Supply, Demand, and Use
Of Licensed Practical Nurses

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Executive Summary

Although licensed practical nurses (LPNs) organized into professional groups as early as 1941, there is little in the literature about the practice, work, demand for, or efficient utilization of the licensed practical nurse. There also is little guidance about how to make effective use of these practitioners' skills to enhance patient care and augment the nurse workforce. Recently there has been an increased interest in trying new care delivery models in acute care hospitals using LPNs (Kenney, 2001). In the 1990s, publications explored the creative use of LPNs in critical care, as advice nurses, and in intravenous therapy teams (Buccini, 1994;Ingersoll, 1995; Intravenous Nurses Society, 1997;Eriksen, 1992;Roth, 1993). However, little systematic study has occurred to explore these roles.

This study examines the demand, supply, utilization, and scope of practice of LPNs in the United States. Particular attention is paid to educational issues, career mobility, geographic distribution, and the ability of LPNs to substitute for registered nurses. The research team analyzed data from the Bureau of the Census, American Hospital Association, National Council of State Boards of Nursing, and Centers for Medicare and Medicaid Services to learn about LPN characteristics, education, and employment. Scope of practice information was obtained and characterized to learn how practice regulations vary nationally and how they affect the demand for LPNs. Key informant interviews and focus groups were conducted in four States: California, Iowa, Louisiana, and Massachusetts. The findings of the study are provided in this report.

Data from the Bureau of Labor Statistics's Current Population Survey to describe the demographic characteristics of LPNs, was compared to registered nurses (RNs) from 1984 to 2001. The data indicate the following similarities and differences between LPNs and RNs.

Similarities:

- Both workforces are aging, with LPNs being slightly older than RNs on average;
- Males represent a small percent of both workforces, but are slowly increasing;
- The western region of the U.S. has the lowest numbers of LPNs and RNs relative to the population;
- On average, RNs and LPNs work between 36 and 38 hours per week;
- The shares of RNs and LPNs working in offices and clinics of physicians doubled between 1984 and 2001; and
- The hourly pay rate of RNs and LPNs increased 19 percent between 1984 and 2001.

Differences:

- The RN workforce is larger than the LPN workforce, but the actual size of the LPN workforce is unclear because the available data are conflicting;
- Compared to RNs, more LPNs live in the South and fewer in the Northeast;
- Fewer LPNs are foreign-born, whereas an increasing percent of RNs are immigrants;
- RNs work in hospitals in greater proportions than LPNs, and the share of LPNs working in hospitals declined more than RNs between 1984 and 2001;
- The percent of LPNs working in nursing and personal care facilities increased between 1984 and 2001, but the percent of RNs did not; and

- By 2001, the percentage of LPNs working in the private sector was greater than the percent of RNs working in the private sector.

State boards of nursing regulate the practice of LPNs. Most States have a single board that oversees RNs and LPNs. Some States have separate boards for RNs and LPNs. The boards are responsible for developing scope of practice regulations and issuing licenses. They also have disciplinary responsibility and can revoke licenses. There are similarities in the nursing practice acts across States, but variation in how the States express the details of the work of practical nurses. Most States have relatively flexible practice requirements and not very specific about the tasks that are permitted. However, some States have very restrictive practice regulations and/or specific detailing of tasks that can and cannot be done by practical nurses. These data are used in Chapter 5 to examine whether the restrictiveness and specificity of the scope of practice affect demand for LPNs. These data suggest that it may be possible to identify States that could reasonably increase their utilization of practical nurses, particularly in hospitals, by reducing the restrictiveness of their practice.

Since the 1990s, the number of LPN education programs has remained relatively stable but there has been a decline in the number of enrolled students and graduates. Despite the drop in graduates, the total number of active licenses increased slightly through the 1990s. This suggests that LPNs are remaining in the workforce at higher rates than in previous years. The number of first time US-educated graduates who are taking the LPN licensing examination has dropped, but the percentage of those passing the examination has remained relatively constant.

LPN educational requirements vary among the States and territories. Most States specify the content and number of hours of training, and some are more detailed than others. Most curricula teach similar basic nursing skills, such as measuring vital signs, patient data collection, patient care and comfort measures, and oral medication administration. Most States have additional training requirements for more advanced skills, such as phlebotomy, IV infusion, and IV medication administration. Even though requirements vary across States, States generally license LPNs that have been licensed in other States without further requirement.

Key informant interviews with leaders of State boards of nursing, LPN education programs, hospitals, and nursing homes allowed us to compare the actual practice of LPNs with the written regulations. State nursing board leaders are aware of the differences in scope of practice regulations across States, and do not find these differences troublesome. They also recognize that employers establish their own internal practice guidelines, which may be more restrictive than the legal scope of practice. Some hospital and education leaders think their States' scopes of practice are too restrictive. Nursing home leaders agreed that LPNs are essential to the provision of care in their facilities; the scope of practice of LPNs is perfectly suited to the needs of their patients. Hospital leaders varied in their willingness to employ LPNs. Most recognized that experienced, intelligent LPNs could be an asset to a nursing care team, but found that the scope of practice of LPNs was too limited to allow for significant employment of LPNs in acute care settings.

Participants in the focus groups discussed their perceptions of their scope of practice, which occasionally differed from State regulations. Most of the LPNs Stated an intention to

return to school to become RNs, but few were enrolled in RN programs. Barriers such as time, the need to keep working, challenges in getting into courses, and family issues were among those that kept LPNs from pursuing further education. Most LPNs and RNs felt they have good working relationships with each other. Some LPNs expressed resentment about the higher wages paid to RNs for what is seen by the LPNs as similar work. Other LPNs said they did not envy RNs, because RNs have a greater amount of paperwork to complete and thus have less time to be with patients. Some RNs expressed discontent about the need to supervise LPNs because supervision adds to their workload.

Based on findings in this report, we make the following recommendations:

1. The LPN could be used to augment the workforce during RN shortages. However, the role of LPNs is limited by their scope of practice. How much the LPN can be used depends on the ability of States to create a more flexible LPN scope of practice. States should assess whether there is evidence that lessening practice restrictions would negatively impact patient care before making changes to the scope of practice. Careful study of the use of the LPN in various settings is necessary to determine positive or negative impact on patient outcomes. Federal and State governments should support research on the effect of LPNs on quality of care.
2. Employers should work to create teams, of RNs and LPNs to share workload appropriately in both acute and long-term care.
3. Boards of Nursing must ensure that bedside RNs and LPNs, nurse managers, and hospital and long term care executives have a common and accurate understanding of the scopes of practice of RNs and LPNs. Employers should clarify for their employees the differences between State scopes of practice and individual institutional policy.
4. State Boards of Nursing should work toward standardization of LPN training, both at the basic education preparation level and beyond. One mechanism to achieve greater uniformity might involve the identification of national standards for entry level and advanced education of LPNs.
5. Nurse educators need to facilitate articulation between LPN and RN license requirements. More efficient “laddering” of workers from lower skill to higher skill healthcare jobs benefits both workers and employees, and will ultimately decrease the total cost to educate nurses.
6. Based on data related to gender, age, marital status, and ethnicity, it appears that LPNs and RNs come from essentially the same pool or potential workers. Therefore, the long-term RN shortage is unlikely be solved with an influx of LPNs, because increased recruitment of students into LPN programs will likely offset recruitment into RN programs.
7. Employers should examine how the work of licensed nurses could be allocated safely and reasonably, so that RNs are not overwhelmed and LPNs can practice to their full scope of practice. Although LPNs cannot directly substitute for RNs, many tasks traditionally completed by RNs can be accomplished by LPNs, with appropriate training.

8. Employers should consider providing additional compensation to LPNs who complete additional training and obtain certifications beyond the basic LPN license, to provide LPNs with incentives to continue their education.
9. The Bureau of Health Professions and State Board of Nursing should strive to educate the public about the LPN profession, both to give recognition to practicing LPNs and to encourage more people to pursue a career in practical nursing.
10. The Bureau of the Health Professions, National Council of State Boards of Nursing, or individual State Boards of Nursing should create a national database to track both LPNs and RNs to have accurate data for prediction of nurse and healthcare workforce needs.

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Chapter 1: Introduction

Background and Significance

Licensed practical nurses (LPNs), called Licensed Vocational Nurses (LPNs) in Texas and California (Seago & Ash, 2002), have been working with physicians and registered nurses in many settings for years. Some women who cared for others but had no formal education frequently called themselves "practical nurses" (White & Duncan, 2001). However there were early schools of practical nursing including the Ballard School in New York City founded in 1892, the Thompson Practical Nursing School in Vermont in 1907, and the Household Nursing School in Boston in 1918 (White & Duncan, 2001). These schools followed the opening of three of the first schools of "trained" nursing in the United States. These "trained" nursing schools were Bellevue Hospital in New York City, Massachusetts General Hospital in Boston, and New Haven Hospital in Connecticut, and they opened around 1873. LPNs organized into professional groups as early as 1941 with the creation of the National Association for Practical Nurse Education & Service, Inc. (NAPNES) and the National Federation of Licensed Practical Nurses in 1949 (NFLPN) (National Association for Practical Nurses Education & Service, 2004).

In a conversation in March of 2004 with Helen Larsen, the Executive Director for the National Association for Practical Nurse Education and Service, Larsen spoke about the State-by--State evolution of giving waivers to and licensing practical nurses.

> In 1946 NAPNES recommended that States become active in seeking licensure for "Practical Nurses" and State-by-State it happened. The "Practicals" were licensed through waivers and different States had different ways. Some required a letter of recommendation from a physician, a supervisor, etc., and the nurse had to have worked as a practical nurse for at least 5 years immediately prior to application. But State-by-State, they were waivered into nursing. Their licenses had a "W" on it and for many of them it was a stigma until they actually took the licensure exam.

It is difficult to categorize the work of LPNs in the U.S. because there is substantial variation in the practice acts and scopes of practice in the various States. Although the National Nursing Council recommended mandatory licensure for LPNs in 1948, not all States acted on the recommendation (Brown, 1948). For example, Ohio did not require mandatory licensure until 1965 (Licensed Practical nurse Association of Ohio, 2002). Some States had a "grandfather clause" to allow licensure of persons who were practicing as practical nurses at the time the licenses were mandated. This is commonly done when new regulations are implemented.

During cycles of nurse shortage in the U.S., there typically is a renewed interest in the licensed practical nurse as a potential worker to augment the nurse workforce and as a potential substitute for registered nurses. In response to a nursing shortage, California Senate Bill 1625 was introduced in 1951, leading to approval of California's first LPN education program at Chaffey College. The notion of LPNs supplementing or substituting for RNs has been discussed in nursing literature during most of the shortage cycles (Bray, 1979; Kenney, 2001) In general, the scope of practice of LPNs is more limited than that of RNs. In some settings LPNs can serve as substitutes for registered nurses (RNs), but in other settings the scope of practice of LPNs is

more restricted. These restrictions may be because of State regulations, Federal regulations, or institutional policy. LPNs can perform many of the functions that RNs perform but at times are not allowed to practice to the full legal limit of practice acts.

One of the broadest descriptions of LPN scope of practice comes from the U.S. Department of Labor Occupational Outlook Handbook: “Licensed practical nurses… care for the sick, injured, convalescent, and disabled under the direction of physicians and registered nurses"(US Department of Labor, 2002). State regulations tend to be more specific about the role of LPNs; for example, the California Board of Vocational Nursing and Psychiatric Technicians (BVNPT) States that the duties “include, but are not limited to, provision of basic hygienic and nursing care; measurement of vital signs; basic client assessment; documentation; performance of prescribed medical treatments; administration of prescribed medications; and, performance of non-medicated intravenous therapy and blood withdrawal (requires separate Board certification.)” (California Board of Licensed Vocational Nursing and Psychiatric Technicians, 2004)

In 1998, LPNs accounted for 39 percent of licensed nurses in hospitals and 46 percent of licensed nurses in long-term care settings (Bureau of Labor Statistics, 2000). Through the 1990s growth in demand for licensed nurses was fairly consistent (Buerhaus, 1996;Spetz, 1996) with that demand being lower in areas heavily penetrated by health maintenance organizations. Additionally, during the 1990s employment of LPNs shifted away from the acute care setting toward long term care (Buerhaus, 1996). This shift was likely related to cost cutting measures in hospitals. The movement of LPNs out of hospitals created a gap in the acute care experience of LPNs, requiring substantial re-training and orientation of vocational/practical nurses who are brought back into the acute care setting (Barber, Bland, Langdon, & Michael, 2000).

Reported annual turnover rates for LPNs in nursing homes range from 32 percent to 61 percent and demand for LPNs is growing each year (Decker, Dollard, & Kraditor, 2001). Poor wages, mandatory overtime, and physically demanding work are thought to contribute to higher turnover rates (Decker et al., 2001). A number of bills have been introduced in State legislatures and Congress that seek to improve the work environment for LPNs and RNs. Eliminating mandatory overtime, providing more resources for nurse training, increasing payment rates, offering whistleblower protection, and developing needlestick prevention programs are among issues being considered through legislation (AFT Healthcare, 2002; Bellandi, 2001; Galloro, 2001). Some States and the Federal government are considering minimum licensed nurse-to-patient ratio regulations for acute-care hospitals, although California is the only State to have instituted such requirements. The only national staffing requirements for long term care settings are minimal standards set by the Centers for Medicare and Medicaid Services (CMS) (formerly Health Care Financing Agency (HCFA))(Center for Medicare and Medicaid Services, 2002).

A number of studies have demonstrated that increased nursing hours are related to better patient outcomes (Aiken, 2000;American Nurses Association, 2000;Needleman, 2002) and organizations have called for increasing nursing hours in hospitals and long-term care settings (Spetz, 1998;AFSCME, 2002). There also is some evidence to indicate that improved patient outcomes may be related to higher education levels of RNs (Aiken, 2003). The literature generally focuses on the importance of RN staffing in improving quality of care, and the

evidence is difficult to apply to the LPN workforce. The education and training of LPNs vary widely across States. LPNs can apply to take a licensing examination after completing a 1 or 2 year program at a community college, an adult educational program, or private vocational school. RNs typically are viewed as workers who have a great deal of skill flexibility, while LPNs have a more limited degree of flexibility. During periods of nursing shortage, there is interest in creating a more efficient educational path for LPNs to become RNs. Many schools and colleges across the U.S. provide career mobility mechanisms to allow LPNs to make this transition (Eastern Tennessee State University, 2002). However, these programs are specific to States, geographic regions, or even schools, and popularity of programs waxes and wanes depending on the nursing labor market and economic climate. A number of barriers, including access to courses, funding, and variation in requirements, prevent LPNs from progressing efficiently through the career ladder and little systematic study has been done to identify and reduce those barriers.

Although LPNs organized into professional groups in the early 1940s, there is little literature about the practice, work, demand or efficient utilization of the licensed practical nurse. Additionally, there is little guidance as to how to most effectively make use of this practitioners' skills to enhance patient care and augment the nurse workforce. In the 1990s, there were published works that explored the creative use of LPNs in critical care, as advice nurses, and in intravenous therapy teams, (Buccini,1994; Ingersoll,1995; Eriksen,1992; Roth,1993); interest in trying new care delivery models using LPNs in acute care hospitals has been renewed in the 2000s (Kenney, 2001). However, little systematic study has occurred that explore these staffing strategies. It is important to measure the effects of these roles and how they work with the scope of practice of the LPN. This study will fill some of the gaps in our understanding of the LPN workforce in the United States.

Purpose and Organization of This Report

The objective of this study is to inform nurse educators, employers, the health professions community, the public, and policy makers about the demand, supply, utilization, and scope of practice of LPNs in the 50 United States, the 4 U.S. territories, the District of Columbia, and the Commonwealth of the Northern Marianas Islands. Particular attention is paid to educational issues, career mobility, geographic distribution, and the ability of LPNs to substitute for registered nurses. Since most boards refer to this provider as a licensed practical nurse, we will use the title LPN and not LVN. The terms “licensed nurse” and “nurse” are used to refer to the combined group of RNs and LPNs

This research will seek to answer these questions:

1. What is it that LPNs do and in what settings are they employed? (Chapters 2 & 3)
2. What is the demographic profile of the LPN workforce? (Chapter 2)
3. What are national and State educational trends in applications, enrollments, and graduates? (Chapter 4)
4. What are the supply, demand, and adequacy of the LPN workforce? (Chapter 5)
5. To what degree can LPNs substitute for RNs? (Chapter 3)

6. Is there any evidence of increasing demand for LPNs as a result of the RN shortage? (Chapter 6)
7. What are the issues precluding greater utilization of LPNs as a way of mitigating the current RN shortage? (Chapter 3)
8. What are employer, educator, and practicing LPN perspectives on the current State of the LPN workforce and its ability to substitute for registered nurses? (Chapter 6)

This report is organized into seven chapters, each addressing specific research questions. Each chapter includes an overview of the questions addressed, the significance of the questions, the design and methods used, specific findings, and a discussion of the meaning of the findings. Chapter 2 provides a general description of the LPN workforce. Using secondary data, we describe the demographic and employment characteristics of the LPN workforce. Chapter 3 provides a discussion and analysis of data on LPN scope of practice and recent legislation related to the work of LPNs. Data on the scope of practice of LPNs were collected from all 50 States. Information was gathered from officials in State licensing boards and government Internet sites. Recent legislation regarding the practice of LPNs was identified with assistance from the National Conference of State Legislatures and other sources. The legislative activity is evaluated to assess how the use of LPNs has changed or might change in the near future.

Chapter 4 provides a description and analysis of LPN education using both primary data collection and secondary data analysis. Chapter 5 examines the supply and demand of LPNs. The supply of RNs is known to vary with personal characteristics and economic conditions (Link, 1985;Buerhaus, 1994;Brewer, 1994). We estimate a multivariate regression equation to identify the relative importance of factors that affect the supply of LPNs. How does the labor force participation of LPNs change as LPNs age? How responsive is the LPN workforce to changes in wages or economic conditions? Has the underlying supply of LPNs changed over time? Then, we estimate multivariate regression equations for the demand for LPNs by hospitals and nursing homes, using national data. These models enable us to determine the relative importance of quantity of care provided by facilities, wages of all personnel, scope of practice regulations, Medicare and Medicaid reimbursement rates, managed care penetration, and other factors on the demand for licensed vocational nurses. The analysis takes into account the fact that demand for LPNs may affect the wages of LPNs and other personnel, and that scope of practice may be affected by demand for LPNs using instrumental variables techniques (Newhouse & McClellan, 1998).

Chapter 6 considers the perspectives of employers, educators, and practicing LPNs regarding the practice and education of LPNs. We selected 4 States in which to conduct in-depth qualitative research, including focus groups and interviews with LPN employers, educators, and Boards. From this research, we gain more depth in our understanding of how LPNs practice in the United States, and what the future may hold for these professionals. Finally, Chapter 7 summarizes our findings, conclusions, and recommendations.

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Chapter 2: The LPN workforce

Relatively little is known about the LPN workforce in the United States. As far as we have been able to determine, there has only been one national survey of LPNs, conducted in 1983 (U.S. Department of Health and Human Services, 1985). We have not been able to locate a single database providing information about the number of licensed practical nurses in the Nation. Information about the size, demographics, and employment characteristics of this workforce must be obtained from a variety of disparate sources. Since none of these sources of data can provide comprehensive information, some of the data are conflicting when compared across sources.

Workforce Size and Distribution

According to estimates from the Census 2000 Special Equal Employment Opportunity Tabulation (U.S. Bureau of the Census, 2000), there were 596,355 licensed practical nurses in 2000. This figure, however, is lower than the total number of active LPN licenses and number of jobs held by LPNs. The following table compares figures from various sources.

Table 2.1: Licensed Practical Nurses in the United States

Source	Measure	Total
Census 2000 Special EEO Tabulation	Number of People in LPN Occupation in 2000	596,355
Bureau of Labor Statistics, U.S. Department of Labor	Number of jobs held by LPNs in 2002	702,000
National Council of State Boards of Nursing (NCSBN)	Total Number of Active LPN Licenses in 2000	889,027

In Table 2.2 we compare two different measures of LPN supply by State. In every State except Maryland, the number of active licenses is much larger than the LPN population estimate. In Maryland the estimated population exceeded the total number of active licenses by 909. The population estimates as a percent of the total number of active licenses range from 35 percent to 111 percent. Since a person can have an LPN license in more than one State, using the number of active licenses as a measure of supply most likely overstates the number of LPNs in each State.

Table 2.2: Total Active LPN Licenses and Estimated LPN population

State	Total Active Licenses in 2000	Estimated Number of People in LPN Occupation in 2000
Alabama	16,676	13,515
Alaska	827	565
Arizona	9,271	6,930
Arkansas	16,917	9,785
California	65,383	46,190
Colorado	10,206	5,140
Connecticut	11,135	6,380
Delaware	2,079	1,415

State	Total Active Licenses in 2000	Estimated Number of People in LPN Occupation in 2000
District of Columbia	2,675	925
Florida	51,899	37,675
Georgia	30,042	18,385
Hawaii	2,699	1,570
Idaho	4,007	2,530
Illinois	28,742	20,745
Indiana	25,997	14,925
Iowa	9,429	6,170
Kansas	8,718	6,405
Kentucky	13,231	9,855
Louisiana	22,369	14,505
Maine	3,463	2,260
Maryland	8,426	9,335
Massachusetts	22,445	12,145
Michigan	28,047	18,160
Minnesota	22,342	15,875
Mississippi	11,315	8,750
Missouri	22,296	15,370
Montana	3,223	1,930
Nebraska	6,413	4,980
Nevada	2,945	2,065
New Hampshire	2,989	2,145
New Jersey	22,855	15,110
New Mexico	3,240	2,645
New York	69,820	40,545
North Carolina	21,578	15,560
North Dakota	3,031	2,025
Ohio	42,720	29,970
Oklahoma	16,732	11,510
Oregon	4,225	3,005
Pennsylvania	50,714	32,785
Rhode Island	3,057	1,835
South Carolina	11,559	9,840
South Dakota	2,176	1,600
Tennessee	26,421	17,025
Texas	77,044	48,760
Utah	3,470	2,695
Vermont	1,884	1,620
Virginia	26,694	17,185
Washington	13,869	9,410
West Virginia	6,091	5,470
Wisconsin	14,521	10,465
Wyoming	1,120	665
Total U.S.	889,027	596,355*

**Estimates may not add to total due to rounding*

Sources: (1) (Crawford, 2001) (2) (U.S. Bureau of the Census, 2000)

Table 2.3 shows the estimated number of LPNs and RNs per 100,000 population, and ranks States based on these ratios. There are about four times as many RNs as there are LPNs per 100,000 people in the U.S. population. Massachusetts and New Hampshire stand out as having the greatest difference between the numbers of RNs and LPNs, having over 1000 RNs and under 200 LPNs per 100,000 population. Overall, there is more variation in the numbers of RNs per capita than of LPNs. Though the distribution of LPNs throughout the U.S. does not closely match the distribution of RNs, there are some similarities.

In 2000, the estimated number of LPNs per 100,000 population ranged from a low of 88 in Oregon to a high of 365 in Arkansas. Other States with low numbers of LPNs per 100,000 people include Alaska, Nevada, Colorado, Utah, and Hawaii. In fact, the Western part of the U.S. appears to have the lowest concentration of LPNs, while the South and Midwest (e.g., Arkansas, Oklahoma, Louisiana, Minnesota, and North Dakota) have the highest. This pattern is similar to that reflected in the data for RNs. States with the lowest numbers of RNs per 100,000 individuals in the population include Nevada, California, Utah, Idaho, and Texas – mostly western States. The highest numbers are in the Northeast and Midwest (e.g., Massachusetts, New Hampshire, Iowa, South Dakota, and Rhode Island).

Table 2.3: LPNs and RNs Per 100,000 Population

State	Estimated Number of LPNs Per 100,000 Population	State Rank - LPNs Per 100,000 Population	Estimated Number of RNs Per 100,000 Population	State Rank - RNs Per 100,000 Population
Alabama	303.6	7	852.1	24
Alaska	90.0	50	793.5	33
Arizona	134.2	45	664.2	45
Arkansas	365.3	1	772.3	35
California	135.9	43	596.8	49
Colorado	118.8	48	716.8	41
Connecticut	187.0	31	977.1	8
Delaware	179.9	33	964.5	9
District of Columbia	161.9	40	303.6	51
Florida	234.8	20	801.4	32
Georgia	223.4	22	717.1	40
Hawaii	129.5	46	709.8	42
Idaho	194.7	28	641.0	47
Illinois	166.8	39	861.1	22
Indiana	245.0	15	867.2	21
Iowa	210.7	26	998.6	3
Kansas	237.9	19	947.0	13
Kentucky	243.4	17	858.3	23
Louisiana	324.6	3	760.1	37
Maine	176.9	35	952.0	12
Maryland	175.7	36	935.7	15
Massachusetts	190.9	30	1099.0	1

State	Estimated Number of LPNs Per 100,000 Population	State Rank - LPNs Per 100,000 Population	Estimated Number of RNs Per 100,000 Population	State Rank - RNs Per 100,000 Population
Michigan	182.4	32	803.8	31
Minnesota	321.8	4	954.7	11
Mississippi	307.2	6	824.0	27
Missouri	274.2	11	878.3	20
Montana	213.6	23	805.9	30
Nebraska	290.7	10	943.0	14
Nevada	102.3	49	568.9	50
New Hampshire	172.9	38	1059.3	2
New Jersey	179.2	34	880.4	19
New Mexico	145.2	42	672.0	44
New York	213.4	24	883.0	18
North Carolina	192.6	29	849.8	25
North Dakota	315.9	5	992.9	6
Ohio	263.7	14	914.7	16
Oklahoma	333.2	2	706.9	43
Oregon	87.6	51	725.7	39
Pennsylvania	266.9	12	988.8	7
Rhode Island	174.7	37	997.5	5
South Carolina	244.6	16	811.8	29
South Dakota	211.7	25	997.8	4
Tennessee	298.5	9	821.5	28
Texas	232.8	21	653.5	46
Utah	120.1	47	614.8	48
Vermont	265.6	13	958.3	10
Virginia	241.9	18	780.8	34
Washington	159.2	41	769.8	36
West Virginia	302.7	8	846.8	26
Wisconsin	194.7	27	891.2	17
Wyoming	134.6	44	740.8	38
Total U.S.	211.3	n/a	803.7	n/a

Sources: (1) (U.S. Bureau of the Census, 2000) (2) (U.S. Bureau of the Census, 2003)

Demographics of LPNs

Information about the demographic characteristics of LPNs can be obtained from the Current Population Survey (CPS). The CPS is a monthly survey of households conducted by the Bureau of the Census for the Bureau of Labor Statistics. It is the primary source of information on the labor force characteristics of the U.S. civilian non-institutional population (see http://www.bls.census.gov/cps/overmain.htm) (U.S. Bureau of the Census, 2004). The CPS contains individual and family demographic information. LPNs are self-identified in these data by reporting that their occupation is licensed practical nursing. We computed all data presented

here using weights provided by the Bureau of the Census to ensure that the data represent the U.S. population. With relatively few LPNs in some years of this survey, the data may not represent the LPN workforce accurately. Furthermore, the CPS was revised in 1994, resulting in the discontinuation of several variables in dataset. Several questionnaire items were changed, making comparisons across all years difficult or impossible depending on the variable. Thus, some of the demographic information we report is for recent survey years only.

Table 2.4 shows the number of LPNs in the CPS from 1984 to 2001. The number of LPNs identified in the CPS has declined from 1,002 in 1984 to 584 in 2001. This drop follows the decline in the total number of records in the CPS between 1984 and 2001. Thus, it does not reflect a trend in the supply of LPNs; rather, it reflects the drop in the number of households surveyed by the Census.

Table 2.4: Number of LPNs Identified in the Current Population Survey Outgoing Rotation Group Files, 1984-2001 (Unicon Research Corporation, 2002)

CPS Survey Year	No. of LPNs
1984	1,002
1985	980
1986	948
1987	898
1988	843
1989	863
1990	925
1991	894
1992	885
1993	825
1994	701
1995	667
1996	583
1997	593
1998	561
1999	508
2000	539
2001	584
Total	13,799

The regional distribution of nurses in the 1984-2001 CPS data is shown in Figures 2.1 through 2.3. All three types of nursing personnel—LPNs, RNs, and nurse aides—have a similar regional distribution. The major difference is that more LPNs live in the South and fewer in the Northeast, as compared to RNs in the data. This is in agreement with the population estimates.

Figure 2.1: Regional Distribution of LPNs

Source: Current Population Survey Outgoing Rotation Group Files, 1984-2001

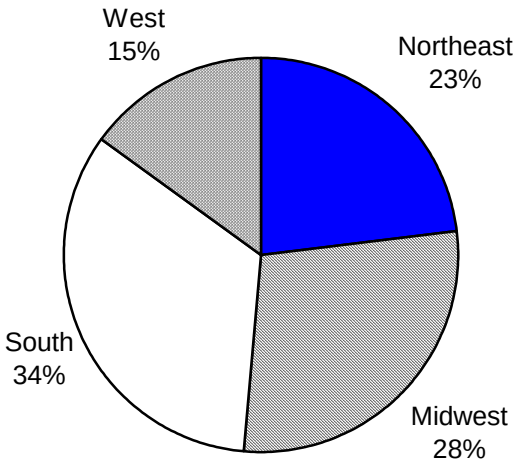


Figure 2.2: Regional Distribution of Registered Nurses

Source: Current Population Survey Outgoing Rotation Group Files, 1984-2001

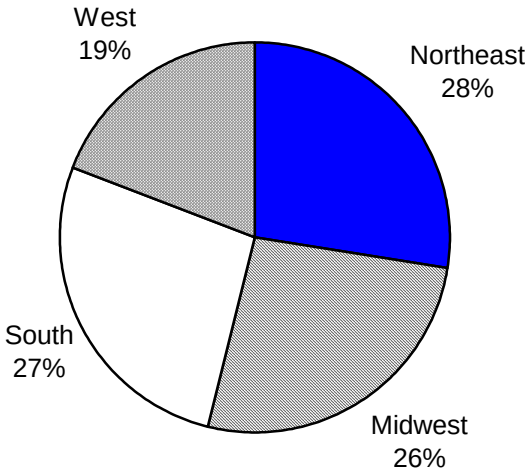


Figure 2.3: Regional Distribution of Nurse Aides

Source: Current Population Survey Outgoing Rotation Group Files, 1984-2001

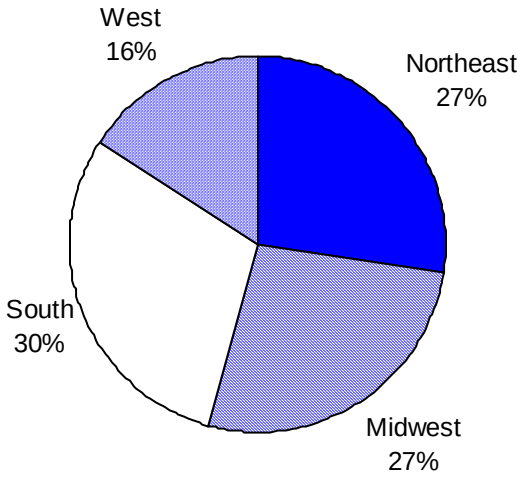


Table 2.5 presents the gender and racial/ethnic characteristics of LPNs in the United States from 1984 through 2001. Men are a slowly growing share of the LPN workforce, comprising only 3 percent of LPNs in 1984 and 5 percent in 2001. The share of LPNs that is male is similar to that of the RN workforce (See Spratley et al. (2000) for information on RN gender distribution).

The LPN workforce is predominantly white, although the ethnic diversity of LPNs has grown over time. In 1984, 77 percent of the LPN workforce was white, but this share dropped to 67 percent by 2001. The largest minority group of LPNs is blacks, comprising 26 percent of the workforce in 2001. Blacks are overrepresented in the LPN workforce relative to the total U.S. population. Hispanics account for 3 percent and Asians account for 2 percent of the LPN workforce; these ethnic groups are significantly underrepresented in this workforce, and these shares have not changed substantially since the 1980s. About 1 percent of the LPN workforce is Native American; this is consistent with the general population (see Census 2000 population estimates at http://quickfacts.census.gov/qfd/States/00000.htm).

Table 2.5: Distribution of Licensed Practical Nurses by Gender and Race/Ethnicity

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Male	3%	3%	3%	3%	4%	3%	4%	5%	6%	5%	5%	5%	5%	7%	4%	5%	6%	5%
Female	97%	97%	97%	97%	96%	97%	96%	95%	94%	95%	95%	95%	95%	93%	96%	95%	94%	95%
White	77%	74%	78%	77%	73%	73%	74%	76%	76%	77%	74%	75%	77%	75%	75%	74%	68%	67%
Black	16%	19%	17%	18%	20%	21%	18%	17%	18%	18%	18%	19%	16%	17%	18%	17%	21%	26%
Hispanic	4%	5%	3%	3%	4%	4%	4%	4%	3%	3%	5%	3%	4%	5%	5%	6%	6%	3%
Native American						0%	1%	1%	1%	1%	1%	0%	1%	1%	1%	1%	1%	1%
Asian or Pacific Islander						2%	2%	1%	2%	1%	2%	1%	2%	2%	2%	2%	3%	2%
Other	2%	2%	2%	3%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Current Population Survey Outgoing Rotation Group Files, 1984-2001

Most LPNs are married (Table 2.6). From 1984 to 2001, the share of LPNs that reported being married varies between 56 percent and 66 percent, with no clear pattern of change over time. During this same time period, between 23 percent and 32 percent were widowed, divorced, or separated, and 10 percent to 14 percent were never married.

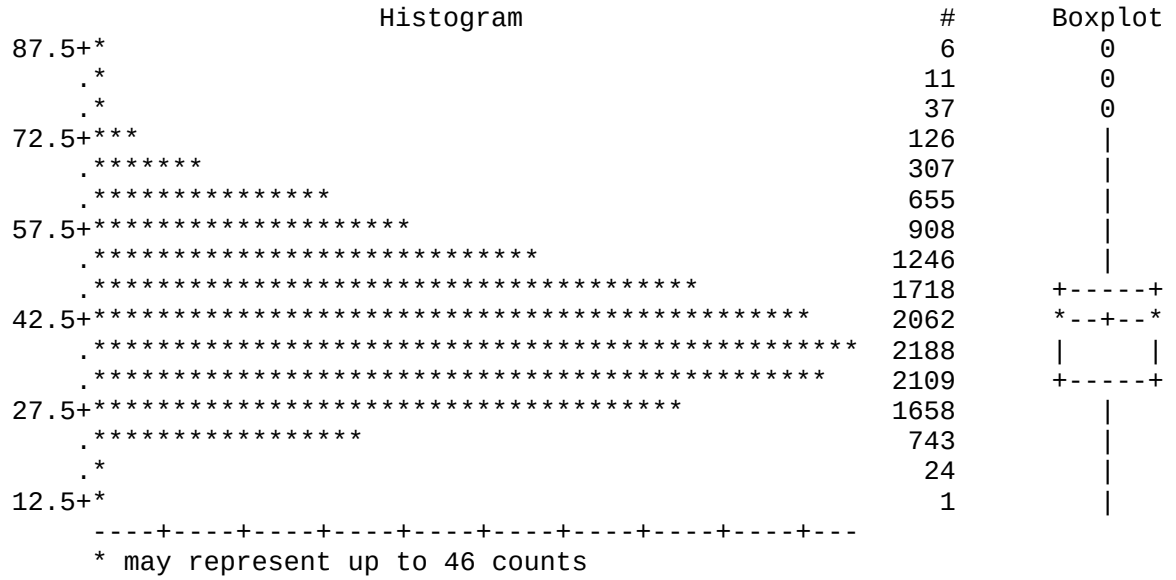
Table 2.6: Marital Status of Licensed Practical Nurses

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Married	65%	64%	66%	62%	63%	63%	65%	65%	61%	60%	59%	56%	62%	63%	60%	61%	64%	60%
Widowed, Divorced, Separated	23%	23%	23%	26%	25%	26%	24%	23%	29%	28%	27%	32%	27%	25%	29%	25%	24%	26%
Never Married	12%	13%	11%	11%	13%	11%	10%	12%	10%	12%	14%	12%	11%	12%	11%	14%	13%	14%

Source: Current Population Survey Outgoing Rotation Group Files, 1984-2001

As with registered nurses, the mean age of LPNs has been increasing since the 1980s. In 1984, the mean age was 39. By 2001, the mean age was 43. As shown in Table 2.7, LPNs are slightly older than RNs on average. The age distribution of LPNs in the 1984-2001 CPS data is shown in Figure 2.4. The histogram shows the distribution of the ages of LPNs. The numbers on the left indicate the age range, while those on the right are the number of LPN observations. The box plot to the right of the histogram illustrates the 75^{th} (age 49) and 25^{th} (age 32) percentiles, denoted by the top and bottom of the box, respectively. The plus sign in the upper half of the box signifies the mean (age 41). Both plots indicate that the LPN workforce leans toward older ages, rather than being evenly spread out across all ages. Based on these data, we can expect large numbers of LPNs to retire within the next 25 years.

Figure 2.4: Histogram of LPN Age



Source: Current Population Survey Outgoing Rotation Group Files, 1984-2001

Table 2.7: Mean Age of Licensed Nurses

Nurse Type	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Licensed Practical Nurses	39	40	40	40	41	41	41	41	42	42	41	42	42	42	42	42	43	43
Registered Nurses	38	39	39	39	39	40	40	41	41	41	41	41	41	41	42	42	43	42

Source: Current Population Survey Outgoing Rotation Group Files, 1984-2001

More LPNs are U.S.-born than RNs. In 2001, 94 percent of LPNs had been born in the U.S. This percent was the same in 1994, the earliest date for which the CPS has data on citizenship status. However, the data shows that an increasing percent of RNs are foreign-born: 11 percent in 2001 compared to 8 percent in 1994. The CPS also collects data on when survey respondents immigrated to the U.S. The data shows that foreign-born LPNs mostly immigrated to the U.S. in the 1970s, 1980s, and late 1990s.

Table 2.8 shows the educational attainment of LPNs in the CPS data. The CPS education data prior to 1992 indicate only the highest grade attended and completed. College is defined as ranging from 13 years of education to 18 or more years of education. Between 1984 and 1991, 47 percent to 59 percent of LPNs completed at least 1 year of college. Beginning in 1992, information on degrees attained is available.

Almost 66 percent of LPNs in 1992 completed some college or an AA degree. This percent increased to almost 80 percent by 2001. Between 1992 and 2001, there was a small increase in the percentage of LPNs with a bachelor's degree. The bachelor's degrees may have been in non-nursing fields of study. Since 1996, this figure has hovered near 5 percent. Less than 1 percent holds a master's or doctorate degree in any field of study. Those who have only a

high school education (including those who did not graduate) represent a decreasing proportion of LPNs. In 1992, this figure was 30 percent; by 2001 it had decreased to 15 percent.

Table 2.8: Educational Attainment of LPNs

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
< 12th	1.8%	1.3%	0.9%	0.9%	1.1%	1.1%	0.8%	0.4%	0.6%	0.8%
High School	28.3%	22.1%	23.3%	19.5%	16.5%	18.6%	19.7%	20.3%	18.8%	14.2%
Some College, No	37.0%	34.9%	31.3%	33.2%	35.6%	34.7%	35.1%	38.6%	29.3%	34.0%
AA Degree, Occ or	23.8%	30.6%	34.6%	37.5%	34.8%	32.5%	31.6%	29.6%	37.0%	35.9%
AA Degree, Academic	4.7%	5.3%	5.5%	3.9%	5.1%	7.7%	5.8%	7.3%	7.7%	9.2%
Bachelor's	3.6%	4.9%	3.3%	3.8%	6.4%	5.3%	5.6%	3.4%	5.7%	4.7%
Master's	0.6%	0.9%	0.5%	0.5%	0.1%	0.0%	0.0%	0.3%	0.4%	0.5%
Doctorate	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Professional School	0.3%	0.1%	0.6%	0.7%	0.3%	0.2%	1.5%	0.0%	0.6%	0.7%

Source: Current Population Survey Outgoing Rotation Group Files, 1992-2001

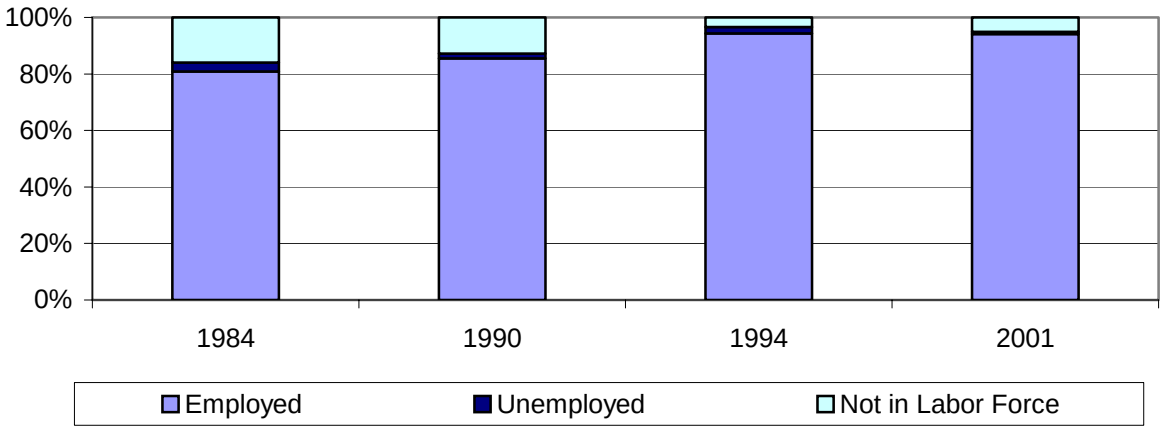
The Current Population Survey contains family income information by income categories. In any year, however, 4 percent to 13 percent of LPNs in the CPS data have no family income information. From 1984 to 2001, the majority of LPNs responded that their family income was less than $50,000 per year. Between 1984 and 1985, more than half reported family incomes less then $25,000. Since the 1980s, the proportion of LPNs with family incomes over $50,000 increased so that by 2001 one-third of LPNs were in this family income category.

