


# Staffing Changes Before and After Mandated Nurse-to-Patient Ratios in California's Hospitals

Policy, Politics, & Nursing Practice  
12(3) 133–140  
© The Author(s) 2011  
Reprints and permission:  
sagepub.com/journalsPermissions.nav  
DOI: 10.1177/1527154411417881  
http://ppn.sagepub.com  


Teresa Serratt, PhD, RN<sup>1</sup>, Charlene Harrington, PhD, RN<sup>2</sup>, Joanne Spetz, PhD<sup>2</sup>, and Mary Blegen, PhD, RN, FAAN<sup>2</sup>

## Abstract

California is the first state to mandate specific nurse-to-patient ratios in general acute care hospitals. These ratios went into effect January 1, 2004 and apply “at all times”. Little is known about the changes in staffing that occurred subsequent to the implementation of this legislation. This study identifies and describes changes in nurse and non-nursing staffing that may have occurred as a result of the enactment of these nurse-to-patient ratios. The results of this study indicate that most hospitals made upward adjustments in their RN and registry nurse staff but decreases in support staff and other non-nurse staff were not evident. These findings suggest that these mandated ratios had the desired effect of increasing the number of nurses caring for acutely ill patients.

## Keywords

acute care hospitals, hospital staffing, nurse staffing, nurse-to-patient ratios

## Introduction

California was the first and, so far, the only state to mandate specific nurse-to-patient ratios in general acute care hospitals. Assembly Bill 394 (1999) directed the California Department of Health Services to issue regulations establishing minimum nurse-to-patient ratios: “To ensure the adequate protection of patients in acute care settings, it is essential that qualified registered nurses and other licensed nurses be accessible and available to meet the needs of patients” (Kuehl, n.d.; California Assembly Bill 394, Chapter 945, Section 1, subsection [c]). The regulations specify maximum numbers of patients per licensed nurse (registered nurse and licensed vocational nurse) for several types of patient care areas (California Code of Regulations, Title 22, Section 70217). The regulations became effective on January 1, 2004. Table 1 presents a summary of these mandated ratios. The ratios apply “at all times” meaning that they are in effect every day, throughout each shift, including when nurses are on breaks.

The health care marketplace has been particularly turbulent for general acute care hospitals over the past two decades. Hospitals have faced great revenue constraints and steep competition for patients (Spetz, 1999). Patients' severity of illness and the proliferation of new medical technology increased during this time, which has required a more skilled workforce and have raised the cost of providing care (Congressional Budget Office, 2008; Newhouse, 1992). Although patients treated in hospitals have higher disease severity, their lengths

of stay decreased under the constraints of managed care cost containment measures (Reinhardt, 1996; Weil, 2003). Together with the trend of patients with higher disease severity and decreased length of stays, more activity was seen in the outpatient setting, which contributed to a decrease in the inpatient occupancy rates for hospitals (American Hospital Association [AHA], 2011). In an environment of increased competition, diminishing Medicare and Medicaid inpatient payments, and a rising level of managed care penetration, hospital revenues and margins decreased, exerting intense fiscal pressures (AHA, 2008; Kaufman, 2011; McCue, Mark, & Harless, 2003). In response, hospitals devised strategies to meet their organizational goals and priorities. One such strategy was to reduce their nursing labor force. By requiring specific minimum staffing levels, AB 394 sharply restricted hospitals' ability to reduce their nursing workforce.

## Purpose of the Study

This descriptive study focuses on the early effects of mandatory nurse staffing ratios by examining staffing changes made

<sup>1</sup>University of Nevada, Reno

<sup>2</sup>University of California San Francisco

## Corresponding Author:

Teresa Serratt, PhD, RN, University of Nevada, Division of Health Sciences, 1664 N Virginia St., Reno, NV 89557-0134  
Email: tserratt@unr.edu

