The Effect of LPN Reductions on RN Patient Load in Florida Hospitals

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EXECUTIVE SUMMARY

Objective: This study examines the effect of licensed practical nurse (LPN) reductions on registered nurse (RN) staffing in Florida hospitals.

Background: When utilizing the usual measures of RN staffing (the number of RNs, RN/patient and RN/nursing staff), researchers generally have not found a deterioration in RN staffing over the last decade. However, reductions in LPNs may impact RN staffing because RNs and LPNs share patients and/or patient care. Given this situation, adequate RN staffing can be assessed more thoroughly by also looking at the changes in LPN and licensed nurse (RNs + LPNs) staffing.

Methods: Using data from the American Hospital Association's Annual Survey, this study describes the changes in RN, LPN, licensed nurse, and total hospital staffing in selected years from 1991 to 2001 in Florida hospitals. Paired sample *t*-tests of the mean difference measure the significance of change from period to period and overall.

Results: As in other studies of RN staffing, RN positions increased throughout the 1990s in Florida hospitals. The RN to 1,000 APDC ratio increased 3% from 1991 to 1999, indicating that RN patient load decreased by that amount. However, a 2.5% reduction in LPNs from 1991-1999 impacted RN patient load through a 1.4% decrease in licensed nurse to 1,000 APDC, indicating a 1.4% increase in licensed nurse patient load. It also impacted skill mix by reducing the proportion of licensed nurse to total hospital staff by 3%. From 2000 to 2001, RN reductions were the major cause of a 8% increase in RN patient load, and a 9% increase in licensed nurse patient load.

Conclusions/Implications: These results support the perception that RN staffing has worsened, but a full explanation involves assessing other factors that impact workload, such as patient acuity, length of stay, nursing care model and other workplace considerations. Future policy and research should consider the role of LPNs in RN staffing, identify factors contributing to increased workloads, and explore ways to redesign the work process to reduce workloads.

INTRODUCTION

In June of 2000, Florida Hospital Association (FHA) released a report of its survey of Florida hospitals entitled "Where Have All the Nurses Gone? Florida's Nursing Shortage" (FHA, 2000). In this report, FHA noted higher RN vacancy and turnover rates. Almost nine out of ten hospital administrators felt there was a shortage of adult critical care and medical/surgical RNs. Since that time, FHA's annual survey has not brightened much. The 2001 survey revealed even higher turnover and vacancy rates than in 2000, and the same perception of a shortage (FHA, 2001). The 2002 survey showed slight improvement in vacancy and turnover rates, but 96% of hospital leaders felt that there continued to be a shortage (FHA, 2002).

Around the nation, the situation appears similar. Articles and reports on the "nursing shortage" speak of an aging population requiring more health care, and an aging and inadequately growing nursing workforce providing health care institutions with insufficient numbers of nurses and nursing hours (AHA Commission, 2002; Kimball & O'Neil, 2001; White, 2001).

While this round of a nursing shortage emerged around 2000 and continues today, the issue of nursing staff inadequacy has a longer history. Nursing surveys of the 1990s reported increases in RN patient load or workload and decreases in skill mix (Shindul-Rothschild, 1994; Shindul-Rothschild, Berry & Long-Middleton, 1996; Tillman, Saylor, Corley & Mark, 1997). Even then, nurses were concerned that the numbers of skilled nursing staff were not adequate to meet the needs of increasingly acutely-ill patients, cared for in shorter and shorter, more intense, hospital stays. (Shindul-Rothschild, Berry & Long-Middleton, 1996; Sochalski, 2001; Tillman, Saylor, Corley & Mark, 1997; Wunderlich, Sloan & Davis, 1996). Although a "shortage" did not exist, in the sense of demand outstripping supply, nurses believed that staffing had deteriorated due to personnel downsizing and skilled nurse replacement. (Aiken, Clarke & Sloane, 2000; Shindul-Rothschild, Berry & Long-Middleton, 1996; Tillman, Saylor, Corley & Mark, 1997). Studies of the relationship

between nurse staffing and patient outcomes corroborated the belief that more adverse patient outcomes occur in poorer staffed units (Aiken, Clarke, Sloane, Sochalski & Silber, 2002; Blegan, Goode & Reed, 1998; Kovner & Gergen, 1998; Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002; Pittet, Tarara & Wenzel, 1994; Unruh, 2003a)