Employment status of LPNs

The Current Population Survey asks respondents whether they are employed. However, we should note that since 1994, the CPS variable for employment status has been derived from all labor force items in the survey; this was not the case previously. Thus, it is possible that estimates from the CPS understated the percent of *working* survey respondents prior to 1994. Also, it is important to keep in mind that LPNs are self-identified in the CPS data (by reporting that their occupation is licensed practical nursing). Thus, some people might have licenses as LPNs, but do not identify themselves as such because they are working in other fields (or not working at all).

In 1984, 80 percent of LPNs said they were employed; this share rose to 94 percent by 2001 (Figure 2.5). This is very similar to RN employment trends in the data. Relatively small shares of LPNs are unemployed at any time, with the rate always below 5 percent between 1984 and 2001. LPNs reporting that they were not part of the labor force decreased from 16 percent in 1984 to 5 percent in 2001. It is unclear whether this is due to changes in the CPS survey in 1994, or whether there is a higher share of LPNs in the labor force in recent years.

Figure 2.5: Employment Status of LPNs, Selected Years



Source: Current Population Survey Outgoing Rotation Group Files

The CPS asks survey respondents why they are not in the labor force, but the precise questions have changed over time. Between 1984 and 1988, 52 percent to 69 percent of LPNs not in the labor force reported housekeeping responsibilities as the main reason for not working. Another 5 percent to 11 percent reported being in school, while 17 percent to 32 percent reported other reasons for not working, including retirement. Comparable data for RNs not in the labor force indicate the following: 66 percent to 72 percent reported housekeeping responsibilities, 4 percent to 6 percent indicated school, and 20 percent to 26 percent claimed other/retired as the main reason for not looking for work.

In 1989, a new variable was added to the CPS that provided more detail as to why survey respondents were not looking for work. (However, this variable was discontinued after 1993). Between 1989 and 1992, 4 percent to 10 percent of LPNs (and 4 percent to 7 percent of RNs) not looking for work reported they were in school; this is a similar share as between 1984 and 1988. Illness and disability were reported by 21 percent to 35 percent of LPNs, compared to 11 percent to 19 percent of RNs, not in the labor force. In 1989, 47 percent indicated that they were "keeping house," with this share declining to 30 percent by 1992. Likewise, compared to previous survey years, a smaller and declining share of RNs reported housekeeping responsibilities as the main reason for not seeking employment. Retirement was reported as the reason for 8 percent to 14 percent of LPNs and 15 percent to 23 percent of RNs not looking for work.

Between 1994 and 2000, 22 percent to 50 percent of LPNs who were not in the labor force said they were retired. Not surprisingly, this share is higher than the estimated retired shares of the 1980s, since LPNs are now older on average. The retirement figures for RNs in the 1994-2000 CPS data range from 29 percent to 41 percent, with no clear trend. The proportion of LPNs who reported not being in the labor force due to disability varies from 9 percent to 39 percent between 1994 and 2000. This figure ranges from 5 percent to 19 percent for RNs. Again, there is no clear trend in the data for LPNs or RNs. In almost every survey year since 1994, most LPNs and RNs who reported not being in the labor force did not provide a detailed reason for their labor force status. By 2001 over 80 percent of LPNs not working and not seeking work provided an answer that fell into the "other" category.

Since 1994, the CPS has asked respondents if they hold more than one job. LPNs reported having more than one job at a rate of 6 percent to 9 percent between 1994 and 2001. A somewhat larger share of RNs reports having more than one job during this same time period. It is unclear from the data whether there is an upward trend in LPNs holding multiple jobs.

Work settings of LPNs

LPNs work primarily in hospitals and nursing and personal care facilities (Table 2.9). From 1984 to 2001, the proportion of LPNs working in hospitals declined from 54 percent to 32 percent. During this same time period, the percent of LPNs working in nursing and personal care facilities grew from 26 percent to 32 percent. The proportion of RNs working in hospitals also declined between 1984 and 2001, but by only by 10 percentage points. However, even at its lowest, 60 percent in 2001, the share of RNs working in hospitals is greater than that of LPNs in every year. Also, the data do not show an increase in the percent of RNs working in nursing and personal care facilities; this share stays near 7 percent in all years.

In 1984, 6 percent of LPNs worked in offices and clinics of physicians; by 2001, this had increased to 12 percent. The share of RNs in this work setting likewise doubled, from 5 percent to 10 percent. There is no obvious trend in the percent of LPNs working for personnel supply services (e.g. temporary agencies), although the percents are lower overall in the 1990s compared to the 1980s. The same is true for RNs in the data. Between 1984 and 2001, 2 percent to 9 percent of LPNs (compared to 1 percent to 5 percent of RNs) worked in this industry. Private households were the work setting of 4 percent of LPNs in 1984. By 1994, less than 1 percent worked in private households. Less than 1 percent of RNs worked in private households in any year.

The CPS industry classification system includes a category called “health services not elsewhere classified (n.e.c.).” In 1984, 3 percent of LPNs were employed in work settings within this broad industry class. The proportion of LPNs in these work settings increased to 11 percent by 2001. Similarly, RN employment in this industry category increased – from 5 percent in 1984 to 12 percent in 2001. Unfortunately, we do not know what precise industries are included in the “health services (n.e.c.)” category. LPNs also are increasingly working in industries other than those discussed above, such as elementary and secondary schools, colleges and universities, child day care services, public administration, and other industries not traditionally associated with the type of work done by LPNs (e.g., real eState).

Table 2.9: Distribution of LPNs by Work Setting

	1984	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Hospitals	54.3 percent	55.4 percent	54.5 percent	50.7 percent	48.1 percent	49.0 percent	46.6 percent	46.7 percent	42.5 percent	43.2 percent	38.4 percent	36.9 percent	36.5 percent	35.0 percent	39.0 percent	35.7 percent	36.9 percent	32.1 percent
Nursing & Personal Care Facilities	25.8 percent	24.8 percent	26.9 percent	26.0 percent	26.2 percent	26.6 percent	28.8 percent	31.0 percent	32.8 percent	32.6 percent	35.2 percent	34.0 percent	37.0 percent	32.1 percent	30.1 percent	34.0 percent	31.9 percent	32.4 percent
Personnel Supply Services	4.2 percent	6.1 percent	5.5 percent	6.2 percent	8.8 percent	6.5 percent	6.5 percent	4.1 percent	4.7 percent	4.2 percent	3.4 percent	3.3 percent	1.6 percent	3.1 percent	3.8 percent	3.2 percent	4.1 percent	5.2 percent
Offices and Clinics of Physicians	6.1 percent	5.1 percent	4.8 percent	6.1 percent	5.4 percent	6.8 percent	6.3 percent	7.4 percent	8.2 percent	8.3 percent	8.9 percent	8.3 percent	8.9 percent	11.3 percent	11.2 percent	10.6 percent	10.1 percent	12.4 percent

Private Households	4.0 percent	2.8 percent	2.1 percent	2.1 percent	2.6 percent	1.8 percent	1.9 percent	1.2 percent	1.0 percent	1.0 percent	0.3 percent	0.5 percent	0.3 percent	0.9 percent	0.3 percent	0.0 percent	0.3 percent	0.2 percent
Health Services (n.e.c.)	3.3 percent	4.1 percent	4.1 percent	5.0 percent	6.1 percent	6.3 percent	6.4 percent	6.8 percent	6.4 percent	5.2 percent	9.2 percent	11.3 percent	10.8 percent	14.1 percent	10.5 percent	11.3 percent	12.4 percent	11.3 percent
Other	2.4 percent	1.6 percent	2.0 percent	4.0 percent	2.9 percent	3.0 percent	3.5 percent	2.9 percent	4.3 percent	5.6 percent	4.6 percent	5.7 percent	4.9 percent	3.6 percent	5.1 percent	5.3 percent	4.4 percent	6.4 percent

n.e.c. = not elsewhere classified

Source: Current Population Survey Outgoing Rotation Group Files, 1984-2001

The majority of LPNs work in private sector jobs, and the percent has increased from almost 80 percent to 89 percent between 1984 and 2001. In 1984, 19 percent Stated that they were employed by government agencies; this share declined to 10 percent by 2001 (Figures 2.6 and 2.7). Only 0.4 to 2 percent of LPNs reported being self-employed in any year. The data do not show much change in the employment sectors of RNs. Between 1984 and 2001, around 80 percent of RNs worked in the private sector, and 20 percent for government.

Figure 2.6: Employment Sector of LPNs, 1984

Source: Current Population Survey Outgoing Rotation Group Files

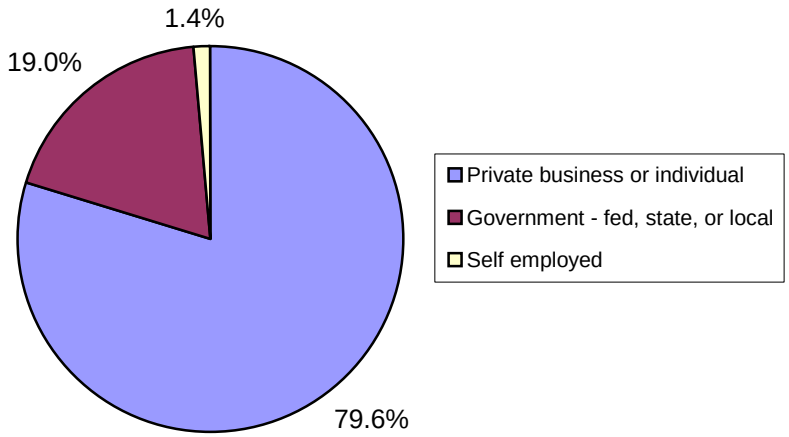
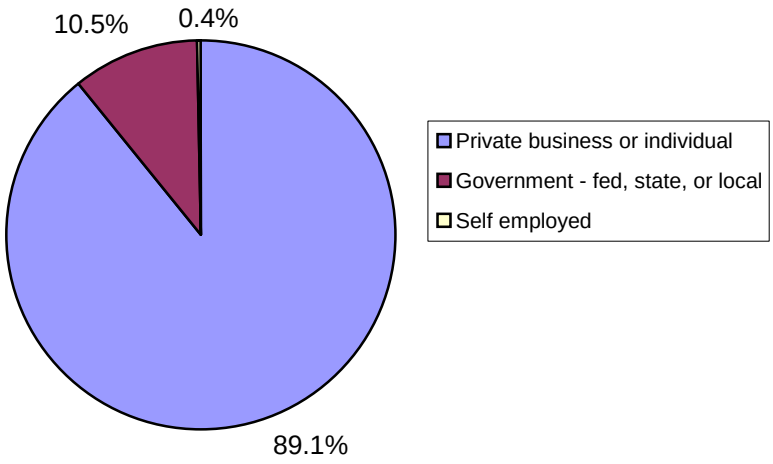


Figure 2.7: Employment Sector of LPNs, 2001

Source: Current Population Survey Outgoing Rotation Group Files

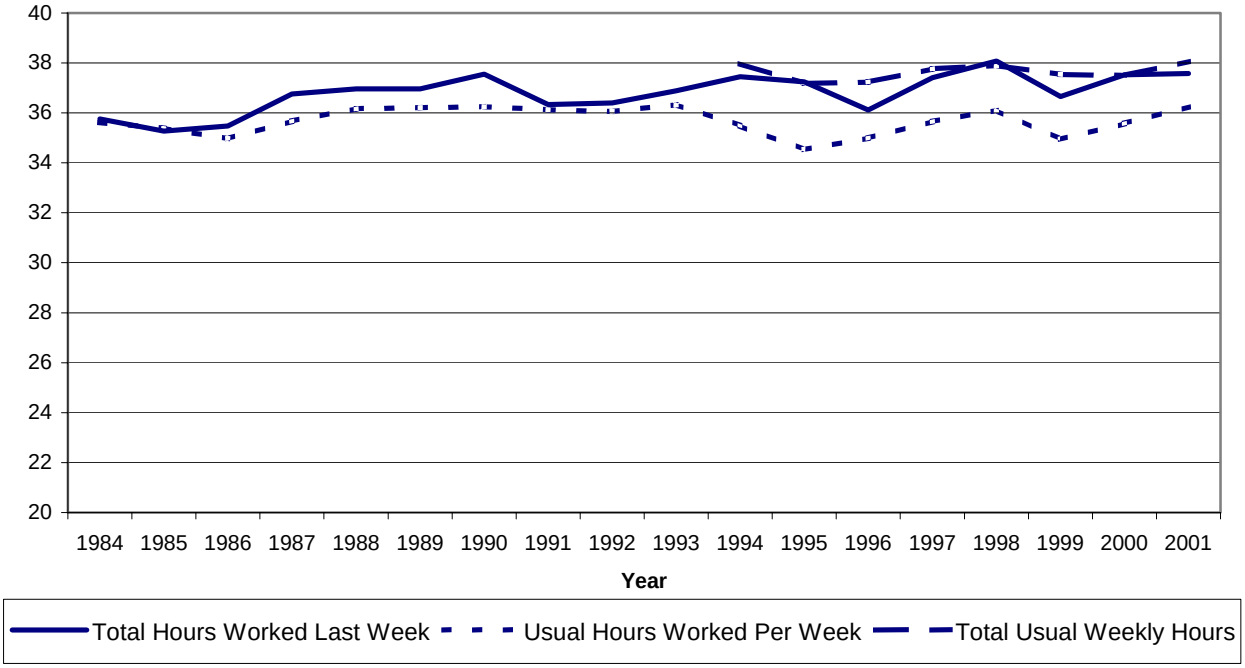


Hours of Work

There are several questions in the Current Population Survey that correspond to hours of work. We report means for the variables denoting total hours worked in the previous week and usual hours worked per week. There are two variables that denote usual weekly work hours. The main differences between these two variables follow: (1) one of the variables was introduced in 1994 and the corresponding survey question is asked of all respondents who report having a job the week prior to being surveyed, and (2) the other variable, though available throughout our sample period, has missing values for salaried workers after 1993.

Figure 2.8 compares the means of the three variables that correspond to hours of work per week. Between 1984 and 2001, LPNs on average worked more than 34 hours per week, which is the same as RNs. LPNs worked slightly more on average in 2001 than they did in 1984. Between 1986 and 1990, mean weekly work hours increased by over 1 hour if measured by usual hours worked per week, and by more than 2 hours if measured by total hours worked last week. After 1993, LPNs' mean usual weekly hours of work fall farther below mean total hours worked in the previous week. This likely is due to the missing values in the data for salaried LPNs from 1994 onward. However, the variable "total usual weekly hours," which was added to the survey in 1994, has values for both salaried and hourly workers, and the mean of this variable indicates that LPNs worked 37 to 38 hours per week between 1994 and 2001. Overall, the CPS data show some evidence of a small increase in the average weekly work hours of LPNs, but there is a high degree of fluctuation in the data, especially during the 1990s. RNs' mean weekly work hours hold steady at 36 to 37 between 1984 and 2001.

Figure 2.8: Mean Hours of Work Per Week - Licensed Practical Nurses



Source: Current Population Survey Outgoing Rotation Group Files, 1984-2001

The majority of LPNs work full-time, and the share working full-time increased between 1984 and 2001. The CPS asks respondents that work less than 35 hours per week what their main reason is for working part-time. The reasons reported by the CPS have changed over time. Between 1984 and 1993, the reasons identified in the CPS include slack work or business conditions; could only find part-time work; own illness, health, or medical limitations; too busy, didn't want full-time work; reported less than 35 hours, but usually works full-time; and all other reasons. Since 1994, additional reasons are seasonal work, childcare problems, other family/personal obligations, school or training, and retired or social security limit earnings. Also, "too busy, didn't want full-time" was dropped from the survey.

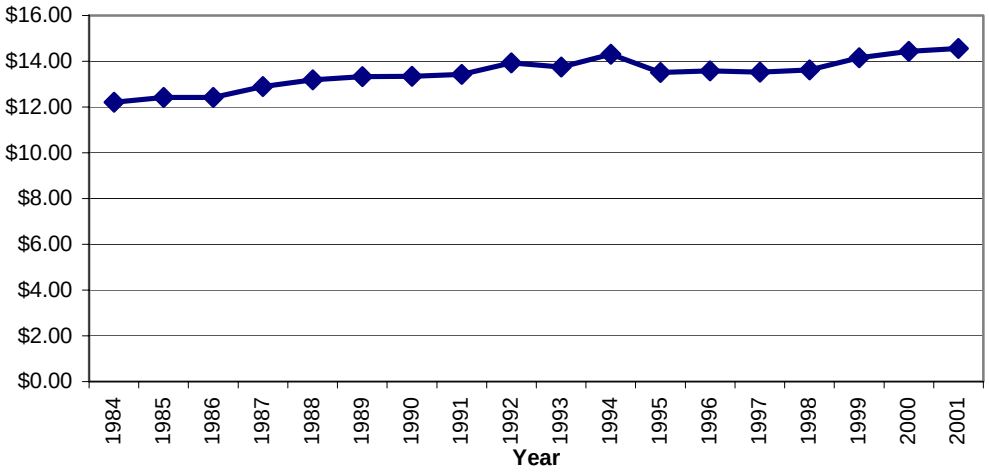
Between 1984 and 1993, most LPNs who reported working less then 35 hours per week responded that they were too busy and/or didn't want full-time work. After the survey change in 1994, most responded that they usually do work full-time. Those reporting slack business or could not find full-time work ranged from less than 1 percent to almost 12 percent between 1984 and 2001. The highest percentages were during the 1990s. There is no obvious trend in the percent that work less then 35 hours per week because of childcare problems or own illness, health, or medical limitations. Furthermore, these percentages are small (almost always under 4 percent). From 1994 to 2001, 4 percent to 11 percent of LPNs reported school or training as their reason for working part-time. An increasing percent since 1994 have responded that they are retired or that social security limits earnings: 2 percent in 1994 and 4 percent by 2001.

Earnings

The Current Population Survey asks respondents who report they are paid by the hour for their hourly pay rate. As shown in Figure 2.9, the hourly earnings of LPNs increased 19 percent between 1984 and 2001, from $12.21 to $14.56 (all figures are adjusted for inflation). By 1994, LPNs earned over $14 per hour on average. However, LPNs experienced a slight decline in their hourly earnings between 1994 and 1998, which corresponds to the decline in real RN wages reported by others (Spetz, 1998). By 1999 LPNs' mean hourly pay rate had bounced back to $14. The data for RNs shows a similar pattern—an overall increase of nearly 19 percent ($17.78 in 1984 and $21.15 in 2001) with a slight drop between 1993 and 1997.

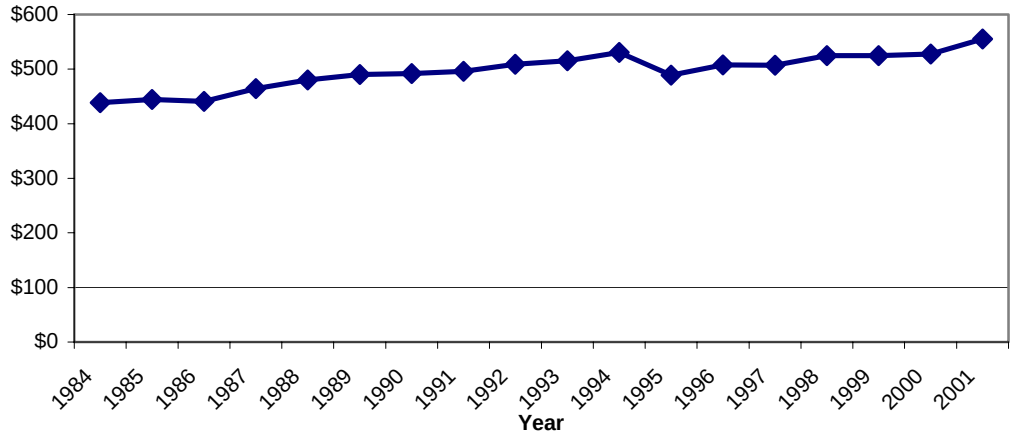
The CPS also collects information on usual weekly earnings before deductions from both hourly and salaried workers. As shown in Figure 2.10, the weekly earnings of LPNs increased 23 percent between 1984 and 2001. In 1984, LPNs earned nearly $450 per week on average. By 1994, this figure had increased to $531. The data shows a decline in average weekly earnings after 1994. It wasn't until 2001 that LPNs' mean weekly earnings rose above the 1994 value to $555.

Figure 2.9: LPNs' Mean Hourly Pay Rate (in Year 2002 Dollars)



Source: Current Population Survey Outgoing Rotation Group Files, 1984-2001

Figure 2.10: LPNs' Average Weekly Earnings (in Year 2002 Dollars), 1984-2001



Source: Current Population Survey Outgoing Rotation Group Files

Summary

In this chapter, we used data from the Current Population Survey, U.S. Census Bureau, Bureau of Labor Statistics, and the National Council of State Boards of Nursing to describe the licensed practical nurse workforce. Most of the reported figures are weighted estimates.

We provided corresponding data on registered nurses for comparison, and found the following similarities:

- Both workforces are aging, with LPNs being slightly older on average;
- Males represent a small percent of both workforces, but this percent is increasing;
- The western region of the U.S. has the lowest numbers of LPNs and RNs relative to the population;
- RNs and LPNs share similar employment trends—greater percents were employed in 2001 than in 1984;
- On average, RNs and LPNs work about the same number of hours per week—between 36 and 38 hours;
- The share of RNs and LPNs working in physician offices/clinics doubled between 1984 and 2001, and the share working in health services "not elsewhere classified" increased; and
- The hourly pay rate of RNs and LPNs increased 19 percent between 1984 and 2001.

Differences we found between the two workforces include the following:

- The RN workforce is larger than the LPN workforce, but the actual size of the LPN workforce is unclear since the available data is conflicting;
- Compared to RNs, more LPNs live in the South and fewer in the Northeast;
- Fewer LPNs are foreign-born, whereas an increasing percent of RNs are immigrants;
- RNs work in hospitals in greater proportions than LPNs, and the share of LPNs working in hospitals declined more than that of RNs between 1984 and 2001;
- The percent of LPNs working in nursing and personal care facilities increased between 1984 and 2001, but not the percent of RNs; and

- By 2001, the percent of LPNs working in the private sector was greater than the percent of RNs.

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Chapter 3: Scope of Practice and Practice Acts

Each of the 50 States, the District of Columbia, the U.S. territories (Guam, U.S. Virgin Islands, American Samoa, and Puerto Rico), and the Commonwealth of the Northern Mariana Islands, have Boards and legislation regulating the practice of registered and practical nursing, as well as advanced practice nurses and other workers[1]. These documents display both similarities and differences in legislation, language, and scope of practice. In order to provide an overview of the scope of practice of the practical nurse in the U.S., this chapter summarizes major similarities and differences in the practice of LPNs and provides a methodology for categorizing the practice acts. Additionally, based on scope of practice data, we discuss issues that limit the utilization of LPNs in various States and settings.

With the exception of four States, the 56 boards have a single governing board that oversees the practice of both RNs and LPNs. California, Georgia, Louisiana, and West Virginia have separate boards for RN and LPN practice. Texas changed to one board on February 1, 2004. The National Council of State Boards of Nursing (NSBCN) (National Council of State Boards of Nursing, 2004) is a not-for-profit organization whose membership is comprised of the boards of nursing of the 50 States, the District of Columbia, four United States territories--American Samoa, Guam, Puerto Rico, the Virgin Islands--and the Commonwealth of the Northern Mariana Islands. The purpose of NCSBN is to serve as an organization through which boards of nursing cooperate and work together on matters of common interest and concern affecting the public health, safety and welfare, including the development of licensing examinations in nursing. NCSBN's activities include developing the National Council Licensure Examination for Registered Nurses (NCLEX-RN®) and the National Council Licensure Examination for Practical Nurses (NCLEX-PN®), performing policy analysis and promoting uniformity in relationship to the regulation of nursing practice, disseminating data related to the licensure of nurses, conducting research pertinent to NCSBN's purpose, and serving as a forum for information exchange for members. NSBCN has developed a model nurse practice act that can be used by the members to guide legislation.

Typically the boards have basic practice acts and documents related to scope of practice, including the education and training that is required for the practice of practical nursing, and what work LPN basic education allows. Most boards then allow for expanded practice with additional education. The most common areas for expanded practice relate to intravenous infusions, intravenous medications, hemodialysis, and supervision of other staff. In order to engage in expanded practice, the practical nurse must obtain further training and/or certification. Generally, the practice acts declare that the practical nurse must work under the supervision of a registered nurse, a physician, and, in some States, pharmacists, podiatrists, or others.

The typical paths to licensure are examination, endorsement, and temporary licensing. For example, California allows application for the licensing examination in five ways: 1) after completion of an approved in-State program, 2) after completion of an approved out-of-State program, 3) with equivalent experience (such as having worked as a nurse aide and taking a pharmacy course), 4) with experience as a military corpsman, and 5) after the first year of an RN

[1] We refer to these governmental authorities as “boards” in the remainder of this chapter.

program. In an interview that took place in February 2003, Suellen Clayworth of the California Department of Consumer Affairs, Board of Vocational Nursing and Psychiatric Technicians, Stated that "there was a period of time that California did not use the standardized examination and nurses who were licensed during that time may not get endorsement to other States." Until 1974, California used the National League for Nursing examination. From May 1974 through March 1986 California used a State constructed licensure examination. People licensed during this time may not be able to get endorsed to other States. According to Ms. Clayworth, the State began using the NCSBN licensure examination in October of 1986. Because of examination standardization, most States now approve endorsement of currently licensed practical nurses from other States.

States have elected to explicate the work of practical nurses in a variety of ways. Some, such as Louisiana, Montana, Maine, and Nevada, have detailed lists of tasks that practical nurses can and cannot do. Other States, such as Georgia, Alaska, Kentucky, and Oklahoma, have decision trees that are to be used to decide on appropriate tasks that can be done. Connecticut has an extensive algorithm for decision-making that can be used regarding issues of practice. Washington has a decision tree that is used for making decisions and specifically States that there is no "laundry list" of approved and prohibited tasks. Some States such as Colorado and Nebraska use the sections of the nursing care plan to detail work that can be done by different nursing personnel (RNs, LPNs, and aides). South Carolina has developed extensive skills charts that are organized by body system, job categories, and experience level within job categories. Neither Michigan nor Texas has a scope of practice or practice act for practical nurses.

There are several points of contention that exist in the scopes of practice of registered nurses and practical nurses. These issues typically surround the words "assessment", "delegation", "supervision or charge nurse" and, more recently, "decision-making" and "critical thinking". Since the American Nurses Association defined registered professional nursing as the diagnosis and treatment of human responses to actual or potential health problems, assessment has been a key to the boundary of practice between the registered nurse and other nurses and nurse assistants. Practical nurses and nurse assistants are permitted to "collect data" rather than assess patients; however, the boundary between data collection and assessment is difficult to define.

Delegation has traditionally been thought of as a management function reserved for the registered nurse. However, practical nurses delegate functions to other providers in many settings, and some practice acts acknowledge that fact. The positions of supervisor and charge nurse are similar, in that those roles traditionally involve management. In long-term care settings practical nurses function in those roles routinely. In 1994, the U.S. Supreme Court upheld a decision by the Sixth Circuit Court of Appeals that said in that case, the licensed nurses involved were supervisors, and therefore no longer covered by collective bargaining agreements (Supreme Court of the United States, 1994). The concepts of decision-making and critical thinking are now included in some scopes of practice, usually in order to define the practice boundary between the practical and registered nurse. However, as with the term "assessment", it is difficult to argue that practical nurses do not engage in decision-making and critical thinking activities.

As in many fields, the professions of RN and LPN seek to protect and expand their jobs and opportunities. The scope of practice regulations delineate the roles of these licensed nurses and thus RN and LPN organizations lobby for scopes of practice that protect jobs. Additionally, in States with powerful RN unions, union contracts and proposed legislation have been explicit about what is and is not the practice of the RN, as compared to the LPN. For example, there has been a controversy in California over whether or not LPNs may administer intravenous medications to patients as part of hemodialysis and blood bank procedures.(Editor, 2003) The California Nurses Association (CNA), which represents RNs, bitterly opposed a change in regulations permitting these activities, while Service Employees International Union (SEIU), which represents LPNs and other hospital workers, supported it. On January 29, 2003, the California Office of Administrative Law approved the new regulation.(Editor, 2003)

When there are shortages of registered nurses, licensed practical nurses often are suggested as substitutes for RNs, or as members of multidisciplinary care provision teams. The ways in which patient care can be allocated across employees depends on the legal scopes of practice of LPNs. In order to better understand the scopes of practice of LPNs, we obtained documentation from virtually every board that regulates the practice of practical and vocational nurses. Our underlying hypothesis was that there is variation in the "restrictiveness" of the scopes of practice for LPNs, and that this restrictiveness influences the role and flexibility of LPNs in work settings. The data show substantial variation in the restrictiveness of scopes of practice, but there also are complexities that require additional explication. As we reviewed the practice acts and scopes of practice information, we determined that there was also variation in the specificity of scopes of practice. Some practice acts and supporting documents are highly specific and others are very vague in describing the roles LPNs can play and the tasks they can complete. Thus, we found that practice acts were variable both in the way the States restricted or enlarged the roles of LPNs and in the specific or nonspecific language they used to detail the roles. We determined that in order to discuss the practice acts and related documentation reasonably, we would categorize the States based on both restrictiveness and specificity of the scopes of practice. To determine our ratings, we relied upon supporting documentation, key informant interviews, focus group data, Web based information, and telephone interviews (Appendix C).

We defined the term restrictiveness as limiting the level of autonomy, flexibility, or independence in the practice of LPNs. The term specificity was defined as explicating or not the defined parameters of practice of LPNs. We created categorical scales for each of the terms and evaluated each State's scope of practice documents (Appendix C). The scales included the following instructions and relative values.

Restrictiveness

As a relative value, on a scale of 1-4, with 1 being the least restrictive and 4 being the most restrictive, categorize each State's LPN scope of practice. "Restrictive" is defined as not allowing a level of autonomy, flexibility, or independence in the practice of LPNs

4- Most Restrictive – allows limited practice under the direct supervision or delegation from an RN or physician, usually allows some IV infusion administration with additional training, but no administration of IV medications.

3- Fairly Restrictive – allows limited scope of practice with some direct supervision. IV medication administration of premixed solutions is allowed, as well as other functions that may include IV insertion and maintenance.

2- Somewhat Restrictive – IV medication administration of premixed solutions allowed, as well as the functions allowed under #3. An additional 2-3 functions are allowed, but not the advanced functions such as those listed in #1

1- Least Restrictive – allows the broadest scope of practice that may be delegated but not directly supervised. Allows broad range of practice including IV therapy, and in addition several additional advanced functions such as administration of cancer agents, hyperalimentation, arterial blood draws, or patient assessment.

Specificity

As a relative value, on a scale of 1-4, with 1 being the least specific and 4 being the most specific, categorize each State's LPN scope of practice. Specificity is defined as explicating defined parameters of practice of LPNs.

4-Most specific – Documents are clear and there are detailed regulations with consistent telephone information. Regulations list specific permitted and prohibited activities.

3-Fairly specific – Documents have specific information about permitted activities, but the information is not detailed or complete. Information obtained by telephone also is not complete and allows some room for interpretation.

2-Somewhat specific –Little information is provided with the regulatory documents about specifically permitted and prohibited activities. The telephone information is answered with little detail.

1-Least specific – There is little information in regulatory documents, and no or limited telephone information.

Methodology for Assigning Categories

The three principal investigators for the study, two registered nurses and one economist, met to categorize the practice acts of the boards. We individually reviewed documentation for every board and each reviewer made a determination of specificity and restrictiveness based on individual experience and expert judgment. We read all available documentation, including Web based information, telephone interviews, focus group data, and key informant information, but did not discuss our decisions with each other. We individually categorized both restrictiveness and specificity for every board and completed the scale forms. A research assistant entered the results of the initial determinations into a database.

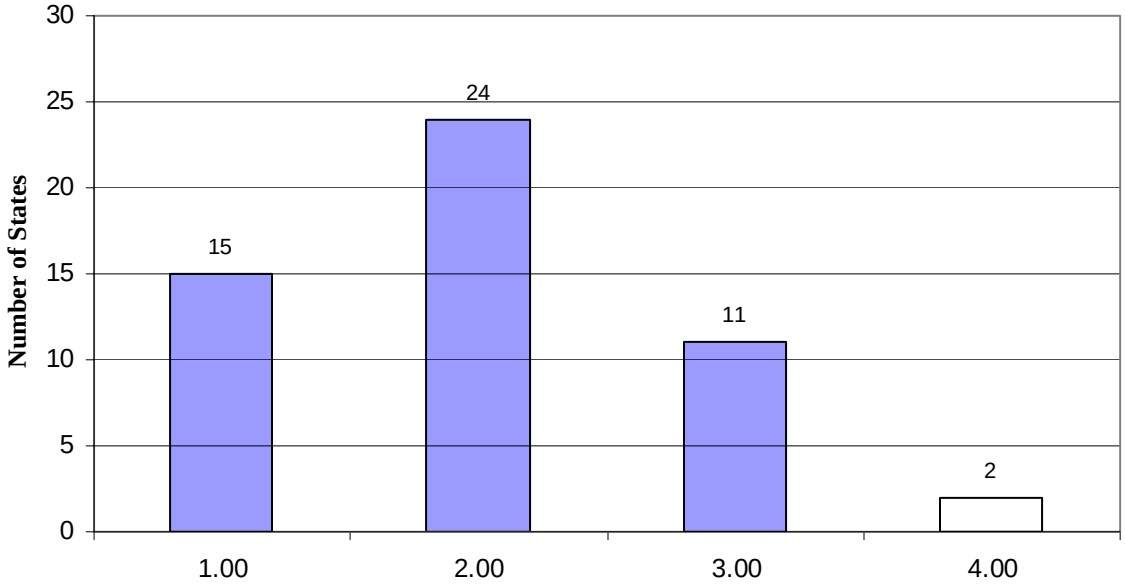
After the data were entered, one of the reviewers evaluated the results of the three scores. If all three reviewers agreed on a score, the score was accepted. If two reviewers agreed and the third score did not differ by more than 1 point, the majority score was accepted. If there

was no agreement among the three reviewers, or if there was a difference of more than 1 point in any of the three scores, the file was pulled for further review. In the initial review, we had insufficient data to review the three territories and the commonwealth. For the restrictiveness scale, there were 40 scores that met the criteria for agreement and 12 that were reviewed a second time by all reviewers. For the specificity scale, there were 32 scores that met the criteria for agreement and 20 that were reviewed a second time by all reviewers. During the second review, the reviewers discussed the issues until agreement was reached.

Results

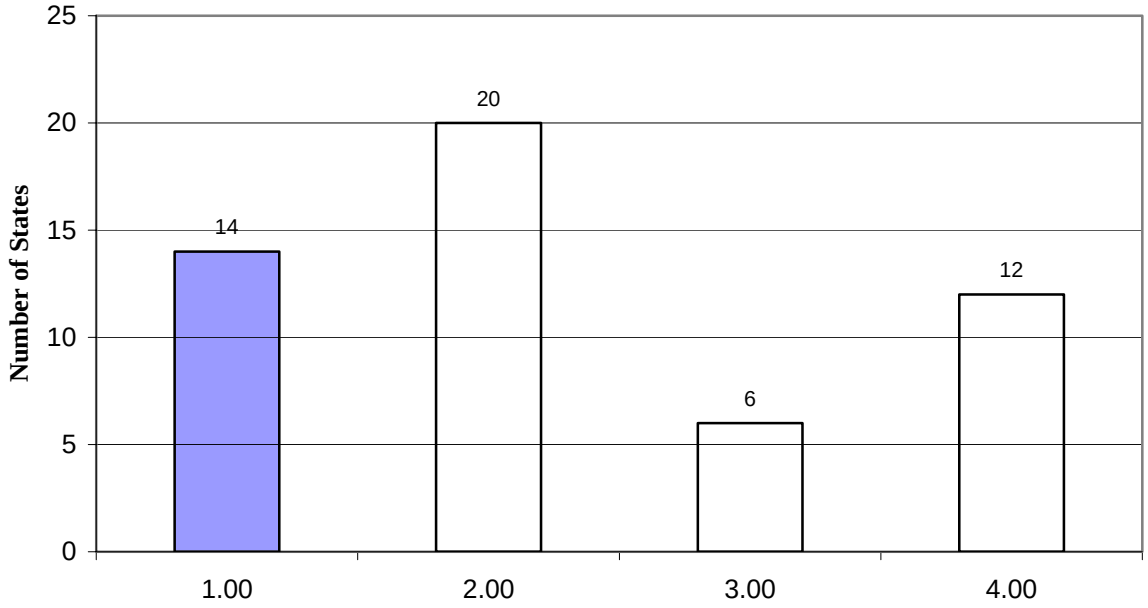
Figures 3.1 and 3.2 provide graphic representations of the final scale score results. Appendices C1 and C2 provide the actual results by State.

Figure 3.1: Restrictiveness Scale



As noted in Figure 3.1, most of the States are in the first or second categories of restrictiveness. There are 13 boards in the two most restrictive categories.

Figure 3.2: Specificity Scale



As noted in Figure 3.2, most States are in the first or second category of specificity, meaning that most States do not have very specific scopes of practice for LPNs. Eighteen States are in the more specific categories.

Based on the focus group data from four States (Louisiana, Massachusetts, California, Iowa), we have indications that individual employers restrict practice of practical nurses even more than regulations require. A number of the focus group members remarked that they were surprised when the facilitator read the actual scope of practice documents. Their responses varied from, "I am not going to mention this to my employer because I will have to do more for the same pay" to "I am going to go back and ask my employer why the practice is restricted more than the legislation allows."

Conclusion

Our data indicate there are similarities in the practice acts across States but variation in how the States express the details of the work of practical nurses. The data also indicate that most States are flexible in the practice requirements and not overly specific in the tasks that are enumerated. However, there are a number of States with restrictive practice or very specific detailing of tasks that can and cannot be done by practical nurses. These data are used in Chapter 5 to examine whether the restrictiveness and specificity of the scope of practice affect demand for LPNs. The descriptive data presented above suggest that it may be possible to identify States that could reasonably increase their utilization of practical nurses by reducing the restrictiveness of their practice.

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Chapter 4: Education of LPNs

Background

The scope of practice and job roles of practical nurses depend, in large measure, on education and training programs. As with curricula for RNs, the approval of training curricula for LPNs rests with the governing board in each State or territory. The governing boards' responsibilities include approving new training programs, reviewing existing training programs, issuing and re-issuing licenses, monitoring practice, administering disciplinary actions, and providing information regarding practice. Boards define curricular requirements in a variety of ways. As with practice acts and scopes of practice, substantial similarities and some variation in legislation, wording, and actual practice exist in curricular requirements, faculty requirements and other areas of the education process. This chapter will summarize major similarities and differences in the education of LPNs and provide data on national and State trends in LPN education.

Method

In order to examine the education of LPNs, we collected data from a number of sources. Data sources include: (1) U.S. Bureau of Health Professions' Area Resource Training File (February 2003 Release), (2) National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources & Services Administration, Department of Health & Human Services, (3) National Council of State Boards of Nursing (NCSBN), and (4) primary data from individual Board Web sites and telephone interviews.

Findings

Curricula

Many State and territory boards use the model developed by the National Council of State Boards of Nursing to guide the language of their regulations related to education and curriculum for practical nursing programs. Most boards have similar ways of describing the administration of the program, the faculty requirements, how to open and close a program and the curricular content. However, curricular requirements vary in specificity, as do the scopes of practice. For example, Arkansas describes specific content to be taught in theory and clinical courses. California and Delaware have detailed faculty qualifications. Arizona and Missouri specify the NCLEX pass rate required in order for the program to remain in good standing with the Board. Some States, such as California, Alaska, Arkansas, Illinois, and the District of Columbia, have continuing education requirements and describe what can and cannot be approved. Arizona and Delaware's documents discuss the requirements for refresher courses.