**Table 1.** Minimum Nurse-to-Patient Ratios

Type of unit	Initial minimum ratio (January 2004)	Final minimum ratio
Critical care	1:2	Unchanged
Operating room	1:1 <sup>a</sup>	Unchanged
Labor and delivery		
Perinatal	1:2	Unchanged
Antepartum	1:4	Unchanged
Postpartum		
Mother-baby couplets/multiple births	1:4/1:8	Unchanged
Mother's only	1:6	Unchanged
Combined labor/delivery/postpartum	1:3	Unchanged
Pediatric	1:4	Unchanged
Emergency department	1:4	Unchanged
Critical care patient	1:2	Unchanged
Critical trauma patient	1:1	Unchanged
Step down	1:4	1:3 <sup>b</sup>
Telemetry	1:5	1:4 <sup>c</sup>
Medical/surgical	1:6	1:5 <sup>d</sup>
Specialty care	1:5	1:4 <sup>e</sup>
Psychiatric	1:6 <sup>f</sup>	Unchanged

a. Operating room: at least one registered nurse assigned to duties of the circulating nurse. In addition, one person must serve as a scrub assistant who may be a licensed nurse, an operating room technician, or other competent person not assisting in the surgery.

b. Step down: As of January 1, 2008, the ratio decreased.

c. Telemetry: As of January 1, 2008, the ratio decreased.

d. Medical/surgical: As of January 1, 2005, the ratio decreased.

e. Specialty care: As of January 1, 2008, the ratio decreased.

f. Psychiatric: This type of unit only may include licensed psychiatric technicians as well as licensed vocational nurses; not to exceed 50% of the licensed nurses on the unit.

by California hospitals following implementation of the ratios. It compares RN, LVN, Nursing Assistant, Registry Nursing (staff not employed directly by the individual hospital—also known as contract, agency, and supplemental staff) as well as other support and nonnurse professional staff between fiscal years 2000 and 2006. Economic theory (Folland, Goodman, & Stano, 2009) suggests that hospitals faced with increased nurse staffing costs may utilize personnel cost containment strategies to mitigate this financial impact. Therefore, this study also examines whether hospitals that increased their RN staffing levels to comply with the new requirements reduced other types of nursing, support, and professional staff.

## Review of the Literature

Currently, only four studies have been published on the effects of the mandated nurse-to-patient ratios on staffing in general acute care hospitals. One of the first of these studies, conducted by Donaldson et al. (2005) found the mean total RN hours of care per patient day increased by 20.8% on medical/surgical units in their sample of 268 patient care units within 68 California hospitals, and the mean total licensed hours of care (i.e., by RNs and LVNs) increased by 17.8%. The mean total nursing hours of care per patient day (including RN, LVN, and unlicensed hours of care) increased by 7.4%. Compliance

with nurse staffing ratios in medical/surgical units was found to be 90% prior to the implementation and 97% in the first two quarters of 2004.

In a follow-up study of 64 hospitals and 187 patient care units, Bolton et al. (2007) found an overall increase of 1.5 hr of RN care per patient day in medical/surgical units in their study between 2002 and 2006. In addition, an increase of 1 hr was noted in RN care per patient day in step-down units. The percentage of care provided by RNs increased by 11.2% in medical/surgical units and by 4.8% in step down units. They also found a 2% reduction in the use of LVNs in both medical surgical units and step-down units. The use of unlicensed nursing care staff decreased by 9% in medical/surgical units and by 3% in step-down units.

Another study explored whether use of LVNs increased in response to the mandated nurse-to-patient ratios and whether nonnurse ancillary support staff were reduced (Aiken et al., 2010). Based on 1,311 registered nurse responses to a survey conducted in 2006, the researchers found 88% of the California medical-surgical respondents reported that they had cared for 5 patients or fewer on their last shift.

Fifteen percent of all California RN respondents ( $n=9,257$ ) reported an increase in the use of LVNs in providing patient care whereas 25% reported a decrease in LVN use. One third of California RNs in this study reported that use of unlicensed assistive personnel decreased. In addition, 30% reported

increased float-pool nurse coverage and 43% reported an increase in supplemental or agency nurse use. Nonnursing support staff (e.g., housekeeping, unit clerks) decreased according to 27% of the California “all nurses” participants.

Another study, conducted by Spetz et al. (2009) examined how California’s staffing regulations affected different hospitals categorized by mix of patients, financial status, and type of ownership. Using data from annual hospital financial disclosure reports submitted by 410 general acute care hospitals to the California Office of Statewide Hospital Planning and Development (OSHPD), the authors found that in 1999 RN hours per patient day averaged just more than 5.0. By 2006, RN hours per patient day had increased to nearly 6.25 hr per patient day. This study also found registry nurse hours per patient day had increased from less than 0.5 to nearly 1.0 and LVN and nursing assistant hours per patient day remained fairly stable.