Despite these impressions and concerns, to date, most research measuring nurse staffing has not demonstrated an increase in RN patient load, or a decrease in the proportion of RNs to total nursing staff (skill mix) (Aiken, Sochalski & Anderson, 1996; Anderson & Kohn, 1996; Bond & Raehl, 2000; Buerhaus & Staiger, 1999; Kovner, Jones & Gergen, 2000, Spetz, 1998, 2000; Unruh, 2003b). Aiken and colleagues (1996) found that both RN/total nursing staff and RN FTEs/100 adjusted average daily census (AADC) increased from 1984 to 1994, the latter by 29%. However, when adjusted for case-mix, RN FTE/100 AADC did not change. Anderson and Kohn (1996) reported a slight increase (2%) in nurses/1,000 inpatient days of care in California hospitals from 1982 to 1994. In another study, the number of RNs increased 15.78% and RN/100 occupied beds increased 57.94% from 1989 to 1998 (Bond & Raehl, 2000). Kovner, Jones and Gergen (2000) found an increase in RN staffing, but a 14% decrease in LPN staffing between 1990 and 1996.

Census Bureau data shows that RN employment in U.S. hospitals continued to grow from 1983 to 1997, but at a slower pace from 1994 to 1997. Hospital employment of LPNs fell throughout this period. Employment of nursing assistants in hospitals fell from 1990 to 1994, and increased from 1994 to 1997. (Buerhaus & Staiger, 1999)

In California, levels of all but LPN hours were stable from 1993-1996. The hours worked by LPNs fell from 1983. Patient load decreased for all staff except LPNs (Spetz, 1998). RN hours and RN/case-mix adjusted average patient days increased between 1996 and 1998 (Spetz, 2000).

In Pennsylvania, the number of RNs increased 5% from 1991 to 2000, but the number of LPNs decreased 27%. RN/1,000 adjusted patient days of care (APDC) increased 5%, but

LPN/1,000 APDC fell 30%. When these ratios were adjusted for patient acuity, RN staffing fell 9% and LPN 37%. (Unruh, 2003b)

Why do perceptions of increased RN patient load and decreased RN to total nursing staff skill mix remain unsubstantiated? It may be that researchers are looking in the wrong place when assessing staffing. Usually, the employment of RNs and the RN to patient ratio is the focus. But if LPNs are instrumental in RN patient load, such as through sharing of patient load, medication delivery, or other aspects of skilled nursing care, and LPNs were reduced, it could produce an increase in the patient load of both RNs and LPNs. Several of the studies above indicate that LPN reductions occurred in the 1990s (Buerhaus & Staiger, 1999; Kovner, Jones & Gergen, 1998; Spetz, 1998, 2000; Unruh, 2003b). Therefore, it is possible that perceptions of increased patient load and lower skill mix are due to this downward trend in LPN employment.

There is some evidence that hospital LPNs function in a way that would affect RN workload. Hospital LPNs provide basic and skilled patient care, pass most types of medications, perform various types of treatments, and educate patients (U.S. Department of Labor, Bureau of Labor Statistics, 1999). All or most of these are tasks that RNs also carry out, depending upon the nursing care model (Gould, et al., 1996). However, as distinguished from RNs, LPNs do not supervise nursing personnel, communicate with physicians, administer certain treatments and medications, or perform overall patient care assessment and planning. (Adams & Largen, 1993; Davis 1982; Manthey, 1989). In general, RNs carry out more complex clinical judgments in providing patient care (Adams & Largen, 1993; Manthey, 1989).

On medical-surgical floors LPNs frequently work alongside RNs in delivering bedside care. RNs and LPNs may divide up the patient load, with the RNs supervising the work of the LPNs and communicating with physicians regarding any problems with the LPNs' patients. Or LPNs may function as medication nurses (Clark & Thurston, 1994; Freeman & Coronado, 1990; Kenny, 2001;

Murphy, Pearlman, Rea & Papazian-Boyce, 1994; Yocom, 1995). LPNs are also being utilized in intensive care (Erikson, et al., 1992; Hunt & James, 1997; Ingersoll, 1995). In this setting, RNs report more comfort if LPNs are assigned the more stable patients with the RNs serving as resources (Ingersoll, 1995). While the supervision of LPNs may add to the RNs own workload, the workload without the LPNs would be considerably greater.