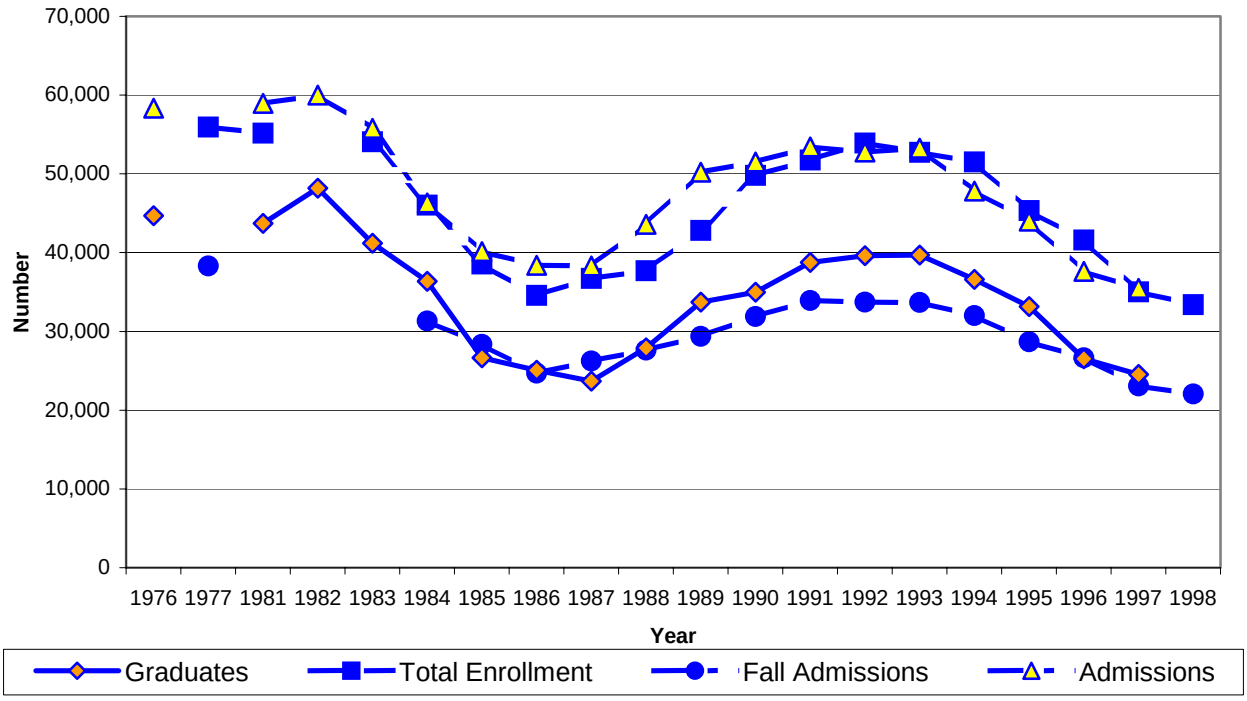
Each board tries to provide guidelines for the programs and schools to ensure adequate training of the student. The greatest degree of variation in LPN education is in the required length of the educational programs. Although most programs can be completed in a calendar year, there are exceptions. North Dakota has an associate of science degree for practical nursing that requires 2 or more years of study. California States that programs must be greater than or

equal to 1,530 hours or 50 semester units, with theory accounting for 576 hours and clinical training accounting for 954 hours. Connecticut requires that programs last for 230 days. Indiana specifies that programs must last two semesters and one summer, or four quarters. Louisiana sets a specific number of hours for given topics of study. Missouri requires no less than a 10-month program. Oklahoma requires that programs last between 1300 and 1600 clock hours or 32-40 semester hours. Each board has mechanisms to evaluate LPN programs, for both the establishment of a new program and re-approval of an existing program.

Trends in LPN Education

Figure 4.1 illustrates the number of graduates, enrollment, and admissions in U.S. practical nursing schools from 1976 to 1998. Specific information by State and school are in the appendix. Over the 22 years shown, there have been cycles of growth and decline, but the decline has been persistent since 1994. After 1994, there was significant downsizing of U.S. hospitals, as a result of the growth of managed care health insurance plans and other cost-containment programs, which was accompanied by lower demand for nursing personnel. Appendix D1 presents the detailed information shown in the figure.

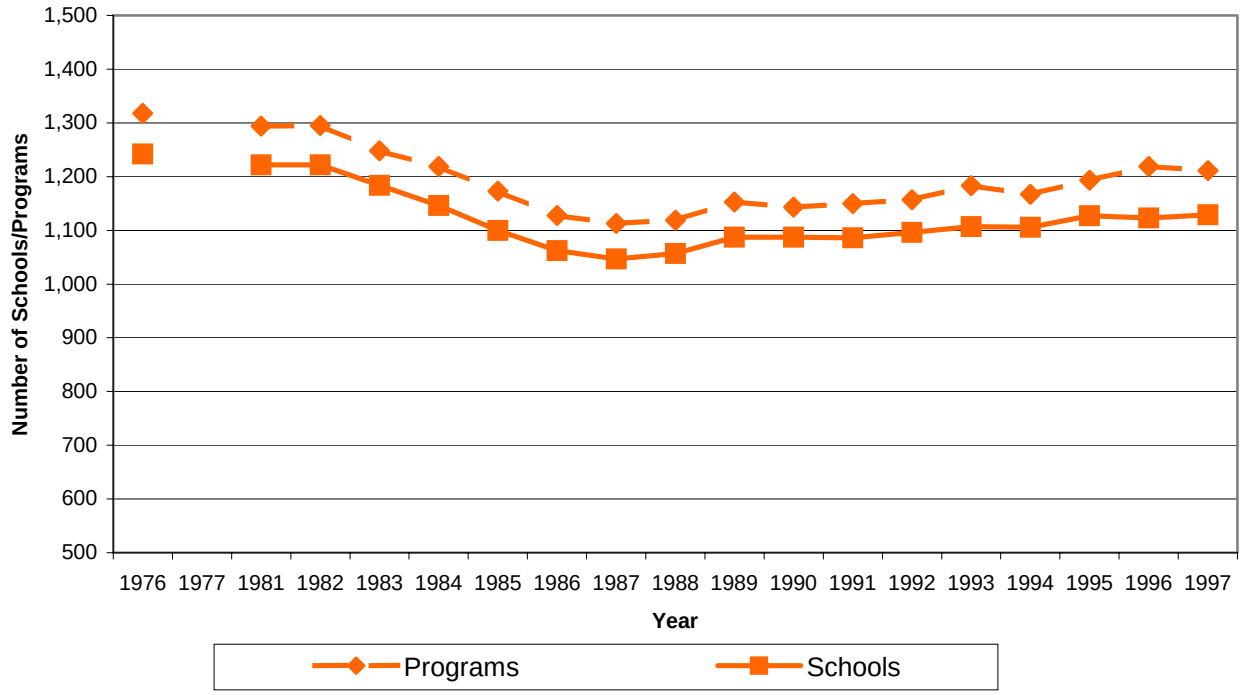
Figure 4.1: LPN Admissions, Enrollment, and Graduation Data for the U. S.



Source: Area Resource Training File (February 2003 Release), National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources & Services Administration, Department of Health & Human Services

Figure 4.2 illustrates the number of programs and schools in the U.S. over the years 1976 to 1997. Since the 1990s, the number of LPN programs has remained relatively stable. Thus, since 1994, there has been a decline in the number of students each program has enrolled and graduated.

Figure 4.2: Practical Nurse Programs and Schools in the U.S.



Source: Area Resource Training File (February 2003 Release), National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources & Services Administration, Department of Health & Human Services

Table 4.1 presents information about active licenses of both registered and practical nurses in the U.S. between 1987 and 2000. There has been a gradual increase in the number of active licenses of both registered and practical nurses since the late 1980s. Even though the number of new graduates has been declining since the early 1990s, the size of the LPN workforce has been rising. This suggests that the flow of LPNs out of the workforce is smaller than the inflow of new graduates, even though the inflow is dropping. The age distribution of LPNs is skewed toward older ages, and as these older LPNs retire greater numbers of new graduates will be needed to maintain the LPN supply.

Table 4.1: Total Number of Active RN & LPN Licenses, 1987-2000

Year	RN	LPN
1987	2,345,996	829,990
1988	2,404,968	841,441
1989	2,465,779	887,802
1990	2,501,996	844,044
1991	2,595,110	885,063
1992	2,608,422	881,584
1993	2,701,125	886,597
1994	2,892,720	912,585
1995-1996	2,956,425	908,207
1997	2,992,342	883,102

Year	RN	LPN
1998	3,054,215	919,240
1999	3,097,902	911,332
2000	3,103,981	902,154

Table 4.2 provides the number of LPNs who have taken the NCLEX-PN, and the percent passing the exam. The data are available from 1997 through 2000. Based on these data, in 1997 43,352 U.S.-educated LPN candidates took the examination for the first-time. This number is much larger than the 24,522 graduates reported that year in the Area Resource File. According to the user documentation for the Area Resource File (February, 2003 release) (Bureau of the Health Professions, 2003) the Area Resource File is likely to underState the number of graduates because some schools withheld data. We anticipate that the number of U.S.-educated LPN candidates taking the exam for the first time most accurately represents the number of graduates from LPN programs.

Table 4.2: Number of Candidates Taking NCLEX-PN® and Percent Passing, by Type of Candidate

Type of Candidate	1997		1998		1999		2000	
	# took exam	percent passed	# took exam	percent passed	# took exam	percent passed	# took exam	percent passed
First-Time, U.S.-Educated	43,351	88.6	40,195	87.2	37,372	86.4	35,572	85.1
Repeat, U.S.-Educated	6,082	43.5	6,947	43.5	7,378	42.4	7,712	41.6
First-Time, Foreign-Educated	1,572	49	1,406	47.9	1,357	47.2	1,306	44.2
Repeat, Foreign-Educated	1,657	24.9	1,688	22.9	1,779	19.7	1,687	20
Invalid Program Codes					93	61.3	95	66.3
TOTAL	52,662	80.2	50,236	77.9	47,979	75.9	46,351	74.3

Source: The NCLEX-RN® and NCLEX-PN® Examination Statistics Database, copyright 1996-2001 (http://www.ncsbn.org/)

Summary

Since the 1990s, the number of LPN programs has remained relatively stable but there has been a decline in number of graduates. Therefore, since 1994, there has been a decline in the number of students each program has enrolled and graduated. The total number of active licenses of LPNs increased slightly through the 1990s. This suggests that LPNs are remaining in the workforce or keeping their licenses active. The number of first time U.S. educated graduates who are taking the NCLEX-PN has dropped, but the percentage of those passing the examination has remained relatively consistent.

LPN educational curricular requirements vary among the States and territories. Most States specify the content and number of hours of training, some more detailed than others. However, most curricula teach similar basic nursing skills training, such as vital signs, patient data collection, patient care and comfort measures, and medication administration. Additionally,

most have added requirements for more advanced skills, such as IV infusion and IV medication administration. Even though requirements vary, endorsement of LPNs from one State to another is generally done smoothly. Therefore, the States recognize the similarities of the training programs, even though they have differences.

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Chapter 5: Factors Affecting the Supply of and Demand for LPNs

The labor market for licensed practical and vocational nurses consists of two components: the supply of LPNs and the demand for LPNs. Both supply and demand should be affected by the wage paid to LPNs. When wages rise, LPNs should find employment more attractive and increase their supply of labor. Conversely, higher wages increase the cost of hiring to employers and thus demand should decline. When there is a shortage or surplus of LPNs, wages should adjust to rectify the imbalance.

Numerous other factors can affect the supply of and demand for LPNs, however. The family circumstances of LPNs may prohibit them from working full-time, and regulatory requirements might lead to higher or lower demand for LPNs. This chapter examines the underlying supply of and demand for LPNs to identify the factors that affect LPNs' decisions to work and employers' demands for them.

The Supply of LPNs

A Conceptual Model of the LPN Supply

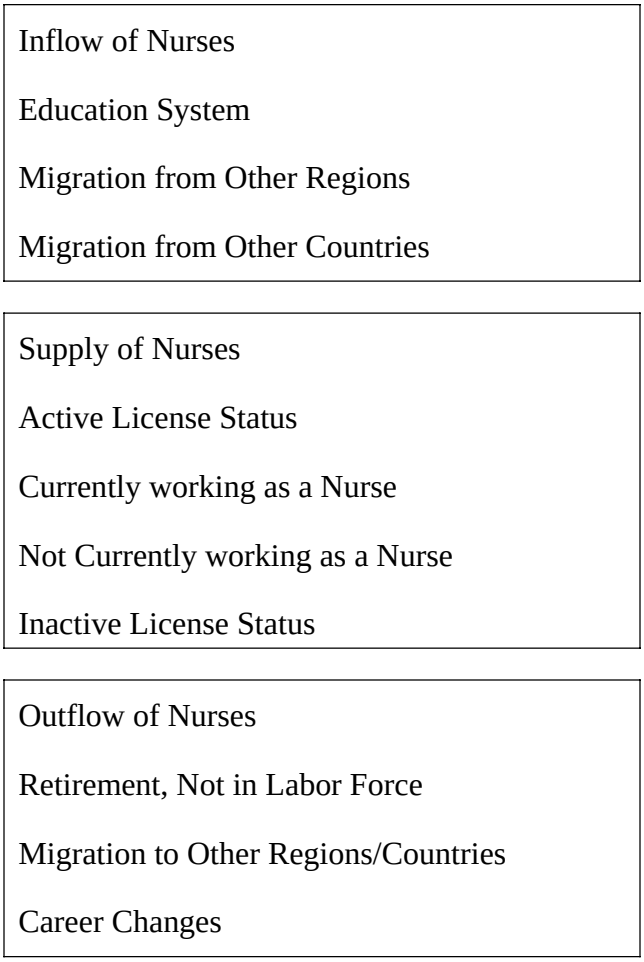
Labor markets for licensed nurses generally are not national in scope. In some geographic regions there are few employers and these employers may have a high degree of control over the local labor market. Other nursing labor markets are very competitive, with a plethora of employers. Because job opportunities for licensed nurses are plentiful at nearly all times, nurses usually do not need to relocate to find interesting and rewarding work.

The supply of nurses consists of nurses with active licenses. Some of these nurses are not working in nursing, but they are part of the current pool of nurses potentially available to work. The supply of nurses to a local labor market increases as nurses flow into the labor market by graduating from nursing programs, migrating from other regions, immigrating from other countries, or increasing hours worked. The supply of nurses declines with retirements, migration out of the region, decreasing hours worked, and career changes out of nursing. Figure 5.1 summarizes the labor flows in and out of the stock of licensed nurses.

The primary source of growth in the nursing workforce is graduations from nursing programs. These graduations generally stem from interest in the nursing profession. For the first part of the 20th century, licensed nursing was one of a few occupations widely open to women. Most women faced limited career choices, and nursing was an attractive option to women who were interested in science. As career opportunities expanded for women in the last quarter of the 20th century, however, nursing had to compete with numerous other attractive professions for new entrants. It has been suggested that women now are less likely to choose a traditionally female-dominated career such as nursing (Buerhaus, Staiger, & Auerbach, 2000). However, an annual survey of 350,000 first-year college students across the U.S. found that the percent of students planning on a career in nursing remained steady at five percent between 1966 and 1996 (Astin, 1998).

Regional and international migration of LPNs has not been measured in any data sources of which we are aware. The National Council of State Boards of Nursing does not maintain a national database of LPN licenses, and States do not link their licensure files so that LPNs can be tracked as they move from State to State. LPNs do not exist in most other countries, so international migration of LPNs is not an important source of new LPNs. This is reflected in the fact that relatively small and stable shares of LPNs are immigrants, as reported in Chapter 2. Some registered nurses educated in other Nations do not pass the RN licensing board examination when they immigrate and subsequently take the LPN licensing examination. To our knowledge, no source of data measures the extent to which this occurs.

Figure 5.9: Flows and Stock of Licensed Practical/Vocational Nurses



The outflow from the supply of LPNs consists of nurses who retire, choose to permanently leave the profession, or who migrate to other countries or regions. Unfortunately, there is no data with which one can examine any of these phenomena. If a LPN allows his or her State license to lapse, it is not possible to identify whether the LPN obtained a license elsewhere, and thus we do not know if the LPN has left the supply of nurses. LPNs who have active licenses but are not working are not identified in any national survey. National data such as that collected by the Bureau of Labor Statistics and Bureau of the Census identify LPNs by their current occupation, and thus very few LPNs who are not working are identified in these data.

Thus, little can be said about important components of the inflow and outflow of LPNs. The behavior of LPNs who are actively licensed and consider their current occupation to be that of LPN can be examined using the annual Current Population Survey conducted by the Bureau of Labor Statistics and the Bureau of the Census. Many characteristics of these LPNs are available from these surveys, and the factors that affect labor supply can be considered in depth.

Data for Supply Analyses

We use data from the 1994-2001 Current Population Survey (CPS) Outgoing Rotation Group (ORG) (U.S. Bureau of the Census, 2004) to analyze factors that influence the supply of licensed practical nurses. In order to identify licensed practical/vocational nurses in the Current Population Survey, we utilize the occupation codes. With these codes, we identified 4,736 LPNs in the 1994-2001 CPS ORG files. The resulting dataset used to estimate the supply of licensed practical nurses in the U.S. has 4,616 observations. This number does not match the total number of LPNs in the 1994-2001 CPS ORG files since we delete LPN observations that have extreme values (defined as over the 99th percentile) for the earnings and work hours variables used in our analysis.

Methods of Analysis

Economic theory suggests that an individual's work decision is a function of individual (demographic) characteristics, family characteristics, and labor market conditions. We use the Current Population Survey's demographic and labor force information on LPNs to create variables for our models of the supply of LPNs. The demographic variables in our models include the following: gender, age, educational attainment, race/ethnicity, and citizenship status. Family characteristics included in our analysis are marital status, number of kids in household by age category (e.g. number of kids aged 0 to 5 in same household as LPN), and household earnings (defined as the sum of weekly earnings of all household members minus the LPN's weekly earnings).

Labor market variables were generated using the geographic and earnings data in the CPS. We created dummy variables for each region in the United States (Northeast, Midwest, South, and West), and for the population size of the metropolitan statistical area in which LPNs in our sample reside. Also included is the percentage of licensed practical nurses unionized in the LPN's State of residence. The market wage for LPNs is an important labor market condition. We generate State-level market wages using hourly earnings from our sample of LPNs. Because we had small numbers of observations for some States, we used a complex method to determine markets wages. Each wage is based on 3 years of data, so the wage of a single year is the median of the wages of that year and the years immediately preceding and following that year. For example, the market wage for 1990 is the median of the wages for 1989, 1990, and 1991.

We then group LPN observations in each State based on whether they resided in a metropolitan statistical area (MSA). Those residing in an MSA are considered to be living in an urban area, while those not residing in an MSA are considered to be in a rural area. Using this information, we calculate urban and rural LPN wages for each State. Since sample sizes were small for several States, we decided that the market wage associated with each LPN would have to be calculated from at least 15 observations. We used the following algorithm to assign market wages: if LPN lives in an urban area in a State and the median urban wage for that State is

calculated from at least 15 observations, then the market wage is the median urban wage; otherwise, the market wage is the State-level median wage. Substituting "rural" for "urban" in the above algorithm explains the logic for assigning a market wage to LPNs residing in rural areas of a State. Thus, we have three potential market wages for each State, but only one is matched to each LPN in our sample.

Even though we assume market wages are exogenous in our labor supply equations, we cannot rule out the possibility that they are determined simultaneously with supply, thus potentially biasing our estimates. To address this concern, we use two-stage least squares regression as a specification check. This technique produces predicted values for wages after estimating a wage equation.[2] We then use these predicted wages in our labor supply regressions, and compare the results with those from the regressions in which market wages are used. As a third specification, we calculate wages for the LPNs in our sample who report being employed. The CPS has data on usual weekly earnings and usual weekly hours of work. We divide usual weekly earnings by usual weekly hours of work to obtain a measure of own wage for each LPN in our sample who reports being employed. We then estimate the supply equations using own wages for working LPNs and predicted wages for non-working LPNs. Thus, we run three regressions for each supply model, each with a different measure of wage.

We focused on three outcome measures in our analysis: (1) the probability of working (labor participation), (2) the probability of working full-time, defined as usually works 30 or more hours per week, and (3) usual hours of work per week. We model each of these to examine the factors that affect the supply of licensed practical nurses. Appendix E1 reports the means of the variables in the dataset used to estimate the supply of LPNs. We discuss trends in the variables here.

Several of the demographic variables show an upward trend in their mean values during our sample time period. These variables include age, and the proportion of LPNs who are black, Native American, have completed some college, and hold an AA degree. Those with a downward trend are the proportion of LPNs who are white and the percent that have no more than a high school education. These trends were discussed in detail in Chapter 2.

The data show an increase in the percent of LPNs holding more than one job, usual hours worked per week, and usual weekly earnings before deductions. Notably, the means of our wage variables follow a similar pattern over our sample time period. They decrease until 1997 and then climb to near their 1994 values by 2001. Most of the market characteristics in the dataset exhibit a trend in their mean values. Union representation/coverage of LPNs decreased, as did the share of LPNs residing in the Northeast and West, and the percent living in metropolitan areas with a population of 500,000 to 2.5 million. The percent of LPNs in our sample that live in the South increased between 1994 and 2001, as did the proportion residing in rural areas.

[2] The explanatory variables in the wage equation are dummy variables for male, citizenship status, highest education attained, race, work setting, type of employer, region, city size, and year in sample, as well as age, age squared, and the percentage of licensed practical nurses unionized in state of residence. The average manufacturing wage and number of physicians per 100,000 people in the LPN's state of residence serve as instrumental variables.

LPNs in our sample also increasingly worked for private employers, in personnel supply services, and the offices of physicians. The share working for government and the percent who are self-employed declined during our sample time period. The only family characteristic exhibiting a trend during our sample time period is household earnings, which increased between 1994 and 2001.

Factors That Affect the Employment of LPNs

Table 5.1 presents the estimated coefficients and marginal effects from probit regression equations of the likelihood of a LPN being employed using the Current Population Survey data for 1994 through 2001. The marginal effect measures the increase in probability resulting from increases in the explanatory variable in the regression equation. For example, the marginal effect of living in the Midwest is 0.016. The explanatory variable has a value of 1 if an LPN lives in the Midwest and 0 otherwise. Thus, living in the Midwest increases the probability of being employed 1.6 percentage points, which is the product of the marginal effect and the change in the explanatory variable. In the regression equation tables, the statistical significance of the coefficients is indicated. We focus our discussion on explanatory variables that are significant with a p-value of 0.05, meaning there is a 5 percent chance that the identified relationship is spurious.

The first three columns in Table 5.1 report the estimated coefficients, robust standard errors, and marginal effects for the regression in which market wages are included as an explanatory variable. The next three columns report estimates for the two-stage least squares model in which predicted wages are used, and the final three columns report results from the regression in which the wage is defined separately, as described above, for working and non-working LPNs. From this point forward, we refer to this last measure of wage as "own wage."

The results from the probit regression with market wages as an independent variable are quite similar to the results from the two-stage least squares regression in which predicted wages are used to estimate the supply model. The probit regression in which own wages are used produce surprising results, especially concerning the effect of wage.

Though not statistically significant, the estimated coefficients on market wage and predicted wage and their squared values have the expected sign. However, when estimating the model using own wages, we find a negative and statistically significant coefficient on wage. The marginal effect implies that a one-dollar increase in wage *decreases* the likelihood of a LPN being employed by 1.4 percentage points. Furthermore, the wage-squared coefficient is positive and statistically significant, implying that as the wage increases beyond a certain point, LPNs are more likely to work. This result is opposite the pattern found in many studies of labor supply. The likelihood of employment typically rises with wage at nearly all wage levels. It is important to note that the LPNs in our sample have very high labor participation rates, ranging from 92 percent to 96 percent during our sample time period of 1994-2001. Thus, there is little variation in our outcome variable, and this may affect our regression results. Nevertheless, several of the coefficients of the remaining explanatory variables across all three specifications of our model are in agreement with economic theory.

Demographic characteristics are important predictors of employment of LPNs. The likelihood of working initially increases with age, by 0.1 to 0.4 percentage points, and then

decreases as indicated by the coefficients on age squared. The inflection points calculated from the marginal effects indicate that LPNs are less likely to work after age 38 (first specification), 40 (second specification), or 50 (third specification). Native American LPNs are 2.5 to 7.6 percentage points less likely to be working than white LPNs. Black LPNs also are less likely to be employed, although the degree of statistical significance is lower in two of the specifications. In contrast, Asian LPNs are more likely to be working, although this result is only statistically significant at a higher p-value. LPNs who are US citizens by naturalization are 0.6 to 3.4 percentage points less likely to be employed than are US-born LPNs. In the regression with market wage as an independent variable, LPNs who are not U.S. citizens also are less likely to be employed.

Family characteristics do not appear to be strong predictors of labor force participation. In all three specifications of the model, only household earnings have a statistically significant relationship with the likelihood of working for LPNs. LPNs are less likely to work as the earnings of other household members (such as the LPN's spouse/partner) increase. However, the marginal effects are practically zero.

Table 5.1: Probit Results for Probability of Working

	(1)			(2)			(3)		
	Market Wages			Predicted Wages			Own Wages if Working, Else Predicted Wages		
Independent Variables	**Coefficient**	**SE**	**Marginal Effect**	**Coefficient**	**SE**	**Marginal Effect**	**Coefficient**	**SE**	**Marginal Effect**
Wage	0.267	(0.255)	0.014	0.303	(0.426)	0.015	-2.220**	(0.341)	-0.014
Wage Squared	-0.010	(0.009)	-0.0005	-0.014	(0.016)	-0.001	0.080**	(0.013)	0.001
Demographic Variables									
Male	-0.034	(0.177)	-0.002	0.030	(0.189)	0.001	-0.040	(0.186)	-0.0003
Age	0.069**	(0.022)	0.003	0.079**	(0.028)	0.004	0.096**	(0.025)	0.001
Age Squared	-0.001**	(0.000)	-0.00004	-0.001**	(0.000)	-0.00005	-0.001**	(0.000)	-0.00001
Some College	0.188*	(0.111)	0.009	0.207*	(0.112)	0.010	0.187	(0.121)	0.001
AA Degree	0.160	(0.108)	0.008	0.188*	(0.110)	0.009	0.145	(0.117)	0.001
Bachelor, Master, PhD, or Professional School Degree	0.131	(0.191)	0.006	0.198	(0.204)	0.008	0.090	(0.207)	0.001
Black	-0.192*	(0.111)	-0.011	-0.189*	(0.111)	-0.011	-0.244**	(0.118)	-0.002
Hispanic	-0.160	(0.202)	-0.009	-0.172	(0.201)	-0.010	-0.209	(0.219)	-0.002
Native American	-0.690**	(0.277)	-0.068	-0.738**	(0.287)	-0.076	-0.945**	(0.305)	-0.025
Asian	0.639*	(0.361)	0.018	0.655*	(0.360)	0.018	0.677*	(0.370)	0.002
Not a U.S. Citizen	-0.383**	(0.238)	-0.028	-0.436*	(0.245)	-0.033	-0.396	(0.261)	-0.005
Citizen by Naturalization	-0.438**	(0.208)	-0.034	-0.422**	(0.209)	-0.032	-0.476**	(0.228)	-0.006
Family Characteristics									
Weekly Earnings of All Household Members Except Nurse	-0.0004**	(0.000)	-0.00002	-0.0004**	(0.000)	-0.00002	-0.0005**	(0.000)	-0.000003
Married	0.005	(0.132)	0.0002	0.011	(0.131)	0.001	0.018	(0.140)	0.0001
Previously Married	0.104	(0.153)	0.005	0.106	(0.151)	0.005	0.093	(0.166)	0.001
No. of Kids Aged 0-5 in Household	-0.051	(0.074)	-0.003	-0.054	(0.073)	-0.003	-0.039	(0.082)	-0.0003
No. of Kids Aged 6-12 in Household	-0.055	(0.057)	-0.003	-0.057	(0.056)	-0.003	-0.075	(0.060)	-0.0005
No. of Kids Aged 13-17 in Household	0.015	(0.069)	0.001	0.010	(0.069)	0.001	-0.017	(0.078)	-0.0001
Market Characteristics									
Northeast	0.217	(0.136)	0.010	0.240*	(0.136)	0.011	0.243*	(0.143)	0.001
Midwest	0.370**	(0.139)	0.016	0.347**	(0.145)	0.015	0.410**	(0.146)	0.002
South	0.149	(0.127)	0.007	0.100	(0.137)	0.005	0.152	(0.125)	0.001
MSA Population 100,000-499,999	-0.038	(0.132)	-0.002	0.009	(0.133)	0.0004	0.023	(0.138)	0.0001
MSA Population 500,000-999,999	0.093	(0.170)	0.004	0.150	(0.179)	0.007	0.225	(0.183)	0.001
MSA Population 1,000,000-2,499,999	-0.138	(0.137)	-0.008	-0.061	(0.150)	-0.003	-0.029	(0.140)	-0.0002
MSA Population 2,500,000+	-0.016	(0.140)	-0.001	0.153	(0.187)	0.007	-0.015	(0.132)	-0.0001
Year Dummy Variables									
1995	0.172	(0.149)	0.008	0.176	(0.150)	0.008	0.198	(0.162)	0.001

	(1)			(2)			(3)		
	Market Wages			Predicted Wages			Own Wages if Working, Else Predicted Wages		
Independent Variables	**Coefficient**	**SE**	**Marginal Effect**	**Coefficient**	**SE**	**Marginal Effect**	**Coefficient**	**SE**	**Marginal Effect**
1996	0.235	(0.167)	0.010	0.183	(0.176)	0.008	0.207	(0.181)	0.001
1997	-0.029	(0.148)	-0.001	-0.100	(0.163)	-0.005	-0.110	(0.162)	-0.001
1998	0.014	(0.151)	0.001	-0.019	(0.156)	-0.001	-0.031	(0.167)	-0.0002
1999	0.258	(0.175)	0.011	0.258	(0.174)	0.011	0.248	(0.190)	0.001
2000	0.103	(0.154)	0.005	0.076	(0.155)	0.004	0.125	(0.171)	0.001
2001	0.142	(0.157)	0.006	0.146	(0.156)	0.007	0.156	(0.167)	0.001
Log-likelihood	-529.04			-528.69			-472.19		
N	4,478			4,478			4,478		

**p < 0.10 **p < 0.05 Notes: (1) dependent variable equals one if employed, and equals zero otherwise; (2) all regressions include a constant; and (3) standard errors are estimated using the "robust" option in Stata.*

Source: Current Population Survey Outgoing Rotation Group Files, 1994-2001

The labor market in which the LPN resides affects employment opportunities, and cultural differences across regions also may affect the likelihood of working. As compared to LPNs living in the West, Midwest LPNs are 0.2 to 1.6 percentage points more likely to work.

It is important to note that LPNs are identified by their self-reported occupation, and thus LPNs who are not working in nursing may not identify themselves as LPNs. The CPS data thus likely overstate the probability of employment, and regression equations estimated for a broader sample of LPNs might produce different results

The Hours Worked by LPNs

Once an individual decides to work, a decision must be made about the extent to which to work. Employees can work part-time or full-time, and the number of hours per week they work can vary. Personal, family, and labor market characteristics affect the decision of how much to work. To explore these relationships, we estimate regression equations similar to those estimated for whether a LPN is working. Table 5.2 presents probit regression equations for the probability of a LPN working full time (i.e., 30 or more hours per week). Again we run three regressions, each with a different measure of wage. The first specification, using market wages as an explanatory variable, is restricted to LPNs who report working, and thus the regression results only apply to the population of working LPNs. The remaining specifications use the full sample of LPNs. Despite differences in how we define the wage variable (and, thus, the wage-squared variable) in each of the three specifications of the model, the regression results are similar.

In all three specifications, the estimated coefficient on wage is positive. It also is statistically significant except in the regression using predicted wages as an independent variable for all observations. For the sample of working LPNs (specification (1)), a one-dollar increase in the market wage increases the likelihood of working full-time 6.8 percentage points. In specification (3), a one-dollar increase in own wage increases the likelihood of full-time employment 2.6 percentage points.

Table 5.2: Probit Results for Probability of Working Full-Time

	(1)			(2)			(3)		
	Market Wages			Predicted Wages			Own Wages if Working, Else Predicted Wages		
Independent Variables	**Coefficient**	**SE**	**Marginal Effect**	**Coefficient**	**SE**	**Marginal Effect**	**Coefficient**	**SE**	**Marginal Effect**
Wage	0.356**	(0.162)	0.068	0.429	(0.299)	0.080	0.142**	(0.024)	0.026
Wage Squared	-0.013**	(0.006)	-0.003	-0.016	(0.011)	-0.003	-0.005**	(0.001)	-0.001
Demographic Variables									
Male	0.496**	(0.160)	0.071	0.505**	(0.161)	0.070	0.538**	(0.161)	0.072
Age	0.091**	(0.015)	0.017	0.081**	(0.018)	0.015	0.082**	(0.016)	0.015
Age Squared	-0.001**	(0.000)	-0.0002	-0.001**	(0.000)	-0.0002	-0.001**	(0.000)	-0.0002
Some College	-0.192**	(0.073)	-0.038	-0.209**	(0.074)	-0.041	-0.214**	(0.073)	-0.041
AA Degree	-0.012	(0.072)	-0.002	-0.033	(0.073)	-0.006	-0.039	(0.072)	-0.007
Bachelor, Master, PhD, or Professional School Degree	0.018	(0.135)	0.003	0.016	(0.141)	0.003	0.018	(0.138)	0.003
Black	0.202**	(0.087)	0.035	0.217**	(0.086)	0.037	0.217**	(0.087)	0.036
Hispanic	-0.097	(0.152)	-0.020	-0.084	(0.151)	-0.017	-0.047	(0.154)	-0.009
Native American	-0.249	(0.251)	-0.055	-0.187	(0.246)	-0.039	-0.217	(0.238)	-0.045
Asian	-0.007	(0.251)	-0.001	-0.068	(0.247)	-0.013	-0.029	(0.235)	-0.005
Not a U.S. Citizen	0.308	(0.243)	0.049	0.326	(0.240)	0.050	0.305	(0.236)	0.047
Citizen by Naturalization	0.680**	(0.215)	0.085	0.715**	(0.211)	0.086	0.690**	(0.203)	0.083
Family Characteristics									
Weekly Earnings of All Household Members Except Nurse	-0.0001*	(0.000)	-0.00002	-0.0001	(0.000)	-0.00001	-0.00004	(0.000)	-0.00001
Married	-0.424**	(0.097)	-0.076	-0.421**	(0.096)	-0.073	-0.444**	(0.096)	-0.076
Previously Married	0.019	(0.110)	0.004	0.020	(0.109)	0.004	0.006	(0.110)	0.001
No. of Kids Aged 0-5 in Household	-0.128**	(0.047)	-0.024	-0.123**	(0.046)	-0.023	-0.111**	(0.046)	-0.020
No. of Kids Aged 6-12 in Household	-0.139**	(0.034)	-0.026	-0.133**	(0.034)	-0.025	-0.129**	(0.034)	-0.024
No. of Kids Aged 13-17 in Household	-0.119**	(0.040)	-0.023	-0.119**	(0.039)	-0.022	-0.112**	(0.039)	-0.021
Market Characteristics									
Northeast	-0.137	(0.086)	-0.027	-0.146*	(0.086)	-0.029	-0.150*	(0.086)	-0.029
Midwest	-0.004	(0.083)	-0.001	0.004	(0.085)	0.001	0.001	(0.082)	0.000
South	0.271**	(0.089)	0.049	0.290**	(0.093)	0.051	0.260**	(0.085)	0.045
MSA Population 100,000-499,999	-0.236**	(0.081)	-0.050	-0.228**	(0.082)	-0.047	-0.210**	(0.079)	-0.042
MSA Population 500,000-999,999	-0.189*	(0.099)	-0.039	-0.189*	(0.099)	-0.039	-0.184*	(0.096)	-0.037
MSA Population 1,000,000-2,499,999	-0.142	(0.094)	-0.029	-0.149	(0.098)	-0.030	-0.143	(0.089)	-0.028
MSA Population 2,500,000+	-0.084	(0.087)	-0.017	-0.071	(0.115)	-0.014	-0.060	(0.082)	-0.011
Year Dummy Variables									
1995	-0.016	(0.093)	-0.003	-0.010	(0.092)	-0.002	-0.002	(0.093)	0.000

	(1)			(2)			(3)		
	Market Wages			Predicted Wages			Own Wages if Working, Else Predicted Wages		
Independent Variables	**Coefficient**	**SE**	**Marginal Effect**	**Coefficient**	**SE**	**Marginal Effect**	**Coefficient**	**SE**	**Marginal Effect**
1996	0.037	(0.101)	0.007	0.038	(0.104)	0.007	0.021	(0.100)	0.004
1997	0.059	(0.100)	0.011	0.076	(0.109)	0.014	0.052	(0.100)	0.009
1998	0.058	(0.101)	0.011	0.064	(0.103)	0.012	0.069	(0.100)	0.012
1999	0.195*	(0.106)	0.034	0.187*	(0.105)	0.032	0.180	(0.106)	0.030
2000	0.118	(0.102)	0.021	0.120	(0.103)	0.021	0.106	(0.102)	0.019
2001	0.214**	(0.104)	0.037	0.209**	(0.103)	0.035	0.189*	(0.104)	0.032
Log-likelihood	-1558.87			-1581.61			-1554.77		
N	4,351			4,478			4,478		

**p < 0.10 **p < 0.05*

Source: Current Population Survey Outgoing Rotation Group Files, 1994-2001

Notes: (1) dependent variable equals one if usually works 30+ hours per week, and equals zero otherwise; (2) in column one, sample is restricted to licensed practical/vocational nurses who reported being employed; (3) all regressions include a constant; and (4) standard errors are estimated using the "robust" option in Stata.

To check for the possibility of backward-bending supply, we included wage-squared as an independent variable. The estimated coefficients are negative in all three specifications, and statistically significant in the regressions with market wages and own wages. The negative coefficients across the three specifications provide evidence that the labor supply of LPNs is backward bending, indicating that after a point, further wage increases reduce the likelihood of working full-time. A possible explanation is that LPNs want to earn a target income, and as wages rise they need to work fewer hours to reach this target.

Demographic characteristics are important predictors of whether LPNs work full-time. Notably, the same demographic variables have statistically significant coefficients regardless of how we define wages. Furthermore, there is very little difference in the marginal effects. For example, black LPNs are 3.5 to 3.7 percentage points more likely to work full-time than are white LPNs. Male LPNs are 7.0 to 7.2 percentage points more likely than females, and LPNs who are naturalized citizens are 8.3 to 8.6 percentage points more likely than U.S.-born LPNs. LPNs with some college education but no degree are less likely to work full-time than LPNs who have never attended college. Finally, LPNs are more likely to work full-time until their late thirties or early forties, after which time age has a negative association with the likelihood of working full-time.

Family characteristics also are important factors for LPNs in deciding whether to work full-time. As the earnings of other members of the household increase, the likelihood of a LPN working full-time decreases. However the estimated coefficients in all three specifications are small in magnitude and only the coefficient in the regression with market wages is statistically significant. All three specifications of the model indicate that married LPNs are less likely to work full-time than are LPNs who have never been married. As expected, the presence of children in the household is negatively associated with full-time work. The results are similar for each age category and suggest that each child under the age of 18 reduces the likelihood of a LPN working full-time by approximately two percentage points.

Several market characteristics affect the probability of a LPN working full-time. LPNs residing in the South are 4.5 to 5.1 percentage points more likely to work full-time than are LPNs in the Western region of the U.S. The results for all three specifications of the model also indicate that LPNs residing in urban areas with a population between 100,000 and 499,999 are less likely to work full-time than those residing in less populated areas. Finally, compared to the beginning of the sample time period, LPNs in 2001 were more likely to work full-time.

Table 5.3 presents regression equations for the usual number of hours worked per week in the past year. As before, we run three regressions, each with a different measure of wage. When market wages are used, the sample is restricted to LPNs who report being employed. Otherwise, the full sample of working and non-working LPNs is used.

The regression results are remarkably similar; however, there are key differences centered on the coefficients for wage. In the specifications (1) and (2), wage is positively associated with hours of work. However, this result is only statistically significant when we correct for the potential endogeneity of wages. In this case, the estimated coefficient implies that LPNs on average work an additional 3.2 hours per week for each dollar increase in wage. In specification (3), the coefficient on own wage is negative, but statistically insignificant. Again, we find evidence of a backward bending supply curve. In all three specifications, the estimated coefficient on wage squared is negative and statistically significant, albeit at a higher p-value.

Male LPNs work more hours per week than do women, and black LPNs work more hours than white LPNs. The number of hours worked increases with age until age 39 (37 in specification (3)) after which time age has a negative relationship with hours worked per week. LPNs who are citizens by naturalization work an average of 2.5 to 2.6 hours per week more than do US-born LPNs.

Family characteristics affect the number of hours worked per week in ways that are consistent with the regression equations that examine full-time versus part-time work. Married LPNs work approximately 2.2 fewer hours per week than do unmarried LPNs. Children also reduce hours worked per week, with the effect being largest for children younger than thirteen. The earnings of other members of a LPN's household are negatively associated with hours worked per week, but in all specifications the size of the coefficient is so small as to be negligible.

The average number of hours worked per week varies across regions of the United States. Southern LPNs work 1.2 to 1.4 hours per week more than do LPNs in Western States, and LPNs living in the Northeast work fewer hours.

The Demand for LPNs

The demand for licensed nurses is derived from the demand for health care, and is affected by a variety of factors, including the general population's demographics and health, new medical treatments, health care payment systems, and health care regulations. Health care providers rely on licensed nurses to provide the majority of direct patient care. Registered nurses assess patients, develop plans for their care, perform tests, provide medical treatments, plan for

patients' discharges, teach patients and their families how to provide ongoing care, and keep detailed records of all these activities. Licensed practical and vocational nurses assist in patient assessments and the development of care plans, provide medications to patients, start intravenous fluids, obtain blood samples, and participate in numerous other components of patient care. Without licensed nurses, many health care providers could not care for patients.