These four studies all indicate an overall increase in medical/surgical RN care hours per patient day after the implementation of nurse-to-patient ratios. There were mixed findings for contract/agency nurse, LVN, and unlicensed personnel use. In the one study examining changes in the use of support staff (staff who are not part of the nursing unit labor force, such as housekeeping personnel and unit clerks), there is some indication that reductions in some hospitals may have been made. Findings from these early studies are mixed and data sources vary—including voluntarily reported data, aggregate data contained in statewide administrative databases derived from mandatory hospital reports, and surveys of nurses—making it difficult to compare or understand differences in study findings.

## Method

### Design

This study utilized data from California Hospital Annual Financial Disclosure Reports. All licensed, nonfederal hospitals in California must submit an annual financial disclosure report to OSHPD, a statewide agency that is part of the California Health and Human Services Agency, within 4 months of the end of their fiscal (accounting) year, which differs from hospital to hospital. The report includes a detailed income statement, balance sheet, statements of revenue and expense, and supporting schedules that are based on a uniform accounting and reporting system developed, maintained, and audited for completeness by OSHPD.

In the Hospital Annual Financial Disclosure Reports, the data are categorized by periods ending between 6/30-6/29 of 2 years (such as 6/30/1999-6/29/2000 and 6/30/2005-6/29/2006).

For this study, data in reports from individual hospitals were examined for 2 fiscal years, one before and one after the ratios were implemented (FY 2000 and FY 2006).

### Unit of Analysis

The primary unit of analysis is individual California general acute care hospitals. Inclusion criteria included availability of Hospital Annual Financial Disclosure Reports for a hospital both FY 2000 and FY 2006, complete reporting of mean productive hours for employee RNs and registry nurses for both time periods, and having at least 30 acute adult medical/surgical beds at the time of the reports. Not all hospital locations submit a separate report because some operate under consolidated licenses (e.g., for a multihospital system), in which case the parent organization may submit a combined report for its hospitals. Hospitals submitting such combined reports were not included in this study, since the unit of analysis for this study was individual hospitals.

Of the 375 potential general acute care hospitals in California, a total of 273 hospitals were included in the analysis. Twenty hospitals did not report mean productive hours for medical/surgical registered and registry nurses in both FY 2000 and FY 2006. Fifteen hospitals began consolidated reporting during this time period and therefore could not be matched with a postratios report. An additional 23 hospitals did not appear on the OSHPD tracking reports (no explanation for the missing reports was available). In addition, between FY 2000 and FY 2006, two hospitals had suspended their operations and 19 had closed. Another 23 facilities were eliminated from this study because they had fewer than 30 acute adult medical/surgical beds.

Data on hospital characteristics (geographic location and changes in occupancy, capacity, patient acuity, payer mix, type of ownership, and system affiliation) were available from the OSHPD files, as well as data describing staffing both licensed nurses (RNs, LVNs), nonlicensed nursing staff and other hospital employees. These hospital characteristics provide a context in which staffing decisions are made. They can either augment or constrain a hospital’s financial status and the subsequent staffing strategies hospitals may choose to employ. Categories of staff in patient revenue producing cost centers reported in the OSHPD database include: registered nurses, licensed vocational nurses, nurse aides/orderlies, clerical/administrative, and registry nurses. By the OSHPD (2005) definition, the registry classification includes RNs and LVNs contracted on a temporary basis. However, due to the limited scope of practice for California LVNs in the general acute care hospital setting, registry nurses are predominately RNs (Aiken et al., 2010; Spetz, 2001).

Staff were quantified by measures of productive hours, that is, the total number of hours actually worked and not hours spent “on call.” Registry nurses are also reported as total productive hours.

“Other” staff includes those designated under ancillary and general services. Ancillary service staff includes those who perform diagnostic (radiology and clinical laboratory)

