath and Safety Code: Division 2. Licensing provisions; Chapter 2 health facilities; Article 3 Regulations (available at [www.lexis-nexis.com](http://www.lexis-nexis.com) and <http://leginfo.ca.gov/calaw.html> and [www.calregs.com](http://www.calregs.com))

<sup>23</sup> According to LexisNexis State Capital (available at [www.lexis-nexis.com/stcapuniv](http://www.lexis-nexis.com/stcapuniv) ), only 3 bills from Connecticut and one from West Virginia proposing legislation of nurse-to-patient ratios in 1999, were introduced; in 2000 Kentucky and Maine proposed such legislation; by 2001 Illinois, Massachusetts, and 2 New York bills, were introduced; .in 2002 Florida and Missouri proposed nurse-to-patient ratios; and in 2003, 16 bills were either introduced or re-introduced in state legislatures addressing nurse-to-patient ratios (2 in Hawaii, 1 in Illinois, 1 in Iowa, 1 in Maine, 2 in Massachusetts, 2 in Missouri, 2 in New Jersey, 4 in New York, and 1 in Tennessee).

<sup>24</sup> *An Act Ensuring Quality Patient Care and Safe Registered Nurse Staffing* (2003) Bill Text MA H.B. 1282 (available at [www.lexis-nexis.com](http://www.lexis-nexis.com) )

<sup>25</sup> Barclays Official California Code of Regulations (2004) Title 22. Social Security Division 5, Article 3. Basic Services; § 70217 *Nursing Service Staff*; California Nurses Association (2004) CNA’s 12 year campaign for safe RN staffing ratios (available at [www.cna.igc.org](http://www.cna.igc.org) ).

<sup>26</sup> Henning, G., Manager Specialist, California Department of Health Services (Personal Communication, December 16, 2004). Information also available at [www.ca.gov/state](http://www.ca.gov/state)

<sup>27</sup> Barclays Official California Code of Regulations (2004) Title 22. Social Security Division 5, Article 3. Basic Services; § 70217 *Nursing Service Staff*;

<sup>28</sup> Seago, J. (2002). *The California experiment: Alternatives for minimum nurse-to-patient ratios*. *JONA*, 32(1), pp 48 – 58.

<sup>29</sup> California Department of Health Services (Jan. 2004). *Nurse-to-Patient Staffing Ratios for General Acute Care Hospitals: Frequently Asked Questions*. (available at [www.dhs.ca.gov](http://www.dhs.ca.gov))

<sup>30</sup> California Nurses Association (May 26, 2004) *Press Release: Court rejects hospital suit to reverse safe staffing law: ‘Big victory for RNs and patient safety,’ says California Nurses Association*.

<sup>31</sup> Henning, G., Manager Specialist, California Department of Health Services (Personal communication, March 7, 2005).

<sup>32</sup> Spetz, J. (2004). *California’s minimum nurse-to-patient ratios- The first few months*. *JONA*, 34(12), pp 571-578.

<sup>33</sup> Henning, G., Manager Specialist, California Department of Health Services (Personal Communication, December 16, 2004). Information also available at [www.ca.gov/state](http://www.ca.gov/state)

<sup>34</sup> Salladay, R. (March 5, 2005). *Nurses’ Win on Staffing Affirmed*, *LA Times*.

<sup>35</sup> AFL 05-04 Information regarding R-01004E: *Licensed nurse-to-patient ratios regulations following the March 14, 2005 California Superior Court Order* (March 17, 2005).

<sup>36</sup> Henning, Gina, Manager Specialist, California Department of Health Services (Personal Communication, March 21, 2005)

<sup>37</sup> The State of Massachusetts Bill Text: House Bill 1282, (2003) *An act ensuring quality patient care and safe registered nurse staffing* (available at [www.lexis-nexis.com](http://www.lexis-nexis.com) ). Introduced by Canavan of Brockton.