Table 5.3: Regression Results for Usual Hours Worked Per Week

	(1)		(2)		(3)	
	Market Wages		Predicted Wages		Own Wages if Working, Else Predicted Wages	
Independent Variables	**Coefficient**	**SE**	**Coefficient**	**SE**	**Coefficient**	**SE**
Wage	1.379	(0.928)	3.198*	(1.805)	-0.003	(0.183)
Wage Squared	-0.057*	(0.033)	-0.127*	(0.066)	-0.010*	(0.006)
Demographic Variables						
Male	3.076**	(0.615)	3.303**	(0.641)	3.345**	(0.599)
Age	0.624**	(0.102)	0.625**	(0.116)	0.667**	(0.104)
Age Squared	-0.008**	(0.001)	-0.008**	(0.001)	-0.009**	(0.001)
Some College	-0.495	(0.382)	-0.490	(0.384)	-0.504	(0.377)
AA Degree	0.364	(0.359)	0.381	(0.365)	0.362	(0.355)
Bachelor, Master, PhD, or Professional School Degree	0.872	(0.601)	1.135*	(0.636)	1.096*	(0.607)
Black	1.212**	(0.382)	1.208**	(0.381)	1.220**	(0.377)
Hispanic	-0.580	(0.616)	-0.654	(0.615)	-0.576	(0.606)
Native American	0.091	(1.469)	0.036	(1.463)	-0.210	(1.454)
Asian	0.904	(1.154)	0.802	(1.149)	0.788	(1.085)
Not a U.S. Citizen	0.476	(0.922)	0.218	(0.944)	0.300	(0.893)
Citizen by Naturalization	2.513**	(0.816)	2.610**	(0.807)	2.487**	(0.782)
Family Characteristics						
Weekly Earnings of All Household Members Except Nurse	-0.0005*	(0.000)	-0.0005*	(0.000)	-0.0004	(0.000)
Married	-2.203**	(0.420)	-2.179**	(0.421)	-2.170**	(0.410)
Previously Married	0.381	(0.452)	0.389	(0.452)	0.392	(0.443)
No. of Kids Aged 0-5 in Household	-0.824**	(0.282)	-0.821**	(0.282)	-0.738**	(0.276)
No. of Kids Aged 6-12 in Household	-0.877**	(0.204)	-0.886**	(0.205)	-0.845**	(0.203)
No. of Kids Aged 13-17 in Household	-0.453**	(0.230)	-0.443*	(0.231)	-0.490**	(0.228)
Market Characteristics						
Percentage of LPNs Unionized in State	-0.262	(1.054)	-0.199	(1.051)	-0.174	(1.047)
Northeast	-0.909*	(0.488)	-0.828*	(0.492)	-0.877*	(0.484)
Midwest	-0.594	(0.484)	-0.466	(0.494)	-0.542	(0.464)
South	1.212**	(0.480)	1.364**	(0.501)	1.235**	(0.454)
MSA Population 100,000-499,999	-0.497	(0.452)	-0.506	(0.462)	-0.399	(0.437)
MSA Population 500,000-999,999	-0.698	(0.547)	-0.691	(0.547)	-0.598	(0.529)
MSA Population 1,000,000-2,499,999	-0.206	(0.487)	-0.224	(0.512)	-0.144	(0.466)
MSA Population 2,500,000+	-0.061	(0.450)	0.269	(0.597)	0.175	(0.416)
Year Dummy Variables						
1995	-0.166	(0.476)	-0.116	(0.478)	-0.097	(0.476)
1996	0.453	(0.527)	0.451	(0.553)	0.361	(0.522)
1997	0.637	(0.538)	0.599	(0.585)	0.452	(0.531)
1998	0.422	(0.539)	0.437	(0.549)	0.383	(0.532)
1999	0.578	(0.492)	0.613	(0.497)	0.564	(0.490)
2000	0.837	(0.524)	0.816	(0.533)	0.763	(0.522)
2001	0.916*	(0.506)	0.987*	(0.505)	0.894*	(0.501)
R-squared	0.0843		0.0836		0.1026	
N	4,002		4,002		4,002	

**p < 0.10 **p < 0.05*

Source: Current Population Survey Outgoing Rotation Group Files, 1994-2001

Notes: (1) in the first column, the sample is restricted to nurses who reported being employed; (2) standard errors (in parentheses) are estimated using the "robust" option in Stata; and (3) all regressions include a constant.

The dominant employer of licensed nurses is the hospital industry, although RNs are more likely to work in hospitals than are LPNs. As the number of patients and patient days in hospitals rise, demand for RNs and LPNs rises (Spetz, 1999). The increasing acuity of illness of patients in the hospital makes RNs particularly important to hospital care, as does the diffusion of high-technology medical services in hospitals (Spetz, 1999). LPNs are generally restricted from giving patients medications through intravenous lines (IVs), administering blood products, and providing other types of care that are critical in the hospital setting. These restrictions reduce the usefulness of LPNs to hospitals.

A high share of LPNs work in nursing homes and long-term care facilities; relatively fewer RNs work in this setting. Patients in nursing homes generally do not receive complex treatments such as IV medication therapy, and thus much of the patient care in nursing homes can be provided by LPNs and unlicensed nursing personnel. LPNs assist in the ongoing assessment of nursing home patients and the administration of oral medications. In this section we use hospital and nursing home data to examine the demand for LPNs by these employers.

Data for the Analysis of Hospital Demand

To analyze the demand for licensed practical/vocational nurses in general acute care hospitals, we use 1990-2000 data from the American Hospital Association (AHA) Annual Survey of Hospitals. This database contains hospital-level information on organizational structure; facilities and services; community orientation; total beds, utilization, finances, and staffing; and location and other geographic codes. The AHA surveys all hospitals in the United States and the response rate averages 85 to 95 percent annually (American Hospital Association, 1999). Thus, in any year, the AHA Annual Survey Database has around 6,000 hospital observations.

The AHA Annual Survey asks hospitals to report full-time and part-time personnel for the total facility and for specific types of personnel, including registered nurses and licensed practical/vocational nurses. The survey specifically defines full-time as working 35 hours or more per week, and part-time as working less than 35 hours per week (American Hospital Association, 1999). The staffing figures reported by the hospitals are then converted by the AHA into full-time equivalent (FTE) measures. According to the AHA, full-time equivalent figures are calculated by adding the number of full-time personnel to half the number of part-time personnel (American Hospital Association, 1999). We use full-time equivalent LPN employment as our measure of LPN staffing for short-term, general acute care hospitals. However, we should note that this measure potentially overestimates or underestimates the use of LPNs by hospitals. For example, a nurse who works 20 hours per week and one who works 34 hours per week each would be counted as one-half of an FTE. Similarly, a nurse who works 35 hours per week and one who works 40 hours per week would each count as one FTE.

We model hospital demand for LPNs as a function of hospital, patient, and market characteristics. This model is similar to that used in previous studies of the demand for nurses (Spetz, 1999). We construct hospital characteristic variables using data from the AHA. We measure the quantity of care provided by each hospital in our sample as the number of patient days. Also included in our model are Medicare's share of total patient days, and the hospital's service mix. Our measure of service mix is the Saidin technology index (Spetz and Maiuro,

2004). The Saidin index provides a measure of the degree of technology available at hospitals by weighting each potential service and calculating the sum of weighted services available at each hospital. The more rare the technology used by a hospital, the higher the weight it receives (Spetz & Maiuro, 2004).

Patient characteristics in our demand model are the average length of stay (available from the AHA data) and the hospital's case mix index from Medicare files (available from the Center for Medicare & Medicaid Services). Both measures control for changes in patient volume, but the case mix index also controls for variation in the complexity or severity of cases treated by hospitals.

We use data from the 1989-2001 Current Population Survey Outgoing Rotation files and the Bureau of Health Professions Area Resource File (ARF) (Bureau of the Health Professions, 2003) to create market-level variables. The CPS contains union status information and we use this to create variables denoting the percentage of LPNs, RNs, and all workers in a given State who are covered by or a member of a union. We calculate market wages for registered nurses, licensed practical nurses, and nurse aides using earnings data from the CPS ORG files. The market wages are median values calculated from 3 years of data. For example, 1990 LPN market wages are based on hourly earnings reported by LPNs in 1989, 1990, and 1991. Furthermore, we calculate these at both the State level and for urban and rural areas within a State. Thus, for each nurse type, we have with three potential market wages per State. We attach an LPN, RN, and nurse aide market wage to each hospital observation in our sample depending on the number of observations used in creating the respective market wage. If the rural or urban wage for a given State was calculated from less than 15 observations, then we assign the State-level wage to the hospital. Otherwise, we assign the rural wage if the hospital is in a rural area or the urban wage if the hospital is in an urban area. In the end, each hospital observation in our sample is matched to three market wages, one for each type of nurse.

We also include managed care variables in our demand model, which were generously provided by Douglas R. Wholey of the University of Minnesota. Managed care activity is measured with two variables: the number of HMOs operating in the county and HMO penetration. We also create a variable interacting these two measures of the managed care environment, and include this in our analysis (Wholey, Christianson, Engberg, & Bryce, 1997). County-level per capita income also is included in the model, and was obtained from the Area Resource File. Finally, we include the two State-level scope of practice variables described in Chapter 3 in some equations.

We estimated our demand equations including several other variables from the ARF, such as physicians per 1,000 population and the share of population estimated to be aged 65 and over; however, we do not report the results of these regressions because these variables had no statistically significant relationship with our dependent variable, nor did their inclusion affect any other coefficients. Our dataset for estimating hospital demand for licensed practical nurses contains 54,258 hospital observations over our sample time period from 1990 to 2000.

As shown in Appendix E2, the average number of full-time equivalent LPNs in our sample of hospitals declined between 1990 and 2000. In contrast, the mean number of full-time

equivalent RNs increased. As a result of these trends, the ratio of LPNs to all licensed nurses declined during our sample time period.

All of the variables denoting hospital and patient characteristics exhibit trends in their mean values. The average number of inpatient days and length of stay declined between 1990 and 2000. Medicaid's share of inpatient days increased, however, as did the service mix and the severity of cases treated in our sample of hospitals.

Market wages for LPNs, RNs, and nurse aides were higher on average in 2000 compared to 1990. However, the data do not show a continuous upward trend during our sample time period. RN and LPN market wages increased between 1990 and 1994, and then declined during the mid-1990s. In contrast, market wages for nurse aides declined during the first half of our sample time period, and then increased between 1994 and 2000.

Other market characteristics in our dataset also exhibit trends. The degree of HMO penetration increased between 1990 and 2000, as did the average number of HMOs operating in a county. In addition, the average per capita income in the hospitals' counties increased during our sample time period.

Methods for Analyzing Hospital Demand for LPNs

In our hospital demand analysis, our dependent variable is the log of the number of full-time equivalent LPNs. We also log several of our independent variables to normalize their distributions. Thus, our demand equation is log-linear in form. Each regression includes dummy variables for each year in our sample. We estimate robust standard errors using the "cluster" command in Stata because it is possible that observations within a State may not be independent (StataCorp, 2003).

We use several estimation methods in our demand analysis. This is motivated by two concerns. One is that there could be some unknown factor inherent to each hospital that affects its demand for licensed practical nurses. If this is the case, ordinary least squares (OLS) estimates will be inefficient. To address this possibility, we estimate fixed effects models to allow for individual hospital effects.

Another concern is the potential endogeniety of LPN wages[1]. If wages are endogenous in the demand equation, then OLS estimates will be inconsistent. Thus, we also estimate our demand equation using the instrumental variable procedure in Stata (StataCorp, 2003). To use this procedure, we have to find variables that are correlated with wages, but not correlated with the error term in our demand equation. County unemployment rates, obtained from the Area Resource File, have been used as an instrument for nurse wages in other studies (Spetz, 1999). As unemployment rates rise, spouses are more likely to be unemployed, and thus the nurse is more likely to work. We also try two other instruments: the average age of LPNs in the

[1] We assume that the market wages for registered nurses and nurse aides are exogenous in our model of hospital demand for licensed practical nurses. While individual hospitals' wages to nurses may indeed be simultaneously determined with demand, market wages should not be influenced significantly by any single hospital's demand for LPNs.

hospital's market area[2], and the percent of all workers unionized within the State. We estimate first-stage regressions for LPN wages including these instruments as explanatory variables, and consistently find that the estimated coefficients on all but the county-level unemployment rates are highly significant. Thus, we determine that the average age of LPNs and the percent of workers unionized within a State are good instruments for LPN wage in our demand equation. We further check for the endogeneity of wages by conducting a Hausman test (Hausman, 1978; Kennedy, 1998; StataCorp, 2003). The test results provide no evidence that LPN market wages are endogenous in our model. Thus, we report regression results both with and without instrumental variables, because although theory suggests instrumental variables are needed, the Hausman test indicates they may not be appropriate.

Longitudinal Analysis of Hospital Demand for LPNs

Table 5.4 presents regression equations estimating hospital demand for licensed practical nurses as a function of hospital, patient, and market characteristics. The first two columns present the ordinary least squares equation coefficients and standard errors. The second two columns present the results of a fixed effects equation, which includes a dummy variable for each hospital to control for hospital characteristics that are unobserved and constant over time. The final two columns contain the results of the model estimated with fixed effects and instruments to control for the endogeneity of wages.

Conventional economic theory predicts that demand for employees will decline as their wages rise. At the same time, demand for a type of employee could rise or fall with the wages of other employees, depending on whether other employees are complements or substitutes. The results presented in Table 5.4 are consistent with this theory. Higher LPN wages have a negative effect on demand for LPNs when instrumental variables are used to control for the endogeneity of wages. The importance of addressing endogeneity is demonstrated by the positive, significant relationship between wages and demand in the uninstrumented fixed effects model. In all three models, higher RN wages are associated with higher demand for LPNs. This finding suggests that LPNs are used as substitutes for RNs, at least in part. The fixed effects and instrumental variables models indicate that a ten percent increase in the RN wage will raise LPN demand about two to three percent. Aide wages have a modest positive relationship to demand for LPNs in the fixed effects equations, with a ten percent increase in the aide wage having less than a one percent effect on demand. In the ordinary least squares equation, the aide wage has a very large, negative effect on LPN demand.

The volume of patients cared for at a hospital has an important effect on demand for LPNs. The fixed effects and instrumental variables models estimate that ten percent growth in the number of inpatient days increases the demand for LPNs by about four percent. Conversely, as the length of stay of these patients rises, the demand for LPNs falls. The coefficient measuring the relationship between case mix and demand for LPNs is negative as well. LPNs are less able to care for acutely ill patients, and thus as acuity rises, demand will fall. Hospitals with a higher level of technology demand fewer LPNs.

[2] Average ages were computed in the same way as were market wages and merged to each observation in the same fashion.

The ability of hospitals to hire staff depends on the revenue received in exchange for patient care services. Several variables measure the potential revenues available to hospitals. As the share of patient days reimbursed by Medicaid rises, demand for LPNs also rises. Medicaid reimbursements to hospitals are known to be low, and hospitals that have high shares of Medicaid patients also typically have large shares of charity and non-paying patients. Thus, it is possible that this relationship results from hospitals with a high share of Medicaid patients having smaller personnel budgets. Another possibility is that Medicaid patients are somewhat less acutely ill than are other patients, and thus as the share of Medicaid patients rises, LPNs are better able to care for more patients.

The next three variables measure the relationship between the type of hospital owner and demand for LPNs. For-profit, district, and government hospitals have greater demand for LPNs than do not-for-profit hospitals, holding other factors constant. The potential reasons for these findings vary by type of owner. For-profit hospitals have a financial incentive to hire less-expensive LPNs to increase their profit margins. District and government hospitals may have smaller personnel budgets because they rely at least in part on tax revenues; thus, they may stretch their budgets with LPNs.

Table 5.4: Estimates of Demand for Licensed Practical/Vocational Nurses in U.S. General Acute Care Hospitals, 1990-2000

	OLS (s.e.)		Fixed Effects (s.e.)		Fixed Effects, Instrumenting for LPN Wages (s.e.)	
log (LPN Wage)	-0.154	(0.259)	0.290**	(0.044)	-0.804**	(0.390)
log (RN Wage)	0.645**	(0.235)	0.235**	(0.047)	0.286**	(0.051)
log (Nurse Aide Wage)	-1.140**	(0.324)	0.009	(0.046)	0.095*	(0.055)
log (Inpatient Days)	0.754**	(0.027)	0.420**	(0.013)	0.424**	(0.014)
log (Length of Stay)	-0.512**	(0.028)	-0.192**	(0.015)	-0.192**	(0.015)
Case Mix	0.037	(0.087)	-0.202**	(0.034)	-0.201**	(0.035)
Technology (Saidin Index)	-0.030**	(0.012)	-0.039**	(0.002)	-0.038**	(0.002)
log (Medicaid Share of Inpatient Days)	0.036*	(0.020)	0.024**	(0.004)	0.023**	(0.004)
For Profit Hospital	0.190**	(0.050)	0.142**	(0.020)	0.154**	(0.020)
District Hospital	0.221**	(0.058)	0.090**	(0.025)	0.098**	(0.025)
Government (State or local) Hospital	0.161**	(0.053)	0.117**	(0.023)	0.117**	(0.023)
Number of HMOs Operating in County	-0.022*	(0.013)	-0.006**	(0.002)	-0.004**	(0.002)
HMO Penetration	-0.328	(0.223)	-0.139**	(0.046)	-0.115**	(0.047)
No. of HMOs X HMO Penetration	0.011	(0.029)	-0.004	(0.004)	-0.014**	(0.005)
Per Capita Income in County	-	(0.000)	-	(0.000)	-	(0.000)
Percentage of LPNs Unionized in State	0.175	(0.154)	0.060**	(0.024)	0.060**	(0.025)
Percentage of RNs Unionized in State	0.007	(0.263)	-0.013	(0.049)	-0.063	(0.052)
1991	-0.006	(0.022)	-0.001	(0.011)	0.026*	(0.014)
1992	-0.063**	(0.027)	-0.054**	(0.011)	-0.012	(0.019)
1993	-0.115**	(0.033)	-0.093**	(0.012)	-0.047**	(0.020)
1994	-0.031	(0.037)	-0.023**	(0.012)	0.022	(0.020)
1995	0.039	(0.041)	-0.001	(0.013)	0.039**	(0.019)
1996	0.072	(0.045)	0.009	(0.014)	0.046**	(0.019)
1997	0.140**	(0.052)	0.045**	(0.015)	0.078**	(0.019)
1998	0.163**	(0.059)	0.040**	(0.017)	0.100**	(0.027)
1999	0.137**	(0.058)	0.002	(0.018)	0.083**	(0.034)
2000	0.121*	(0.062)	-0.029	(0.019)	0.061*	(0.037)
R-Squared	0.519		0.458		0.451	
N	42,401		42,317		42,299	

**p < 0.10 **p < 0.05*

Sources: American Hospital Association Annual Survey of Hospitals, Current Population Survey Outgoing Rotation Group Files, and Area Resource File. Managed care data courtesy of Douglas R. Wholey

Notes: (1) the dependent variable is log (Number of Full-time Equivalent Licensed Practical Nurses) (2) all regressions include a constant; and (3) OLS regression uses the cluster (on State) option in Stata.

As HMO penetration and the number of HMOs operating in a county rise, the demand for LPNs falls, and these effects are somewhat accelerated as the interaction between penetration and the number of HMOs rises. Greater HMO penetration in a market is thought to have a primary effect of reducing revenues available to hospitals. Such revenue reduction could reduce demand for LPNs because hospital budgets are tighter. However, HMOs also may value the quality of care offered by hospitals, and thus as HMO penetration increases, hospitals are pressured to favor the hiring of more-skilled RNs while reducing LPN staff.

County income affects demand for LPNs. As per capita income rises, the demand for LPNs falls. This relationship may arise if wealthier patients prefer hospitals with more highly skilled staff, and thus hospital demand for LPNs falls.

Statewide unionization of LPNs is associated with greater demand for LPNs in the instrumental variables equation. This relationship may indicate that unionized LPNs are better able to ensure that they are retained in hospital staffing models. Conversely, LPNs may be more likely to unionize when their numbers are higher in the hospital industry. RN unionization has no statistically significant relationship to LPN demand.

The coefficients of the yearly dummy variables indicate that there has been some change in hospital demand for LPNs over time. In 1993, demand for LPNs was lower than in 1990, while demand rose from 1995 through 1999. This period of increased demand coincides with reports that hospitals were redesigning their nursing services to emphasize team nursing and less-skilled nursing personnel. In these staffing strategies, LPNs would have had a more prominent role, and thus demand for LPNs would have risen.

Table 5.5 presents regression equations similar to Table 5.4, but the dependent variable is employment of LPNs as a share of all licensed nurses. In these equations, we can directly compare the effects of explanatory variables on demand for LPNs to demand for RNs. The results confirm those of the level of LPN employment equations. Relative demand for LPNs declines as the LPN wage rises, and it rises with growth in RN wages.

Increases in the number of inpatient days has no effect on relative demand for LPNs, suggesting that hospitals maintain a consistent skill mix even as patient volumes rise. Longer lengths of patient stays increase relative demand for LPNs, even though they decrease overall demand for LPNs. Together, these findings suggest that longer lengths of stay are associated with lower overall demand for nursing care, perhaps because the share of patients in intermediate and rehabilitation units increases.

A higher patient case mix reduces relative demand for LPNs, although this relationship is statistically significant only in the ordinary least squares equation. The coefficient on the technology index is consistent with expectations, in that higher technology reduces relative demand for LPNs. It is possible that case mix is collinear with both length of stay and the technology index, so the statistically insignificant coefficients for case mix result from multicollinearity rather than a lack of relationship.

Table 5.5: Estimates of Relative Demand for Licensed Practical/Vocational Nurses

	OLS (s.e.)		Fixed Effects (s.e.)		Fixed Effects, Instrumenting for LPN Wages (s.e.)	
log (LPN Wage)	-0.055	(0.041)	0.019**	(0.006)	-0.126**	(0.055)
log (RN Wage)	0.098**	(0.045)	0.039**	(0.007)	0.046**	(0.007)
log (Nurse Aide Wage)	-0.234**	(0.056)	-0.024**	(0.006)	-0.012	(0.008)
log (Inpatient Days)	-0.016**	(0.005)	-0.002	(0.002)	-0.002	(0.002)
log (Length of Stay)	0.027**	(0.004)	0.016**	(0.002)	0.016**	(0.002)
Case Mix	-0.070**	(0.013)	-0.006	(0.005)	-0.006	(0.005)
Technology (Saidin Index)	-0.004**	(0.001)	-0.001**	(0.000)	-0.001**	(0.000)
log (Medicaid Share of	0.007**	(0.003)	0.005**	(0.001)	0.005**	(0.001)
For Profit Hospital	0.027**	(0.008)	0.015**	(0.003)	0.017**	(0.003)
District Hospital	0.040**	(0.010)	0.022**	(0.004)	0.023**	(0.004)
Government (State or local)	0.020*	(0.010)	0.024**	(0.003)	0.024**	(0.003)
Number of HMOs Operating in	-0.003**	(0.001)	-0.002**	(0.000)	-0.002**	(0.000)
HMO Penetration	-0.070**	(0.027)	-0.020**	(0.007)	-0.017**	(0.007)
No. of HMOs X HMO	0.005*	(0.003)	0.004**	(0.001)	0.003**	(0.001)
Per Capita Income in County	-	(0.000)		(0.000)	-0.000001**	(0.000)
Percentage of LPNs Unionized	0.014	(0.022)	0.006*	(0.003)	0.006*	(0.003)
Percentage of RNs Unionized	0.004	(0.044)	0.001	(0.007)	-0.005	(0.007)
1991	-0.008**	(0.004)	-0.009**	(0.002)	-0.005**	(0.002)
1992	-0.021**	(0.005)	-0.024**	(0.002)	-0.018**	(0.003)
1993	-0.033**	(0.006)	-0.036**	(0.002)	-0.030**	(0.003)
1994	-0.030**	(0.007)	-0.038**	(0.002)	-0.032**	(0.003)
1995	-0.021**	(0.007)	-0.040**	(0.002)	-0.035**	(0.003)
1996	-0.022**	(0.007)	-0.049**	(0.002)	-0.044**	(0.003)
1997	-0.012	(0.007)	-0.049**	(0.002)	-0.044**	(0.003)
1998	-0.009	(0.009)	-0.057**	(0.002)	-0.049**	(0.004)
1999	-0.008	(0.010)	-0.063**	(0.003)	-0.052**	(0.005)
2000	-0.010	(0.010)	-0.071**	(0.003)	-0.058**	(0.005)
R-Squared	0.378		0.098		0.181	
N	43,289		43,204		43,186	

**p < 0.10 **p < 0.05 Notes: (1) the dependent variable is log (LPNs as a Proportion of Total Licensed Nurse Staff) (2) all regressions include a constant; and (3) OLS regression uses the cluster (on State) option in Stata.*

Sources: American Hospital Association Annual Survey of Hospitals, Current Population Survey Outgoing Rotation Group Files, and Area Resource File. Managed care data courtesy of Douglas R. Wholey.

The effects of payer mix and hospital ownership in the relative demand equations are similar to those in the level of demand equations. Hospitals with higher shares of Medicaid inpatient days have greater relative demand for LPNs, and the relative demand for LPNs falls as HMO penetration and the number of HMOs increases. For-profit, district, and government hospitals have greater demand for LPNs relative to RNs than not-for-profit hospitals. Per capita county income also has a negative effect on relative demand for LPNs. Hospitals in States with higher shares of LPNs in unions have greater relative demand for LPNs.

Relative demand for LPNs declined from 1991 through 2000 (relative to 1990). Combined with Table 5.4, these findings indicate that although absolute demand for LPNs stabilized in the late 1990s, hospitals have demanded relatively more RNs over time.

These findings demonstrate the importance of wages, hospital characteristics, and payer mix on hospital demand for LPNs. As hospitals face increased pressure to reduce costs, or face higher wages for RNs and LPNs, the demand for LPNs changes significantly. There have been periods of time during which LPNs have been considered attractive substitutes for RNs, and other times when demand for LPNs dropped because hospitals preferred RNs. These demand changes have large effects on the career opportunities of LPNs.

The Effect of Scope of Practice on Hospital Demand for LPNs

The longitudinal models presented above omit one important factor that could affect demand for LPNs: scope of practice regulations. Using the categorizations of LPN scope of practice created as part of this study, we examined the relationship between the scope of practice of LPNs and hospital demand for LPNs. This is a complex undertaking, because these things are determined jointly. For example, a liberal scope of practice may encourage employers to demand LPNs and reduce demand for other workers such as RNs. However, when there is a shortage of RNs, employers are likely to increase their demand for LPNs and also to lobby State legislatures for expanded scope of practice for LPNs. Because the relationship between demand and scope of practice is likely to be endogenous, we use instrumental variables to predict scope of practice regulations, in a fashion similar to that used to control for endogeneity of wages. Our instruments are a set of variables measuring the political characteristics of each State: whether there is Democratic control of both legislative houses and the governorship, whether there is divided control of the legislature and/or governorship, the ratio of per capita State debt to per capita income, whether the governor has a line item veto, the percent of the upper legislative house that is Democratic, and the percent of the lower legislative house that is Democratic. Mark W. Smith from the Veterans Health Administration Health Economics Resource Center in Menlo Park kindly provided these variables.

Because we have scope of practice data for only 1 year, we estimate the demand for LPNs using only a single year of data. Table 5.6 presents the results of regression equations for hospital demand for LPNs using data from 2000, and Table 5.7 presents analogous equations for relative demand for LPNs (as a share of total licensed nurse employment). The tables are organized in the same way as Tables 5.4 and 5.5. As seen in the first two rows of Table 5.6, hospitals in States with restrictive scopes of LPN practice tend to have lower employment of LPNs. However, once the potential endogeneity of wages and scope of practice are addressed using instrumental variables, the relationship is no longer statistically significant. A similar pattern holds for the specificity of scope of practice. However, Table 5.7 demonstrates that as the scope of practice of LPNs becomes more restrictive, the demand for LPNs falls relative to the demand for all licensed nurses, even when controlling for the endogeneity of scope of practice.

There are some differences in the effects of other explanatory variables between the cross-section and longitudinal results. LPN wages continue to have a negative effect on demand for LPNs, but this effect is not significant when instrumental variables are used to control for the endogeneity of LPN wages. RN and aide wages are not significantly associated with LPN

demand, except in the uninstrumented equations. In these equations, higher aide wages are associated with greater demand for LPNs. As seen in Table 5.7, wages have little to no effect on relative demand for LPNs.

Table 5.6: Estimates of Demand for Licensed Practical/Vocational Nurses in U.S. General Acute Care Hospitals, 2000

	OLS (s.e.)		Instrumenting for Scope of Practice (s.e.)		Instrumenting for Scope of Practice & LPN Wages (s.e.)	
Specific	-0.077*	(0.040)	-0.085**	(0.041)	0.221	(0.354)
Restrictive	-0.137**	(0.032)	-0.136**	(0.032)	-0.060	(0.056)
log (LPN Wage)	-0.857**	(0.281)	-0.838**	(0.289)	-4.929	(3.977)
log (RN Wage)	-0.092	(0.350)	-0.093	(0.348)	1.912	(1.373)
log (Nurse Aide Wage)	0.667**	(0.275)	0.725**	(0.277)	0.183	(0.601)
log (Inpatient Days)	0.615**	(0.024)	0.615**	(0.024)	0.631**	(0.030)
log (Length of Stay)	-0.418**	(0.030)	-0.420**	(0.031)	-0.436**	(0.033)
Case Mix	0.098	(0.080)	0.087	(0.081)	0.076	(0.091)
Technology (Saidin Index)	-0.022*	(0.012)	-0.021*	(0.012)	-0.022*	(0.012)
log (Medicaid Share of Inpatient Days)	0.067**	(0.023)	0.069**	(0.024)	0.083**	(0.032)
For Profit Hospital	0.035	(0.039)	0.039	(0.039)	0.044	(0.039)
District Hospital	0.154**	(0.050)	0.159**	(0.051)	0.137**	(0.055)
Government (State or local) Hospital	0.127**	(0.055)	0.134**	(0.056)	0.132**	(0.060)
Number of HMOs Operating in County	-0.049**	(0.008)	-0.049**	(0.008)	-0.026	(0.025)
HMO Penetration	-0.138	(0.261)	-0.120	(0.265)	0.131	(0.332)
No. of HMOs X HMO Penetration	0.042	(0.032)	0.040	(0.032)	-0.003	(0.058)
Per Capita Income in County	-0.00001**	(0.000)	-0.00001**	(0.000)	-0.000009**	(0.000)
R-Squared	0.542		0.539		0.498	
N	3,890		3,798		3,798	

**p < 0.10 **p < 0.05 Notes: (1) dependent variable is log (No. of Full-time Equivalent Licensed Practical Nurses), (2) all regressions include State dummy variables and a constant; and (3) all regressions use the cluster (on State) option in Stata.*

Sources: American Hospital Association Annual Survey of Hospitals, Current Population Survey Outgoing Rotation Group Files, and Area Resource File. Managed care data courtesy of Douglas R. Wholey Political variables courtesy of Mark W. Smith, Health Economics Resource Center, VA Palo Alto Health Care System.

Higher patient volumes increase the demand for LPNs, and this relationship is larger in magnitude in the cross-section than it was in the longitudinal data. However, higher volumes reduce the relative demand for LPNs in the cross section, suggesting that larger hospitals demand fewer LPNs, all other things held equal. LPN demand is negatively associated with length of stay, but relative demand for LPN rises with length of stay, again suggesting that the acuity of patients declines with length of stay. Thus, both overall demand for nursing staff and demand for RNs drops as length of stay rises. Relative demand for LPNs falls as the case mix of patients rises.

Table 5.7: Estimates of Demand for Licensed Practical/Vocational Nurses in U.S. General Acute Care Hospitals, 2000

	OLS (s.e.)		Instrumenting for Scope of Practice (s.e.)		Instrumenting for Scope of Practice & LPN Wages (s.e.)	
Specific	-0.025**	(0.006)	-0.0001	(0.010)	0.045	(0.056)
Restrictive	-0.004	(0.024)	-0.038**	(0.009)	-0.027**	(0.009)
log (LPN Wage)	-0.108	(0.084)	-0.106	(0.083)	-0.722	(0.621)
log (RN Wage)	-0.154*	(0.090)	-0.152*	(0.089)	0.150	(0.244)
log (Nurse Aide Wage)	0.054	(0.064)	0.059	(0.065)	-0.022	(0.116)
log (Inpatient Days)	-0.025**	(0.002)	-0.026**	(0.002)	-0.024**	(0.003)
log (Length of Stay)	0.034**	(0.004)	0.035**	(0.004)	0.033**	(0.004)
Case Mix	-0.057**	(0.013)	-0.057**	(0.014)	-0.059**	(0.015)
Technology (Saidin Index)	-0.001	(0.001)	-0.001	(0.001)	-0.001	(0.001)
log (Medicaid Share of Inpatient Days)	0.006**	(0.003)	0.006**	(0.003)	0.008**	(0.004)
For Profit Hospital	-0.001	(0.007)	-0.0002	(0.007)	0.0003	(0.007)
District Hospital	0.022**	(0.007)	0.022**	(0.007)	0.019**	(0.008)
Government (State or local) Hospital	0.015*	(0.008)	0.016*	(0.009)	0.015*	(0.009)
Number of HMOs Operating in County	-0.006**	(0.002)	-0.006**	(0.002)	-0.003	(0.003)
HMO Penetration	-0.046**	(0.019)	-0.045**	(0.019)	-0.008	(0.039)
No. of HMOs X HMO Penetration	0.009**	(0.004)	0.009**	(0.004)	0.002	(0.007)
Per Capita Income in County	-0.000001**	(0.000)	-0.000001**	(0.000)	-0.000001**	(0.000)
R-Squared	0.529		0.527		0.464	
N	3,963		3,867		3,867	

**p < 0.10 **p < 0.05*

Sources: American Hospital Association Annual Survey of Hospitals, Current Population Survey Outgoing Rotation Group Files, and Area Resource File. Managed care data courtesy of Douglas R. Wholey Political variables courtesy of Mark W. Smith, Health Economics Resource Center, VA Palo Alto Health Care System.

Notes: (1) dependent variable is log (LPNs as a Proportion of Total Licensed Nurse Staff), (2) all regressions include State dummy variables and a constant; and (3) all regressions use the cluster (on State) option in Stata.

As in the longitudinal models, hospitals with a higher share of Medicaid inpatient days have greater demand for LPNs. District and government hospitals demand more LPNs both in absolute and relative terms. The only cross-sectional effect of managed care is that as the number of HMOs operating in a county rises, demand for LPNs falls. Relative demand for LPNs also falls as the number of HMOs and HMO penetration rise. However, neither of these findings is observed when instrumental variables are used to account for the potential endogeneity of wages. County per capita income continues to be negatively associated with LPN demand and relative LPN demand.

The Demand for LPNs by Long-Term Care Facilities

The above analysis demonstrates that restrictive scopes of LPN practice reduce hospital demand for LPNs, both in absolute terms and relative to total licensed nurse demand. How does scope of practice affect demand for LPNs by nursing homes? To answer this question, we turned to Medicare's Online Survey, Certification, and Reporting System (OSCAR). These data provide information about long-term care facilities, including staffing, limitations in the activities of daily living of residents (ADLs), the share of residents insured by Medicaid, and facility number of beds. To examine the factors that affect long-term care facility demand for LPNs, we estimate regression equations similar to those used to study hospital demand for LPNs.

The dependent variables in our analysis are LPN hours per facility resident day, and LPN hours as a share of licensed nurse hours per resident day. We anticipate that demand for LPNs will be a function of the scope of practice, measured as above; the number of beds in the facility; the resident case mix index; State Medicaid reimbursement rates; nurse wages; the share of residents on Medicaid; whether the State uses a case mix reimbursement method; the facility's ownership, including profit status, and chain membership; whether the nursing facility is based in a hospital; whether is certified to accept patients insured by Medicaid, Medicare, or both; and the concentration of nursing homes in the market, measured as the Herfindahl index. All data are from 2002, except for RN and LPN wages, which are measured as in the hospital demand models.

Previous research has demonstrated that many of the variables that affect demand for LPNs are endogenous (Harrington & Swan, 2003; Zinn, 1993). Specifically, the case mix of residents is simultaneously determined with LPN demand, and State Medicaid rates are endogenous. In order to estimate the demand equations, we implemented instrumental variables techniques to address this endogeneity. The instrumental variables for case mix, which is measured as the dependency of residents in activities of daily life, are the proportion of the MSA population aged 65 and over, the percentage of females in the labor force, personal per capita income, and the percent excess beds in the county. The instrumental variables for State Medicaid rates are the proportion of the MSA population aged 65 and over, personal per capita income, whether the governor is Democratic, and whether the legislature and/or governorship are split between political parties. Wages also are endogenous, and we use RNs per 100,000 population, the share of the population over age 65, percentage of females in the labor force, and personal income per capita as instrumental variables. Finally, we assume that scope of practice regulations may be endogenous with demand for LPNs, and we use the same instrumental variables as in the hospital equations.

Tables 5.8 and 5.9 present LPN demand equations for long-term care facilities. In Table 5.8, the dependent variable is LPN hours per resident day, and in Table 5.9 it is LPN hours divided by total licensed nursing hours per resident day. The first two columns of both tables present an equation in which instrumental variables are used for Medicaid reimbursement rates, case mix, and scope of practice. The second two columns include instrumental variables for LPN wages as well.

Table 5.8: Estimates of Demand for Licensed Practical/Vocational Nurses in U.S. Long-Term Care Facilities, 2002

	Not instrumenting for wages		Instrumenting for wages	
Restrictive scope of practice	-0.028**	(0.006)	-0.022**	(0.006)
Specific scope of practice	-0.030**	(0.004)	-0.033**	(0.004)
LPN wage (or relative wage)	-0.025**	-0.004	-0.097**	(0.006)
Number of beds	-0.0004**	(0.00006)	-0.0005**	(0.00006)
Case mix Index	0.390**	(0.018)	0.344**	(0.018)
Rate of Medicaid residents	-0.004**	(0.0002)	-0.004**	(0.0002)
Accepts Medicare and Medicaid	-0.263**	(0.012)	-0.232**	(0.012)
Medicaid reimbursement rate	0.0001	(0.0003)	0.003**	(0.0003)
Case mix reimbursement method	0.011	(0.009)	-0.021**	(0.009)
For-profit facility	0.002	(0.008)	0.003	(0.008)
Chain facility	0.021**	(0.008)	0.028**	(0.008)
Hospital-based facility	0.022*	(0.012)	0.014	(0.012)
Market concentration	-0.062**	(0.017)	-0.163**	(0.018)
Intercept	-0.595**	(0.108)	0.347**	(0.121)
R-squared	0.138		0.154	
N	14029		14029	

**p < 0.10 **p < 0.05*

Notes: (1) Dependent variable is LPN hours per resident day; (2) both equations instrument for Medicaid Reimbursement Rate, Case mix, and Scope of Practice

As seen in Table 5.8, long-term care facilities located in States with more restrictive and specific scopes of LPN practice demand fewer LPNs. This effect is statistically significant in both the level of demand and the relative demand equations. This result persists in the equations for relative LPN demand, although the relationship is not statistically significant when instrumental variables are used for relative wages. Thus, as with hospitals, it appears that the restrictiveness of the LPN scope of practice has an important effect on the demand for LPNs by long-term care facilities.

Other factors affect long-term care facility demand for LPNs. As the market wage rises, demand for LPNs falls, as expected. However, in the relative demand equation, the opposite relationship is found: higher LPN wages, relative to RN wages, are associated with increased demand for LPNs relative to RNs. We have not been able to explain this contrary finding. It may be that the higher wages for LPNs are related to having additional training and certification. That would also explain the increase in demand for LPNs. If the LPNs have acquired higher

skills, they are more attractive to hospitals than RNs, even though they have a higher wage. They can perform more complex activities and they cost less than RNs.

Table 5.9: Estimates of Relative Demand for Licensed Practical/Vocational Nurses in U.S. Long-Term Care Facilities, 2002

	Not instrumenting for wages		Instrumenting for wages	
Restrictive scope of practice	-0.005**	(0.003)	-0.004	(0.003)
Specific scope of practice	-0.016**	(0.002)	-0.012**	(0.002)
LPN wage (or relative wage)	0.055*	(0.031)	0.659**	(0.083)
Number of beds	0.0002**	(0.00003)	0.0002**	(0.00003)
Case mix Index	0.157**	(0.008)	0.188**	(0.009)
Rate of Medicaid residents	0.002**	(0.00007)	0.002**	(0.00008)
Accepts Medicare and Medicaid	-0.030**	(0.005)	-0.043**	(0.006)
Medicaid reimbursement rate	-0.002**	(0.0001)	-0.002**	(0.0001)
Case mix reimbursement method	-0.007*	(0.004)	-0.014**	(0.004)
For-profit facility	0.035**	(0.004)	0.038**	(0.004)
Chain facility	-0.006*	(0.003)	-0.008**	(0.004)
Hospital-based facility	-0.007	(0.005)	-0.005	(0.006)
Market concentration	-0.0001	(0.007)	0.004	(0.008)
Intercept	-0.211**	(0.048)	-0.785**	(0.089)
R-squared	0.143		0.131	
N	14029		14029	

**p < 0.10* ***p < 0.05*

Notes: (1) dependent variable is log (No. of Full-time Equivalent Licensed Practical Nurses), (2) all regressions include State dummy variables and a constant; and (3) all regressions use the cluster (on State) option in Stata. (3) Dependent variable is (LPN hours/(LPN+RN hours)) per resident day; 4) both equations instrument for Medicaid Reimbursement Rate, Case mix, and Scope of Practice

Facilities with more beds demand fewer LPNs per resident day, but demand more LPNs relative to RNs. These figures suggest there are economies of scale in providing long-term care. The absolute and relative demand for LPNs rises with the ADL dependency of residents. A higher share of Medicaid residents is associated with lower demand for LPNs per resident day, but with a greater share of LPNs relative to RNs. In sum, these coefficients suggest that as the share of Medicaid residents rises, long-term care facilities rely more on less-skilled licensed nursing personnel. Facilities that have certification for both Medicare and Medicaid patients demand fewer LPNs overall and also fewer LPNs relative to RNs.

Payment rates for long-term care facilities have significant effects on demand for LPNs. Increases in the Medicaid reimbursement rate result in higher LPN demand, and also lower LPN demand relative to RN demand, probably because facilities can better afford more skilled nurses when reimbursement rates are higher. Case mix reimbursement methods are associated with lower demand for LPNs and lower LPN/RN ratios.

The ownership of the long-term care facility affects demand for LPNs. For-profit facilities demand more LPNs relative to RNs, although the absolute level of demand for LPNs is not associated with profit status. This suggests that for-profit facilities employ fewer RNs than do other facilities. Chain-owned long-term care facilities demand more LPNs, and also demand fewer LPNs relative to RNs (indicating that they demand more RNs).