**Table 2.** Mean Productive Hospital Staffing Hours per Patient Days or Service Volume

Variables	FY 2000	FY 2006	p Value
	M (SD)	M (SD)	M (SD)
<b>Nurse staffing</b>			
Medical/surgical RN	4.36 (1.36)	5.16 (1.67)	0.000
Medical/surgical LVN	0.92 (0.80)	0.95 (0.87)	0.932
Medical/surgical registry	0.30 (0.40)	0.88 (0.89)	0.000
Medical/surgical aide	2.26 (1.08)	2.37 (1.15)	0.263
Medical/surgical clerical/administration	0.64 (0.43)	0.70 (0.47)	0.127
Medical/surgical RN + registry	4.66 (1.65)	6.04 (1.71)	0.000
Hospital-wide RN	5.50 (1.96)	5.98 (2.06)	0.000
Hospital-wide LVN	1.05 (0.67)	0.98 (0.72)	0.448
Hospital-wide registry	0.35 (0.41)	0.92 (0.86)	0.000
Hospital-wide aide	2.08 (1.02)	2.10 (0.86)	0.615
Hospital-wide clerical/administration	0.65 (0.43)	0.69 (0.45)	0.175
Hospital-wide RN + registry	5.85 (2.04)	6.89 (2.21)	0.000
<b>"Nonnurse" staff</b>			
Clinical lab	0.23 (0.11)	0.20 (0.11)	0.000
Physical therapy	0.65 (0.52)	0.60 (0.43)	0.149
Pharmacy	0.64 (0.28)	0.71 (0.26)	0.000
Radiology	0.53 (0.41)	1.27 (0.49)	0.000
Respiratory therapy	0.35 (0.33)	0.83 (0.39)	0.000
Total general services	6.35 (2.89)	6.17 (2.91)	0.156

Note: RN = registered Nurse; LVN = licensed vocational nurse. Nursing and "nonnurse" staffing variables are reported as mean productive hours and have been adjusted for patient days or units of service ( $p \leq .05$ , two-tailed).

or therapeutic (respiratory, physical, occupational, and speech therapy) services. General services staff include those associated with the operation and maintenance of the hospital (dietary, laundry and linen, housekeeping, and plant operations and maintenance). The measures for "other" staff are total productive hours.

## Findings

For this sample of 273 California general acute hospitals, the mean number of licensed beds increased slightly (219 to 229) between FY 2000 and FY 2006, and the mean occupancy rate increased from 0.53 to 0.58. Mean length of stay decreased from 5.78 days to 5.5 days, and the case-mix index remained relatively stable at 1.07. (Case-mix index is a measure of the complexity of care required or the relative proportion of complex cases for which the hospital provides care; Fetter, Shin, Freeman, Averill, & Thompson, 1980). The mean percentage of Medicare patients remained constant from FY 2000 (44.37%) and FY 2006 (44.21%) and the mean percentage of Medi-Cal increased from 28.74% in FY 2000 to 31.84% in FY 2006. The percentage of insured and other payers (this category includes county indigent programs, third-party payers, other indigent, and other payers) decreased from 26.89% in FY 2000 to 23.91% in FY 2006. The great majority of the hospitals in this study are classified as urban (91.9%). Slightly more than half are not-for-profit; this group declined slightly over the study period, from 59% to 57.1% of hospitals. About

half of all hospitals in this study were affiliated with a health care system (46.9%), and this share did not change over the study period. Mean wages for RNs increased from FY 2000 to FY 2006 by nearly 9%, adjusted for inflation (US\$31.68 per hour to US\$40.66 in 2005 dollars).

Table 2 shows that the mean productive hours per patient day for employed RNs increased significantly by nearly an additional hour in medical/surgical units over the study period. Medical/surgical registry nurse hours per patient day also increased significantly by more than 1.5 hr. Increases were not observed for LVN, aide, or clerical/administrative hours per patient day.

*Total daily services* includes multiple types of hospital units (pediatrics, intensive care, labor and delivery, etc.) with different mandated nurse-to-patient ratios. Hospital-wide showed staffing patterns similar to those of the medical/surgical units. Table 2 shows that RN employee and registry nurse hours per patient day increased significantly. The remaining staffing categories did not demonstrate a significant difference in mean productive hours per patient day between FY 2000 and FY 2006.

Table 2 shows the mean productive hours for other types of support and professional services for the two periods. The productive hours for pharmacy, radiology, and respiratory therapy all increased significantly. Clinical laboratory staff had a significant decrease in staff from FY 2000 to FY 2006. No significant differences were found for the physical therapy and total general services staff categories. These findings



**Table 3.** Comparison of Medical/Surgical Total RN Staffing Categories in FY 2000 and FY 2006

Staffing categories	FY 2000	FY 2006
Above (mph/pd > 6.0)	11.4% (n = 31)	48.0% (n = 131)
Reference (mph/pd = 4.0-6.0)	53.9% (n = 147)	43.2% (n = 118)
Below (mph/pd < 4.0)	34.8% (n = 95)	8.8% (n = 24)
Totals	100% (n = 273)	100% (n = 273)