<sup>38</sup> Commonwealth of Massachusetts, HB No. 2600 (2003) *An act relative to safe staffing for quality care* (available at [www.mass.gov](http://www.mass.gov) ) Introduced by Koutoujian of Newton.

<sup>39</sup> The Commonwealth of Massachusetts, Senate, No. 635 (2003) *An act to promote improved patient outcomes through registered nurse staffing in licensed health care facilities* (available at [www.mass.gov](http://www.mass.gov) ) Introduced by Moore.

<sup>40</sup> Massachusetts Hospital Association (June 18, 2003). Testimony on professional nursing workforce legislation (available at [www.mhalink.org](http://www.mhalink.org) )

<sup>41</sup> Massachusetts Government, Division of Health Care Finance and Policy, *Quarterly Acute Hospital Financial Report FY04 Q3* (available at [www.mass.gov](http://www.mass.gov) . )

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- <sup>42</sup> Massachusetts Organization of Nurse Executives (June 18, 2003). Testimony in opposition to House Bills 1282 and 2600 Mandatory Registered Nurse Staffing Legislation; Comments on Senate Bill 635, An Act to Promote Improved Patient Outcomes Through Registered Nurse Staffing in Licensed Health Care Facilities, page 1. (available at [www.massone.org](http://www.massone.org) )
- <sup>43</sup> Pinkham, J. (February 27, 2004). *The hospital industry's opposition to H. 1282 and why it is wrong*. The Massachusetts Nurses Association, page 2 (available at [www.massnurses.org](http://www.massnurses.org) ) Pinkham is the Executive Director of the MNA.
- <sup>44</sup> Massachusetts Nurses Association (Feb, 2005). *The truth about the nursing shortage in Massachusetts: There is none*. Tuesday Reporter, 5(6).
- <sup>45</sup> The Coalition to Protect Massachusetts Patients (available at [www.massnurses.org](http://www.massnurses.org) ); Higgins, K. (June 18, 2003). Testimony: *The role of the registered nurse*. (available at [www.massnurses.org](http://www.massnurses.org) ) Higgins is the president of the MNA, representing 22,000 + registered nurses and other health care professionals; McCabe, D. (June 18, 2003). Testimony: *Research makes clear – safe staffing saves lives* (available at [www.massnurses.org](http://www.massnurses.org) ) McCabe is the Director of the Nursing Department for the MNA and works with Congress on nurse practice issues; Healy, P. (June 18, 2003) Testimony: Results of RN survey – a wake up call. (available at [www.massnurses.org](http://www.massnurses.org) ) Healy is a member of the MNA Board of Directors and a critical care nurse at Brigham and Women's Hospital; Weinberg, D. (June 18, 2003). Testimony. (available at [www.massnurses.org](http://www.massnurses.org) ) Weinberg is author of the book “Code Green”; Stolbach, L. (June 18, 2003) Testimony (available at [www.massnurses.org](http://www.massnurses.org) ) Stolback is a medical oncologist and professor of medicine at U. Mass Medical School.
- <sup>46</sup> Healy, P. (June 18, 2003). *Testimony before the Joint Committee on Health Care: Results of RN survey – A wake up call*”
- <sup>47</sup> *An Act to Promote Safe Patient Care and Support the Nursing Profession (SD 79)*