Finally, LPN demand is affected by market characteristics. Facilities in markets where there is less competition between facilities have lower demand for LPNs, and competition has no effect on the LPN to RN mix. This finding suggests that competition between long-term care facilities may increase quality of care, because the facilities compete for patients by hiring more licensed staff.

The earnings of LPNs

In general, the wages of LPNs result from the intersection of market supply and market demand. As demand rises relative to supply, wages will rise. This wage inflation will, in turn, increase the supply of LPNs and reduce demand for LPNs. These movements bring the labor market into balance. Thus, it is difficult to examine the earnings of LPNs separately from demand and supply. The above sections on demand and supply explore these relationships. In this section, we present the results from the first-stage regression used to obtain predicted values of wage. Recall that these predicted values were used in our supply regressions.

We use Current Population Survey data from 1994 through 2001 to estimate the wage of each LPN, controlling for demographic, market, and job characteristics. We omit family characteristics because in theory family characteristics should not affect the human capital of workers. The yearly dummy variables included in the equation control for secular changes in wages nationwide, such as those that result from economy-wide inflation. We also include the number of physicians per 100,000 people and the average manufacturing wage in the LPN's State of residence as explanatory variables in the wage equation. These two variables serve as instruments in our two-stage least squares regressions of the supply of LPNs. The dependent variable is created for each LPN in our sample by dividing their usual weekly earnings (before deductions) by their usual hours of work per week, and is adjusted for inflation.

Table 5.10 presents ordinary least squares regression results for LPN wages. Notably, the estimated coefficients on the two variables serving as instruments are positive and statistically significant, and imply that LPN wages increase as the Statewide average manufacturing wage and the number of physicians relative to the population increase.

Demographic characteristics affect the wages received by LPNs. Male LPNs earn higher wages than do female LPNs, and LPNs with a college degree have higher wages than do those who do not have a college degree. Furthermore, the wage differential is greater for LPNs with at least a 4-year degree (i.e., bachelor's degree or higher). LPNs who are not citizens earn lower wages than US-born LPNs, though this result is only statistically significant at a higher p-value. Age has a significant effect on LPN wages. Wages rise with age until age 52, after which time they decline. This finding suggests that, adjusted for inflation, LPN wages do not progress consistently with potential experience.

Table 5.10: Regression Results for Log of LPN/LPN Earnings Per Hour

	Coefficient	SE
Instruments		
Number of Physicians Per 100,000 People in State	0.004**	(0.001)
Average Manufacturing Wage in State	0.270**	(0.044)
Demographic Variables		
Male	0.782**	(0.323)
Age	0.207**	(0.040)
Age Squared	-0.002**	(0.000)
Some College	0.274	(0.185)
AA Degree	0.445**	(0.180)
Bachelor, Master, PhD, or Professional School Degree	0.987**	(0.357)
Black	-0.265	(0.190)
Hispanic	-0.053	(0.391)
Native American	-0.903	(0.604)
Asian	0.357	(0.567)
Not a U.S. Citizen	-0.846*	(0.491)
Citizen by Naturalization	0.026	(0.436)
Government Worker	-0.262	(0.185)
Market Characteristics		
Percentage of LPNs Unionized in State	-0.498	(0.550)
Northeast	-0.235	(0.281)
Midwest	-0.829**	(0.220)
South	-0.671**	(0.229)
MSA Population 100,000-499,999	0.508**	(0.198)
MSA Population 500,000-999,999	0.548**	(0.227)
MSA Population 1,000,000-2,499,999	0.993**	(0.211)
MSA Population 2,500,000+	1.599**	(0.214)
Type of Industry		
Personnel Supply Services	0.935	(0.601)
Offices and Clinics of Physicians	-0.918**	(0.203)
Private Households	-2.455**	(1.012)
Health Services (not else where classified)	0.021	(0.227)
Hospitals	0.154	(0.147)
Other Industries	-0.459	(0.309)
Year Dummy Variables		
1995	-0.092	(0.233)
1996	-0.782**	(0.242)
1997	-1.117**	(0.240)
1998	-0.608**	(0.250)
1999	-0.328	(0.252)
2000	-0.495**	(0.250)
2001	-0.047	(0.238)
R-squared	0.1057	
N	3,994	

**p < 0.10 **p < 0.05*

Source: Current Population Survey Outgoing Rotation Group Files, 1994-2001

Notes: (1) the dependent variable is created by dividing usual weekly earning by usual hours of work per week; (2) standard errors (in parentheses) are estimated using the "robust" option in Stata; and (3) all regressions include a constant.

Market characteristics are important predictors of wages. Compared to those living in the Western region of the U.S., LPNs residing in the Midwest and South earn lower wages. Also, LPNs in rural areas earn lower wages than do their urban-dwelling counterparts. The more populated an urban area is, the higher the wage relative to wages in rural areas. This may reflect higher costs of living in cities, especially in cities of 2.5 million or more.

Employment setting has some effect on the wages of LPNs. LPNs working in physician offices and private households have lower wages than do LPNs working in long-term care settings. Finally, wages in 1996-1998 and in 2000 were lower compared to wages in 1994. Thus, there is some evidence that inflation adjusted wages for LPNs declined during our sample time period.

Conclusions about Supply and Demand of LPNs

The supply of LPNs is affected by characteristics common to other professions. Male LPNs are not more likely to be employed, but they tend to work more hours and are more likely to be employed full time than are females. LPNs reduce their participation in the labor force after some age, the probability of employment drops after age 40 or 50 (depending on how the model is specified) and the probability of full-time work declines after LPNs reach their early forties. Black LPNs are more likely to work full time and tend to work more hours than white LPNs. Likewise for LPNs living in the South, relative to those in the Western States. Furthermore, Midwestern LPNs are more likely to be employed than their counterparts in the West. LPNs who are foreign-born are less likely to be employed, but work more hours than do LPNs who are US-born. LPNs with children in their households tend to work fewer hours. Finally, as LPN wages rise, LPNs are more likely to work full-time. LPNs enjoy higher earnings with experience, until they are in their early 50s. They also have higher wages if they have a college degree, especially if they have a 4-year or graduate degree. LPN earnings vary by employment sector; the highest earnings are enjoyed by LPNs working in personnel supply services (such as temporary and home health agencies), hospitals, and long-term care facilities, and the lowest earnings are received by those working in private households and physician offices.

The demand for LPNs varies with LPN wages, wages of other nursing personnel, patient volumes, case mix of patients, and market characteristics. In general, demand for LPNs drops as LPN wages rise, and demand for LPNs rises as wages of RNs rise. Higher patient volumes are associated with higher demand for LPNs. In hospitals, rising patient acuity reduces demand for LPNs, while demand increases in long-term care facilities with higher ADL dependency of patients.

Hospital demand for LPN rises as the share of patients insured by Medicaid increases. Long-term care facility demand for LPNs declines as the share of residents insured by Medicaid rises, and demand for RNs also declines. Thus, both types of employers shift their labor demand to the least skilled nursing personnel possible when Medicaid is more prominent in the patient mix. Increases in the Medicaid reimbursement rate cause long-term care facilities to demand more skilled nurses.

Finally, the scope of practice of LPNs affects demand for them. Restrictive scopes of practice have a significant, negative effect on hospital and long-term care facility demand for LPNs. Demand for LPNs also is lower in States with more specific scopes of practice. If States want to encourage the employment of LPNs as substitutes for RNs, they can liberalize the scope of practice of LPNs to achieve this goal. However, because there is little research indicating whether these skill mix changes would have negative effects on quality of care, policymakers should tread carefully before moving in this direction.

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Chapter 6: Perspectives of the Employers, Educators, State Boards, and Nurses

The preceding chapters reported on the work of LPNs, their demographic characteristics, the process of education for LPNs, and their demand and supply. While the data presented in these chapters provide substantial information about the LPN workforce, it does not answer some key questions. How do LPNs and their employers view their role in the workforce? How do they interact with RNs? Are LPNs interested in pursuing additional education? To answer these questions, we turn to qualitative research methods, including focus groups and key informant interviews. This chapter reports on qualitative work conducted in four States to better understand the these issues related to the LPN workforce.

Methods

The qualitative approaches used in this study included key informant interviews and focus groups. Key informant interviews were conducted with officials from State nursing boards, nurse administrators in acute care hospitals and long-term care settings, and directors of LPN educational programs in community colleges and adult schools. Focus groups were conducted separately with practicing LPNs and RNs to learn the perspectives of staff nurses.

We selected four States in which to conduct qualitative research: Iowa, California, Massachusetts, and Louisiana. These States were selected to provide geographic variation and a range of restrictiveness of scopes of practice. California and Iowa have relatively restrictive scopes of practice, with scores of 4. Massachusetts and Louisiana's scopes of practice are among the most liberal in the U.S., with scores of one. In California, Louisiana, and Iowa, we visited both a large city and a smaller city in order to determine whether population density was associated with differences in the utilization of LPNs. In California, these cities were Los Angeles (population 3,694,820) and Bakersfield (population 247,057); in Iowa we visited Des Moines (population 198,682) and Cedar Rapids (population 120,758); in Louisiana we visited New Orleans (population 484,674) and Baton Rouge (population 227,818). In Massachusetts, we conducted our interviews and focus groups in Framingham, a city halfway between the large city of Boston and the smaller metropolitan area of Worcester. Key informant interviewees and focus group participants were selected from these seven sites.

Key Informant Interviews

Potential hospital key informant interviewees were identified using data from the American Hospital Association (AHA) Annual Survey of Hospitals (American Hospital Association, 1999). With these data, we examined the number of beds at each hospital and the share of licensed nurses who were LPNs. We attempted to schedule key informant interviews with people from hospitals with at least 100 beds and with at least 10 percent of their licensed nursing staff was comprised of LPNs. In some cases we visited hospitals that were slightly smaller or had somewhat fewer LPNs in their nursing staff.

To identify potential interviewees in long-term care facilities in the target States, we utilized the Medicare Web site, *Nursing Home Compare,* which includes data on all Medicare certified nursing homes in the country (U.S. Department of Health and Human Services, 2004).

We targeted nursing homes with more than 75 beds in order to assure a staffing mix that would include both RNs and LPNs.

A research assistant contacted potential interviewees and read a telephone script that explained the purpose of the study, the purpose of the interview, and procedures for voluntary consent and confidentiality. Once interviewees agreed to participate, a follow-up letter and email were sent including the interview details, a written information sheet, and a copy of the consent form to be signed at the time of the interview.

In total, there were 24 key informant interviews conducted in the four States. Most of these were in-person interviews, scheduled to coincide with the focus groups in each State. When schedules did not permit in-person interviews, telephone interviews were held subsequent to the focus groups. There was no overlapping participation between the focus groups and key informant interviewees although several of the focus group participants were employees at facilities where the Director of Nursing was interviewed as a key informant.

The Employer Perspective

LPN practice in hospitals

In general, LPNs tend to be a small component of the total nurse staffing in hospitals, regardless of the State and scope of practice. LPNs generally are employed in medical-surgical units, rehabilitation units, hospital-based skilled nursing facilities, and outpatient clinic settings. However, the RN shortage seems to be increasing LPN employment in hospitals. In more than one State, nursing directors of hospitals Stated that LPN employment was increasing in all types of patient units. Some respondents Stated that they were considering increased LPN staffing or replacing some nursing assistant staff with LPNs.

Factors Favoring LPNs in Hospitals

Nursing directors in hospitals Stated that several factors made it attractive to hire LPNs. The major attraction of LPNs is that they cost less than RNs and can be used for nursing functions within their scope of practice. LPNs are attractive because they have more skills and training than nurse aides and are licensed to perform functions that nurse aides are not allowed to do, such as administer medications. In some locations, LPN wages are not much higher than those of nurse aides. Wages for RNs and LPNs varied widely across the four States we studied, but the difference between RN and LPN salaries averaged $5 per hour. Hospitals were particularly interested in hiring LPNs who are enrolled in RN programs and working their way through school. The students are attractive because they have a high level of skills and knowledge and can also be recruited for a future position as an RN. Another factor making LPNs more attractive in some States is that they are more plentiful than RNs and can perform many of the same functions. Regardless of the State or scope of practice, experienced long-tenured LPN employees were highly valued in the acute care units where they work. They were trusted by the RNs, highly skilled as a result of their education and experience, which was valued by the nurse managers and directors.

Factors Unfavorable for Hiring LPNs in Hospitals

Factors that made LPNs unattractive to hire primarily centered around their limited, or perceived limited, scope of practice. Because there are many nursing functions such as advanced IV therapy, patient assessment, and administration of blood that LPNs are not able to perform, they must be teamed with an RN who then shares the patient assignment. Some RNs consider this more burdensome than helpful. Even States with the most liberal scopes of practice have limitations in LPN scope of practice that reduce LPN utility in acute care settings. Other factors that limit the attractiveness of LPNs were limited training in critical thinking and the lack of clinical experience in specialized hospital units.

LPN and RN Working Relationships

In general, most nursing directors felt that RNs and LPNs worked well together in their hospitals. On the inpatient units, RNs are in charge (make the assignments and supervise all staff). LPNs usually have an independent assignment and may care for complex patients, but the RN on the team performs RN-required procedures for those patients. On hospital-based skilled nursing units, LPNs often have the role of charge nurse with a supervising RN overseeing the LPN. In the outpatient setting, LPNs may work alongside RNs in performing a variety of outpatient services including patient screening and education. In one interview site, a large integrated health system practice, LPNs function as health educators in the outpatient setting.

Substitution

All hospital nurse administrators interviewed Stated that LPNs could not substitute for RNs in any situation that required an RN skill level. LPNs can, and often do, substitute for nurse aides as well as other allied health staff such as EKG technologists if they are trained in that skill.

Adequacy of LPN Education

Most interviewees felt that LPN education was adequate. Nursing directors usually preferred particular LPN education programs in their region and tended to recruit primarily from the preferred schools. These hiring preferences provide feedback to the schools on the strength of the curriculum and teaching. Hospital nursing directors generally thought that the longer LPN programs (18 months or more) were better. Several interviewees mentioned that they do not support the challenge exam in which certain categories of LPN candidates, generally those with a military background, are allowed to take the LPN licensing exam without completing a training program.

Appropriateness of Scope of Practice

Most nursing administrators in hospitals agreed that the scope of LPN practice was appropriate even though it varied widely between the restrictive and liberal States. Some Stated that the challenge facing hospitals and the RNs who manage the patient care units is to assure that LPNs are allowed to perform up to the maximum of their legal scope of practice, yet not exceed that scope. Problems occur when there is a lack of knowledge of the LPN scope of practice, or when RNs are unwilling to let LPNs maximize their practice.

LPN practice in long-term care facilities

Long-term care facilities are a major employer of LPNs across the country and in the four States where we conducted interviews. LPNs are hired in LTC facilities for virtually all nursing functions except those that require an RN under Medicare requirements. LPN functions

include supervision of nurse aides, administration of medications, IV care, and other skilled care within the LPN scope of practice in that State.

Factors Favoring LPNs in Long-term Care Facilities

LPNs are attractive to long-term care facilities for several reasons. The primary reason is that LPNs are less costly than RNs for nursing functions that can be performed by either LPNs or RNs, such as basic bedside care, administration of oral medications, supervision of nurse aides, and interaction with patients and their families. In addition, LPNs as compared to RNs are more available for hire, often have more experience in geriatric settings, and have a more positive attitude about working in long-term care facilities.

Factors Unfavorable for Hiring LPNs in Long-term Care Facilities

LPNs may be unattractive to hire in long-term care facilities for reasons similar to those cited for acute care settings. Patients entering skilled nursing facilities can be acutely ill, requiring complex treatments, IV therapy, and wound care, some of which is outside the LPN scope of practice. Thus, an RN may be preferred over an LPN to fill a vacant position because of the broader scope of practice for RNs. In addition, skilled nursing homes must hire RNs to meet Medicare requirements for RN staffing, at least 8 hours per day, and to complete the Medicare Minimum Data Set (MDS). The MDS is the Medicare mandated report on patient level and facility level data that is required for all Medicare and Medicaid certified nursing home residents. Other interviewees mentioned that RNs are better able to perform patient assessments. While LPNs are more likely to note that a patient's condition has changed, RNs are in a better position to assess and diagnose the problem.

An unexpected, but understandable, negative factor cited by employers was that LPNs who were studying to become RNs often do not stay in LPN roles long enough to obtain significant experience in nursing. In areas where many LPNs follow career ladders to RN licensure, LPNs tend to spend fewer years in LPN practice and the number of highly experienced LPNs in the community is diminished.

LPN and RN Working Relationships

All interviewees Stated that RNs and LPNs work well together in long-term care facilities, sometimes performing the same functions or with the RN performing RN-required functions only. Some long-term care facilities hire a greater proportion of RNs and others hire only the minimally required number of RNs. LPNs often act as charge nurses in long-term care facilities, while RNs function as the Director of Nursing.

Substitutability

There were mixed responses to questions about the substitutability of LPNs for other staff in long-term care facilities. A few said that LPNs substituted for RNs but most said that LPNs only substituted for aides. In fact, when facilities have a high rate of turnover of nurse aide staff, LPNs are more likely to substitute for nurse aides. Some of this substitution is intentional and pre-scheduled in order to give the LPNs an opportunity to get to know the patients better and to better understand, or recall, the role of nursing aides.

Adequacy of LPN Education

Most of the long-term care interviewees believed that LPN education in their State was adequate. Most agreed that not all programs are equal and that the longer courses are better than "fast track" courses. There was consensus that the curriculum could be stronger in two areas important to long-term care facilities: supervisory skills and geriatric care. Iowa addresses this concern by requiring a continuing education supervisory course that is mandatory for all LPNs within 6 months of employment in a long-term care facility. The Iowa State Board of Nursing developed the course and it is offered at community colleges throughout the State. Facilities in California offer in-service programs to strengthen LPN supervisory skills. Some interviewees recommended curriculum additions including psychosocial content focused on interacting with patient families, preventive care, and assessment.

Scope of Practice

Most interviewees agreed that the LPN scope of practice is adequate for their State. Some commented that requiring an RN to sign off on LPN patient assessments is an unnecessary practice since frequently the RN is merely providing the signature rather than oversight of practice. Others stated that LPNs are not able to practice to the full scope of practice because RNs would not or were not allowed to delegate certain functions. For example, in Louisiana, LPNs are not allowed to perform certain functions under their scope of practice because the RN scope of practice forbids RNs from delegating those functions.

The Educational Program Perspective

We interviewed directors and faculty of several types of LPN educational programs in the four focus States, including private adult schools, community college degree programs, and community college non-degree programs. Some of the programs are ladder programs in which students receive credits toward an RN program and can matriculate into an RN program after completing the LPN program and passing the LPN licensure exam. Other programs were built in as part of RN programs. For example, some of the community college programs in Iowa are ladder programs in which students, seeking RN or LPN training, enter a single nursing program. After the first year of study, students are prepared for and encouraged to take the LPN exam. Some students stop at this level and pursue a career and employment as an LPN. Students seeking an RN license, and who meet the minimum grade point average, continue in the program for another year to earn an associate degree in nursing. In one of these programs about 85 percent to 90 percent of students eventually pursue their RN license.

Another nuance found in some of the LPN programs was the requirement of certified nursing assistant (CNA) training as a prerequisite for entry into the LPN program. The purpose was to assure that students master basic skills of the CNA so the LPN curriculum can proceed at a faster pace.

Enrollment Trends

In most of the programs, enrollment has increased over the past 2 years. Most of the programs had no difficulty filling available slots and some have a waiting list of a year or more. Several program interviewees believed that the enrollment increase was greater in recent years due to the national nursing shortage and the downturn in the economy, which made competing occupations less attractive. Several interviewees noted an increase in the diversity of student enrollment over the past few years with greater enrollment of males and ethnic minorities.

Adequacy of Preparation prior to LPN Program

Interviewees generally thought that many students were not adequately prepared for the LPN program. They felt that students are less well prepared than in the past and believed poorer high school education, less rigorous admission criteria, and an increasing number of new immigrant applicants contributed to the lack of preparation. They also Stated that the skills most lacking were in math, reading, and writing. To address these deficiencies, many of the programs instituted prerequisite math courses or a math entrance exam as an admission requirement. Others offered English as a second language and math tutoring to help students through the program. These interventions help students who would otherwise likely fail to complete the program. However, remedial programs and tutoring are costly and the tuition fees are not adequate to cover these expenses.

Program Completion Rates

Completion rates for the LPN programs ranged from 55 percent to over 95 percent. Some programs tried to assure completion by allowing students multiple opportunities to retake courses until they passed. Other programs increased their completion rates by being more selective in the admission process. In States with open access admission, such as California, programs wee not allowed to be selective in admissions even if there are more applicants than student slots.

Pass Rates on State Board Exam

Data on passing the LPN State board exams were not available from all the programs interviewed. The programs that provided information reported that their pass rates ranged between 64 and 95 percent. One program director reported that the program's low first-time pass rate had resulted in pressure from the State licensing board to improve. The director Stated that the program offered free tutoring for students to prepare for repeating the exam if they failed it the first time. The director felt that the State board should consider second and third-time pass rates when reviewing programs. Because we selected only a few programs in each State to interview, overall State board pass rates give a better indication of performance in that State.

Academic and Social Support Services

The educational programs offered a variety of academic support services including tuition assistance, loans, educational tutoring, and peer counseling as well payment for books and supplies for students who need assistance in getting through the LPN program. Interviewees Stated that a variety of services and support are needed to assist some students through the program. LPN programs located at the community colleges took full advantage of campus learning centers, academic advising, practice labs, tutoring services, and financial assistance. Some programs also took advantage of county workforce programs to offer students transportation and childcare services in order to help them complete the program.

Barriers to Completion

Respondents indicated that barriers to completing LPN programs were those targeted by the support services. Financial needs and lack of educational preparation were cited as the primary barriers to students completing LPN programs. Programs directors Stated that most LPN students found it necessary to work part or full time while in school. Many students are older than other college students and have families to support; many are single parents. Although most programs had the ability to offer some type of financial aid or loans, the amounts

were rarely enough to cover a student's total financial needs. The other major barriers to completing the program were student lifestyle issues. Some students have difficulty focusing on school and the need to study, some have attendance problems, and others have unexpected family issues and health problems that impede their ability to focus on school. Most program directors Stated that these students are usually identified and leave the program early, although often not early enough for the slot to be filled by another student from the waiting list.

Curriculum and Employment Opportunities

Not surprisingly, most LPN program directors felt that the curriculum at the institution was adequate preparation for the students' future work. The program directors based this perception on the positive feedback they get from employers directly or from employers recruiting and hiring the program graduates. Program directors Stated that the students had no difficulty getting jobs, although most Stated that hospital jobs were less available and jobs in long-term care facilities were abundant. This employment landscape for LPNs may be changing as a result of the RN shortage, and may be altered with staffing legislation such as that recently implemented in California.

One of the LPN programs is a bit unique in that it also prepares LPNs with skills in phlebotomy, EKG, coding, and medical office computer skills. Some of the graduates take non-traditional LPN jobs in clinical laboratories or medical offices. It was not clear how this extra course work fit into the curriculum or whether it was an add-on that could be selected by students.

Pursuing RN Education

According to the program directors, many LPN students want to pursue RN education, although the number of students who eventually complete RN education varied among the programs. The ladder program schools, such as those in Iowa, have a much higher rate of students who finish RN education because the program structure is one program with two possible exit points. Other programs that are well articulated with RN programs also have higher proportions of LPN graduates pursuing an RN license. In these programs, the length of the RN program is one to two semesters shorter when LPN program credits are accepted. The vocational and/or certificate LPN programs create a greater challenge and time commitment for LPNs who wish to pursue an RN license. In most cases, graduates of vocational LPNs programs must start at the beginning of an RN program, including taking the RN program prerequisites.

Scope of Practice

The program directors generally thought that the LPN scope of practice in their State was appropriate. They felt that they produce a much-needed bedside caregiver who is well prepared for his or her role and scope of practice. One interviewee noted that the RN board wields a great deal of power over the LPN scope of practice. She does not anticipate any changes in LPN scope of practice due to the RN board's power to impede any movement toward expanding LPN practice. Another noted that if the LPN scope of practice does change, s/he will be ready to alter the LPN program curriculum, but that it would likely mean expanding the length of the program. A few program directors noted that they thought the intravenous administration of some medications and nutritional solutions should be permitted under the LPN scope of practice. One director argued that medications that are available over-the-counter should be permitted for IV administration by LPNs.

Boards of Nursing Perspective

In all four States, we interviewed officials at the State board overseeing LPNs. In Iowa and Massachusetts, a single board oversees RNs and LPNs. In Louisiana and California there are separate boards for RNs and LPNs. The predominant model in the United States is for the boards to be combined.

Board Composition

Whether or not the LPN and RN board is combined may have implications for the scope of practice for LPNs in that State. It is possible that LPNs have relatively less power when a combined board represents them, and thus their scope of practice may be limited. However, when boards are separated they may not consult with each other regarding the scope of practice. We do not have adequate data to assess whether it is beneficial for patient care and nursing practice in general and for LPN practice in particular to have separate or combined boards of nursing.

The directors of the State boards of nursing interviewed were RNs with varied backgrounds in nursing care, administration, nursing education, and State government. Most had served for a considerable time in their board position and were knowledgeable about trends and issues in nursing for their State.

Board Responsibility for LPN Practice

The chief responsibility of the State boards of nursing is consumer protection and assuring compliance with regulations governing the practice of nursing in that State. All the board directors felt strongly that the regulatory role was their major responsibility. Most quoted directly from State statutes regarding authority and responsibility of the board of nursing as a consumer protection agency. Those responsibilities include oversight of the licensing and license renewal process, collecting and summarizing data on licensees, investigation of complaints, administering the disciplinary process, and determining scope of practice based upon the laws and regulations in the State. Other board functions include setting policy, presiding over board meetings, reviewing nursing education programs in the State, and conducting research on nurses in the State. Boards track trends in NCLEX pass rates and demographic data of nurses. All four States have State health care workforce task forces or committees to study the nursing shortage and health workforce issues in the State. State board staff members were usually participants in those efforts.

LPN Data

The nursing board directors provided detailed data on the number of LPNs in the State the number of educational programs, graduates, exam pass rates, and other demographic data. Some of the boards have this information readily available on their Web sites, while others gave us copies of written reports and summary data. Financial resources and staff capacity limit the ability of each State to gather data on LPNs and analyze trends. Nevertheless, there was a great deal of detailed data available for each of the four focus States.

LPN Scope of Practice Changes

In the four focus States, the LPN scope practice has had only minor or no changes over the past 5 years. In Louisiana, the scope has not changed since 1948 although the board director

noted that the utilization of LPNs in clinical settings has changed. The scope of practice Statements in Louisiana and Massachusetts are very broad, leaving it open to interpretation. Iowa has a specific Statement of the scope of practice, and there have been minor changes. For example, a change in the scope of practice was required to allow limited performance of intravenous therapy by LPNs and to include the requirement of the supervisory course for LPNs working in long-term care facilities. Iowa is considering expanding the scope of LPN practice in managing end-stage renal disease and hemodialysis. Recently in California, there have been changes in the interpretation of the scope of practice to allow LPNs to perform hemodialysis and to administer IV medications during the dialysis procedure.

Substitution

All nursing board directors Stated very specifically that LPNs could not substitute for RNs in their State. Each saw the role of LPNs as very different from RNs and did not think that the roles overlapped. Interviewees stated that LPNs supplement RN care and perform routine care but the educational preparation of LPNs and RNs is very different and should remain so.

Enrollment

Board directors generally agreed that enrollment in LPN programs had increased over the past 2 years in each of the States we visited. One interviewee said that, over the long-term, LPN enrollment has been tied to the general economy and the availability of alternate careers. Over the past several years, nursing has been considered a secure career, and the increased awareness of registered nursing has created more interest in LPN programs as well. The RN shortage seemed to contribute to an increase in LPN enrollment in some States. During the nursing surplus of the 1990s, there was a decrease in LPN enrollment, presumably due to a diminished number of jobs available for LPNs. During that time, the State Board of Licensed Practical Nursing in Louisiana recommended a moratorium on new LPN programs. However, with the advent of another nursing shortage, Louisiana has seen a 12 percent increase in enrollment in LPN programs over the past year.

LPN Shortages

All the State board directors are concerned about a shortage of RNs in the State. There were mixed responses about whether there were an adequate number of LPNs. In Louisiana, board staff felt that there was an adequate supply of LPNs but that they were not all working in health care. Because of overwork due to the nursing shortage and higher salaries available in other occupations, some LPNs have stopped working in health care. LPNs work for local registries or traveling nurse agencies and some are practicing out of State. Even Iowa, which has one of the highest RN to population ratios in the Nation, loses nursing staff to neighboring States that pay higher salaries. In Iowa, nurses living near the border are able to work as traveling nurses in a neighboring State while still living at home. In California, more LPNs are needed to work in long-term care and home health settings. Massachusetts interviewees felt that the shortage in their State was not as severe as other States.

Board Suggestions

There were various responses to the question of how States are addressing RN and LPN supply issues. Most respondents focused on the need for increased funding for nursing at both the Federal and State level. Funding is needed to build programs, hire faculty, increase the number of clinical sites, and provide tuition assistance for students. Iowa passed legislation 2 years ago

to increase the education of the nursing workforce but funding was not made available. California has devoted over $34 million via the Nursing Workforce Investment Act to fund nurse workforce development. In Louisiana, the State has few funds to allocate for addressing the nursing shortage.

Perspectives from Working RNs and LPNs

Focus Groups

Methods

Eleven focus groups were conducted, 7 with LPNs and 4 with RNs. A professional focus group organization recruited RNs and LPNs via telephone from lists provided by public and private sources. All of the groups were held between May 21 and June 9, 2003, in the following locations:

- Iowa: Des Moines: 1 group each of RNs and LPNs
  Cedar Rapids: 1 group of LPNs
- Louisiana: New Orleans: 1 group each of RNs and LPNs in New Orleans
  Baton Rouge: 1 group of LPNs in Baton Rouge
- California: Los Angeles: 1 group each of RNs and LPNs in Los Angeles
  Bakersfield: 1 group of LPNs in Bakersfield
- Massachusetts: Framingham: 1 group each of RNs and LPNs in Framingham

Jennifer Arthur, Principal of Arthur Associates, moderated the focus groups using discussion guides (Appendix F). Each focus group lasted one and one-half hours and participants were paid incentives ranging from $75–85 for LPNs and from $100–125 for RNs. The different amounts were determined based on customary incentives for this type of activity for each geographic area. The groups were held in focus group facilities or hotel conference rooms. Prior to each focus group, participants were asked to complete a two-page written survey (Appendix F).

Description of Participants

A total of 67 LPNs and 43 RNs participated in the 11 focus groups. The average age of LPNs and RNs in the focus groups was 46.1 and 45.2 years of age, respectively. LPNs had slightly more children under 18 living at home than did RNs (2.1 versus 1.8). The LPNs were somewhat less likely than RNs to be married (47 percent versus 62 percent), and more likely to be divorced (33 percent versus 21 percent). A higher percentage of RNs (75 percent) were Caucasian than LPNs (59 percent), while LPNs (13 percent) are more likely than RNs (5 percent) to be Asian.

According to written survey responses, 44 percent of LPNs attended community or junior colleges, versus 23 percent of RNs. Adult school education was obtained by 32 percent of LPNs and 2 percent of RNs. Similar percentages of LPNs and RNs attended a 4-year college (17 percent and 16 percent, respectively). Among the RNs, 33 percent earned an ADN, 23 percent a

diploma, and 21 percent had a BSN. Over one-fourth (29 percent) of the RNs obtained an LPN license before they pursued their RN license. LPNs in the groups had been licensed an average of 15.8 years, while RNs had been licensed an average of 17.1 years.

Key Findings From Focus Groups

Despite the differences in licensure and employer, both RNs and LPNs Stated that direct patient care is the main responsibility of both RNs and LPNs. The acute care setting was desired by most RNs and LPNs if pay was equal. LPNs, however, predominate in long-term care settings in a more hands-on, technical capacity. RNs are more prevalent in acute care, where they are more likely to supervise and perform highly skilled tasks. Though some LPNs who work in the acute care setting expressed resentment regarding their lower pay and perceived lower status, most LPNs and RNs in the focus groups reported that relationships between the two groups are generally positive.

Although some of the focus group LPNs were not interested in obtaining an RN license, one or more individuals in each LPN group are either currently studying for their RN license, or are very interested in doing so. The LPNs in the focus group cited few barriers to earning their LPN license, saying they found it fairly easy. However, there are significant barriers for LPNs to obtain RN education and licensure. The major obstacles to LPNs obtaining an RN license appear to be:

- The need to take prerequisite courses such as math and science
- The difficulty of finding time off from work to take courses
- The expense of financing additional education

The majority of focus group participants were generally familiar with the State's scope of practice for LPNs. There were differences between what the regulations actually explicated and what members believed that LPNs were permitted to do. Those areas of discrepancy generally centered on patient assessment, IV therapy, and administration of blood products. Some LPNs reported that they are not permitted to perform all of the activities outlined in the scope of practice, while others felt that they have responsibilities that go beyond the State's regulations. Several LPNs who had knowingly practiced outside their scope of practice by performing tasks in the RN scope of practice expressed discomfort. Reasons for the discomfort included concern about legal liability issues and the fact that they are paid less than RNs and should not be expected to perform "RN tasks".

Focus group participants were generally satisfied with their choice of nursing as a career and certain aspects of their current jobs. In the written survey of the participants, over half the LPNs (56 percent) and three-fourths (74 percent) of RNs said that they strongly agree they are satisfied with nursing as a career (Appendix F1).

Summary of Workforce Perspectives

The key informant interviews yielded information from working RNs and LPNs about scope of practice issues, relationships between the two groups of nurses, and how each group perceived the practice of practical nursing, its limitations and opportunities. Both RNs and LPNs were generally aware of the legal scope of practice for LPNs in their State, yet there was wide variation in interpretation and implementation. There was uncertainty in some groups about the

difference between institutional policy and State law. Both RNs and LPNs often assumed that the "law" was what was practiced in their institution. Some individuals expressed surprise at the actual language of the State Practice Act and indicated that the scope was broader than their institutional policy allowed.

In the focus groups, we learned about perceptions of scope of practice, educational barriers, and the relationships between RNs and LPNs. Although most of the LPNs stated a desire or intention to return to school to get the RN license, few were actually enrolled in RN programs. Barriers such as time, a need to keep working, challenges in getting into courses, and family issues were among those that kept LPNs from pursuing further education. Relationships between LPNs and RNs in the workplace were reported to be cordial. There was some resentment by LPNs of the higher wages paid to RNs for what is seen by the LPNs as similar work. RNs, on the other hand, expressed some discontent over the need to supervise LPNs because it often added to their workload.

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Chapter 7: Summary, Conclusions, and Recommendations

Summary

Although LPNs organized into professional groups as early as 1941, there is little in the literature about the practice, work, demand or efficient utilization of the licensed practical nurse. Additionally, there is little guidance as to how to most effectively make use of this practitioners' skills to enhance patient care and augment the nurse workforce. Recently there has been an increased interest in trying new care delivery models in acute care hospitals using LPNs (Kenney, 2001). In the 1990s, there were published works that explored the creative use of LPNs in critical care, as advice nurses, and in intravenous therapy teams, (Buccini, 1994; Ingersoll, 1995; Eriksen, 1992; Roth, 1993). However, little systematic study has occurred that explore these roles.

Information about the LPN workforce is necessary before making predictions about how best to make use of that workforce. We found that LPNs were similar to RNs in the following ways:

- Both workforces are aging, with LPNs being slightly older on average;
- Males represent a very small percent of both workforces, but this is slowly increasing;
- The western region of the U.S. has the lowest numbers of LPNs and RNs relative to the population;
- RNs and LPNs share similar employment trends—more were employed in 2001 than in 1984;
- On average, RNs and LPNs work about the same number of hours per week—between 36 and 38 hours;
- The share of RNs and LPNs working in the offices and clinics of physicians doubled between 1984 and 2001. Also the share working in health services “not else where classified” increased; and
- The hourly pay rate of RNs and LPNs increased 19 percent between 1984 and 2001.

Differences found between the two workforces include the following:

- The RN workforce is larger than the LPN workforce, but the actual size of the LPN workforce is unclear since the available data are conflicting;
- Compared to RNs, more LPNs live in the South and fewer in the Northeast;
- Fewer LPNs are foreign-born, whereas an increasing percent of RNs are immigrants;
- RNs work in hospitals in greater proportions than LPNs, and the share of LPNs working in hospitals declined more than that of RNs between 1984 and 2001;
- The percent of LPNs working in nursing and personal care facilities increased between 1984 and 2001, but the percent of RNs did not; and
- By 2001, the percentage of LPNs working in the private sector was greater than the percent of RNs working in the private sector.

Our data indicate there are similarities in the LPN nurse practice acts across States but variation in how the States express the details of the work of practical nurses. The data also indicate that most States are flexible in the practice requirements and not overly specific in the tasks that are enumerated. However, there are a number of States that have a restrictive scope of practice and/or very specific detailing of tasks that LPNs are permitted to perform. Because of

the restrictiveness/specificity in selected States, it would be possible to identify States that could reasonably increase their utilization of practical nurses by reducing the restrictiveness of their practice.

Since the 1990s, the number of LPN programs has remained relatively stable but there has been a decline in number of graduates. Therefore, since 1994, there has been a decline in the number of students each program has enrolled and graduated. The total number of active licenses of LPNs has increased slightly through the 1990s. This suggests that LPNs are remaining in the workforce or keeping their licenses active. The number of first time US educated graduates who are taking the NCLEX-PN has dropped, but the percentage of those passing the examination has remained relatively consistent.

LPN educational curricular requirements vary among the States and territories. Most States specify the content and number of hours of training, some more detailed than others. However, most curricula teach similar basic nursing skills training, such as vital signs, patient data collection, patient care and comfort measures, and medication administration. Additionally, most have added requirements for more advanced skills, such as IV infusion and IV medication administration. Even though requirements vary, endorsement of LPNs from one State to another is generally done smoothly. Therefore, the States recognize the similarities of the training programs, even though they have differences.

The supply of LPNs is affected by characteristics common to other professions. Male LPNs are not more likely to be employed, but they tend to work more hours and are more likely to be employed full time than are females. LPNs reduce their participation in the labor force after a given age; the probability of employment drops after age 40 or 50 and the probability of full-time work declines after LPNs reach their early forties. Black LPNs are more likely to work full time and tend to work more hours than white LPNs. LPNs with children in their households work fewer hours. As LPN wages rise, LPNs are more likely to work full-time.

LPNs generally enjoy higher earnings with experience, but their earnings level off. They also have higher wages if they have a college degree. LPN earnings vary by employment sector, with the highest earnings enjoyed by LPNs working in personnel supply services (such as temporary and home health agencies), hospitals, and long-term care facilities.

The demand for LPNs varies with LPN wages, wages of other nursing personnel, patient volumes, case mix of patients, and market characteristics. In general, demand for LPNs drops as LPN wages rise, and demand for LPNs rises as wages of RNs rise. Higher patient volumes are associated with higher demand for LPNs. In hospitals, rising patient acuity reduces demand for LPNs, while demand increases in long-term care facilities with higher ADL dependency of patients. Revenue constraints imposed by Medicaid lead to higher LPN demand in hospitals but lower LPN demand in long-term care facilities.

Finally, the scope of practice of LPNs affects demand for them. Restrictive scopes of practice have a significant, negative effect on hospital demand for LPNs. The restrictiveness of the scope of practice has a negative effect on demand by long-term care facilities. The weaker effect of scope of practice restrictions on long-term care facility demand for LPNs is not surprising. Long-term care facilities rarely require the skills that LPNs are prevented from practicing in the restrictive States.

The key informant interviews and focus groups yielded a great deal of information from working RNs and LPNs about scope of practice issues, relationships between the two groups of

nurses, and how each group perceived the practice of practical nursing, its limitations and opportunities. Both RNs and LPNs were fairly knowledgeable about the legal scope of practice for LPNs in their State, yet there was wide variation in its interpretation and implementation. There was also variation in understanding about the scopes of practice of the two practitioners.

Although most of the LPNs expressed a desire or an intention to return to school to get the RN license, few were actually enrolled in RN programs. Barriers such as time, a need to have a salary, challenges in getting into courses, and family issues were among those that kept LPNs from pursuing further education. In some locations, LPNs in long-term care facilities have salaries that are at or near hospital RN salaries. These LPNs tend to be less interested in pursuing an RN license. In locations with a substantial gap in salary between RNs and LPNs, there was more interest in moving from LPN to RN. In several focus group locations, long-term care facilities paid LPNs more money than acute care hospitals. There was also a perception that LPNs are treated with less respect in acute care hospitals and that the work is more technical and less interesting.

Workplace relationships between LPNs and RNs in the workplace are reported to be cordial. There is some resentment by LPNs of the higher wages paid to RNs for what is seen by the LPNs as similar work. RNs, on the other hand, expressed some discontent over the need to supervise LPNs, since this can adds to the RN workload.

Conclusions

LPNs are now and have historically been a necessary part of the healthcare workforce in U.S. hospitals, long-term care facilities, and other organizations that provide health care. As the technical complexity of patient care has increased, the demand for more extensive education for both LPNs and RNs has increased. Simultaneously, the demand for more LPNs, and RNs seems to require that the educational requirements be reduced. Nurse educators and executives have responded to these conflicting demands by adding additional training to both the basic LPN and RN education programs and generally increasing the time to complete both programs. Additionally, both practitioners can opt to expand their scopes of practice with additional training. It is not clear that this increase in scope of practice leads to an increase in salary for the LPN or RN. LPNs with additional training and responsibility for IV medications may see no salary increase. So, while the increased skill is good for organizations, it is not clear that it benefits the individual in a tangible way.