Note: Mean productive hours per patient day is indicated as (mph/pd). The reference category reflects a general estimate of the medical/surgical nurse-to-patient ratio of 1:5 by using mean productive hours per patient day with the calculation: 24 hr divided by mph/pd = number of patients per nurse. If mph/pd were 4.0 then the nurse-to-patient ratio would be 1:6 ( $24 \div 4 = 6$ ), 5.0 mph/pd would be 1:4.8, and 6.0 mph/pd would be 1:4.

fail to support the speculation and widely held concern (Feder, 2003; Robertson, 2004; Seago, Spetz, Coffman, Rosenoff, & O'Neil, 2000; Service Employees International Union [SEIU], 2009; Spetz, 2004) that hospitals would "trade off" these staff to increase RN staffing.

Medical/surgical total RN baseline mean productive hours per patient day were categorized into three groups. The reference group was those hospitals staffing at approximately the medical/surgical minimum 2004 standard of 1:6 nurse-to-patient ratio (which changed to 1:5 in 2005). It was calculated by dividing 24 hr by the mean productive hours per patient day. This calculation provides an estimate of the number of patients assigned to one nurse. If mean productive hours per patient day were 4.0 then the nurse-to-patient ratio would be 1:6, 5.0 mean productive hours per patient day would be 1:4.8, and 6.0 mean productive hours per patient day would be 1:4. Using the reference group range of 4.0-6.0 mean productive hours per patient day allowed for the regulatory change in medical/surgical nurse-to-patient ratios between 2004 and 2005. Although this calculation can approximate mean productive hours with nurse-patient ratios, it is important to note that patient days may be more or less than 24 hr (hospital daily census is typically reported as the number of patients at midnight) and productive hours may include hours for nurses not providing direct patient care (which may result in higher estimates of nurse-to-patient ratios).

Hospitals staffing at the medical/surgical minimum nurse-to-patient ratio were compared to hospitals with staffing below and those staffing above the minimum requirement. Table 3 shows that prior to the implementation of the staffing regulations nearly 35% of hospitals in this study were staffing below the minimum 1:5 medical/surgical nurse-to-patient ratio, but by FY 2006 that percentage decreased to 8.8%. Nearly half were staffing in the top category by FY 2006. This suggests that the majority of hospitals in this study made an upward adjustment in their medical/surgical RN and registry mean productive hours per patient day in response to the nurse-to-patient ratio mandate. However, hospitals with nurse staffing below 4.0 mean productive hours per patient day had a significantly larger change in

mean productive hours than did hospitals with average mean productive hours per patient day (approximately 5 mean productive hours per patient day) in FY 2000. Hospitals staffing above 6.0 mean productive hours per patient day in FY 2000 changed their staffing less as compared with hospitals with average mean productive hours per patient day. These results indicate that hospitals that were not staffing near the 1:5 medical/surgical nurse-to-patient ratios in FY 2000 increased nurse staffing in response to the implementation of the minimum nurse staffing regulation that went into effect in 2004. The amount of increase depended largely on the level of staffing in hospitals before the ratios went into effect. In addition, registry nurses, who are a more expensive source of labor than regular employees, were used to move toward compliance with the staffing mandate.

## Discussion

Three important conclusions are supported by this analysis. First, the mean productive hours per patient day of RNs and registry nurses in California hospitals increased between FY 2000 and FY 2006. Second, hospitals staffing above the minimum 1:5 nurse-to-patient ratio in FY 2000 increased their staffing by a smaller amount between FY 2000 and FY 2006 compared to hospitals staffing at or below the minimum 1:5 nurse-to-patient ratio. The findings also suggest that some of these hospitals may have decreased their staffing levels from FY 2000 to FY 2006. Third, unit-based support staff and other nonnurse staff mean productive hours per patient day or per service were not reduced.

These findings suggest most hospitals did make upward adjustments to RN staffing in response to the mandated nurse-to-patient ratios, by increasing use of employee RNs and registry nurses. However, this adjustment did not decrease use of nonnurse staff who could have been vulnerable to cost reduction strategies. In the past, hospitals could reduce a significant portion of the operating budget by reducing nursing staff (Aiken, Clarke, & Sloane, 2000; Curran & Mazzie, 1995; Hadley, Zuckerman, & Iezzoni, 1996; McConnell, 2005; Walston, Burns, & Kimberly, 2000; Weiner, 2000). Because the mandated nurse-to-patient ratios generally preclude such an approach, unit-based support and nonnurse support staff could have become the new focus of such financial strategies. However, this reaction was not evident in the findings of this study.