- <sup>48</sup> Massachusetts Hospital Association and Massachusetts Organization of Nurse Executives (personal communication, March 29, 2005).
- <sup>49</sup> Massachusetts Nurses Association (personal communication), March 7, 2005.
- <sup>50</sup> Joint Commission on Accreditation of Healthcare Organizations (JCAHO) (available at [www.jcaho.org](http://www.jcaho.org) accessed 11/15/04)
- <sup>51</sup> Needleman, J., Buerhaus, P., Matke, S., Stewart, M., & Zelevinsky, K (2002). Nurse-staffing levels and the quality of care in hospitals. *New England Journal of Medicine*, 346(22), pp 1715 – 1722.
- <sup>52</sup> Lang, T., Hodge, M., Olson, V., Romano, P., & Kravitz, R. (2004). *A systematic review of the effects of nurse staffing on patient, nurse employee and hospital outcomes*. *JONA*, 34,(7/8), pp 326 – 337..
- <sup>53</sup> Person, S., Allison, J., Kiefe, C., Weaver, M., Williams, D., Centor, R., & Weissman, N. (2004). *Nurse staffing and mortality for Medicare patients with acute myocardial infarction*. *Medical Care*, 42(1), pp 4 – 12
- <sup>54</sup> Coffman, J., Seago, J., & Spetz, J. (2002). *Minimum nurse-to-patient ratios in acute care hospitals in California*. *Health Affairs*, 21(5) pp 53 – 64.
- <sup>55</sup> Aiken, L., Clarke, S., Sloane, D., Sochalski, J., & Silber, J. (2002a) *Hospital nurse staffing and patient mortality, nurse burnout and job dissatisfaction*. *JAMA*, 288(16) pp 1987 – 1993 (page 1992).
- <sup>56</sup> Mark, B., Harless, D., McCue, M. & Xu, Y. (2004). *A longitudinal examination of Hospital registered nurse staffing and quality of care*. *Health Services Research*, 39(2), pp 279 – 300.
- <sup>57</sup> Kovner, C. & Gergen, P. (1998). *Nurse staffing levels and adverse events following surgery in U.S. hospitals*. *Image: Journal of Nursing Scholarship*, 30(4), pp 315 – 321.
- <sup>58</sup> Amaravadi, R., Dimick, J., Pronovost, P., Lipsett, P. (2000). ICU nurse-to-patient ratio is associated with complications and resource use after esophagectomy; Archibald, L., Manning, M., Bell, L., Banerjee, S., & Jarvis, W. (1997). *Patient density, nurse-to-patient ratio and nosocomial infection risk in a pediatric cardiac intensive care unit*. *The Pediatric Infectious Disease Journal*, 16(11), pp1045 – 1048; Robert, J., Fridkin, S., Blumberg, M., Anderson, B., White, N., Ray, S., Chan, J., & Jarvis, W. (2000). *The influence of the composition of the nursing staff on primary bloodstream infection rates in a surgical intensive care unit*. *Infection control and hospital epidemiology*, 21(1), pp 12 – 17.
- <sup>59</sup> American Nurses Association (2001) *Analysis of American Nurses Association Staffing Survey*.
- <sup>60</sup> Aiken, L., Clarke, S., & Sloane, D. (2002). *Hospital staffing, organization, and quality of care: Cross-national findings*. *International Journal for quality in Health Care*, 14(1), pp 5 – 13.
- <sup>61</sup> Aiken, L., Clarke, S., Sloane, D., Sochalski, J., & Silber, J. (2002a) *Hospital nurse staffing and patient mortality, nurse burnout and job dissatisfaction*. *JAMA*, 288(16) pp 1987 – 1993; Vahey, D., Aiken, L., Sloan, D., Clarke, S., & Vargas, D. (2004). *Nurse burnout and patient satisfaction*. *Medical Care*, 42(2), II-57 – II-66.