Given these dynamics, if the number of LPNs falls, RN patient load may rise, yet the usual indicators of RN patient load, the RN/patient or RN/patient days of care, would be unaffected. Similarly, if nursing assistants are substituted for LPNs, a downward substitution of nursing personnel (a lowering of "skill mix") would occur, yet as usually defined (RN/total nursing personnel), skill mix would be unaffected.

In order to understand the changes occurring in RN patient load and skill mix, the changes in LPN staffing, and RN and LPN staffing together—licensed nurse staffing—need to be assessed. The only research to date that looks at the category of licensed nurses is that of Unruh (2003b). She found that a 29% reduction in LPNs in Pennsylvania hospitals from 1991 to 2000 contributed to an increase in licensed nurse patient load by 1.5%, and a slightly lower skill mix, defined as licensed nurses/total nursing staff.

More research of licensed nurse staffing, using national and state-wide data sets would aid our understanding of whether LPN reductions are an important factor in RN staffing problems. Analyzing data specific to Florida would provide information that is directly applicable to this state. Therefore, utilizing data from Florida hospitals, 1991-2001, this study examines changes in RNs, LPNs, "licensed nurses"—RNs and LPNs together—and total hospital staff. It aims to discover if LPN reductions occurred, and if so whether licensed nurse patient load increased and therefore affected RN patient load, and also whether skill mix was affected. This information could help hospital administrators and policy-makers address current staffing problems.

RESEARCH METHODS

Levels of RNs, LPNs, licensed nurses (RNs + LPNs), and total hospital staff were measured through the number of full-time equivalent (FTE) employees on payroll at the end of the hospital's reporting period. FTEs were defined as one full-time position (35 hours per week or more) or two part-time positions (up to 35 hours per week). Although we were unable to assess nursing staff skill mix because information on nursing assistants was not available, we did assess the proportion of RNs to total hospital staff, and licensed nurses to total hospital staff.

Patient load was measured through adjusted patient days of care (APDC), which equals the yearly number of patients in the institution, multiplied by the length of stay for each patient, plus an estimated number of outpatient days. The out-patient adjustment must be made because the staffing variables do not distinguish between in- and out-patient staff. Outpatient care is estimated by multiplying the number of inpatient days by the proportion of outpatient to inpatient revenue.

The nursing staff patient load for RNs, LPNs and licensed nurses was assessed through the ratio of the nursing staff to 1,000 APDC (e.g., RN/1,000 APDC). Therefore, lower values of this ratio indicate higher patient load for that category of nursing staff, and vice versa. When tracing the change in this ratio over time, a fall in the ratio indicates an increase in patient load, and vice versa.

Data from the American Hospital Association (AHA) Annual Survey were used for the analysis. The Annual Survey has information on nursing personnel and APDC in all hospitals in the U.S. that are members of the AHA. This, generally, includes most of the general, acute care hospitals in the U.S. For this analysis, the APDC and the numbers of RNs, LPNs and total hospital staff in Florida hospitals in 1991, 1999, 2000 and 2001 were obtained. AHA does not record information on nursing assistants, so their numbers and ratios could not be assessed in this study.

Excel spread sheets with the AHA data for each period were merged into one data set by AHA hospital identification numbers. Due to hospital mergers, closings and new openings, the

number of hospitals varied from period to period, ranging from 202 to 227. Data preparation included creating: 1) FTE positions from full and part-time positions; 2) the category of licensed nurses from the number of RNs and LPNs; 3) the ratios of RNs and licensed nurses to total hospital staff; and 4) the ratios of RNs, LPNs and licensed nurses to 1,000 APDC.

Data analysis consisted of calculating the mean difference and percent change from period to period and overall in each of the staffing categories and in APDC. Mean difference was merely the mean of the hospital values in the second year minus the paired values of those in the first year. Hospitals that did not have values for both years dropped out of that period's paired difference. This created a mean based on the difference of a paired sample, a more accurate measure of the changes in each hospital than a pooled mean. The percent change in nursing staff categories was calculated as follows: [(mean value for nursing staff in the second year – mean value in the first year)/ mean value in the first year]*100. The significance of the mean difference was tested through paired sample *t*-tests. This involved testing the significance of the paired sample mean difference described above.