This study adds to the body of knowledge about the impact of mandatory staffing ratios by identifying and describing changes in both medical/surgical total RN and nonnurse staffing before and after the implementation of the nurse-to-patient ratios legislation. The results of this study indicate that the legislation had the overall desired effect of increasing the number of nurses caring for acutely ill patients in California's general acute care hospitals; however, nearly 9% of hospitals in FY 2006 had mean productive nursing hours per patient day below 4, which would equate to a nurse-to-patient ratio greater than 1:6 and

suggests a lack of compliance with the mandated ratios. The findings of this study also suggest that some hospitals with nurse staffing levels above the minimum nurse-to-patient ratio requirements in FY 2000 decreased their total RN staffing in FY 2006. This indicates that one of the unintended consequences of the legislation may have been to create a staffing ceiling rather than the intended floor. That is, instead of hospitals using the ratios to set the minimum number of nurses required to care for patients then adjusting upward based on patient acuity, staffing is only set to meet the minimum requirements established by the ratios. In addition, registry nurses, which are a more expensive source of labor than regular employees, were used to move toward compliance with the staffing mandate. Hospitals that spend more money on expensive nurse labor may restrict their capacity to continue or expand services or improve technologies. Furthermore, unit-based and nonnurse support staff were not reduced to alleviate any financial stress the ratios may have caused to the hospitals and, in fact, increased for some staff categories. This is in contrast to qualitative findings reported by Spetz et al. (2009) in which several hospital executives reported that they reduced ancillary staff. It is possible that some hospitals did reduce their ancillary staff, but the overall trend for the hospitals in this study showed no decrease.

Results of this study reflect changes made in the second fiscal year after the legislation went into effect. As this study looks at early results after the implementation, further research is needed to ascertain long-term changes caused by this legislation. In addition, because the findings of this study did not substantiate anecdotal reports that hospitals reduced non-nurse staff, other strategies that may have been implemented for cost reduction should be explored. Economic theory suggests that hospitals experiencing increased expenditures in one category, in this case nursing personnel, may respond by reducing spending in others (Folland et al., 2009). Future research should examine other strategies related to maintaining sufficient operating margins that may have been implemented and any subsequent unintended consequences that resulted from these strategies.

As the focus of this study was on the changes in nurse and nonnurse staffing during the early implementation phase of the nurse-to-patient ratios, continued exploration of changes in staffing, both nurse and nonnurse, are needed to ascertain ongoing and long-term staffing changes wrought by the nurse-to-patient ratio legislation. A publically available statewide data source that provided staffing hours for direct patient care activities at the individual unit level, by shift, for each hospital, utilizing a calendar year time period, would provide a richer source for future staffing studies. Questions remain as to the effect nurse-to-patient ratios have had on patient outcomes and the quality of care being delivered in California hospitals. Further studies must be conducted that assess the impact this policy has had on the changes in quality of care that may be associated with nurse staffing increases.

## Limitations

The Hospital Annual Financial Disclosure Report is one of the best sources for California hospital staffing data because it includes nurse and nonnurse staffing data at the cost center level (medical/surgical, pediatrics, intensive care, etc.) that is superior to hospital-wide aggregated data. However, the data are aggregated by fiscal year and by type of unit rather than being reported for each shift and each individual unit. Thus they do not allow us to determine compliance with the nurse-to-patient ratios (since the regulations require staffing ratios to be calculated for each shift and at the unit level). Although mean productive hours can be loosely equated with nurse-to-patient ratios, it is important to note that productive hours (as reported to OSHPD) include time nurses spend in educational activities, meetings, and non-patient-care-related tasks of the unit. Also, some nurses who do not provide direct patient care (charge nurses, infection control nurse, nurse educators, etc.) may be included in productive hours (Spetz et al., 2008). If this is the case, the measure of mean productive hours per patient day would overestimate the number of nurses per patient in this study.

Another limitation arises because the data are reported by type of unit. Many hospitals may have more than one medical/surgical unit, and the aggregated total of mean productive hours may not represent any single unit well. One medical/surgical unit may be staffed higher whereas another medical/surgical unit in the same hospital may be below the minimum nurse-to-patient ratio, but the aggregate data might indicate a 1:5 nurse-to-patient ratio on medical-surgical units. As these are annually reported data it is not possible to determine unit-to-unit, shift-to-shift or "at all times" differences required by the regulation (Spetz et al., 2008).