The LPN workforce displays the same demographic characteristic as the RN workforce, and thus has many of the same limitations, in regards to age, gender, and family obligations. To expect the LPN workforce to substantially augment the RN workforce is unrealistic, as it presently exists. There are selected States that have scopes of practice that limit the utility of the LPN. Less restrictive scopes of LPN practice would increase hospital demand for LPNs but leave long-term care demand unchanged. Further, selected organizations restrict the scope of practice of LPNs further than the State laws allow. Reasons for these restrictions may be the belief, supported by some studies, that fewer LPN hours have been found to be related to better patient outcomes in acute care facilities. In any case, less restrictive scopes of practice would influence demand for LPNs in acute care hospitals.

Although all key informants and focus group members stated flatly that LPNs could not directly substitute for RNs, most acknowledged that much of the work that RNs perform could be performed by LPNs. There are, of course, differences in the training, skill, and ability of the two different work groups, just as there are differences among individuals in both work groups.

It is very clear that long-term care institutions in the U.S. could not function without LPNs. It is also clear that LPNs could be used more fully in hospitals. However, even if direct substitution was possible, there is little hope that the current number of LPNs will be able to augment the RN workforce in adequate numbers to fill the need. More of both LPNs and RNs are needed.

Recommendations

Based on our findings, we recommend the following:

1. The LPN could be used to augment the workforce during RN shortages. However, the role of LPNs is limited by their scope of practice. How much the LPN can be used depends on the ability of States to create a more flexible LPN scope of practice. States should assess whether there is evidence that lessening practice restrictions would negatively impact patient care before making changes to the scope of practice. Careful study of the use of the LPN in various settings is necessary to determine positive or negative impact on patient outcomes. Federal and State governments should support research on the effect of LPNs on quality of care.
2. Employers should work to create teams, of RNs and LPNs to share workload appropriately in both acute and long-term care.
3. Boards of Nursing must ensure that bedside RNs and LPNs, nurse managers, and hospital and long term care executives have a common and accurate understanding of the scopes of practice of RNs and LPNs. Employers should clarify for their employees the differences between State scopes of practice and individual institutional policy.
4. State Boards of Nursing should work toward standardization of LPN training, both at the basic education preparation level and beyond. One mechanism to achieve greater uniformity might involve the identification of national standards for entry level and advanced education of LPNs.
5. Nurse educators need to facilitate articulation between LPN and RN license requirements. More efficient "laddering" of workers from lower skill to higher skill healthcare jobs benefits both workers and employees, and will ultimately decrease the total cost to educate nurses.
6. Based on data related to gender, age, marital status, and ethnicity, it appears that LPNs and RNs come from essentially the same pool or potential workers. Therefore, the long-term RN shortage is unlikely be solved with an influx of LPNs, because increased recruitment of students into LPN programs will likely offset recruitment into RN programs.
7. Employers should examine how the work of licensed nurses could be allocated safely and reasonably, so that RNs are not overwhelmed and LPNs can practice to their full scope of practice. Although LPNs cannot directly substitute for RNs, many tasks traditionally completed by RNs can be accomplished by LPNs, with appropriate training.
8. Employers should consider providing additional compensation to LPNs who complete additional training and obtain certifications beyond the basic LPN license, to provide LPNs with incentives to continue their education.
9. The Bureau of Health Professions and State Board of Nursing should strive to educate the public about the LPN profession, both to give recognition to practicing LPNs and to encourage more people to pursue a career in practical nursing.
10. The Bureau of the Health Professions, National Council of State Boards of Nursing, or individual State Boards of Nursing should create a national database to track both LPNs and RNs to have accurate data for prediction of nurse and healthcare workforce needs.

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Kenney, P. A. (2001). Maintaining quality care during a nursing shortage using licensed practical nurses in acute care. Journal of Nursing Care Quality, 15(4), 60-68.

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Appendices

Appendix A

A1. Nursing-Related Web sites

Advance for LPNs
http://www.advanceforlpns.com/

Board of Vocational Nursing and Psychiatric Technicians (California)
http://www.bvnpt.ca.gov/

Bureau of Labor Statistics, U.S. Department of Labor: Licensed Practical and Licensed Vocational Nurses
http://www.bls.gov/oco/ocos102.htm/

National Association for Practical Nurse Education and Service, Inc
http://www.napnes.org/

National Council of State Boards of Nursing
http://www.ncsbn.org/

The National Federation of Licensed Practical Nurses, Inc
http://www.nflpn.org/

Appendix B

B1. Summary of Responses to IV Medication Survey Sent to all Boards of Nursing except California

State	Statement Allowing LPNs/LPNs to Administer IV Medications	Statement Specific to Hemodialysis
Alabama	General Statement section 610-X-6-.04 of regulations: "Provision of care using standardized procedures including administration of medications and treatments under the direction of licensed professional nurse…"	• Statement: "Chronic Hemodialysis by Licensed Practical Nurses" "…it is within the scope of practice of licensed practical nurses to perform hemodialysis…" including, "initiation of dialysis treatment at peripheral sites; performance of intravenous therapy…, including connection of IV fluids/ "piggyback" solutions to existing central venous infusions; flushing of central venous ports and alteration of fluid rates by LPNs with two years experience in initiating peripheral IV therapy; monitoring of dialysis treatment; adjustment of dialysis treatment at the direction of physician or registered nurse; termination of dialysis treatment…" "Functions under the supervision of a registered nurse, i.e., RN physically present in the facility."
Alaska	Alaska advocates the use of the National Council's Delegation process to determine what LPNs can do. Using the example of "hanging a premixed medicated intravenous solution", they go on to State that, "Activities that fit the decision making model depicted in Figure 1 are appropriate areas for expanded practice by experienced LPNs."	The Alaska Board uses "management of chronic dialysis care in the health care facility setting" as another example of a task that can be appropriately delegated to LPNs.
Arizona	LPNs allowed to administer IV meds.	
Arkansas	LPNs are not taught IV therapy in the Education Program. The RN may delegate this task to an LPN provided the LPN has had postgraduate education and competency validation. They cannot perform any task that requires "specialized knowledge, skill or judgment of an RN, "e.g. cancer chemotherapy or any medication that requires assessment/monitoring, as assessment is not in the LPN scope of practice.	No

State	Statement Allowing LPNs/LPNs to Administer IV Medications	Statement Specific to Hemodialysis
Colorado	"Intravenous therapy and venous blood withdrawal is a part of the expanded role of the LPN." In addition to other activities, LPNs may administer, "pre-mixed antibiotic solutions via peripheral veins regulated by gravity flow or pump."	No
Connecticut	May initiate IV therapy, maintain continuous therapy and administer IV medications (except IV push medications) with special post-basic training, demonstrated competence and availability of ongoing supervision.	No
Delaware	Board's position paper recognizes initiation and maintenance of peripheral therapy (including IV medications, except by push) They have limited central line activities (not delineated by Board in our response.)	No
Florida	LPNs can administer IV medications.	
Georgia	No restrictions on LPN's administering IV medications.	
Idaho	"The licensed practical nurse implements aspects of the strategy of care by:…Performing peripheral intravenous therapy functions as follows…Hanging containers of medicated or unmedicated intravenous solutions which are commercially prepared or pre-mixed by pharmacy, hanging blood or blood derivatives, inserting analgesic cartridges and programming and monitoring patient controlled analgesia pumps and performing autoinfusion"	"The licensed practical nurse implements aspects of the strategy of care by:…Performing a variety of procedures including but not limited to: application of monitoring equipment, recording of readings and hemodialysis or peritoneal dialysis."
Illinois		The letter of the Illinois Nurse Practice Act States that the LPN does not give IVP medications. However, it is standard practice in the Nephrology Community for LPN's with IV certification to give Dialysis specific IVP medications. They are not allowed to co-sign or administer blood or blood products
Indiana	"Indiana does not have specific laws defining the scope of practice for Practical Nurses. The law just basically States that a nurse can perform functions that they are trained to do and those in which the facility allows them to do." Kristen Kelley – Indiana Board of nursing.	

State	Statement Allowing LPNs/LPNs to Administer IV Medications	Statement Specific to Hemodialysis
Iowa	"Iowa Administrative Code 655.6.5(3) authorizes the licensed practical nurse to perform procedures related to the expanded scope of administration of intravenous therapy in a licensed hospital, a licensed skilled nursing facility and a **certified end-stage renal dialysis unit**" after taking a Board-approved post-graduate course. LPNs may initiate peripheral IV therapy, administer premixed electrolyte and vitamin solutions and premixed antibiotic solutions – all of these after the initial dose is administered by an RN.	See Statement re IV meds.
Kansas	After post-graduate training the LPN may, administer "continuous intravenous drip analgesics and antibiotics…administer by direct intravenous push analgesics, antibiotics, antiemetics and diuretics."	No
Kentucky	"When delegated by a registered nurse, the licensed practical nurse may administer IV medications and fluids that are: (a) mixed and labeled by a registered nurse or pharmacist or are commercially prepared; and (b) given on a routine reoccurring basis to a patient with a stable condition."	"LPNs who provide dialysis care may: • Collect assessment data; • Cannulate and perform dialysis treatment via an implanted subcutaneous vascular device, and/or peripheral access sites (AV fistulas and AV grafts). • Administer heparin 1:1000 units or less concentration… • Administer normal saline via the dialysis machine to correct dialysis induced hypotension based upon pre-approved medical protocol • Administer intravenous therapy/ medications" as listed in "Statement Allowing LPNs/LPNs to Administer IV Medications" in this table.

State	Statement Allowing LPNs/LPNs to Administer IV Medications	Statement Specific to Hemodialysis
Louisiana	"Scope of practice is a fluid concept. It changes as knowledge and technology expand. LPNs must possess the knowledge, skill, and ability to perform their duties, therefore, scope of practice comes down to the competency of the individual LPN….Some of the tasks an LPN may perform when the above conditions are met… Initiate and maintain IV therapy and administer IV medications by IVPB and/or IVP (including hyperalimentation, blood and blood products)…Perform heparinization during hemodialysis…Care for clients with external venous catheters and specifically: obtain blood specimens/connect and monitor IV fluids/connect IVPB, provide site care (including dressing changes)	See Statement re IV meds.
Maine	*Must have IV certification course [could not access more detailed information]*	"…a licensed practical nurse may administer a heparin bolus as part of the procedure for initiating dialysis in a renal dialysis center."
Maryland	*"The LPN may perform the following infusion therapy acts for peripheral and subcutaneous infusion when there is an RN on site or available by telephone…Administer a medication which is routine for the patient…Administer medication via a peripheral IV line (including midline) using: (a) pharmacy-prepared medication; and (b) PPN solutions; and Add medications to an intravenous solution."* "The LPN may perform the following additional acts under the direct supervision of the RN following a comprehensive patient assessment: (1) Administer medication and TPN via midclavicular or CVC by hanging pharmacy-prepared solutions; (2) Add medication to a solution administered via a midclavicular or CVC; (3) Administer medication and subsequent replacement solutions including TPN via implanted ports." "On completion of a second specialized educational program…and with documented evidence of clinical competency, the LPN may administer standardized doses of non-vesicant chemotherapeutic agents and antiviral agents."	No

State	Statement Allowing LPNs/LPNs to Administer IV Medications	Statement Specific to Hemodialysis
Massachusetts	*LPNs may administer IV medications with the exception of IV medications used during conscious sedation. "The measurement of competency and whether the LPN is allowed this practice is given to the facility to determine. Our regs say that it is within the SOP."*	No
Michigan		In Michigan, LPN's can give IV meds as long as they have the Medication class and certificate. They may not administer blood but can give all other drugs.
Minnesota	*LPNs are allowed to give IV medications.*	
Mississippi	*LPNs are allowed to give IV medications*	
Missouri	*LPNs are allowed to give IV medications.*	
Montana	*"Any of the following IV therapy tasks related to peripheral vessel IVs may be performed by the practical nurse:…mix medication solution from a unit dose vial and add to IV solution or volutrol; hang medication solutions that are pre-mixed and properly labeled by a registered nurse or pharmacist; administer metered dose of medication by way of a patient controlled analgesia pump…"* *"Any of the following tasks related to central venous lines may be performed by a practical nurse:…change standard solutions on continuous flow, pre-established central line system."*	"Under the direct supervision of a dialysis RN, an LPN may perform hemodialysis procedures that include: (a) arterio-venous fistula/graft needle insertion; (b) administration of prescribed local anesthesia as needed prior to dialysis needle insertion; (c)accessing, blood draws, flushes and dressing changes of hemodialysis central-venous catheters; (d) administration of prescribed doses of routine dialysis heparin."
Nebraska	*"A licensed practical nurse-certified may perform limited intravenous therapy interventions under the direction of a registered nurse or licensed practitioner… When under the direct supervision of an RN or licensed practitioner, an LPN-C may perform these activities for an adult client: (1) Infuse intravenous fluids and administer approved medications into a continuous flow central line..* *"Approved medications" Approval determined by RN or MD delegating the task.*	"The Nebraska Board supports the ANNA Position Statement on Delegation of Nursing Tasks and the ANNA Position Statement on Use of Unlicensed in Dialysis." The Board supports administration of heparin but does not support administration of other IV medications in dialysis setting.

State	Statement Allowing LPNs/LPNs to Administer IV Medications	Statement Specific to Hemodialysis
Nevada	*"A licensed practical nurse who has at least 1 year of experience in nursing after receiving his initial license, who has completed a course in intravenous therapy approved by the Board…, and who acts pursuant to a written order of a physician and under the immediate supervision of a physician or registered nurse may:… Administer antibiotics or histamine H2 receptor antagonists by adding a solution by piggyback…"*	No
New Hampshire	*LPNs may administer intravenous "medications and nutrients to intravenous fluids after the initial dose is administer by the registered nurse…Add medications and nutrients to fluids previously premixed by a registered pharmacist or the pharmaceutical manufacturer after the initial dose is administered by the registered nurse…"*	No
New Jersey	*"LPNs need to be competent to perform the delegated task of initiating and administering IV therapy (excluding IV push medications)."*	No
New Mexico	*LPNs are allowed to give IV medications.*	
New York	*"…a licensed practical nurse, who has demonstrated knowledge, skills and competency in intravenous therapy, **MAY**, while practicing in an acute care setting under appropriate supervision:… Add medications except chemotherapy to IV solutions for infusion through vascular access devices."*	No
North Carolina	*"Administration of IV fluids and medications via the central vascular route is within the scope of nursing practice for the registered nurse and the licensed practical nurse."* *"Administration of IV fluids and medications via the peripheral vascular route is within the scope of practice for the licensed practical nurse."*	No

State	Statement Allowing LPNs/LPNs to Administer IV Medications	Statement Specific to Hemodialysis
North Dakota	*"The North Dakota Board of Nursing authorizes the provision of selected components of intravenous therapy by a Licensed Practical Nurse who has completed a board approved educational program that included intravenous therapy in the curriculum or has successfully completed a course in intravenous therapy…"* *"The role of the Licensed Practical Nurse in the nursing management of intravenous therapy of a stabilized client is to:… Add prescribed medications to intravenous fluids to administer through existing peripheral lines and central venous lines having external access."* *"Administer selected medications by intravenous bolus according to specific institutional policies and after specific institutional inservice."*	"The Licensed Practical Nurse may perform the following nursing functions in a dialysis unit according to specific institutional policy and after completion of specific institutional inservice:… Administer IV medications and solutions during hemodialysis."
Ohio	*After completing a course in intravenous therapy approved by the Board the LPN may "initiate or maintain an intravenous piggyback infusion containing an antibiotic additive."*	"…at the direction of a physician or a registered nurse, a licensed practical nurse authorized by the board to perform intravenous therapy may perform the following activities for the purpose of performing dialysis: (1) The routine administration and regulation of saline solution for the purpose of maintaining an established fluid plan; (2) The administration of a heparin dose intravenously; (3) The administration of a heparin dose peripherally via a fistula needle; (4) The loading and activation of a constant infusion pump or the intermittent injection of a dose of medication prescribed by licensed physician for dialysis."
Oklahoma	*"IV therapy and medication administration may be within the scope of practice of the LPN who has appropriate educational training and under supervision."*	No
Oregon	*"The Board recognizes that the role of the licensed practical nurse and registered nurse will change over time. Basic education which leads to licensure as a licensed practical nurse of registered nurse establishes entry level competencies. The licensee may add technical skills to practice following initial licensure through such methods as inservice education, on the job training or continuing education." Oregon does not publish a laundry list of tasks that are within the LPN scope of practice.*	No

State	Statement Allowing LPNs/LPNs to Administer IV Medications	Statement Specific to Hemodialysis
Pennsylvania	*LPNs may administer IV medications except for antineoplastic agents, titrated medication and intravenous push medications other than heparin flush.*	No
Rhode Island	*"There is nothing in statute or regulations to preclude an LPN from administering IV therapy or medication. The employing agency decides which level of caregiver (RN or LPN) may perform this task and to assure the individual is competent to perform task."*	No
South Carolina		South Carolina requires an IV certification course
South Dakota	*LPNs may, "Administer, by peripheral route, standard solutions at a defined flow rate, with or without admixtures, mixed and labeled by a pharmacist, registered nurse or physician…Administer vitamins, antibiotics, corticosteroids, and H2 antagonists by the intravenous piggyback route, that are mixed and labeled by a pharmacist, registered nurse, or physician, excluding the first dose which must be administered by a registered nurse."* *Administer "via an externally accessed centrally place catheter…standard solutions at a defined flow rate, with or without admixtures, mixed and labeled…" "Administer vitamins, antibiotics, corticosteroids, and H2 antagonists by the intravenous piggyback route, that are mixed and labeled by a pharmacist, registered nurse, or physician, excluding the first dose which must be administered by a registered nurse."*	No
Texas	*LPNs may administer intravenous medications both peripherally and via central lines after education that includes competencies specific to those functions.*	No
Utah	*LPNs may administer IV medications after taking a post-graduate certification course.*	No
Virginia		LPN's can administer all med's utilized in dialysis, IV included. They cannot, however, administer blood without an RN second signature.

State	Statement Allowing LPNs/LPNs to Administer IV Medications	Statement Specific to Hemodialysis
Washington	*"Licensed Practical Nurses (PN) may, under the supervision of a registered nurse, administer intravenous medications and fluids provided the LPN has had the appropriate continuing education and practice to prepare to administer these procedures safely and competently." "The LPN may perform administration of fluids, medication, Total Parenteral Nutrition (TPN), blood or blood products via central venous catheters and central lines, access these lines for blood draws and administration of emergency cardiac medications via IV push"…if there are strict guidelines and protocols in place."*	No
West Virginia	*"The registered nurse may delegate selected activities associated with the administration and management of intravenous therapy to a licensed practical nurse qualified by education and experience." Based on this, LPNs do administer IV medications.*	No
Wisconsin	*"We don't do laundry lists of tasks-they may be delegated acts according to their education/training and experience." Intravenous therapy, including administration of intravenous medications, "are considered either delegated medical acts or delegated nursing acts from an RN."*	No
Wyoming	*LPNs may administer IV medications after completing an IV Therapy Certification course.*	No

Source: www.bvnpt.ca.gov/

Appendix C

C1. Restrictiveness Scale Scores Sorted by Most Restrictive

	Review1	Review2	Review3	Restrictiveness Final
Iowa	4	4	3	4
Virgin Islands	4	4	4	4
Alaska	3	3	2	3
Arizona	4	3	3	3
Arkansas	3	3	3	3
California	4	3	3	3
Colorado	2	3	3	3
Illinois	3	3	3	3
Kansas	4	3	3	3
Maine	4	3	3	3
Nebraska	3	3	3	3
Utah	3	3	3	3
Washington, D.C.	4	3	3	3
Alabama	2	2	2	2
Connecticut	2	2	3	2
Delaware	2	2	3	2
Georgia	1	2	2	2
Idaho	1	2	2	2
Kentucky	1	2	2	2
Maryland	1	2	2	2
Mississippi	1	2	2	2
Missouri	2	2	3	2
Montana	1	2	2	2
Nevada	2	2	2	2
New Hampshire	1	2	2	2
New York	1	2	2	2
North Dakota	1	2	2	2
Ohio	3	2	2	2
Oregon	2	2	2	2
Pennsylvania	2	2	2	2
South Carolina	3	2	2	2
South Dakota	2	2	3	2
Tennessee	2	2	2	2
Virginia	2	2	2	2
West Virginia	1	2	2	2
Wisconsin	2	1	2	2
Wyoming	2	2	3	2
Florida	1	1	1	1
Hawaii	1	1	1	1
Indiana	1	1	1	1

	Review1	Review2	Review3	Restrictiveness Final
Louisiana	1	1	1	1
Massachusetts	2	1	1	1
Michigan	2	1	1	1
Minnesota	1	1	1	1
New Jersey	1	1	1	1
New Mexico	1	1	2	1
North Carolina	1	1	1	1
Oklahoma	1	1	1	1
Rhode Island	1	1	1	1
Texas	1	1	1	1
Vermont	1	1	2	1
Washington	1	1	1	1

C2. Specificity Scale Scores Sorted by Most Specific

	Review1	Review2	Review3	Specificity Final
California	4	4	4	4
Idaho	4	4	4	4
Iowa	4	4	4	4
Kansas	4	4	3	4
Maine	4	3	4	4
Montana	3	4	4	4
Nebraska	4	4	4	4
New Jersey	3	4	4	4
Ohio	4	4	4	4
Pennsylvania	3	4	4	4
South Carolina	4	4	3	4
South Dakota	3	4	4	4
Alaska	4	3	3	3
Illinois	4	3	3	3
Mississippi	2	3	3	3
Nevada	4	3	3	3
New Hampshire	1	3	3	3
Oregon	3	3	2	3
Alabama	3	2	2	2
Arkansas	2	2	2	2
Colorado	1	2	2	2
Delaware	3	2	2	2
Kentucky	1	2	2	2
Louisiana	1	2	2	2
Missouri	1	2	2	2
New Mexico	1	2	2	2
New York	1	2	2	2

	Review1	Review2	Review3	Specificity Final
North Carolina	1	2	2	2
North Dakota	1	2	2	2
Rhode Island	1	2	2	2
Tennessee	1	2	2	2
Utah	2	2	2	2
Vermont	1	2	2	2
Washington	1	2	2	2
Washington, D.C.	1	2	2	2
Wisconsin	2	2	2	2
Wyoming	1	2	2	2
Virgin Islands	1	2	2	2
Arizona	1	1	1	1
Connecticut	2	1	1	1
Florida	1	1	1	1
Georgia	1	1	2	1
Hawaii	1	1	1	1
Indiana	1	1	2	1
Maryland	1	1	1	1
Massachusetts	2	1	1	1
Michigan	1	1	1	1
Minnesota	1	1	1	1
Oklahoma	1	1	1	1
Texas	1	1	1	1
Virginal	1	1	1	1
West Virginia	1	1	1	1

C3. LPN Scopes of Practice

Scope of Practice																							
State									Tubes		Dressings			Nursing Care Planning			Supervisors						
	IV meds	Cancer agents	Central lines	Blood	Hyperal	Venus blood draw	Arterial blood draws	Insert IV	Insertion	Maintenance	Changes	Reinforcement	Documentation	Assessment	Data collection	Observation	Verbal and phone orders	Documentation co-signed	Teaching	Standardized Procedures/ Expanded practice	Restrictive	Specific	Other Procedures
Alabama																	RN, MD				x		
Alaska	x			x					x	x				no			RN, MD, Dentist				x		
Arizona	x												x		x	x							
Arkansas	x*	no															RN, MD, Dentist, APN						
California	x*	x	x*	x		x					x	x					RN, MD					4	4
Colorado	x*		no			x*			no		x		x	no	x	x	RN,MD,APN,Dentist, Podiatrist				x	3	3
Connecticut	x*							x*															
Delaware	x							x*							x	x							1
Florida	x																RN,MD,DO, Podiatrist,dentist						1
Georgia	x														x	x							1
Hawaii															x	x							1
Idaho	x	no	x*	x		x		x*	x	x	x	x	x		x	x	RN,MD,Dentist			x		2	4
Illinois	x			no	x			no	x	x			x		x	x	RN,MD,Dentist			x		3	3
Indiana																	RN,MD,Dentist,Chiropractor, Optometrist,Podiatrist					1	1
Iowa	x*			no		x		x*	x	x*	x				x	x		x				4	4
Kansas	x*	no	no	no				x*	x*	x*	x						RN					3	4
Kentucky	x*																						

Louisiana	x			x	x	x		x	x	x	x				x	x	RN,MD,Optometrist,Dentist, Psychologist	x				1	2
Maine	x*			no				x	x*	x*	x		x	no	x	x						3	3
Maryland	x	x*																					
Massachusetts	x												x		x	x				x			2
Michigan	x*			no																			1
Minnesota	x																						1
Mississippi	x*	no	x*	no									x		x	x	RN,MD,Dentist					3	3
	IV	Cancer agents	Central lines	Blood	Hyperal	Venus blood	Arterial blood	Insert IV	Insertion	Maintenance	Changes	Reinforcement	Documentation	Assessment	Data collection	Observation	Supervisors	Verbal and phone orders	Documentation co-signed	Teaching	Standardized	Restrictive	Specific
Missouri	x*																RN,MD						2
Montana	x	no	no	no	no				x	x	x				x	x	RN,MD,Dentist, OD,Podiatrist				x	2	2
Nebraska	x*	no	no	no	no	x*		no		x			x		x	x	RN			x		4	3
Nevada	x*	no		no			no	x	x	x	x	x			x	x				x		3	3
New	x*														x	x	RN,MD,ARNP,Dentist						2
New Jersey	x														x	x							2
New Mexico	x							x	x														2
New York	x*	no		x*											x	x				x			2
North Carolina	x		x*												x	x				x			1
North Dakota	x														x	x				x			1
Ohio	x*														x	x	RN,MD,Dentist,Optometrist,Podiatrist			x			
Oklahoma	x																						1
Oregon															x	x				x			
Pennsylvania	x*	no		no		x		x										x				3	3
Rhode Island	x																						
South Carolina	x*		x*			x*			x/*	x*	x*				x	x						4	5
South Dakota	x	no	x*	no				x		x	x						RN,MD	no		x		3	3
Tennessee															x	x							1

	IV	Cancer agents	Central lines	Blood	Hyperal	Venus blood	Arterial blood	Insert IV	Insertion	Maintenance	Changes	Reinforcement	Documentation	Assessment	Data collection	Observation	Supervisors	Verbal and phone orders	Documentation co-signed	Teaching	Standardized	Restrictive	Specific
Texas	x*		x*					x*	x*	x					x	x						2	2
Utah	x*														x	x	RN,MD						2
Vermont															x	x	RN,MD,APRN,Dentist						1
Virginia				x*																			1
Washington	x*		x*	x*		x*			x*				x		x	x						3	3
Washington,	x								x*	x					x	x							2
West Virginia	x*														x	x		x		x			1
Wisconsin	x														x		RN,MD,Podiatrist,Dentist,Optometrist			x			1
Wyoming	x*														x	x	RN,MD,Dentist						1

** with additional education* *x = written* *Y = verbal*

non-specific-specific =1-5 *unrestrictive-restrictive=1-5* *(with 1 being the least and 5 being the most)*

C4. Model for Categorizing Scopes of Practice

Restrictive and Specific Scale Scoring Instructions

As demonstrated by the Web information, telephone interviews of the Boards, key informant interviews, and focus groups, please make the following judgments:

As a relative value, on a scale of 1-4, with 1 being the least restrictive and 4 being the most restrictive, categorize (by circling) each State's LPN/LPN scope of practice. Restrictive is defined as allowing or not allowing a level of autonomy/flexibility/independence in the practice of the LPN/LPN.

State Name

Least Restrictive			Most Restrictive
1	2	3	4

As a relative value, on a scale of 1-4, with 1 being the least specific and 4 being the most specific, categorize (by circling) each State's LPN/LPN scope of practice. Specific is defined as explicating defined parameters of practice of the LPN/LPN.

State Name

Least Specific			Most Specific
1	2	3	4

C5. Telephone Interview Script for LPN Boards

Introduction:

I am------ and we were recently funded by HRSA to study LPN scope or practice in the 50 States. We have collected information from your Web site and have several questions for clarification. It will take about 20 minutes of your time. Would you answer the questions? Offer to read or fax the Information Letter.

1. Are there other written documents, not on the Web site, that further explains the scope of practice for your State?

2. How would you characterize the scope of practice in your State? From 1-5 with 1 being the most restrictive and 5 being the least restrictive?

3. We have developed a chart of LPN activities. As I go through the information, will you verify that it is correct?

4. Have you changed your scope of practice in the last 5 years? If yes, please describe.

5. How many disciplinary actions has your board taken in the past year against LPNs?
   - Can you characterize the reasons for these actions?
   - What share of actions result from patient care violations/drug violations/etc.?

6. What data does your State collect about LPNs?
   - What information is collected with licensure? Demographics, employment status?
   - Have you done any special surveys of LPNs in your State? Do you do regular surveys?
   - What information do you have about your State's LPN education programs?
   - Can you share any or all of these data with us?

Appendix D

D1. LPN Training Data Totals for U.S.: 1976-1998

	1976	1977	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Graduates	44,707		43,705	48,173	41,193	36,347	26,641	25,054	23,674	27,920	33,736	34,970	38,775	39,623	39,703	36,625	33,170	26,546	24,522	
Total Enrollment		55,947	55,170		54,080	46,034	38,552	34,581	36,736	37,719	42,826	49,809	51,773	53,910	52,740	51,508	45,326	41,602	35,013	33,379
Fall Admissions		38,310				31,312	28,375	24,700	26,235	27,642	29,357	31,886	33,941	33,706	33,660	32,029	28,684	26,667	23,084	22,049
Admissions	58,352		58,960	59,994	55,792	46,314	40,120	38,405	38,293	43,612	50,214	51,526	53,422	52,780	53,277	47,812	43,989	37,607	35,483	
No. of Programs	1,318		1,294	1,295	1,248	1,219	1,173	1,128	1,113	1,119	1,153	1,143	1,150	1,157	1,183	1,167	1,193	1,219	1,211	
No. of Schools	1,242		1,222	1,222	1,184	1,146	1,100	1,062	1,047	1,057	1,087	1,087	1,086	1,096	1,107	1,106	1,127	1,123	1,129	

Source: Area Resource Training File (February 2003 Release), National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources and Services Administration, Department of Health and Human Services

Note: Data may appear unrealistically low as some LPN schools withheld data. See User Documentation for the Area Resource Training File (February 2003 release) for detail on counties and years with incomplete data.

D2. Graduates of LPN/LPN Schools by State: 1976 -1997

State	1976	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Alabama	1077	1216	2174	1276	1014	760	753	702	798	1109	1144	1519	1718	1473	1304	1425	1103	865
Alaska	17	8	12	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arizona	445	389	384	398	375	253	311	253	272	340	419	427	460	427	472	384	207	140
Arkansas	898	888	1108	895	668	421	454	409	571	602	593	650	562	673	576	670	480	482
California	3142	3062	6684	2877	2837	1957	1886	1405	2018	2297	1777	2303	2575	2239	2411	1834	1642	1591
Colorado	501	497	444	485	304	239	260	323	395	434	450	483	538	533	482	297	243	165
Connecticut	524	228	229	296	311	256	439	178	142	342	330	119	284	346	174	119	280	206
Delaware	113	91	57	61	39	38	26	55	17	34	60	81	69	108	79	13	45	83
District of Columbia	80	81	71	59	45	44	61	42	54	62	79	48	27	52	236	113	60	42
Florida	1923	1887	2148	2158	1859	1404	1313	1157	1352	1925	2127	2323	2091	2243	2278	1597	1416	1417
Georgia	1334	1045	1374	1243	1038	658	753	631	896	872	896	911	903	894	881	790	413	433
Hawaii	105	116	114	99	81	60	55	52	49	91	96	116	42	61	189	64	153	73
Idaho	182	150	105	149	136	80	94	90	107	107	113	130	129	112	142	135	109	58
Illinois	1965	2125	2195	1881	1489	1094	942	1017	1124	1324	1401	1498	1695	1511	1185	1337	839	714
Indiana	824	855	834	823	885	658	630	653	730	893	949	1187	1376	1104	1185	1225	980	641
Iowa	848	754	809	675	483	391	475	440	569	713	771	883	953	803	725	559	394	452
Kansas	539	570	716	645	512	368	462	507	465	612	705	638	630	580	526	613	452	434
Kentucky	539	803	676	651	663	413	503	449	521	682	769	989	1144	917	1057	691	660	665
Louisiana	1044	873	964	1064	885	673	654	538	742	712	789	947	974	1174	909	866	679	486
Maine	197	185	183	266	156	146	120	131	182	204	156	103	28	36	21	69	0	0
Maryland	396	360	355	292	301	206	156	168	190	241	225	207	185	169	219	151	100	71
Massachusetts	1143	1079	883	699	635	525	511	550	601	714	661	578	643	676	686	665	518	561
Michigan	1927	1613	1468	1357	1112	1057	893	747	751	1031	956	1214	1052	866	821	722	413	456
Minnesota	1161	1135	1118	1058	908	715	718	752	914	1110	1138	1330	976	1160	1150	866	834	730
Mississippi	602	708	538	554	416	286	344	310	295	388	397	519	434	420	529	486	294	340
Missouri	1077	1068	1073	1048	1032	750	652	655	726	850	1035	1095	1043	1350	1245	1187	956	779
Montana	175	129	132	155	145	106	100	104	128	161	149	151	111	140	134	97	126	120

State	1976	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Nebraska	439	381	468	446	391	255	200	270	316	336	319	312	314	251	315	254	267	253
Nevada	67	74	67	57	53	28	43	56	47	63	79	73	88	73	72	0	0	0
New Hampshire	130	143	200	209	122	96	56	40	32	87	82	92	104	99	108	104	102	82
New Jersey	1333	1050	1171	1069	1064	799	674	541	627	791	822	1139	834	1157	826	701	620	410
New Mexico	279	267	294	305	284	197	152	135	130	115	155	170	158	187	236	187	131	128
New York	3632	2478	2910	2846	2719	1835	1844	1568	1731	2072	2479	2576	3343	3142	2288	2467	2232	2086
North Carolina	933	843	929	651	499	429	317	307	352	430	469	516	484	641	561	498	413	420
North Dakota	268	249	223	211	102	55	27	33	38	80	55	104	140	164	122	123	83	89
Ohio	2156	2032	2274	2317	1701	1117	997	1088	1342	1594	1627	1641	1853	1873	1635	1572	1453	1310
Oklahoma	656	690	721	667	654	392	431	516	609	766	792	895	843	845	771	861	850	865
Oregon	403	375	358	321	343	344	265	269	289	350	234	369	199	205	142	158	0	20
Pennsylvania	2449	2438	2705	2726	2227	1718	1329	1245	1492	1678	1940	2127	2263	2250	2264	2000	1532	1336
Rhode Island	99	99	111	87	78	79	45	48	0	59	52	51	0	63	0	0	0	0
South Carolina	580	542	490	491	508	360	313	284	334	424	414	400	509	437	484	468	255	306
South Dakota	231	215	245	231	67	13	17	19	21	52	61	50	59	62	58	49	53	50
Tennessee	1023	1355	921	796	1003	708	573	687	781	964	1039	912	983	1060	949	911	627	662
Texas	3471	3184	3370	3414	3174	2510	2024	2156	2735	3166	3557	4028	3767	3991	3903	3550	2963	2616
Utah	197	267	339	311	248	237	233	255	328	341	272	338	353	386	217	259	99	185
Vermont	154	131	129	128	107	89	57	58	66	69	79	75	85	77	84	143	83	85
Virginia	970	1076	1102	536	948	667	680	682	672	764	755	822	892	978	747	734	618	849
Washington	896	2426	764	953	857	576	702	602	685	946	796	884	822	863	606	648	270	256
West Virginia	367	509	531	450	368	373	301	305	376	424	436	475	476	477	346	286	290	300
Wisconsin	1133	880	917	699	416	142	142	129	206	200	158	148	327	278	177	180	196	210
Wyoming	63	86	86	93	85	64	67	63	102	115	113	129	85	77	98	42	13	0
TOTAL	44,707	43,705	48,173	41,193	36,347	26,641	25,054	23,674	27,920	33,736	34,970	38,775	39,623	39,703	36,625	33,170	26,546	24,522

Source: Area Resource Training File (February 2003 Release), National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources and Services Administration, Department of Health and Human Services

Note: Data may appear unrealistically low as some LPN/LPN schools withheld data. See User Documentation for the Area Resource Training File (February 2003 release) for detail on counties and years with incomplete data.

D3. Total Enrollment in LPN/LPN Schools by State: 1977-1998

State	1977	1981	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Alabama	1371	1636	1641	1166	1031	940	1089	1182	1546	2174	2348	2490	2213	2321	2125	2160	1654	1408
Alaska	33	22	22	7	0	0	0	0	0	0	0	0	0	0	0	0	16	0
Arizona	421	319	255	291	239	286	343	225	272	408	395	283	444	243	333	200	320	191
Arkansas	895	1145	1070	717	542	520	587	546	746	782	694	740	678	746	817	843	578	565
California	4362	4602	4098	3798	3253	2744	2642	2427	3610	3694	3069	3656	3953	3168	3090	2855	2059	1991
Colorado	575	533	498	374	199	264	486	368	419	409	344	561	375	435	344	287	302	219
Connecticut	498	422	332	328	302	249	202	156	196	383	424	358	325	403	214	230	294	242
Delaware	186	272	236	180	28	28	52	86	21	80	114	130	128	251	135	25	53	128
District of Columbia	202	119	118	117	140	244	148	202	110	236	119	120	98	170	226	224	57	67
Florida	2130	2391	2465	2166	1821	1536	1870	1684	2040	2581	3003	2854	2614	2759	2925	2136	1782	1684
Georgia	1602	1539	1719	1375	1258	849	1076	1083	1244	1568	1674	1689	1676	1390	1495	1428	897	707
Hawaii	112	120	117	78	93	78	102	79	63	167	51	101	0	82	228	83	172	88
Idaho	179	164	119	128	120	117	103	116	117	131	139	142	155	149	148	136	143	72
Illinois	2554	2738	2471	2035	1541	1241	1379	1455	1607	1974	1840	1799	1852	1938	1590	1474	913	873
Indiana	975	1021	1044	867	946	784	883	1056	1233	1364	1886	1512	2079	1270	1588	1499	1276	991
Iowa	909	674	849	589	427	626	923	603	812	976	890	982	820	922	580	421	455	645
Kansas	532	528	467	395	347	559	543	550	573	626	741	659	622	519	523	579	501	519
Kentucky	609	1005	775	684	725	543	639	674	723	1052	1189	1303	1301	1280	1180	967	824	931
Louisiana	1451	1386	1249	1430	1323	881	972	937	1327	1243	1084	1844	1721	1638	1453	1073	964	606
Maine	214	222	178	192	151	181	128	213	254	235	124	48	0	45	0	0	0	0
Maryland	792	617	535	474	417	319	222	291	339	335	379	360	259	239	284	171	160	96
Massachusetts	1309	1141	1020	781	799	662	739	875	766	800	857	691	882	911	870	799	634	718
Michigan	2005	1651	1481	1563	1304	1283	1023	1220	994	1371	1149	1073	992	1084	916	727	643	677
Minnesota	1229	1361	1302	1108	927	1004	1145	1429	1768	2021	2389	2798	1826	2455	1922	1957	1846	1459
Mississippi	776	820	553	697	352	418	476	375	526	513	473	676	584	586	624	641	363	421
Missouri	1226	1254	1219	1101	998	780	879	962	1086	1097	1187	1312	1424	1620	1403	1119	995	933
Montana	223	199	196	178	171	166	161	194	229	257	255	255	194	254	258	208	225	209

State	1977	1981	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Nebraska	489	545	533	415	303	388	437	436	421	330	414	406	424	244	314	339	325	294
Nevada	115	68	49	62	44	42	52	42	73	86	83	72	47	75	70	0	0	0
New Hampshire	186	235	203	134	51	123	102	122	141	143	165	178	165	184	194	186	145	170
New Jersey	1789	1423	1586	1749	1176	888	1256	979	1305	1368	1575	1718	1534	1950	1198	778	699	519
New Mexico	322	180	275	294	139	248	260	228	137	188	152	165	127	193	165	109	156	146
New York	6438	5026	5125	4321	3978	3006	3023	3232	3376	4242	5142	4986	5480	4202	3343	3626	3264	2959
North Carolina	1185	1088	1078	791	597	518	475	546	534	614	732	843	766	855	614	594	552	480
North Dakota	215	263	247	165	134	82	26	34	0	172	250	314	251	315	59	193	217	202
Ohio	2501	2684	2718	2178	1500	1264	1479	1701	2134	2271	2255	2196	2415	2153	1791	2051	1860	1760
Oklahoma	785	985	994	756	666	535	634	798	820	1039	1083	1000	912	1014	985	1046	985	1066
Oregon	244	183	206	180	129	240	256	36	0	94	0	0	0	30	0	0	0	23
Pennsylvania	2679	2951	3206	2833	2082	1924	1761	1866	2117	2438	2815	2849	2668	2661	2228	2105	1693	1573
Rhode Island	117	125	96	96	98	0	0	0	0	304	0	0	0	0	0	0	0	0
South Carolina	986	964	961	611	617	541	538	546	688	735	862	758	798	789	664	625	427	498
South Dakota	243	281	282	196	50	20	24	26	66	73	60	64	67	63	63	61	65	60
Tennessee	1179	456	691	1084	1087	878	808	1031	1118	1200	1186	1172	1327	1192	1137	996	696	955
Texas	4010	4401	4697	3775	3327	3438	3191	3876	3806	4080	4565	4983	4358	4649	4157	3595	3425	3119
Utah	319	375	374	338	287	259	279	322	376	318	359	331	370	419	167	203	106	179
Vermont	180	170	174	162	93	81	82	82	100	108	101	96	95	95	94	175	93	71
Virginia	2012	2441	2177	1092	1576	1402	1591	1552	1672	1833	1755	2035	1942	2065	1616	1538	1223	1635
Washington	825	714	775	856	542	817	961	515	534	795	665	581	850	657	604	616	388	458
West Virginia	505	575	594	407	367	358	396	433	494	528	510	511	539	507	352	296	337	364
Wisconsin	1184	1034	888	620	192	139	198	199	221	195	179	199	390	294	201	210	231	389
Wyoming	69	102	122	100	63	88	95	129	72	178	48	17	0	24	39	18	0	19
TOTAL	55,947	55,170	54,080	46,034	38,552	34,581	36,736	37,719	42,826	49,809	51,773	53,910	52,740	51,508	45,326	41,602	35,013	33,379

Source: Area Resource Training File (February 2003 Release), National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources and Services Administration, Department of Health and Human Services

Note: Data may appear unrealistically low as some LPN/LPN schools withheld data. See User Documentation for the Area Resource Training File (February 2003 release) for detail on counties and years with incomplete data.