FINDINGS

Table 1 presents the mean numbers and standard deviation of Florida hospital nursing staff in 1991, and 1999 through 2001. It also shows the paired-sample mean difference and percent change in nursing staff from one time period to the next, and overall. Between 1991 and 1999 the average number of FTE RNs in Florida hospitals rose 33%, while that of LPNs fell 2.5%. Since LPNs are a small proportion of licensed nurses (40 out of 238 in 1991, or around 17%), the level of licensed nurses rose 26%. Total hospital staff increased by 155% in this period. Despite this large increase, the ratio of RNs to total hospital staff increased 5%, most likely due to with-in hospital changes. On the other hand, the ratio of licensed nurses to total hospital staff fell 3% on the average.

Table 1. Nursing Staff Levels and Ratios in Florida Hospitals, 1991, and 1999-2001 (Mean Values)

	1991	1999	2000	2001	1991-2001
RNs	198	263	279	274	----
SD	261	334.31	352.13	385.29	----
Mean difference from prior period	----	44.08 *	18.78 *	-3.20	61.20 *
% change from prior period	----	32.83	5.73	-1.79	38.38
LPNs	40	39	36	35	----
SD	46.27	65.13	45.40	41.10	----
Mean difference from prior period	----	-3.76	-3.24	-0.624	-6.76 *
% change from prior period	----	-2.50	-8.33	-2.78	-12.50
Licensed Nurses	238	301	315	309	----
SD	300.60	384.55	391.41	421.28	----
Mean difference from prior period`	----	40.22	15.71 *	-3.82	54.50 *
% change from prior period	----	26.47	4.44	-1.90	29.83
Total Hospital Staff	408	1041	1089	1086	----
SD	243.12	1263.52	1325.25	1464.05	----
Mean difference from prior period	----	91.78 *	47.37 *	4.04	83.73 *
% change from prior period	----	155.15	4.41	-0.28	166.18
RN/Total Hospital Staff	0.235	0.247	0.254	0.246	----
SD	0.068	0.055	0.058	0.056	----
Mean difference from prior period	----	0.002	0.008	-0.008 *	0.006
% change from prior period	----	5.11	2.76	-3.15	4.68
Licensed Nurse/Total Hospital Staff	0.302	0.293	0.296	0.288	----
SD	0.068	0.053	0.057	0.059	----
Mean difference from prior period	----	-0.013 *	0.004	-0.008 *	-0.014 *
% change from prior period	----	-2.98	1.01	-2.70	-4.64

*Paired sample *t* test for the mean difference was significant at $p < 0.05$

Between 1999 and 2000, RNs increased 6% while LPNs decreased 8%. This resulted in a

4% increase in licensed nurses. Total hospital staff, and the ratio of RNs to total hospital staff and licensed nurses to total hospital staff increased a small amount. Between 2000 and 2001, the average numbers and ratios of all staff reported here fell. The numbers of RNs fell 2%, and that of LPNs fell 3%, which resulted in the licensed nurses category declining by 2%. Licensed nurses/total hospital staff fell 3%. For the period overall (1991-2001), RNs and total hospital staff increased by 38 and 166% respectively, but LPNs declined by 12.5%. Although licensed nurses increased by 30%, the ratio of licensed nurses to total hospital staff fell 5%.

Table 2 reviews the changes in patient load, calculated as adjusted patient days of care (APDC), and in nurse staffing given patient load. The table lists mean values and standard deviations for APDC and nurse staffing given 1,000 APDC for 1991 and 1999- 2001. It then presents the paired sample mean difference and percent change from one time period to the next, and overall. Due to an average increase in APDC of 26% between 1991 and 1999, the ratio of RNs to 1,000 APDC only increased by 3%, even though the number of RNs increased 33%. The ratio of LPNs to 1,000 APDC fell 22%. Licensed nurses to APDC fell 1.4%. APDC did not increase at such a fast rate between 1999 and 2000. During this year, RN, LPN and licensed nurse to 1,000 APDC increased from 8 to 12%. From 2000 to 2001, APDC continued to level off, but RN, LPN and licensed nurse to 1,000 APDC all declined. The RN to 1,000 APDC ratio fell 8%, LPN to 1,000 APDC fell 14%, and licensed nurse to 1,000 APDC fell 9%. From 1991 to 2001, APDC increased by 30%. RN to 1,000 APDC increased by 6%, but LPN to 1,000 APDC fell 27%. The licensed nurse to 1,000 APDC was unchanged from 1991 to 2001.