An additional limitation of this study is that data were not available for every California general acute care hospital for both FY 2000 and 2006. Hospitals were eliminated from the study due to a lack of matching pre- and post-Hospital Annual Financial Disclosure Reports ( $n = 23$ ), had less than 30 adult acute medical/surgical beds ( $n = 23$ ), and failed to report mean productive hours for RNs and registry nurses for both time periods ( $n = 20$ ). Thus, generalization of these study findings to all California general acute care hospitals cannot be made.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## References

- Aiken, L. H., Clarke, S. P., & Sloane, D. M. (2000). Hospital restructuring: Does it adversely affect care and outcomes? *Journal of Nursing Administration, 30*(10), 457-465.

- Aiken, L. H., Sloane, D. M., Cimiotti, J. P., Clarke, S. P., Flynn, L., Seago, J. A., & . . . Smith, H. L. (2010). Implications of the California nurse staffing mandate for other states. *Health Services Research, 45*(4), 904-921.
- American Hospital Association. (2008). *Underpayment by Medicare and Medicaid fact sheet*. Retrieved from <http://www.aha.org/aha/content/2008/pdf/08-medicare-shortfall.pdf>
- American Hospital Association. (2011). *Trends in inpatient utilization in community hospitals, 1989-2009. Trend Watch Chartbook 2011*. Retrieved from <http://www.aha.org/aha/trendwatch/chartbook/2011/table3-1.pdf>
- Bolton, L. B., Aydin, C. E., Donaldson, N., Brown, D. S., Sandhu, M., Fridman, M., & Aronow, H. U. (2007). Mandated nurse staffing ratios in California: A comparison of staffing and nurse-sensitive outcomes pre- and post-regulation. *Policy, Politics & Nursing Practice, 8*(4), 238-250.
- Congressional Budget Office. (2008). *Technological change and the growth of health care spending*. Retrieved from <http://www.cbo.gov/ftpdocs/89xx/doc8947/01-31-TechHealth.pdf>
- Curran, C. R., & Mazzie, S. A. (1995). *The effect of hospital restructuring on nursing: A report on findings from a survey of hospital chief nursing executives*. Chicago: APM.
- Donaldson, N., Bolton, L. B., Aydin, C., Brown, D., Elashoff, J. D., & Sandhu, M. (2005). Impact of California's licensed nurse-patient ratios on unit-level nurse staffing and patient outcomes. *Policy, Politics, & Nursing Practice, 6*(3), 198-210.
- Feder, O. B. (2003, October 18). Stanford nursing levels studied. *San Jose Mercury News*.
- Fetter, R. B., Shin, Y., Freeman, J. L., Averill, R. F., & Thompson, J. D. (1980). Case mix definition by diagnosis-related groups. *Medical Care, 18*(Suppl. 2), 1-53.
- Folland, S., Goodman, A. C., & Stano, M. (2009). *The economics of health and health care*. Upper Saddle River, NJ: Prentice Hall.
- Hadley, J., Zuckerman, S., & Iezzoni, L. I. (1996). Financial pressure and competition: Changes in hospital efficiency and cost-shifting behavior. *Medical Care, 34*(3), 205-219.
- Kaufman, N. S. (2011). Changing economics in an era of healthcare reform. *Journal of Healthcare Management, 56*(1), 9-13.
- Kuehl, S. (n.d.). *Assembly Bill 394, Chapter 945, California Statutes of 1999, Section 1, subsection (c)*. Retrieved from [ftp://leginfo.public.ca.gov/pub/99-00/bill/asm/ab\\_0351-0400/ab\\_394\\_bill\\_19991010\\_chaptered.html](ftp://leginfo.public.ca.gov/pub/99-00/bill/asm/ab_0351-0400/ab_394_bill_19991010_chaptered.html)
- McConnell, C. R. (2005). Larger, smaller, and flatter: The evolution of the modern Healthcare organization. *The Health Care Manager, 24*(2), 177-188.
- McCue, M., Mark, B., & Harless, D. W. (2003). Nurse staffing, quality, and financial performance. *The Journal of Health Care Finance, 29*, 54-76.
- Newhouse, J. P. (1992). Medical care costs: How much welfare loss? *Journal of Economic Perspectives, 6*(3), 3-21.
- Office of Statewide Health Planning and Development. (2005). *OSHPD glossary of hospital financial data items*. Retrieved from <http://www.oshpd.ca.gov/hid/Products/Hospitals/AnnFinanData/HAFDDoc2004.pdf>
- Reinhardt, U. (1996). Spending more through "cost control": Our obsessive quest to gut the hospital. *Health Affairs, 15*, 145-154.
- Robertson, K. (2004, May 7). New nurse law fails to cause emergency. *Sacramento Business Times*.
- Seago, J. A., Spetz, J., Coffman, J., Rosenoff, E., & O'Neil, E. (2003). Minimum staffing ratios: The California workforce initiative survey. *Nursing Economic, 21*(2), 65-70.
- ServiceEmployeesInternationalUnion. (2009). *A record of SEIU patient and community health advocacy in California*. Retrieved from <http://www.nurseallianceca.org/assets/assetcontent/6ea0a9b0-b757-485d-9806-063d7f52713b/546bfa9e-94e2-495f-9d30-54cc81f55e47/c503ec95-da68-43cc-a2f6-363fc2159c9d/1/CA%20Nurse%20Alliance%20Patient%20Advocacy%20final%203-12-09.pdf>
- Spetz, J. (1999). The effects of managed care and prospective payment on the demand for hospital nurses: Evidence from California. *Health Services Research, 34*(5), 993-1010.
- Spetz, J. (2001). What should we expect from California's minimum nurse staffing legislation? *The Journal of Nursing Administration, 31*(3), 132-140.
- Spetz, J. (2004). California's minimum nurse-to-patient ratios: The first few months. *Journal of Nursing Administration, 34*(12), 571-578.
- Spetz, J., Chapman, S., Herrera, C., Kaiser, J., Seago, J. A., & Dower, C. (2009). *Assessing the impact of California's nurse staffing ratios on hospitals and patient care* (Issue Brief). Oak Land: California Health Care Foundation.
- Spetz, J., Donaldson, N., Aydin, C., & Brown, D. S. (2008). How many nurses per patient? Measurements of nurse staffing in health services research. *Health Services Research, May 5, 2008*. (ahead of print)
- Walston, S. L., Burns, L. R., & Kimberly, J. R. (2000). Does reengineering really work? An examination of the context and outcomes of hospital reengineering initiatives. *Health Services Research, 34*, 1363-1388.
- Weil, T. P. (2003). Hospital downsizing and workforce reduction strategies: Some inner workings. *Health Services Management Research, 16*, 13-23.
- Weiner, C. L. (2000). *The elusive quest: Accountability in hospitals*. Hawthorne, NY: Aldine de Gruyter.