D4. Fall Admissions to LPN/LPN Schools by State: 1977-1998

State	1977	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Alabama	896	837	708	606	640	743	859	1179	1162	1021	1653	1001	801	946	936	688
Alaska	33	9	0	0	0	0	0	0	0	0	0	0	0	0	16	0
Arizona	354	171	150	217	146	224	158	226	239	225	287	217	191	107	256	172
Arkansas	699	564	494	509	547	494	546	654	568	517	461	606	540	543	378	550
California	2178	1820	1831	1342	1501	1505	1886	1414	1494	1842	1431	1578	1332	1272	1044	902
Colorado	476	279	201	216	304	346	271	336	289	404	254	303	294	201	228	156
Connecticut	408	40	102	132	32	141	40	109	408	277	145	209	227	201	110	32
Delaware	148	64	39	34	41	98	25	43	105	79	78	100	112	25	53	73
District of Columbia	155	101	113	196	146	191	124	120	98	40	61	74	172	97	28	28
Florida	1077	1157	1038	1031	1169	1128	1050	1454	1528	1306	1373	1598	1636	1011	1015	894
Georgia	1106	943	917	665	627	580	660	627	819	619	922	510	698	675	337	451
Hawaii	120	84	95	59	73	74	54	40	52	109	0	83	231	83	97	24
Idaho	130	92	90	83	73	101	107	117	117	124	138	100	89	70	52	40
Illinois	1810	1457	1282	1036	1136	1049	1163	1293	1333	1330	1525	1255	965	1040	799	696
Indiana	660	654	698	577	587	783	948	1050	1202	959	1265	949	863	969	748	692
Iowa	673	441	384	444	476	429	542	669	713	696	571	458	422	410	286	281
Kansas	328	264	281	389	377	354	422	362	568	479	435	416	449	452	398	436
Kentucky	427	402	466	456	422	543	557	551	732	801	760	740	751	415	379	485
Louisiana	811	757	963	418	689	531	760	509	650	1301	914	632	777	576	402	348
Maine	156	173	132	198	124	202	210	200	131	51	0	45	0	0	0	0
Maryland	557	307	251	217	162	231	278	267	298	216	181	142	169	138	124	72
Massachusetts	1233	768	803	655	717	862	777	793	758	616	839	825	860	801	632	730
Michigan	1312	929	920	822	633	778	519	854	851	720	685	556	597	432	350	434
Minnesota	1094	894	916	804	1068	1160	1276	1212	1438	1147	908	1304	1278	1270	1136	705
Mississippi	466	475	257	265	241	462	367	485	416	611	501	510	597	567	316	406
Missouri	993	840	728	681	734	709	874	939	959	1047	1122	1220	996	765	742	752
Montana	188	149	127	106	167	120	153	139	137	142	116	138	131	91	100	107

State	1977	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Nebraska	319	234	206	240	236	339	321	266	280	261	362	161	212	223	226	215
Nevada	115	62	44	42	46	31	21	86	86	72	48	40	40	0	0	0
New Hampshire	188	99	22	122	56	89	94	103	59	55	109	110	118	118	89	120
New Jersey	1270	1191	919	720	877	740	970	980	1197	1220	941	1015	768	571	392	446
New Mexico	334	229	103	134	145	197	150	126	159	165	129	194	172	113	136	135
New York	4460	3548	3236	2426	2319	2768	2902	3241	3788	3884	3985	3298	2640	2801	2557	2077
North Carolina	1070	634	538	476	419	530	493	495	610	561	541	634	490	517	511	442
North Dakota	192	118	56	68	26	50	0	58	32	67	89	124	25	62	74	104
Ohio	1754	1366	1064	938	1109	1333	1597	1662	1536	1479	1601	1500	1301	1326	1370	1320
Oklahoma	590	623	652	403	529	640	715	910	930	878	819	768	660	894	738	823
Oregon	123	134	105	67	101	36	0	0	0	0	0	10	0	0	0	26
Pennsylvania	1615	1581	1395	1257	1027	1093	1178	1370	1634	1412	1438	1511	1194	1111	946	948
Rhode Island	118	102	116	0	0	0	0	308	0	0	0	0	0	0	0	0
South Carolina	727	490	547	466	474	437	460	568	619	520	634	507	492	564	354	402
South Dakota	187	161	49	20	24	23	67	80	64	66	105	63	31	66	66	74
Tennessee	526	592	675	670	523	692	696	768	618	700	848	699	660	630	486	619
Texas	2828	2869	2239	2447	2660	2472	2546	2624	2610	2880	2723	3077	2483	2457	2270	2004
Utah	235	153	111	122	189	167	165	160	219	236	225	245	75	157	120	132
Vermont	92	66	78	51	80	64	104	90	106	100	101	84	102	185	121	81
Virginia	1238	890	1240	958	1107	1154	1179	1252	1323	1454	1283	1361	1140	959	914	1173
Washington	613	730	510	408	834	323	431	480	367	346	530	433	442	442	311	273
West Virginia	444	326	303	303	385	385	438	362	448	514	330	426	266	140	275	256
Wisconsin	709	352	117	132	165	172	145	177	165	157	194	200	155	174	166	225
Wyoming	75	91	64	72	72	69	59	78	26	0	0	0	40	0	0	0
TOTAL	38,310	31,312	28,375	24,700	26,235	27,642	29,357	31,886	33,941	33,706	33,660	32,029	28,684	26,667	23,084	22,049

Source: Area Resource Training File (February 2003 Release), National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources and Services Administration, Department of Health and Human Services

Note: Data may appear unrealistically low as some LPN/LPN schools withheld data. See User Documentation for the Area Resource Training File (February 2003 release) for detail on counties and years with incomplete data.

D5. Admissions to LPN/LPN Schools by State: 1976-1997

State	1976	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Alabama	1416	1784	2078	1769	1447	1228	1244	1429	1839	2103	2285	2699	2749	2922	2337	2494	1995	1641
Alaska	46	56	24	23	0	0	0	0	0	0	0	0	0	0	0	0	16	0
Arizona	476	302	424	363	378	357	380	353	273	468	434	332	345	326	337	203	378	184
Arkansas	1120	1273	1242	1135	705	586	664	580	824	766	806	832	712	784	896	983	614	701
California	4187	4549	4456	3986	3708	3033	2840	2559	3072	3555	3117	3510	3975	2688	3069	2529	2307	2087
Colorado	534	583	521	528	313	282	451	333	407	424	301	547	324	442	381	215	318	211
Connecticut	609	437	420	402	383	425	275	218	294	455	371	421	398	424	226	289	362	277
Delaware	179	254	155	142	70	47	59	116	25	70	109	108	80	124	165	29	56	95
District of Columbia	174	124	144	122	116	277	159	283	107	277	132	123	80	65	256	148	53	74
Florida	2347	2818	2713	2609	2308	2074	2164	1948	2363	2797	3333	3171	2734	3123	3301	2185	2014	1925
Georgia	2023	1819	2066	1852	1619	1226	1401	1249	1810	1732	1780	1629	1809	1492	1681	1603	788	830
Hawaii	153	118	122	72	107	93	99	88	54	173	37	112	0	73	178	84	154	65
Idaho	191	185	128	181	158	148	111	119	139	141	160	152	158	160	160	164	174	80
Illinois	2620	2979	2780	2437	2034	1428	1535	1422	1588	1873	1727	1912	1943	2081	1637	1693	1064	913
Indiana	1072	1131	1099	1104	1067	842	878	998	1170	1407	1493	1665	1769	1457	1484	1529	1205	989
Iowa	1030	788	882	741	552	607	978	596	883	1121	822	963	864	917	658	460	548	524
Kansas	582	548	562	451	451	492	614	584	633	595	875	722	649	573	568	651	575	566
Kentucky	588	1180	1048	1008	843	681	754	754	833	1206	1189	1454	1442	1424	1448	1062	974	1080
Louisiana	1565	1657	1773	1879	1695	1286	1115	1339	1576	1594	1366	2024	2155	2217	1914	1511	1323	934
Maine	227	234	200	222	206	190	139	185	270	250	154	76	0	53	0	0	0	0
Maryland	570	629	556	465	427	317	233	228	281	355	323	255	213	202	228	132	141	89
Massachusetts	1433	1083	1166	894	841	761	718	767	770	815	909	656	838	857	850	874	646	761
Michigan	2202	1698	1749	1767	1440	1463	1044	1212	992	1027	1216	992	908	938	758	739	610	588
Minnesota	1400	1614	1573	1556	1141	1185	1213	1354	1691	2021	2431	2092	1668	2369	1870	1829	1755	1242
Mississippi	923	964	688	776	488	410	572	501	515	588	568	731	653	551	689	767	417	547
Missouri	1312	1293	1312	1193	1202	809	1009	886	1092	1117	1237	1455	1359	1793	1495	1220	1113	965
Montana	310	262	240	246	233	205	180	168	241	246	220	227	161	240	234	167	213	212

State	1976	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Nebraska	573	636	636	558	339	434	348	401	521	439	423	453	444	314	365	352	371	372
Nevada	119	71	59	75	57	42	56	87	69	48	90	66	72	88	72	0	0	0
New Hampshire	145	239	208	148	42	126	62	89	124	45	118	125	126	137	140	146	110	109
New Jersey	1833	1472	1745	1737	1548	1190	1095	945	1078	1375	1525	1521	1170	1771	1049	924	746	471
New Mexico	376	199	258	306	218	234	182	209	136	173	161	189	133	179	226	156	211	199
New York	5270	4341	4386	4352	4171	3054	2943	2842	3056	3731	3872	4230	5150	4209	3513	3472	3207	3036
North Carolina	1305	1068	1200	953	684	573	543	562	552	627	730	891	734	945	658	625	558	538
North Dakota	360	368	275	238	125	65	87	25	0	108	159	147	177	142	48	97	120	126
Ohio	2761	2824	2973	2706	1840	1446	1351	1622	1989	2358	2517	2186	2433	2316	1981	2025	1924	1920
Oklahoma	857	958	1097	901	879	588	610	774	783	955	1036	1048	1007	1027	1027	1075	1007	1136
Oregon	355	165	228	136	151	522	310	36	0	94	0	0	0	30	0	0	0	24
Pennsylvania	2835	3174	3561	3275	2471	2244	1947	1808	2101	2471	2779	2807	2720	2786	2355	2424	1769	1736
Rhode Island	118	116	130	100	100	114	0	0	0	291	0	0	0	0	0	0	0	0
South Carolina	928	888	935	748	648	588	520	481	676	789	856	824	780	793	747	678	462	527
South Dakota	256	301	295	271	68	14	20	26	24	68	77	59	70	67	63	63	66	66
Tennessee	1214	1508	1111	2165	1254	1098	915	1162	1353	1410	1549	1243	1532	1473	1350	1222	891	1105
Texas	4773	5098	5670	4869	4325	4036	3257	4030	4103	4484	4827	5183	4609	5095	4610	4278	3963	3486
Utah	379	423	428	365	334	281	289	317	444	330	359	400	375	425	174	238	109	225
Vermont	207	177	206	163	104	114	51	80	88	105	90	104	80	99	84	189	98	101
Virginia	1489	1769	1739	1144	1459	1163	1233	1154	1273	1358	1489	1585	1585	1561	1294	1302	1032	1517
Washington	1020	841	878	1071	604	1032	997	581	603	820	657	634	749	663	572	534	469	478
West Virginia	513	627	675	570	467	390	451	461	555	550	558	616	570	584	412	338	393	398
Wisconsin	1291	1221	1059	892	417	222	197	218	279	232	205	227	278	254	212	271	288	310
Wyoming	86	114	121	126	77	98	112	114	63	177	54	24	0	24	40	20	0	23
Total	58,352	58,960	59,994	55,792	46,314	40,120	38,405	38,293	43,612	50,214	51,526	53,422	52,780	53,277	47,812	43,989	37,607	35,483

Source: Area Resource Training File (February 2003 Release), National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources and Services Administration, Department of Health and Human Services

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D6. LPN/LPN Programs by State: 1976-1997

State	1976	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Alabama	25	25	25	22	23	22	22	22	22	23	23	23	22	22	22	22	22	22
Alaska	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Arizona	14	12	12	13	12	12	10	10	11	13	15	14	13	14	13	13	13	14
Arkansas	30	29	29	29	29	28	27	27	27	27	27	27	27	29	28	28	28	28
California	96	94	95	88	86	81	80	76	75	71	70	69	71	68	70	76	76	80
Colorado	17	18	18	17	14	14	14	14	14	15	15	15	15	17	17	17	16	15
Connecticut	10	10	10	10	10	11	11	11	11	11	11	12	13	13	12	12	12	12
Delaware	5	5	5	5	3	3	4	4	4	4	3	4	4	4	4	3	3	4
District of Columbia	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	3
Florida	35	36	37	37	35	36	34	34	36	39	41	40	43	43	45	44	43	45
Georgia	53	49	48	48	44	47	46	42	44	42	39	40	40	41	39	40	39	37
Hawaii	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Idaho	11	8	8	8	8	7	6	5	5	5	5	5	5	5	5	6	7	5
Illinois	42	44	42	41	41	39	37	37	38	39	38	39	39	40	40	37	37	39
Indiana	17	17	18	19	19	17	18	19	19	21	21	21	22	23	22	22	23	23
Iowa	25	30	30	28	27	25	25	25	25	26	26	26	26	26	26	26	26	28
Kansas	16	18	18	17	17	17	17	17	17	18	18	18	18	18	18	18	18	19
Kentucky	15	16	16	16	17	17	17	17	17	18	18	18	18	18	18	19	19	19
Louisiana	35	37	36	37	37	36	35	35	34	39	39	40	45	47	45	47	47	46
Maine	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Maryland	22	20	20	18	18	17	15	17	15	16	16	13	13	15	13	14	15	16
Massachusetts	32	25	26	23	23	22	22	22	21	22	21	20	20	20	20	20	19	20
Michigan	37	37	36	36	33	32	31	29	29	31	31	29	30	29	27	25	28	27
Minnesota	27	27	26	26	27	27	27	26	26	27	28	29	28	25	27	29	31	32
Mississippi	13	13	12	12	12	12	12	13	14	14	14	14	15	15	15	15	15	15
Missouri	33	34	34	35	35	33	32	31	32	36	35	36	37	38	39	41	40	42
Montana	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Nebraska	9	9	8	8	8	8	8	8	9	7	7	7	7	7	7	7	7	7

State	1976	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Nevada	7	5	4	4	4	4	3	3	3	3	2	2	2	2	2	1	1	1
New Hampshire	4	5	5	5	5	5	4	3	3	2	2	2	2	2	2	2	2	2
New Jersey	37	31	32	33	31	30	29	27	28	27	26	29	28	25	24	24	23	22
New Mexico	10	9	10	10	9	8	7	7	7	7	8	8	8	8	8	8	9	9
New York	106	90	89	88	92	89	84	82	84	82	74	78	74	75	71	73	76	76
North Carolina	41	46	46	27	26	26	23	23	27	29	31	32	32	32	31	29	28	28
North Dakota	5	7	7	7	7	5	3	3	3	3	5	5	5	5	5	5	5	5
Ohio	42	46	47	44	43	41	44	46	43	44	42	44	44	46	45	45	46	46
Oklahoma	27	33	35	33	27	25	25	27	27	29	29	29	29	28	31	32	32	32
Oregon	12	11	12	12	12	12	11	11	11	11	11	11	11	11	11	11	10	11
Pennsylvania	53	54	56	56	56	53	50	48	50	52	52	52	50	51	51	50	49	47
Rhode Island	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1
South Carolina	34	31	30	29	34	31	24	24	24	24	25	25	27	27	26	28	28	28
South Dakota	6	6	6	6	3	1	1	1	2	2	2	2	2	2	2	2	2	2
Tennessee	7	12	12	24	25	23	22	23	22	23	25	27	27	28	26	26	25	24
Texas	158	142	139	127	121	114	106	100	99	101	102	102	103	106	105	114	119	112
Utah	5	6	6	6	6	6	6	6	6	6	7	6	6	6	6	7	7	8
Vermont	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4
Virginia	59	57	58	55	57	57	58	61	57	61	58	56	53	68	65	67	88	81
Washington	28	28	29	29	25	24	23	22	23	24	22	22	23	24	23	27	23	23
West Virginia	18	20	20	19	19	19	19	19	19	20	20	20	21	21	21	21	21	19
Wisconsin	14	14	14	12	11	9	9	9	9	11	11	11	11	11	11	11	12	12
Wyoming	3	6	7	7	7	7	6	6	6	6	6	6	6	6	6	6	5	6
TOTAL	1,318	1,294	1,295	1,248	1,219	1,173	1,128	1,113	1,119	1,153	1,143	1,150	1,157	1,183	1,167	1,193	1,219	1,211

Source: Area Resource Training File (February 2003 Release), National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources and Services Administration, Department of Health and Human Services

Note: Data may appear unrealistically low as some LPN/LPN schools withheld data. See User Documentation for the Area Resource Training File (February 2003 release) for detail on counties and years with incomplete data.

D7. LPN/LPN Schools by State: 1976-1997

State	1976	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Alabama	25	25	25	22	23	22	22	22	22	23	23	23	22	22	22	22	22	22
Alaska	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Arizona	12	12	12	12	12	11	10	10	10	11	14	13	13	13	13	13	12	13
Arkansas	30	28	28	29	29	28	27	27	27	27	27	27	27	29	28	28	28	28
California	93	91	91	84	83	78	78	75	73	70	69	68	69	67	69	74	75	80
Colorado	17	18	18	17	14	14	14	14	14	15	15	15	15	17	17	17	15	15
Connecticut	10	10	10	10	10	11	11	11	11	11	11	12	12	13	12	12	12	12
Delaware	5	5	5	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3
District of Columbia	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
Florida	33	34	35	34	34	34	34	34	36	39	40	39	41	42	41	42	43	43
Georgia	53	49	46	45	43	43	42	40	41	40	37	37	38	38	38	39	38	37
Hawaii	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Idaho	11	8	8	8	8	7	6	5	5	5	5	5	5	5	5	5	5	5
Illinois	35	38	36	35	35	34	32	32	33	33	34	35	35	36	36	37	37	37
Indiana	17	17	18	19	19	17	18	19	19	21	21	21	22	22	22	22	23	23
Iowa	25	19	19	27	26	25	25	25	25	26	26	26	26	26	26	26	26	26
Kansas	14	17	17	16	16	16	16	16	16	17	17	17	17	17	17	17	17	18
Kentucky	14	16	16	16	17	17	17	17	17	18	18	18	17	17	17	18	18	18
Louisiana	33	37	36	36	36	35	35	35	34	39	39	40	45	46	45	46	46	46
Maine	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Maryland	22	20	20	18	18	17	14	14	15	15	14	12	11	13	11	12	11	13
Massachusetts	32	24	26	23	23	22	22	22	21	22	21	20	20	20	20	20	19	20
Michigan	34	34	33	32	29	28	27	26	26	28	28	27	27	27	27	25	27	27
Minnesota	27	27	26	26	26	26	26	26	26	26	27	25	25	24	24	26	26	26
Mississippi	13	13	12	12	12	12	12	13	14	14	13	14	15	15	15	15	15	15
Missouri	32	34	34	35	35	33	32	31	32	35	35	36	36	38	39	41	40	41
Montana	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

State	1976	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Nebraska	9	9	8	8	8	8	8	8	9	7	7	7	7	7	7	7	7	7
Nevada	7	5	4	4	4	4	3	3	3	3	2	2	2	2	2	1	1	1
New Hampshire	4	5	5	5	5	5	4	3	3	2	2	2	2	2	2	2	2	2
New Jersey	36	31	32	30	30	30	27	26	26	26	26	26	25	24	23	23	23	22
New Mexico	10	9	10	10	9	8	7	7	7	7	8	8	8	8	8	8	8	8
New York	77	64	63	63	62	61	60	57	58	58	53	53	53	54	54	54	53	51
North Carolina	41	46	46	27	26	26	23	23	27	29	31	32	32	32	31	29	28	28
North Dakota	5	7	7	7	7	5	3	3	3	3	5	5	5	5	5	5	5	5
Ohio	39	46	46	44	41	40	41	41	41	40	40	40	40	41	41	41	41	43
Oklahoma	23	28	30	32	27	25	25	27	27	29	29	29	29	28	30	31	31	31
Oregon	12	11	12	12	12	12	11	11	11	11	11	11	11	11	11	11	10	11
Pennsylvania	51	53	55	55	54	52	50	48	50	51	51	51	50	50	50	50	49	47
Rhode Island	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
South Carolina	31	29	29	27	26	24	20	21	21	22	21	21	23	23	23	23	23	23
South Dakota	6	6	6	6	3	1	1	1	2	2	2	2	2	2	2	2	2	2
Tennessee	7	12	12	24	25	23	22	23	22	23	25	27	27	28	26	26	25	24
Texas	155	140	138	125	118	110	103	98	97	100	102	102	103	103	104	111	111	111
Utah	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	7	7	8
Vermont	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4
Virginia	54	52	52	51	51	49	49	48	48	50	49	49	49	50	53	54	55	55
Washington	26	27	28	28	24	23	22	22	22	22	22	22	22	22	22	22	23	23
West Virginia	18	20	20	19	19	19	19	19	19	20	20	20	21	21	21	21	21	19
Wisconsin	14	14	14	12	11	9	9	9	9	11	11	11	11	11	11	11	12	12
Wyoming	3	5	7	7	7	7	6	6	6	6	6	6	6	6	6	6	5	6
TOTAL	1,242	1,222	1,222	1,184	1,146	1,100	1,062	1,047	1,057	1,087	1,087	1,086	1,096	1,107	1,106	1,127	1,123	1,129

Source: Area Resource Training File (February 2003 Release), National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources and Services Administration, Department of Health and Human Services

Note: Data may appear unrealistically low as some LPN/LPN schools withheld data. See User Documentation for the Area Resource Training File (February 2003 release) for detail on counties and years with incomplete data

D8. Total Number of Active Licenses by State: 1997-2000

Jurisdiction	1997	1998	1999	2000
AK	845	737	740	827
AL	17,161	16,906	19,086	16,676
AR	16,890	16,953	16,807	16,917
AS	a	a	96	72
AZ	9,385	9,548	8,812	9,271
CA	66,150	65,766	65,830	65,383
CO	9,735	9,800	9,276	10,206
CT	11,641	11,078	11,061	11,135
DC	3,093	2,560	2,675	2,675
DE	1,827	1,770	1,832	2,079
FL	55,162	52,904	48,312	51,899
GA	2,611	28,321	30,042	30,042
GU	a	140	277	277
HI	3,225	3,598	2,357	2,699
IA	9,772	9,573	9,506	9,429
ID	3,658	3,512	3,616	4,007
IL	27,422	29,526	26,864	28,742
IN	23,361	25,102	25,102	25,997
KS	8,921	8,519	8,039	8,718
KY	14,083	13,285	14,393	13,231
LA	22,149	22,028	21,170	22,369
MA	23,186	18,195	22,170	22,445
MD	8,584	8,871	9,603	8,426
ME	3,895	3,750	3,591	3,463
MI	32,871	31,763	32,626	28,047
MN	22,489	22,388	22,442	22,342
MO	18,715	21,750	23,683	22,296
MP	a	28	28	50
MS	11,979	11,214	12,227	11,315
MT	3,211	3,226	3,321	3,223
NC	21,483	22,658	21,854	21,578
ND	3,007	3,059	3,073	3,031
NE	6,966	6,417	6,847	6,413
NH	3,165	3,023	3,340	2,989
NJ	25,308	25,151	24,443	22,855
NM	3,482	3,437	3,268	3,240
NV	2,408	2,263	2,523	2,945
NY	76,919	71,730	73,877	69,820
OH	41,741	44,411	40,468	42,720
OK	14,515	16,942	17,018	16,732
OR	4,766	4,377	4,299	4,225
PA	59,694	57,968	56,396	50,714
PR	a	12,550	12,550	12,550
RI	3,031	2,935	2,998	3,057
SC	11,331	15,252	11,007	11,559
SD	2,250	2,241	2,211	2,176
TN	26,425	26,439	25,738	26,421
TX	73,648	74,496	74,648	77,044
UT	3,816	3,394	3,727	3,470
VA	25,808	26,453	26,747	26,694
VI	182	195	129	178
VT	2,146	1,946	2,136	1,884
WA	14,184	15,761	13,984	13,869
WI	16,581	15,694	14,585	14,521
WV	7,132	6,592	6,789	6,091
WY	1,093	1,045	1,093	1,120
Total	883,102	919,240	911,332	902,154

a = no information available

D9: Summary of Licensing Activities

	Year 2000
New in State	
RN	151,982
LPN/LPN	47,171
Total	199,153
Active Licenses	
RN	3,103,981
LPN/LPN	902,154
Total	4,006,135
Graduates of Foreign Nursing Programs	
RN	2,512
LPN/LPN	23
Total *	2,535

D10. Number of Graduates of Foreign Nursing Programs Licensed by State

Jurisdiction	1997	1998	1999	2000
AK				
AL		2	12	
AR	0	1	0	
AS				
AZ		3		
CA				
CO	25			
CT				
DC				
DE	0			
FL		11		
GA				
GU		9	15	
HI				
IA				
ID				
IL				
IN				
KS	0			5
KY	1	0	1	
LA		0		
MA				
MD		2		
ME	0	0	0	
MI				
MN		3	1	1
MO	5	1	3	4
MP		1		13
MS			4	
MT				
NC		14		
ND		0	0	
NE	0			
NH				
NJ				
NM		3	2	
NV				
NY				
OH	3	6	2	
OK	18		0	
OR		13		
PA	6	14		
PR				
RI		2		
SC				
SD	1			
TN				
TX				
UT				
VA				
VI	1		0	
VT				
WA				
WI		4		
WV	3	0		
WY				
Total	63	89	40	23

D11. New in State Functions by Jurisdiction: 1997-2000

	Examination 1997		Endorsement 1997		New in State 1997		Examination 1998		Endorsement 1998		New in State 1998		Examination 1999		Endorsement 1999		New in State 1999		Examination 2000		Endorsement 2000		New in State 2000	
JD	n	percent	n	percent	n	percent	n	percent	n	percent	n	percent	n	percent	n	percent	n	percent	n	percent	n	percent	n	percent
AK	21	0.06 percent	59	0.36 percent	80	0.14 percent	9	0.02 percent	66	0.42 percent	75	0.13 percent	24	0.07 percent	69	0.43 percent	93	0.17 percent	17	0.06	59	0.46	76	0.16
AL	930	2.51 percent	346	2.11 percent	1276	2.16 percent	1,029	2.37 percent	306	1.96 percent	1,335	2.26 percent	824	2.39 percent	242	1.50 percent	1,066	1.90 percent	739	2.51	240	1.87	979	2.08
AR	717	1.94 percent	322	1.96 percent	1039	1.76 percent	697	1.60 percent	271	1.73 percent	968	1.64 percent	711	2.06 percent	350	2.17 percent	1,061	1.89 percent	662	2.24	310	2.42	972	2.06
AS	a	a	a	a	a	a	a	a	a	a	a	a	4	0.01 percent	1	0.01 percent	5	0.01 percent	4	0.01	0	0	4	0.01
AZ	570	1.54 percent	516	3.14 percent	1086	1.84 percent	506	1.16 percent	1,200	7.68 percent	1,706	2.89 percent	390	1.13 percent	420	2.61 percent	810	1.44 percent	498	1.69	542	4.23	1,040	2.2
CAVN	3489	9.42 percent	469	2.86 percent	3958	6.69 percent	3,177	7.31 percent	486	3.11 percent	3,663	6.20 percent	3,162	9.18 percent	482	2.99 percent	3,644	6.49 percent	3,158	10.71	468	3.65	3,626	7.69
CO	804	2.17 percent	431	2.63 percent	1235	2.09 percent	675	1.55 percent	380	2.43 percent	1,055	1.79 percent	2,308	6.70 percent	1,558	9.66 percent	3,866	6.88 percent	477	1.62	357	2.79	834	1.77
CT	355	0.96 percent	132	0.80 percent	487	0.82 percent	304	0.70 percent	123	0.79 percent	427	0.72 percent	100	0.29 percent	170	1.05 percent	270	0.48 percent	369	1.25	200	1.56	569	1.21
DC	0	0.00 percent	0	0.00 percent	209	0.35 percent	38	0.09 percent	133	0.85 percent	171	0.29 percent	a	a	a	a	122	0.22 percent	a		a		a	
DE	69	0.19 percent	74	0.45 percent	143	0.24 percent	117	0.27 percent	105	0.67 percent	222	0.38 percent	114	0.33 percent	79	0.49 percent	193	0.34 percent	101	0.34	97	0.76	198	0.42
FL	2257	6.10 percent	1349	8.22 percent	3606	6.10 percent	2,107	4.85 percent	1,305	8.35 percent	3,412	5.78 percent	2,249	6.53 percent	1,299	8.06 percent	3,548	6.32 percent	1,562	5.3	993	7.75	2,555	5.42
GAPN	1001	2.70 percent	762	4.64 percent	1763	2.98 percent	1,040	2.39 percent	808	5.17 percent	1,848	3.13 percent	824	2.39 percent	825	5.12 percent	1,649	2.94 percent	a		a		a	
GU	a	a	a	a	a	a	9	0.02 percent	9	0.06 percent	18	0.03 percent	12	0.03 percent	8	0.05 percent	20	0.04 percent	a		a		a	
HI	115	0.31 percent	212	1.29 percent	327	0.55 percent	200	0.46 percent	133	0.85 percent	333	0.56 percent	188	0.55 percent	87	0.54 percent	275	0.49 percent	131	0.44	159	1.24	290	0.61
IA	843	2.28 percent	187	1.14 percent	1030	1.74 percent	727	1.67 percent	183	1.17 percent	910	1.54 percent	695	2.02 percent	186	1.15 percent	881	1.57 percent	667	2.26	175	1.37	842	1.78
ID	146	0.39 percent	96	0.59 percent	242	0.41 percent	121	0.28 percent	65	0.42 percent	186	0.31 percent	164	0.48 percent	81	0.50 percent	245	0.44 percent	172	0.58	95	0.74	267	0.57
IL	1102	2.98 percent	199	1.21 percent	1301	2.20 percent	1,413	3.25 percent	25	0.16 percent	1,438	2.43 percent	a	a	a	a	1,458	2.60 percent	a		a		1,241	2.63
IN	1195	3.23 percent	362	2.21 percent	1557	2.63 percent	1,132	2.61 percent	335	2.14 percent	1,467	2.48 percent	a	a	a	a	a	a	963	3.27	342	2.67	1,305	2.77
KS	574	1.55 percent	360	2.19 percent	934	1.58 percent	587	1.35 percent	324	2.07 percent	911	1.54 percent	545	1.58 percent	295	1.83 percent	840	1.50 percent	546	1.85	273	2.13	819	1.74

	Examination 1997		Endorsement 1997		New in State 1997		Examination 1998		Endorsement 1998		New in State 1998		Examination 1999		Endorsement 1999		New in State 1999		Examination 2000		Endorsement 2000		New in State 2000	
KY	633	1.71 percent	289	1.76 percent	922	1.56 percent	638	1.47 percent	326	2.09 percent	964	1.63 percent	696	2.02 percent	261	1.62 percent	957	1.70 percent	569	1.93	274	2.14	843	1.79
LA PN	1192	3.22 percent	346	2.11 percent	1538	2.60 percent	1,006	2.32 percent	267	1.71 percent	1,273	2.16 percent	858	2.49 percent	266	1.65 percent	1,124	2.00 percent	1,005	3.41	189	1.47	1,194	2.53
MA	755	2.04 percent	184	1.12 percent	939	1.59 percent	782	1.80 percent	182	1.17 percent	964	1.63 percent	678	1.97 percent	191	1.18 percent	869	1.55 percent	646	2.19	170	1.33	816	1.73
MD	369	1.00 percent	329	2.01 percent	698	1.18 percent	324	0.75 percent	419	2.68 percent	743	1.26 percent	328	0.95 percent	428	2.65 percent	756	1.35 percent	344	1.17	595	4.64	939	1.99
ME	20	0.05 percent	78	0.48 percent	98	0.17 percent	26	0.06 percent	59	0.38 percent	85	0.14 percent	11	0.03 percent	84	0.52 percent	95	0.17 percent	10	0.03	89	0.69	99	0.21
MI	1220	3.29 percent	273	1.66 percent	1493	2.52 percent	1,165	2.68 percent	277	1.77 percent	1,442	2.44 percent	1,039	3.02 percent	276	1.71 percent	1,315	2.34 percent	860	2.92	224	1.75	1,084	2.3
MN	1053	2.84 percent	179	1.09 percent	1232	2.08 percent	1,027	2.36 percent	166	1.06 percent	1,193	2.02 percent	1,014	2.94 percent	168	1.04 percent	1,182	2.10 percent	862	2.92	195	1.52	1,057	2.24
MO	584	1.58 percent	1226	7.47 percent	1810	3.06 percent	1,027	2.36 percent	611	3.91 percent	1,638	2.77 percent	1,012	2.94 percent	424	2.63 percent	1,436	2.56 percent	1,115	3.78	602	4.7	1,717	3.64
MP	a	a	a	a	a	a	2	0.00 percent	1	0.01 percent	3	0.01 percent	a	a	a	a	a	a	12	0.04	2	0.02	14	0.03
MS	730	1.97 percent	252	1.54 percent	982	1.66 percent	695	1.60 percent	210	1.34 percent	905	1.53 percent	582	1.69 percent	191	1.18 percent	773	1.38 percent	535	1.81	173	1.35	708	1.5
MT	119	0.32 percent	59	0.36 percent	178	0.30 percent	140	0.32 percent	51	0.33 percent	191	0.32 percent	126	0.37 percent	92	0.57 percent	218	0.39 percent	66	0.22	94	0.73	160	0.34
NC	1016	2.74 percent	933	5.69 percent	1949	3.30 percent	957	2.20 percent	833	5.33 percent	1,790	3.03 percent	874	2.54 percent	718	4.45 percent	1,592	2.83 percent	875	2.97	727	5.67	1,602	3.4
ND	53	0.14 percent	17	0.10 percent	70	0.12 percent	142	0.33 percent	67	0.43 percent	209	0.35 percent	114	0.33 percent	63	0.39 percent	177	0.32 percent	121	0.41	63	0.49	184	0.39
NE	292	0.79 percent	120	0.73 percent	412	0.70 percent	230	0.53 percent	104	0.67 percent	334	0.57 percent	236	0.69 percent	132	0.82 percent	368	0.66 percent	262	0.89	120	0.94	382	0.81
NH	177	0.48 percent	112	0.68 percent	289	0.49 percent	180	0.41 percent	125	0.80 percent	305	0.52 percent	195	0.57 percent	125	0.78 percent	320	0.57 percent	162	0.55	147	1.15	309	0.66
NJ	844	2.28 percent	170	1.04 percent	1014	1.71 percent	700	1.61 percent	182	1.17 percent	882	1.49 percent	561	1.63 percent	224	1.39 percent	785	1.40 percent	542	1.84	83	0.65	625	1.32
NM	193	0.52 percent	206	1.26 percent	399	0.67 percent	180	0.41 percent	167	1.07 percent	347	0.59 percent	173	0.50 percent	170	1.05 percent	343	0.61 percent	159	0.54	139	1.08	298	0.63
NV	110	0.30 percent	254	1.55 percent	364	0.62 percent	24	0.06 percent	231	1.48 percent	255	0.43 percent	24	0.07 percent	265	1.64 percent	289	0.51 percent	28	0.09	229	1.79	257	0.54
NY		0.00 percent		0.00 percent	5489	9.28 percent	5,235	12.05 percent	a	a	5,235	8.86 percent	a	a	a	a	4,015	7.15 percent	a		a		3,210	6.81
OH	1677	4.53 percent	420	2.56 percent	2097	3.55 percent	1,656	3.81 percent	507	3.25 percent	2,163	3.66 percent	1,470	4.27 percent	442	2.74 percent	1,912	3.40 percent	1,391	4.72	425	3.32	1,816	3.85
OK	1340	3.62 percent	423	2.58 percent	1763	2.98 percent	1,300	2.99 percent	354	2.27 percent	1,654	2.80 percent	1,495	4.34 percent	292	1.81 percent	1,787	3.18 percent	1,158	3.93	220	1.72	1,378	2.92
OR	138	0.37 percent	106	0.65 percent	244	0.41 percent	259	0.60 percent	75	0.48 percent	334	0.57 percent	245	0.71 percent	226	1.40 percent	471	0.84 percent	234	0.79	130	1.01	364	0.77
PA	1669	4.51 percent	408	2.49 percent	2077	3.51 percent	1,584	3.65 percent	345	2.21 percent	1,929	3.27 percent	1,249	3.63 percent	440	2.73 percent	1,689	3.01 percent	1,155	3.92	396	3.09	1,551	3.29

	Examination 1997		Endorsement 1997		New in State 1997		Examination 1998		Endorsement 1998		New in State 1998		Examination 1999		Endorsement 1999		New in State 1999		Examination 2000		Endorsement 2000		New in State 2000	
PR	a	a	a	a	a	a	1,653	3.81 percent	1	0.01 percent	1,654	2.80 percent	1,705	4.95 percent	0	0.00 percent	1,705	3.04 percent	a		a		a	
RI	61	0.16 percent	58	0.35 percent	119	0.20 percent	27	0.06 percent	40	0.26 percent	67	0.11 percent	40	0.12 percent	65	0.40 percent	105	0.19 percent	8	0.03	80	0.62	88	0.19
SC	497	1.34 percent	422	2.57 percent	919	1.55 percent	468	1.08 percent	398	2.55 percent	866	1.47 percent	436	1.27 percent	410	2.54 percent	846	1.51 percent	401	1.36	285	2.22	686	1.45
SD	74	0.20 percent	62	0.38 percent	136	0.23 percent	77	0.18 percent	51	0.33 percent	128	0.22 percent	66	0.19 percent	50	0.31 percent	116	0.21 percent	70	0.24	58	0.45	128	0.27
TN	1017	2.75 percent	582	3.55 percent	1599	2.70 percent	942	2.17 percent	729	4.67 percent	1,671	2.83 percent	827	2.40 percent	725	4.50 percent	1,552	2.76 percent	806	2.73	600	4.68	1,406	2.98
TX VN	4055	10.95 percent	1065	6.49 percent	5120	8.66 percent	3,722	8.57 percent	1,073	6.87 percent	4,795	8.12 percent	3,385	9.83 percent	999	6.20 percent	4,384	7.81 percent	3,321	11.26	883	6.89	4,204	8.91
UT	434	1.17 percent	200	1.22 percent	634	1.07 percent	641	1.48 percent	80	0.51 percent	721	1.22 percent	563	1.63 percent	99	0.61 percent	662	1.18 percent	645	2.19	62	0.48	707	1.5
VA	1152	3.11 percent	645	3.93 percent	1797	3.04 percent	1,051	2.42 percent	610	3.91 percent	1,661	2.81 percent	945	2.74 percent	543	3.37 percent	1,488	2.65 percent	949	3.22	576	4.49	1,525	3.23
VI	10	0.03 percent	15	0.09 percent	25	0.04 percent	6	0.01 percent	32	0.20 percent	38	0.06 percent	5	0.01 percent	18	0.11 percent	23	0.04 percent	a		a		24	0.05
VT	59	0.16 percent	70	0.43 percent	129	0.22 percent	81	0.19 percent	69	0.44 percent	150	0.25 percent	81	0.24 percent	343	2.13 percent	424	0.76 percent	41	0.14	81	0.63	122	0.26
WA	510	1.38 percent	622	3.79 percent	1132	1.91 percent	800	1.84 percent	257	1.65 percent	1,057	1.79 percent	352	1.02 percent	677	4.20 percent	1,029	1.83 percent	612	2.08	336	2.62	948	2.01
WI	288	0.78 percent	137	0.83 percent	425	0.72 percent	317	0.73 percent	211	1.35 percent	528	0.89 percent	286	0.83 percent	285	1.77 percent	571	1.02 percent	a		a		388	0.82
WV PN	446	1.20 percent	212	1.29 percent	658	1.11 percent	429	0.99 percent	210	1.34 percent	639	1.08 percent	417	1.21 percent	203	1.26 percent	620	1.10 percent	420	1.42	181	1.41	601	1.27
WY	55	0.15 percent	58	0.35 percent	113	0.19 percent	56	0.13 percent	43	0.28 percent	99	0.17 percent	38	0.11 percent	75	0.47 percent	113	0.20 percent	40	0.14	80	0.62	120	0.25
Total	37030	100.00 percent	16408	100.00 percent	59136	100.00 percent	43,437	100.00 percent	15,620	100.00 percent	59,057	100.00 percent	34,440	100.00 percent	16,122	100.00 percent	56,157	100.00 percent	29,490	100	12,818	100	47,171	100

a = no information available

Note: New in State total for 2000 includes new in State processing of 4,863 licenses not available by specific function category.