Table 2. Adjusted Patient Days of Care (APDC) and

Nursing Staff/1,000 APDC in Florida Hospitals, 1991, and 1999-2001 (Mean Values)

	1991	1999	2000	2001	1991-2001
APDC	64,534	81,344	82,344	83,898	----
SD	64,491	76,050	83,414	88,992	----
Mean difference from prior period	----	10,927 *	1,050	2,073	13,048 *
% change from prior period	----	26.05		1.89	30.01
			1.23		
RN/1,000APDC	2.95	3.05	3.43	3.15	----
SD	1.60	1.10	1.60	1.50	----
Mean difference from prior period	----	0.159 *	0.345 *	-0.283 *	0.316 *
% change from prior period	----	3.39	12.46	-8.16	6.78
LPN/1,000APDC	0.74	0.58	0.63	0.54	----
SD	0.740	0.66	0.92	0.45	----
Mean difference from prior period	----	-0.111 *	0.031	-0.097 *	-0.158 *
% change from prior period	----	-21.62	8.62	-14.29	-27.03
Licensed Nurse/1,000 APDC	3.69	3.64	4.06	3.69	----
SD	2.03	1.26	2.26	1.71	----
Mean difference from prior period	----	0.045	0.381 *	-0.383 *	0.155
% change from prior period	----	-1.36	11.54	-9.11	0.00

*Paired sample *t* test for the mean difference was significant at $p < 0.05$

Tables 1 and 2 also indicate the periods in which the mean difference in nurse staffing was statistically significant at $p < .05$ given paired sample *t*-tests. RNs experienced significant increases in all periods except 2000-2001 and for the period overall. Their patient load also fell significantly from 1991-1999, from 1999-2000, and overall. Their patient load from 2000 to 2001 increased significantly. The decrease in LPNs was significant only in the overall years of 1991-2001, not in any

of the subperiods. However, their patient load increased significantly in every period except 1999-2000. Licensed nurses increased significantly in 1999-2000 and overall. Their patient load decreased significantly only from 1999 to 2000 and increased significantly in the following period (2000-2001). Total hospital staff increased significantly in all years expect 2000 to 2001. The ratio of RNs to total hospital staff decreased significantly from 2000 to 2001. Licensed nurses to total hospital staff decreased significantly in 1991-1999, 2000-2001, and overall.

DISCUSSION OF FINDINGS

Results show that of all nursing categories, only LPNs experienced a decline for 1991-2001 overall. This 12.5% decline was statistically significant in terms of the mean difference. The finding that only LPNs decreased corresponds to other studies (Buerhaus & Staiger, 1999; Kovner, Jones & Gergen, 2000; Spetz, 1998, 2000; Unruh, 2003b). However, in contrast to the 12.5% decline found in Florida, other studies reveal a larger one. For example, Kovner, Jones and Gergen (2000) found that LPN hospital FTEs nationally decreased by 14% between 1990 and 1996 alone, and Unruh (2003b) found that the number of LPNs employed in Pennsylvania hospitals fell 29% between 1991 and 2000.

The increase in RNs in Florida hospitals of 33% from 1991-1999 is higher than the 15% increase nationally from 1990 to 1996, as reported by Kovner and colleagues (2000), and the 5% increase in Pennsylvania hospitals from 1991-2000, as reported by Unruh (2003b). In contrast to studies indicating a slowing in growth in RNs after the mid 1990s (Buerhaus & Staiger, 1999; Kovner, Jones & Gergen, 2000; Spetz, 2000; Unruh, 2003b), growth in the employment of RNs in Florida hospitals appears to have continued at a strong pace until 2000. At that point, the growth became negative between 2000 and 2001.