## BIOS

**Teresa Serratt**, PhD, RN, is an assistant professor in the Orvis School of Nursing at the University of Nevada Reno. Her research focuses on health policy, nursing workforce and organizational analysis of economic and quality issues of acute care hospitals. As the Legislative Committee co-chair for the Nevada Nurses Association, she has worked on key state legislative initiatives that improve the work environment for nurses and the access to and quality of care for Nevadans.

**Charlene Harrington**, PhD, RN, is Professor Emeritus of Sociology and Nursing at the UCSF School of Nursing Department of Social & Behavioral Sciences where she is currently the principal investigator of the national UCSF Center for Personal Assistance Services funded by National Institute on Disability and Rehabilitation Research, the CalQualityCare website project for long term care

funded by the California HealthCare Foundation, and a national study home and community based services funded by the Kaiser Commission on Medicaid and the Uninsured.

**Joanne Spetz**, PhD, is a Professor at the Institute for Health Policy Studies and the School of Nursing at the University of California, San Francisco. She has led national and state surveys of registered nurses and nursing schools, evaluations of programs to expand the supply of nurses, research on the effects of health information technologies in hospitals, studies of the relationship between nursing and patient outcomes, analysis of hospital services and organization, and assessments of the effects of minimum nurse staffing regulations on patients and hospitals. Joanne was a consultant to

the Institute of Medicine Committee on the Future of Nursing and a member of the National Commission on VA Nursing. She frequently provides testimony and technical assistance to state and federal agencies and policymakers.

**Mary Blegen**, PhD, RN, FAAN, is a Professor Emeritus in the Department of Community Health Systems and Director of the Center for Patient Safety in the School of Nursing at the University of California, San Francisco. She serves as Associate Editor for Nursing Research, and is a member of the Expert Panel on Quality Health Care for the American Academy of Nursing. Her research has focused on nurse staffing and the quality and safety of patient care.