- <sup>62</sup> Buerhaus, P., Staiger, D., & Auerbach, D. (2004). *New signs of a strengthening U.S. nurse labor market?* Health Affairs, W4-526 – 533.
- <sup>63</sup> U.S. Department of Health and Human Services, Health Resources and Services Administration, Bureau of Health Professions (July, 2002). *Projected supply, demand and shortages of registered nurses: 2000 – 2020*.
- <sup>64</sup> Vahey, , D., Aiken, L., Sloan, D., Clarke, S., & Vargas, D. (2004). *Nurse burnout and patient satisfaction*. Medical Care, 42(2), II-57 – II-66.
- <sup>65</sup> Laschinger, H., Finegan, J., Shamian, J., & Wilk, P. (2004). *A longitudinal analysis of workplace empowerment on work satisfaction*. Journal of Organizational Behavior, 25, pp 527 – 545.
- <sup>66</sup> Norrish, B., & Rundall, T. (2001). *Hospital restructuring and the work of registered nurses* The Milbank Quarterly, 79(1), pp 55 – 79.
- <sup>67</sup> McCue, M., Mark, B., & Harless, D. (2003). *Nurse staffing, quality and financial performance*. Journal of Healthcare Finance, 29, pp 54 – 76.
- <sup>68</sup> Cho, S., Ketefian, S., Barkauskas, V., & Smith, D. (2003). *The effects of nurse staffing on adverse events, morbidity, mortality and medical costs*. Nursing Research, 52(2), pp 71 – 79.
- <sup>69</sup> California Department of Health Services (9/12/02) *R-37-01, Initial Statement of Reasons*, page 2
- <sup>70</sup> Ibid
- <sup>71</sup> Grannemann, T. (2004). *Estimated cost of achieving 4:1 nurse staffing ratios on medical/surgical floors in Massachusetts hospitals*. Andover Economic Evaluation. This survey was sponsored by the Massachusetts Nurses Association and included responses from nurses on medical/surgical floors, with a response rate of 53.2% for selected floors.
- <sup>72</sup> Massachusetts Hospital Association (personal communication, March 2, 2005).
- <sup>73</sup> Seago, J. (2002). *The California experiment: Alternatives for minimum nurse-to-patient ratios*. JONA, 32(1), pp 48 – 58.
- <sup>74</sup> Hendrix, T. (2003). *Optimization techniques: Industrial production tools with applications in nurse staffing efficiency research*. Outcomes Management, 7(4), pp 194 -197.
- <sup>75</sup> Ray, C., Jagim, M., Agnew, J., McKay, J., & Sheehy, S.- ENA’s Staffing Best Practices Work Group (2003). *ENA’s new guidelines for determining emergency department nurse staffing*. Journal of Emergency Nursing, 29, pp 245 – 253.
- <sup>76</sup> American Nurses Credentialing Center: ANCC Magnet program – Recognizing excellence in nursing services, page 1. (available at [www.nursecredentialing.org](http://www.nursecredentialing.org) ); American Nurses Association: *New law, JCAHO report recognize success of Magnet concept*, page 1 (available at [www.ana.org](http://www.ana.org) ); Aiken, I., Havens, D., & Sloane D. (2000). *The magnet nursing services recognition program: A comparison of two groups of magnet hospitals*. AJN, 100(3), pp 26 – 35.
- <sup>77</sup> Aiken, I., Havens, D., & Sloane D. (2000). *The magnet nursing services recognition program: A comparison of two groups of magnet hospitals*. AJN, 100(3), pp 26 – 35; Havens, D., & Aiken, L. (1999). *Shaping systems to promote desired outcomes: The magnet hospital model*. JONA, 29(2), pp 14 – 20.
- <sup>78</sup> American Organization of Nurse Executives (December 2003). *Policy statement on mandated staffing ratios*. (available at [www.aha.org](http://www.aha.org) )
- <sup>79</sup> Weinberg, D. (June 18, 2003). Testimony. (available at [www.massnurses.org](http://www.massnurses.org) ) Weinberg is author of the book “Code Green”
- <sup>80</sup> Buerhaus, P., Needleman, J., Mattke, S., & Stewart, M. (2002), *Strengthening hospital nursing*. Health Affairs, 21(5), pp 123 – 132; Buerhaus, P., Staiger, D., Auerbach, D. (2000). *Implications of an aging registered nurse workforce*, JAMA, 283(22), pp 2948 – 2954; Spetz, J., & Given, R. (2003). *The future of the nurse shortage: Will wage increases close the gap?* Health Affairs, 22(6), pp 199-206.