Another area of difference with other studies is what happened to patient load throughout the 1990s. Studies tracking patient days of care in the 1990s show a decline in this measure until the end

of the 1990s (Spetz, 2000; Unruh, 2003b). Although our Florida data did not include data points between 1991 and 1999, the increase in APDC in this period was 26%, indicating that the 1990s was not a period of APDC decline. So even though hospital employment of RNs increased 26%, and this growth did not slow until the end of the 1990s, due to the fact that APDC also grew 26% throughout this same period, the RN to 1,000 APDC ratio only increased a small amount between 1991 and 1999, and was even negative from 2000 to 2001. LPN to 1,000 APDC declined in every period except 1999 to 2000, and ended up being 27% lower in 2001 than in 1991. When these patient load ratios are compared to those in other studies such as Kovner and colleagues (2000), Spetz (2000) and Unruh (2003b), they are comparable up to the end of the 1990s.

The analysis of the final year in this study, 2000-2001, is new to staffing studies. This appears to be a watershed year in Florida in which the numbers of all nursing and hospital staff, including RNs, declined. Yet APDC continued to rise, resulting in significantly increased patient load, even for RNs.

The key difference between Florida results and national or individual state results appears to be that APDC grew during the 1990s in Florida, likely as a result of a fast-growing population and a higher proportion of elderly requiring a greater amount of hospital care. The Office of Economic and Demographic Research in the Florida Legislature (2002) calculates that the overall population grew 23.5% between 1990 and 2000, compared to a national average of 13%. People age 65 and older constituted 18% of the Florida population in 1990, and their numbers grew by 18% over the decade. This variability of population growth and hospital utilization from state to state means that researchers must look at not just raw staffing numbers, but the ratios of nurses to patients in order to assess staffing adequacy.

Due to the strong growth in RNs and the small proportion of LPNs in the nursing staff, the impact of LPN reductions on the numbers of licensed nursing staff was minimal. In the only period of

licensed nurse decline reported here, 2000 to 2001, the 4% decline came nearly entirely from the 3% RN decline in that period. In other periods, the growth of licensed nurse positions was slightly less than that of RNs, but still remained high.

When it comes to patient load, however, the reduction in LPNs was strong enough to make a positive RN to 1,000 APDC ratio become a negative licensed nurse to 1,000 APDC ratio in 1991-1999. The licensed nurse to 1,000 APDC ratio was 1% lower than the already negative RN to 1,000 APDC ratio in the 2000 to 2001 period. Also, while RN to 1,000 APDC was positive for the period overall, the licensed nurse to 1,000 APDC ratio showed no change. In other words, the decrease in LPNs throughout the 1990s and early 2000s did have an impact on the licensed nurse to APDC ratio, and therefore indirectly affected RN patient load. Another area in which LPN reductions made an impact was in the decline in licensed nurse/total hospital staff from 1991 to 1999 and from 1991 to 2001 overall. The RN/total nursing staff ratio did not show a decline, so LPN reductions impacted this ratio enough to bring the licensed nurse to total nursing staff ratio down.

To the extent that RNs and LPNs share bedside patient care tasks, the results of this study indicate that LPN reductions in Florida caused a small increase in RN patient load in the 1990s, and contributed to the significant increase from 2000 to 2001. These results help explain the perceptions of RNs and the public that RN staffing has deteriorated. When LPNs are removed through attrition or downsizing, RNs must take care of the missing LPNs' patients. RN patient load, as indicated by the licensed nurse to patient ratio, increases, even though the RN to patient ratio may not fall or may even increase. The only reason that LPN reductions do not contribute more acutely to RN patient load is that LPNs have been a small proportion of the nursing staff.

However, the main contributor to the increase in RN patient load in 2000-2001 came from RN reductions, not LPN reductions. This seems to indicate that while LPN reductions impacted RN

patient load in the 1990s, since 2000 the problem has been primarily one of fewer RNs. This result confirms the recent reports of an RN shortage.

STUDY LIMITATIONS

These results do not entirely, or perhaps even primarily, explain the perceptions of increasing staffing problems. Perceptions are that RN patient load increased significantly throughout the 1990s, yet this study indicates that even after accounting for the changes in patient load due to LPN reductions (by looking at the licensed nurse patient load) there was only a small increase in RN patient load until 2000. Assuming perceptions to be correct, there are several reasons why the changes may not be showing up. First, because LPNs are utilized in many different ways, it is impossible to compute the exact amount of extra patients an RN must care for when an LPN position is lost, so the numbers in this study are only rough estimates of the increase in patient load.

Second, the nursing staff indicators may not adequately measure bedside nursing staff. The measures of RNs, LPNs, and licensed nurses in this study are based on hospital personnel who were on the payroll at the end of the reporting period. For these numbers to adequately represent the ongoing numbers of nurses at the bedside requires that part-time hours are not less than ½ full-time hours, that only working nurses are included in the filled position, and that the number of positions at the end of the period represents those of the entire year. These are all questionable assumptions.

Also, the nurse staffing measures are based on both bedside and non-bedside personnel. The number of RNs in the data includes any RN in the institution, whether staff nurse or administrator or educator. This is an important consideration because the proportion of RNs in non-bedside roles is estimated to have increased 7.5% from 1988 to 2000 (Spratley, Johnson, Sochalski, Fritz & Spencer, 2002), and therefore the measure increasingly over-represents the numbers of bedside nurses. Another staffing measure consideration is that the study did not capture unit to unit or shift to shift variation in staffing, and therefore cannot address any variation along these lines.

Third, the patient load indicator, APDC, may not be an accurate measure of patient load. For in-patient care, patient days of care equals the number of patients times the number of days the patient is in the hospital, not counting the discharge day. This is apparently done because neither the admission nor discharge day is a full 24 hours of care. However, because the last hours of a patients' stay during the discharge day tend to be ones of intensive teaching and discharge preparation, the discharge day should count at least as a portion of a day of care. Unruh and colleagues (2003) found that for patients in Pennsylvania hospitals from 1994 through 1997 the average hours of care in the admission and discharge day combined were around 26--2 hours greater than the 24 assumed by the APDC measure. They adjusted APDC by the 2 hours and found a significant difference in APDC after the adjustment. They also found that the difference was enough to impact changes in nursing staff patient load.

On the other hand, the perceptions of greatly increased patient load, may not be completely accurate. Possibly, it is not so much patient load, but workload, that has significantly increased. It is not just the number of patients, but also the work associated with caring for those patients that determines the staffing adequacy (Smith, 1980). Workload is influenced by factors such as patient severity, the length of stay, the nursing care model, unit characteristics, and other components. Staffing studies that adjust patient load for patient severity find that the RN to acuity-adjusted APDC ratio decreased by a significant amount in the 1990s (Unruh, 2003b). Therefore, RN workload increased significantly in this time period. The licensed nurse to acuity-adjusted APDC ratio decreased even more significantly, indicating that licensed nurse workload increased by a large amount (Unruh, 2003b). The impacts on workload of the other factors listed here have not been the subject of study. Future studies need to examine whether RN workload has increased, and to explore the factors that contribute to increased workload.

POLICY RECOMMENDATIONS

The mixed results of this study—that LPN reductions impacted RN patient load in the 1990s and to a small degree from 2000 to 2001, while RN reductions are the more significant cause of increased RN patient load from 2000 to 2001—allow for multiple recommendations. In the first place, administrators need to assess whether and to what degree LPNs might contribute to alleviating RN patient load in particular units in their institution. If appropriate, they may consider hiring a certain number of LPNs. This assessment and hiring must take into account the nursing care model, LPN skill level, and other institutional and unit-specific factors. The number of LPNs employed should be enough to provide RNs with relief of a certain amount of patient load, without completely replacing that relief with increased supervisory activities, or causing communication or organizational difficulties.

Second, increasing the number of RNs is paramount. This is not a new recommendation, and has been a difficult one for hospitals to act on in recent years due to an RN shortage. Solving the RN shortage is therefore a necessary condition for improving RN staffing in hospitals. To resolve the RN shortage we must: 1. increase the growth in supply of actively working hospital RNs; 2. increase the numbers of RNs in hospitals. Both of these goals require recruitment of new or clinically inactive RNs into clinical nursing, and better retention of RNs at the professional and institutional level.

A number of articles and reports have suggested ways to accomplish these goals (AHA Commission, 2002; American Organization of Nurse Executives, 2000; Nevidjon & Erikson, 2001; McNeese-Smith, 2001; Purnell, Horner, Gonzalez & Westman, 2001; White, 2001). Of the many methods suggested (and some already implemented) to improve recruitment and retention, two are especially important. First, the public needs to become aware of the current institutional financial shortfalls, and how they impact adequate staffing and patient outcomes. The American Hospital Association (AHA) recommends “building societal support for the public policies and resources

needed to help hospitals hire and retain a qualified workforce" (AHA Commission, 2002, p. 5). Once aware of the problems, consumers and political leaders must consider the health care policy alternatives for adequately funding health care institutions and ensuring that the increased funds go toward staffing needs.

The second important strategy is to improve hospital recruitment and retention through an improvement in working conditions. In surveys that explore job or professional dissatisfaction, RNs state that a major factor driving them out of nursing or out of a particular institution is the stressful and physically demanding nature of their job (Aiken, et al., 2001; Cape, 2001; Federation of Nurses and Health Professionals, 2001; McNeese-Smith, 2001; North Carolina Center for Nursing, 2002). Therefore, one of the major solutions to the RN nursing shortage is to improve the hospital workplace, which will, in turn, draw more RNs into, or back into, the workplace.

Combined, the increase in RNs and LPNs should improve the licensed nurse to APDC ratio in Florida, which declined slightly from 1991-999 and drastically in 2000 to 2001. The increase should also be with an eye to improve skill mix. By increasing the numbers of nursing staff with RNs and LPNs, skill mix would be strengthened. With a higher skill mix, RNs would have less supervisory activities and their workload would lessen.

It may be argued that these improvements in licensed nursing staff are too costly to accomplish, especially when the RN shortage places upward pressure on wages. But there is some evidence that having a higher proportion of professional nurses and/or managers is cost effective. The rationale is that having a greater proportion of experienced professionals helps hospitals provide appropriate care within a shorter length of stay, minimize costly adverse events, or maximize productivity (Cody, Friss & Hawkinson, 1995; Flood & Diers, 1988; Krall & Prus, 1995). A classic case-study by Halloran (1983) found an all-RN unit was able to function with much less staff than one with a mix of RNs, LPNs and nursing assistants. A more recent study by Bloom and colleagues

(1997) finds a greater RN skill mix to be cost-neutral. Other studies show that higher RN/patient ratios are associated with shorter lengths of stay and lower costs (Pronovost, et al., 1999). Furthermore, in the current situation, the increased hiring of LPNs in addition to RNs would improve skill mix, yet not be as costly as an attempt to improve skill mix through just RN positions.

Given the difficulties in hiring RNs due to the RN shortage, hospitals may also want to improve efficiencies in the nursing process as a way to improve workload. It may be possible to make the work process more efficient through the use of assistive personnel for non-nursing and custodial nursing tasks, the reduction of licensed nurses' paperwork, physical unit reorganization, and other types of redesign. As efficiencies are gained in these areas, workload will decrease, RN satisfaction will increase, and the quality of care will improve.

RESEARCH RECOMMENDATIONS

Future research suggested by this study would be to further assess the impact of LPN reductions on RN patient load and to explore the impact of other factors on RN workload. In addition, the relationship between RN staffing and costs and quality should be assessed. The following studies are suggested:

1. Continue to evaluate changes in all nursing staff, including LPNs, licensed nurses, and nursing assistants, so that RN staffing can be more completely understood.
2. Assess the impact of LPN reductions on RN patient load in a national sample.
3. Explore RN and LPN roles, and how the roles interact given various nursing models.
4. Examine the factors that impact workload and develop strategies for redesigning the workplace that reduce workload.
5. Explore nursing staff satisfaction, patient outcomes, and costs associated with various staffing strategies regarding levels and mix of staff and nursing care delivery models.

CONCLUSION

The findings of this study that LPN reductions resulted in a small increase in licensed nurse patient load from 1991 to 1999, and that RN and LPN reductions resulted in a large increase in patient load from 2000 to 2001, support the perception that RN staffing has worsened. However, perceptions are that staffing worsened much more over the past decade. A fuller explanation involves assessing other factors that impact workload, such as patient acuity, length of stay, nursing care model and other workplace considerations. Future policy and research should consider the role of LPNs in RN staffing, identify factors contributing to increased workloads, and explore ways to redesign the work process to reduce workloads.

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