D12. Maintenance Functions by Jurisdiction: 1997-1998

	Renewal 1997		ReinStatement 1997		Total Maintenance 1997		Renewal 1998		ReinStatement 1998		Total Maintenance 1998	
JD	**n**	**percent**	**n**	**percent**	**n**	**percent**	**n**	**percent**	**n**	**percent**	**n**	**percent**
AK	628	0.12 percent	45	0.50 percent	673	0.13 percent	0	0.00 percent	a	a	a	a
AL	374	0.07 percent	3	0.03 percent	377	0.07 percent	16,147	3.18 percent	4	0.06 percent	16,151	3.14 percent
AR	7816	1.48 percent	2	0.02 percent	7818	1.46 percent	7,629	1.50 percent	6	0.09 percent	7,635	1.48 percent
AS	a	a	a	a	a	a	a	a	a	a	a	a
AZ	4080	0.77 percent	4	0.04 percent	4084	0.76 percent	4,800	0.94 percent	a	a	4,800	0.93 percent
CAVN	29969	5.68 percent	7	0.08 percent	29976	5.59 percent	29,802	5.87 percent	3	0.05 percent	29,805	5.79 percent
CO	7500	1.42 percent	300	3.32 percent	7800	1.45 percent	7,600	1.50 percent	200	3.06 percent	7,800	1.52 percent
CT	11115	2.11 percent	39	0.43 percent	11154	2.08 percent	11,078	2.18 percent	42	0.64 percent	11,120	2.16 percent
DC	3080	0.58 percent	13	0.14 percent	3093	0.58 percent	3,423	0.67 percent	a	a	3,423	0.66 percent
DE	1680	0.32 percent	67	0.74 percent	1747	0.33 percent	1,770	0.35 percent	54	0.83 percent	1,824	0.35 percent
FL	a	a	3	0.03 percent	3	0.00 percent	54,000	10.63 percent	3	0.05 percent	54,003	10.49 percent
GAPN	2471	0.47 percent	140	1.55 percent	2611	0.49 percent	0	0.00 percent	211	3.22 percent	211	0.04 percent
GU	a	a	a	a	a	a	122	0.02 percent	a	a	122	0.02 percent
HI	2898	0.55 percent	0	0.00 percent	2898	0.54 percent	3,298	0.65 percent	a	a	3,298	0.64 percent
IA	2332	0.44 percent	103	1.14 percent	2435	0.45 percent	2,346	0.46 percent	102	1.56 percent	2,448	0.48 percent
ID	2556	0.48 percent	24	0.27 percent	2580	0.48 percent	3,236	0.64 percent	32	0.49 percent	3,268	0.63 percent
IL	26640	5.05 percent	1629	18.03 percent	28269	5.27 percent	579	0.11 percent	509	7.78 percent	1,088	0.21 percent
IN	21804	4.13	0	0.00 percent	21804	4.06 percent	0	0.00	a	a	a	a

	Renewal 1997		ReinStatement 1997		Total Maintenance 1997		Renewal 1998		ReinStatement 1998		Total Maintenance 1998	
		percent						percent				
KS	3180	0.60 percent	404	4.47 percent	3584	0.67 percent	2,988	0.59 percent	395	6.04 percent	3,383	0.66 percent
KY	0	0.00 percent	148	1.64 percent	148	0.03 percent	13,344	2.63 percent	243	3.71 percent	13,587	2.64 percent
LAPN	19708	3.73 percent	903	10.00 percent	20611	3.84 percent	19,755	3.89 percent	1,000	15.28 percent	20,755	4.03 percent
MA	22200	4.21 percent	47	0.52 percent	22247	4.15 percent	9,097	1.79 percent	10	0.15 percent	9,107	1.77 percent
MD	7841	1.49 percent		0.00 percent	7841	1.46 percent	8,128	1.60 percent	0	0.00 percent	8,128	1.58 percent
ME	1635	0.31 percent	111	1.23 percent	1746	0.33 percent	1,628	0.32 percent	85	1.30 percent	1,713	0.33 percent
MI	18612	3.53 percent	307	3.40 percent	18919	3.53 percent	14,616	2.88 percent	0	0.00 percent	14,616	2.84 percent
MN	a	a	a	a	a	a	9,828	1.93 percent	287	4.39 percent	10,115	1.96 percent
MO	21179	4.01 percent	325	3.60 percent	21504	4.01 percent	21,297	4.19 percent	126	1.93 percent	21,423	4.16 percent
MP	a	a	a	a	a	a	5	0.00 percent	1	0.02 percent	6	0.00 percent
MS	0	0.00 percent	218	2.41 percent	218	0.04 percent	11,024	2.17 percent	674	10.30 percent	11,698	2.27 percent
MT	3077	0.58 percent	44	0.49 percent	3121	0.58 percent	3,066	0.60 percent	52	0.79 percent	3,118	0.61 percent
NC	8426	1.60 percent	530	5.87 percent	8956	1.67 percent	10,010	1.97 percent	524	8.01 percent	10,534	2.05 percent
ND	1418	0.27 percent	a	a	1418	0.26 percent	1,480	0.29 percent	63	0.96 percent	1,543	0.30 percent
NE	0	0.00 percent	59	0.65 percent	59	0.01 percent	6,736	1.33 percent	65	0.99 percent	6,801	1.32 percent
NH	987	0.19 percent	92	1.02 percent	1079	0.20 percent	985	0.19 percent	90	1.38 percent	1,075	0.21 percent
NJ	391	0.07 percent	148	1.64 percent	539	0.10 percent	127	0.02 percent	32	0.49 percent	159	0.03 percent
NM	1332	0.25 percent		0.00 percent	1332	0.25 percent	1,289	0.25 percent	a	a	1,289	0.25 percent
NV	1104	0.21		0.00 percent	1104	0.21 percent	1,085	0.21	a	a	1,085	0.21 percent

	Renewal 1997		ReinStatement 1997		Total Maintenance 1997		Renewal 1998		ReinStatement 1998		Total Maintenance 1998	
		percent						percent				
NY	71430	13.54 percent		0.00 percent	71430	13.31 percent	23,671	4.66 percent	a	a	23,671	4.60 percent
OH	38904	7.37 percent	1628	18.02 percent	40532	7.55 percent	0	0.00 percent	507	7.75 percent	507	0.10 percent
OK	14077	2.67 percent	217	2.40 percent	14294	2.66 percent	16,942	3.33 percent	0	0.00 percent	16,942	3.29 percent
OR	1865	0.35 percent	8	0.09 percent	1873	0.35 percent	2,188	0.43 percent	0	0.00 percent	2,188	0.43 percent
PA	55000	10.42 percent	300	3.32 percent	55300	10.30 percent	52,000	10.23 percent	200	3.06 percent	52,200	10.14 percent
PR	a	a	a	a	a	a	10,896	2.14 percent	a	a	10,896	2.12 percent
RI	1446	0.27 percent	a	a	1446	0.27 percent	1,469	0.29 percent	a	a	1,469	0.29 percent
SC	10198	1.93 percent	214	2.37 percent	10412	1.94 percent	14,331	2.82 percent	55	0.84 percent	14,386	2.79 percent
SD	1078	0.20 percent	39	0.43 percent	1117	0.21 percent	1,012	0.20 percent	49	0.75 percent	1,061	0.21 percent
TN	13200	2.50 percent	527	5.83 percent	13727	2.56 percent	12,000	2.36 percent	570	8.71 percent	12,570	2.44 percent
TXVN	36463	6.91 percent	a	a	36463	6.79 percent	35,935	7.07 percent	a	a	35,935	6.98 percent
UT	a	a	60	0.66 percent	60	0.01 percent	3,116	0.61 percent	a	a	3,116	0.61 percent
VA	12000	2.27 percent	a	a	12000	2.24 percent	13,226	2.60 percent	a	a	13,226	2.57 percent
VI	147	0.03 percent	10	0.11 percent	157	0.03 percent	a	a	a	a	157	0.03 percent
VT	2017	0.38 percent	a	a	2017	0.38 percent	1,811	0.36 percent	0	0.00 percent	1,811	0.35 percent
WA	10341	1.96 percent	60	0.66 percent	10401	1.94 percent	14,736	2.90 percent	10	0.15 percent	14,746	2.86 percent
WI	16156	3.06 percent	208	2.30 percent	16364	3.05 percent	15,166	2.98 percent	104	1.59 percent	15,270	2.97 percent
WVPN	6435	1.22 percent	39	0.43 percent	6474	1.21 percent	6,358	1.25 percent	234	3.58 percent	6,592	1.28 percent
WY	875	0.17	9	0.10 percent	884	0.16 percent	943	0.19	3	0.05 percent	946	0.18 percent

	Renewal 1997		ReinStatement 1997		Total Maintenance 1997		Renewal 1998		ReinStatement 1998		Total Maintenance 1998	
		percent						percent				
Total	527665	100.00 percent	9034	100.00 percent	536699	100.00 percent	508,118	100.00 percent	6,545	100.00 percent	514,820	100.00 percent

a = no information available

D13. Total Licenses Processed by Jurisdiction: 1997-1998

JD	New in State 1997		Maintenance 1997		Total Processed 1997		New in State 1998		Maintenance 1998		Total Processed 1998	
	n	percent	n	percent	n	percent	n	percent	n	percent	n	percent
AK	80	0.14 percent	673	0.13 percent	753	0.13 percent	75	0.13 percent	0	0.00 percent	75	0.01 percent
AL	1,276	2.16 percent	377	0.07 percent	1,653	0.28 percent	1,335	2.26 percent	16,151	3.14 percent	17,486	3.05 percent
AR	1,039	1.76 percent	7,818	1.46 percent	8,857	1.49 percent	968	1.64 percent	7,635	1.48 percent	8,603	1.50 percent
AS	a	a	a	a	a	a	a	a	a	a	a	a
AZ	1,086	1.84 percent	4,084	0.76 percent	5,170	0.87 percent	1,706	2.89 percent	4,800	0.93 percent	6,506	1.13 percent
CAVN	3,958	6.69 percent	29,976	5.59 percent	33,934	5.70 percent	3,663	6.20 percent	29,805	5.79 percent	33,468	5.83 percent
CO	1,235	2.09 percent	7,800	1.45 percent	9,035	1.52 percent	1,055	1.79 percent	7,800	1.52 percent	8,855	1.54 percent
CT	487	0.82 percent	11,154	2.08 percent	11,641	1.95 percent	427	0.72 percent	11,120	2.16 percent	11,547	2.01 percent
DC	209	0.35 percent	3,093	0.58 percent	3,302	0.55 percent	171	0.29 percent	3,423	0.66 percent	3,594	0.63 percent
DE	143	0.24 percent	1,747	0.33 percent	1,890	0.32 percent	222	0.38 percent	1,824	0.35 percent	2,046	0.36 percent
FL	3,606	6.10 percent	3	0.00 percent	3,609	0.61 percent	3,412	5.78 percent	54,003	10.49 percent	57,415	10.00 percent
GAPN	1,763	2.98 percent	2,611	0.49 percent	4,374	0.73 percent	1,848	3.13 percent	211	0.04 percent	2,059	0.36 percent
GU	a	a	a	a	a	a	18	0.03 percent	122	0.02 percent	140	0.02 percent
HI	327	0.55 percent	2,898	0.54 percent	3,225	0.54 percent	333	0.56 percent	3,298	0.64 percent	3,631	0.63 percent
IA	1,030	1.74 percent	2,435	0.45 percent	3,465	0.58 percent	910	1.54 percent	2,448	0.48 percent	3,358	0.59 percent
ID	242	0.41 percent	2,580	0.48 percent	2,822	0.47 percent	186	0.31 percent	3,268	0.63 percent	3,454	0.60 percent
IL	1,301	2.20 percent	28,269	5.27 percent	29,570	4.96 percent	1,438	2.43 percent	1,088	0.21 percent	2,526	0.44 percent
IN	1,557	2.63 percent	21,804	4.06 percent	23,361	3.92 percent	1,467	2.48 percent	0	0.00	1,467	0.26 percent

JD	New in State 1997		Maintenance 1997		Total Processed 1997		New in State 1998		Maintenance 1998		Total Processed 1998	
										percent		
KS	934	1.58 percent	3,584	0.67 percent	4,518	0.76 percent	911	1.54 percent	3,383	0.66 percent	4,294	0.75 percent
KY	922	1.56 percent	148	0.03 percent	1,070	0.18 percent	964	1.63 percent	13,587	2.64 percent	14,551	2.54 percent
LAPN	1,538	2.60 percent	20,611	3.84 percent	22,149	3.72 percent	1,273	2.16 percent	20,755	4.03 percent	22,028	3.84 percent
MA	939	1.59 percent	22,247	4.15 percent	23,186	3.89 percent	964	1.63 percent	9,107	1.77 percent	10,071	1.75 percent
MD	698	1.18 percent	7,841	1.46 percent	8,539	1.43 percent	743	1.26 percent	8,128	1.58 percent	8,871	1.55 percent
ME	98	0.17 percent	1,746	0.33 percent	1,844	0.31 percent	85	0.14 percent	1,713	0.33 percent	1,798	0.31 percent
MI	1,493	2.52 percent	18,919	3.53 percent	20,412	3.43 percent	1,442	2.44 percent	14,616	2.84 percent	16,058	2.80 percent
MN	1,232	2.08 percent	0	0.00 percent	1,232	0.21 percent	1,193	2.02 percent	10,115	1.96 percent	11,308	1.97 percent
MO	1,810	3.06 percent	21,504	4.01 percent	23,314	3.91 percent	1,638	2.77 percent	21,423	4.16 percent	23,061	4.02 percent
MP	a	a	a	a	a	a	3	0.01 percent	6	0.00 percent	9	0.00 percent
MS	982	1.66 percent	218	0.04 percent	1,200	0.20 percent	905	1.53 percent	11,698	2.27 percent	12,603	2.20 percent
MT	178	0.30 percent	3,121	0.58 percent	3,299	0.55 percent	191	0.32 percent	3,118	0.61 percent	3,309	0.58 percent
NC	1,949	3.30 percent	8,956	1.67 percent	10,905	1.83 percent	1,790	3.03 percent	10,534	2.05 percent	12,324	2.15 percent
ND	70	0.12 percent	1,418	0.26 percent	1,488	0.25 percent	209	0.35 percent	1,543	0.30 percent	1,752	0.31 percent
NE	412	0.70 percent	59	0.01 percent	471	0.08 percent	334	0.57 percent	6,801	1.32 percent	7,135	1.24 percent
NH	289	0.49 percent	1,079	0.20 percent	1,368	0.23 percent	305	0.52 percent	1,075	0.21 percent	1,380	0.24 percent
NJ	1,014	1.71 percent	539	0.10 percent	1,553	0.26 percent	882	1.49 percent	159	0.03 percent	1,041	0.18 percent
NM	399	0.67 percent	1,332	0.25 percent	1,731	0.29 percent	347	0.59 percent	1,289	0.25 percent	1,636	0.29 percent
NV	364	0.62 percent	1,104	0.21 percent	1,468	0.25 percent	255	0.43 percent	1,085	0.21	1,340	0.23 percent

JD	New in State 1997		Maintenance 1997		Total Processed 1997		New in State 1998		Maintenance 1998		Total Processed 1998	
										percent		
NY	5,489	9.28 percent	71,430	13.31 percent	76,919	12.91 percent	5,235	8.86 percent	23,671	4.60 percent	28,906	5.04 percent
OH	2,097	3.55 percent	40,532	7.55 percent	42,629	7.15 percent	2,163	3.66 percent	507	0.10 percent	2,670	0.47 percent
OK	1,763	2.98 percent	14,294	2.66 percent	16,057	2.69 percent	1,654	2.80 percent	16,942	3.29 percent	18,596	3.24 percent
OR	244	0.41 percent	1,873	0.35 percent	2,117	0.36 percent	334	0.57 percent	2,188	0.43 percent	2,522	0.44 percent
PA	2,077	3.51 percent	55,300	10.30 percent	57,377	9.63 percent	1,929	3.27 percent	52,200	10.14 percent	54,129	9.43 percent
PR	a	a	a	a	a	a	1,654	2.80 percent	10,896	2.12 percent	12,550	2.19 percent
RI	119	0.20 percent	1,446	0.27 percent	1,565	0.26 percent	67	0.11 percent	1,469	0.29 percent	1,536	0.27 percent
SC	919	1.55 percent	10,412	1.94 percent	11,331	1.90 percent	866	1.47 percent	14,386	2.79 percent	15,252	2.66 percent
SD	136	0.23 percent	1,117	0.21 percent	1,253	0.21 percent	128	0.22 percent	1,061	0.21 percent	1,189	0.21 percent
TN	1,599	2.70 percent	13,727	2.56 percent	15,326	2.57 percent	1,671	2.83 percent	12,570	2.44 percent	14,241	2.48 percent
TXVN	5,120	8.66 percent	36,463	6.79 percent	41,583	6.98 percent	4,795	8.12 percent	35,935	6.98 percent	40,730	7.10 percent
UT	634	1.07 percent	60	0.01 percent	694	0.12 percent	721	1.22 percent	3,116	0.61 percent	3,837	0.67 percent
VA	1,797	3.04 percent	12,000	2.24 percent	13,797	2.32 percent	1,661	2.81 percent	13,226	2.57 percent	14,887	2.59 percent
VI	25	0.04 percent	157	0.03 percent	182	0.03 percent	38	0.06 percent	157	0.03 percent	195	0.03 percent
VT	129	0.22 percent	2,017	0.38 percent	2,146	0.36 percent	150	0.25 percent	1,811	0.35 percent	1,961	0.34 percent
WA	1,132	1.91 percent	10,401	1.94 percent	11,533	1.94 percent	1,057	1.79 percent	14,746	2.86 percent	15,803	2.75 percent
WI	425	0.72 percent	16,364	3.05 percent	16,789	2.82 percent	528	0.89 percent	15,270	2.97 percent	15,798	2.75 percent
WVPN	658	1.11 percent	6,474	1.21 percent	7,132	1.20 percent	639	1.08 percent	6,592	1.28 percent	7,231	1.26 percent
WY	113	0.19 percent	884	0.16 percent	997	0.17 percent	99	0.17 percent	946	0.18	1,045	0.18 percent

JD	New in State 1997		Maintenance 1997		Total Processed 1997		New in State 1998		Maintenance 1998		Total Processed 1998	
										percent		
Total	59,136	100.00 percent	536,699	100.00 percent	595,835	100.00 percent	59,057	100.00 percent	514,820	100.00 percent	573,877	100.00 percent

a = no information available *From: 1997 Licensure and Examination Statistics*

D14. Number of Candidates Taking NCLEX-PN® Examination and Percent Passing for First-Time Candidates Educated in Member Board Jurisdictions: 1997-2000

	1997	1997	1997	1998	1998	1998	1999	1999	1999	2000	2000	2000
Jurisdiction	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**
AL	1,277	1,053	82.5 percent	1,113	899	80.8 percent	839	688	82.0 percent	883	695	78.7 percent
AK	0	0	0.0 percent	2	2	100.0 percent	1	1	100.0 percent	0	0	0.0 percent
AS	4	2	50.0 percent	2	0	0.0 percent	8	0	0.0 percent	4	3	75.0 percent
AZ	566	527	93.1 percent	458	433	94.5 percent	530	494	93.2 percent	513	463	90.3 percent
AR	816	705	86.4 percent	708	611	86.3 percent	645	571	88.5 percent	708	618	87.3 percent
CA	3,349	2,657	79.3 percent	3,176	2,429	76.5 percent	2,898	2,098	72.4 percent	3,267	2,343	71.7 percent
CO	577	524	90.8 percent	554	507	91.5 percent	489	457	93.5 percent	555	513	92.4 percent
CT	319	310	97.2 percent	348	323	92.8 percent	357	334	93.6 percent	100	76	76.0 percent
DE	164	143	87.2 percent	154	134	87.0 percent	140	117	83.6 percent	105	86	81.9 percent
DC	165	101	61.2 percent	161	105	65.2 percent	260	164	63.1 percent	334	159	47.6 percent
FL	2,266	2,032	89.7 percent	2,299	2,022	88.0 percent	2,211	1,888	85.4 percent	2,046	1,731	84.6 percent
GA	1,120	980	87.5 percent	992	872	87.9 percent	957	825	86.2 percent	901	750	83.2 percent
GU	0	0	0.0 percent	0	0	0.0 percent	1	1	100.0 percent	7	3	42.9 percent
HI	227	200	88.1 percent	190	162	85.3 percent	182	157	86.3 percent	160	144	90.0 percent
ID	125	123	98.4 percent	156	147	94.2 percent	160	151	94.4 percent	108	101	93.5 percent
IL	1,335	1,154	86.4	1,215	1,043	85.8	1,121	939	83.8	1,042	876	84.1

	1997	1997	1997	1998	1998	1998	1999	1999	1999	2000	2000	2000
Jurisdiction	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**
			percent			percent			percent			percent
IN	1,112	1,030	92.6 percent	1,119	1,029	92.0 percent	990	894	90.3 percent	977	882	90.3 percent
IA	842	775	92.0 percent	737	657	89.1 percent	762	690	90.6 percent	681	622	91.3 percent
KS	605	573	94.7 percent	575	520	90.4 percent	557	500	89.8 percent	577	511	88.6 percent
KY	691	633	91.6 percent	668	583	87.3 percent	690	598	86.7 percent	623	552	88.6 percent
LA	1,064	1,002	94.2 percent	1,090	1,017	93.3 percent	1,080	968	89.6 percent	866	759	87.6 percent
ME	23	22	95.7 percent	9	6	66.7 percent	13	13	100.0 percent	17	16	94.1 percent
MD	229	213	93.0 percent	181	163	90.1 percent	182	166	91.2 percent	171	148	86.5 percent
MA	708	645	91.1 percent	720	650	90.3 percent	649	567	87.4 percent	645	555	86.0 percent
MI	1,006	962	95.6 percent	982	931	94.8 percent	918	873	95.1 percent	878	822	93.6 percent
MN	1,084	996	91.9 percent	1,171	1,035	88.4 percent	930	814	87.5 percent	918	802	87.4 percent
MS	747	611	81.8 percent	658	525	79.8 percent	620	482	77.7 percent	561	448	79.9 percent
MO	1,235	1,064	86.2 percent	1,086	926	85.3 percent	1,075	907	84.4 percent	971	844	86.9 percent
MP	0	0	0.0 percent	1	1	100.0 percent	0	0	0.0 percent	0	0	0.0 percent
MT	129	118	91.5 percent	146	133	91.1 percent	99	94	94.9 percent	102	95	93.1 percent
NE	246	232	94.3 percent	239	227	95.0 percent	218	209	95.9 percent	245	237	96.7 percent
NV	59	57	96.6 percent	18	18	100.0 percent	15	15	100.0 percent	19	18	94.7 percent
NH	152	140	92.1 percent	149	136	91.3 percent	128	120	93.8 percent	95	82	86.3 percent

	1997	1997	1997	1998	1998	1998	1999	1999	1999	2000	2000	2000
Jurisdiction	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**
NJ	878	743	84.6 percent	782	639	81.7 percent	645	523	81.1 percent	525	411	78.3 percent
NM	179	169	94.4 percent	184	170	92.4 percent	138	126	91.3 percent	178	159	89.3 percent
NY	4,444	3,754	84.5 percent	3,874	3,192	82.4 percent	3,206	2,593	80.9 percent	2,574	2,063	80.1 percent
NC	874	831	95.1 percent	861	802	93.1 percent	858	814	94.9 percent	860	793	92.2 percent
ND	134	124	92.5 percent	173	162	93.6 percent	117	109	93.2 percent	178	166	93.3 percent
OH	1,688	1,568	92.9 percent	1,608	1,519	94.5 percent	1,535	1,405	91.5 percent	1,645	1,505	91.5 percent
OK	1,289	1,163	90.3 percent	1,292	1,144	88.5 percent	1,219	1,065	87.4 percent	1,140	993	87.1 percent
OR	225	219	97.3 percent	221	218	98.6 percent	236	233	98.7 percent	219	215	98.2 percent
PA	1,756	1,525	86.8 percent	1,446	1,201	83.1 percent	1,320	1,112	84.2 percent	1,022	888	86.9 percent
PR	38	10	26.3 percent	38	6	15.8 percent	28	3	10.7 percent	27	2	7.4 percent
RI	20	19	95.0 percent	26	22	84.6 percent	28	24	85.7 percent	23	19	82.6 percent
SC	462	437	94.6 percent	427	405	94.8 percent	450	409	90.9 percent	418	396	94.7 percent
SD	59	52	88.1 percent	57	55	96.5 percent	58	57	98.3 percent	56	50	89.3 percent
TN	939	874	93.1 percent	855	794	92.9 percent	956	871	91.1 percent	932	834	89.5 percent
TX	4,511	4,052	89.8 percent	3,867	3,464	89.6 percent	3,747	3,318	88.6 percent	3,684	3,140	85.2 percent
UT	573	548	95.7 percent	586	564	96.2 percent	609	583	95.7 percent	577	550	95.3 percent
VT	82	82	100.0 percent	84	80	95.2 percent	55	52	94.5 percent	79	76	96.2 percent
VI	12	4	33.3	8	4	50.0	8	5	62.5	27	10	37.0

	1997	1997	1997	1998	1998	1998	1999	1999	1999	2000	2000	2000
Jurisdiction	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**	**No. of Candidates**	**No. Passing**	**percent Passing**
			percent			percent			percent			percent
VA	1,086	952	87.7 percent	1,144	964	84.3 percent	992	840	84.7 percent	1,000	834	83.4 percent
WA	736	710	96.4 percent	738	697	94.4 percent	687	642	93.4 percent	648	594	91.7 percent
WV	435	401	92.2 percent	411	370	90.0 percent	455	396	87.0 percent	353	315	89.2 percent
WI	257	237	92.2 percent	277	238	85.9 percent	243	229	94.2 percent	268	242	90.3 percent
WY	76	75	98.7 percent	41	38	92.7 percent	57	56	98.2 percent	59	58	98.3 percent
Invalid program codes	356	295	82.9 percent									
Total	43,351	38,426	88.6 percent	40,077	34,994	87.3 percent	37,372	32,260	86.3 percent	35,571	30,267	85.1 percent

From: 1997 Licensure and Examination Statistics

D15. Number of First-Time Candidates Not Educated in Member Board Jurisdictions Taking NCLEX-PN® Examination and Percent Passing: 1997-2000

	1997	1997	1998	1998	1999	1999	2000	2000
Country of Education	**n**	**percent**	**n**	**percent**	**n**	**percent**	**n**	**percent**
Afghanistan	1	0.0 percent	1	100.0 percent				
Albania	1	0.0 percent			1	100.0 percent		
Algeria			2	0.0 percent				
Andorra							2	50.0 percent
Angola			1	0.0 percent	1	0.0 percent		
Argentina	1	0.0 percent	1	0.0 percent	1	0.0 percent	3	66.7 percent
Armenia							3	0.0 percent
Australia					2	100.0 percent	2	50.0 percent
Austria								
Azerbaijan							1	100.0 percent
Azores			1	100.0 percent				
Bahamas	2	50.0 percent			1	100.0 percent	1	0.0 percent
Bahrain							3	66.7 percent
Bangladesh			1	0.0 percent	1	100.0 percent		
Barbados					1	100.0 percent		
Belgium	1	100.0 percent						
Belize (British Honduras)	3	33.3 percent			2	50.0 percent		
Bermuda							1	0.0 percent
Bolivia					1	0.0 percent		
Bosnia and Herzegovina					1	0.0 percent	7	42.9 percent
Botswana							1	100.0 percent
Brazil	1	100.0 percent	4	25.0 percent	3	33.3 percent		
British West Indies					2	0.0 percent		

	1997	1997	1998	1998	1999	1999	2000	2000
Country of Education	**n**	**percent**	**n**	**percent**	**n**	**percent**	**n**	**percent**
Bulgaria	2	50.0 percent	1	0.0 percent	1	0.0 percent	2	50.0 percent
Burma	2	0.0 percent	1	100.0 percent				
Cambodia			1	0.0 percent				
Cameroon, Free Republic of	2	100.0 percent	2	50.0 percent				
Canada	75	65.3 percent	42	69.0 percent	50	58.0 percent	33	48.5 percent
Cayman			3	66.7 percent				
Central African Republic					1	0.0 percent		
Chile					1	100.0 percent		
Colombia	3	33.3 percent			2	100.0 percent	1	0.0 percent
Commonwealth of States-USSR	94	40.4 percent	60	38.3 percent				
Costa Rica	2	50.0 percent			1	100.0 percent	1	0.0 percent
Croatia					1	0.0 percent		
Cuba	7	0.0 percent	3	0.0 percent	2	50.0 percent	8	50.0 percent
Denmark			1	100.0 percent			1	0.0 percent
Dominica	1	100.0 percent	1	100.0 percent	1	100.0 percent		
Dominican Republic	3	33.3 percent			4	50.0 percent	1	0.0 percent
Ecuador			1	0.0 percent				
Egypt, Arab Republic of	1	100.0 percent	2	0.0 percent	1	100.0 percent	1	100.0 percent
El Salvador	4	25.0 percent	4	25.0 percent				
England	18	55.6 percent	15	73.3 percent	9	77.8 percent	14	64.3 percent
Eritrea					1	100.0 percent		
Estonia	1	100.0 percent						
Ethiopia	6	33.3 percent	10	70.0 percent	10	70.0 percent	8	37.5 percent
Falkland Islands					1	0.0		

	1997	1997	1998	1998	1999	1999	2000	2000
Country of Education	**n**	**percent**	**n**	**percent**	**n**	**percent**	**n**	**percent**
						percent		
Fiji Islands					2	0.0 percent	2	0.0 percent
France			4	75.0 percent				
Finland	1	100.0 percent			1	100.0 percent	1	100.0 percent
French Polynesia					3	100.0 percent	2	100.0 percent
French Terr of Afars &							1	100.0 percent
Gabon					3	66.7 percent		
Gambia	5	60.0 percent	7	14.3 percent				
Georgia							1	0.0 percent
Germany United	4	100.0 percent	5	100.0 percent	7	85.7 percent	7	100.0 percent
Ghana	15	66.7 percent	20	60.0 percent	17	52.9 percent	22	50.0 percent
Greece					1	0.0 percent		
Grenada and the Grenadines			7	71.4 percent	1	100.0 percent	1	100.0 percent
Guadeloupe	1	0.0 percent						
Guatemala			1	100.0 percent			3	66.7 percent
Guinea, Republic of	1	100.0 percent						
Guyana	24	70.8 percent	30	30.0 percent	19	31.6 percent	10	70.0 percent
Haiti	76	23.7 percent	91	37.4 percent	45	4.4 percent	67	9.0 percent
Honduras	2	50.0 percent			1	0.0 percent	1	0.0 percent
Hong Kong	5	60.0 percent	3	100.0 percent	2	50.0 percent	2	0.0 percent
Hungary	2	50.0 percent			1	0.0 percent		
India	227	51.1 percent	135	49.6 percent	143	46.2 percent	130	39.2 percent
Indonesia	3	33.3 percent	10	30.0 percent	6	33.3 percent	4	0.0 percent
Iran	15	46.7 percent	7	28.6 percent	15	66.7 percent	6	66.7 percent
Iraq					1	0.0		

	1997	1997	1998	1998	1999	1999	2000	2000
Country of Education	**n**	**percent**	**n**	**percent**	**n**	**percent**	**n**	**percent**
						percent		
Ireland	3	100.0 percent	1	100.0 percent	3	100.0 percent		
Israel	2	50.0 percent	3	33.3 percent	5	40.0 percent	4	50.0 percent
Italy			4	25.0 percent	1	0.0 percent		
Ivory Coast					1	0.0 percent	1	100.0 percent
Jamaica	10	40.0 percent	5	60.0 percent	6	83.3 percent	3	33.3 percent
Japan	6	83.3 percent	6	50.0 percent	6	83.3 percent	2	50.0 percent
Jordan	2	50.0 percent	1	0.0 percent				
Kazakhstan					1	0.0 percent		
Kenya	8	50.0 percent	12	75.0 percent	9	66.7 percent	10	70.0 percent
Korea	13	69.2 percent	5	20.0 percent	12	66.7 percent	8	37.5 percent
Korea (North)	1	0.0 percent	8	12.5 percent	1	100.0 percent		
Lebanon	2	100.0 percent					2	100.0 percent
Liberia	2	100.0 percent	1	100.0 percent	1	0.0 percent	1	0.0 percent
Lithuania	1	0.0 percent	3	33.3 percent	1	0.0 percent		
Macao			2	50.0 percent	2	100.0 percent	1	0.0 percent
Macedonia, Former Yugloslav							2	50.0 percent
Malagasy Madagascar							1	0.0 percent
Malawi							3	0.0 percent
Malaysia	1	0.0 percent						
Marshall Islands					1	100.0 percent		
Mexico	20	45.0 percent	13	7.7 percent	10	30.0 percent	8	25.0 percent
Moldova					1	100.0 percent	2	100.0 percent
Nepal			2	50.0 percent	3	33.3 percent		
Netherlands							1	100.0 percent

	1997	1997	1998	1998	1999	1999	2000	2000
Country of Education	**n**	**percent**	**n**	**percent**	**n**	**percent**	**n**	**percent**
New Zealand			1	100.0 percent				
Nicaragua	2	0.0 percent	23	52.2 percent	1	0.0 percent	1	0.0 percent
Niger					1	0.0 percent	1	100.0 percent
Nigeria	122	62.3 percent	82	63.4 percent	103	57.3 percent	74	51.4 percent
Northern Ireland							1	100.0 percent
Norway					1	0.0 percent		
Pakistan	7	28.6 percent	8	50.0 percent	2	0.0 percent	4	75.0 percent
Panama, Republic of	1	0.0 percent	11	54.5 percent	1	0.0 percent		
Peoples Republic of China	36	52.8 percent	16	68.8 percent	23	43.5 percent	20	75.0 percent
Peru	8	12.5 percent	190	50.0 percent	7	71.4 percent	2	0.0 percent
Philippines	648	46.5 percent	452	45.1 percent	617	45.4 percent	655	47.0 percent
Poland	10	70.0 percent	31	61.3 percent	13	53.8 percent	11	36.4 percent
Portugal			1	0.0 percent				
Russia			3	0.0 percent	72	40.3 percent	41	46.3 percent
Rumania Romania	4	25.0 percent	2	50.0 percent	8	50.0 percent	3	33.3 percent
Rwanda			1	0.0 percent				
Saudi Arabia	1	100.0 percent						
Scotland					1	100.0 percent		
Sierra Leone	5	20.0 percent	5	40.0 percent	8	37.5 percent	9	11.1 percent
Senegal							1	0.0 percent
Singapore					1	100.0 percent		
South Africa			1	0.0 percent	2	100.0 percent		
Spain			2	50.0 percent				
St Thomas & Principe							1	0.0 percent
St. Vincent	3	66.7			2	50.0	2	50.0

	1997	1997	1998	1998	1999	1999	2000	2000
Country of Education	**n**	**percent**	**n**	**percent**	**n**	**percent**	**n**	**percent**
		percent				percent		percent
Sweden	2	50.0 percent			3	66.7 percent	1	100.0 percent
Taiwan (Republic of China)	13	38.5 percent	11	54.5 percent	11	54.5 percent	7	28.6 percent
Tajikistan					1	100.0 percent	2	50.0 percent
Tanzania, United Republic of			1	0.0 percent	1	0.0 percent		
Thailand			3	33.3 percent	6	66.7 percent	1	0.0 percent
Tonga	1	0.0 percent						
Tunisia	1	0.0 percent						
Trinidad & Tobago	3	66.7 percent	3	66.7 percent	2	100.0 percent	6	66.7 percent
Turkey	2	50.0 percent	1	100.0 percent				
Uganda	2	100.0 percent	1	0.0 percent	1	100.0 percent	1	100.0 percent
Ukraine					10	40.0 percent	8	25.0 percent
United Arab Emirates			1	100.0 percent			2	50.0 percent
Uruguay					1	100.0 percent	1	100.0 percent
Uzbekistan			1	0.0 percent	18	33.3 percent	15	20.0 percent
Vatican City State					1	0.0 percent		
Venezuela							1	100.0 percent
Vietnam	4	75.0 percent	2	0.0 percent			1	0.0 percent
Windward Islands	4	100.0 percent						
Yugoslavia	4	75.0 percent	4	0.0 percent			1	100.0 percent
Yugoslavia/Former							6	83.3 percent
Zaire					1	0.0 percent		
Zambia	2	100.0 percent	1	100.0 percent	1	100.0 percent	2	0.0 percent
Zimbabwe	2	100.0 percent	1	100.0 percent	2	100.0 percent	1	0.0 percent

	1997	1997	1998	1998	1999	1999	2000	2000
Country of Education	**n**	**percent**	**n**	**percent**	**n**	**percent**	**n**	**percent**
TOTAL	1570	49.2 percent	1403	47.8 percent	1357	47.2 percent	1285	44.8 percent

From: 1997 Licensure and Examination Statistics

D16. Summary Statistics for First-Time, U.S.-Educated Candidates Taking NCLEX-PN® Examination: 1997-2000

	1997	1998	1999	2000
Passing Standard*	-0.51	-0.51	-0.51	-0.47
			-0.47	
Estimated Decision Consistency**	0.92	0.91	0.9	0.9
Average Number of Test Items (questions) Taken	111	113	118	114.7
Percent Taking Minimum Number of Items	60 percent	58 percent	53 percent	56 percent
Percent Taking Maximum Number of Items	14 percent	15 percent	18 percent	16 percent
Average Testing Time	1 hr 58 min	2 hr 0 min	2.24	2.11
Percent Taking Maximum Amount of Time	0.7 percent	0.6 percent	1.7 percent	1.2 percent

** These statistics are in units, called logits, on the Rasch measurement scale*

*** Estimated Decision Consistency calculations include only U.S.-Educated, First-Time Candidates Taking NCLEX-PN® Examination*

D17. National Passing Rate: Licensed Practical/Vocational Nurses: 1989-1994

Month/Year Administered	1st-time, U.S.-educated	All Examinees
Apr-89	0.87	0.70
Oct-89	0.90	0.79
Apr-90	0.90	0.74
Oct-90	0.87	0.76
Apr-91	0.86	0.68
Oct-91	0.89	0.78
Apr-92	0.89	0.69
Oct-92	0.91	0.78
Apr-93	0.91	0.76
Oct-93*	0.89	0.75
Apr-Jun94	0.91	0.83
Jul-Dec 94	0.90	0.82
Jan-Mar 95	0.89	0.77
Apr-Jun 95	0.91	0.80
Jul-Sep 95	0.92	0.87
Oct-Dec 95	0.90	0.82
Jan-Mar 96	0.91	0.82
Apr-Jun 96	0.90	0.80
Jul-Sep 96	0.92	0.87
Oct-Dec 96	0.88	0.80
Jan-Mar 97	0.90	0.80
Apr-Jun 97	0.88	0.77
Jul-Sep 97	0.90	0.84
Oct-Dec 97	0.86	0.77
Jan-Mar 98	0.86	0.75
Apr-Jun 98	0.87	0.75
Jul-Sep 98	0.89	0.82
Oct-Dec 98	0.85	0.76
Jan-Mar 99	0.87	0.76
Apr-Jun 99	0.85	0.72
Jul-Sep 99	0.88	0.81
Oct-Dec 99	0.84	0.73

**Last paper-and-pencil examination*

D18. Number of Candidates Taking NCLEX-PN® Examination and Percent Passing by Type of Candidate: 1994-2003

	Total 1994		Total 1995		Total 1996		Total 1997		Total 1998		Total 1999		Total 2000		Total 2001		Total 2002		Total 2003	
Type of Candidate																				
	#	**percent**	#	**percent**	#	**percent**	#	**percent**	#	**percent**	#	**percent**	#	**percent**	#	**percent**	#	**percent**	#	**percent**
First Time, US Educated candidates	46,823	90.30 percent	47,684	90.80 percent	44,942	90.60 percent	43,351	88.60 percent	40,195	87.20 percent	37,465	86.30 percent	35,666	85.00 percent	34,649	86.40 percent	37,917	86.50 percent	34,160	88.70 percent
Repeat, US Educated candidates	6,251	49.20 percent	6,546	47.60 percent	5,825	47.00 percent	6,082	43.50 percent	6,947	43.50 percent	7,378	42.40 percent	7,712	41.60 percent	8,014	43.80 percent	8,056	44.00 percent	6,363	45.70 percent
First Time, Foreign Educated candidates	1,694	54.30 percent	1,998	54.10 percent	1,615	54.80 percent	1,572	49.00 percent	1,406	47.90 percent	1,357	47.20 percent	1,286	44.90 percent	1,363	49.30 percent	1,805	53.50 percent	1,636	53.20 percent
Repeat, Foreign Educated candidates	1,943	37.30 percent	2,455	27.10 percent	1,863	24.70 percent	1,657	24.90 percent	1,688	22.90 percent	1,779	19.70 percent	1,687	20.00 percent	1,799	23.60 percent	1,781	26.20 percent	1,404	30.10 percent
All candidates	56,711	82.90 percent	58,683	82.10 percent	54,245	82.60 percent	52,662	80.20 percent	50,236	77.90 percent	47,979	75.90 percent	46,351	74.30 percent	45,825	75.40 percent	49,559	76.20 percent	43,563	79.20 percent

**2003 total incomplete -- missing data for Oct-Dec.*

Source: The NCLEX-RN® and NCLEX-PN® Examination Statistics Database, copyright 1996-2001

Appendix E

E1. Means of Variables, 1994-2001 – Supply of Licensed Practical/Vocational Nurses

	1994	1995	1996	1997	1998	1999	2000	2001
Male	4.8 percent	5.0 percent	4.8 percent	6.5 percent	3.2 percent	5.0 percent	6.5 percent	4.7 percent
Age	41.03	42.28	41.65	41.22	40.91	41.58	42.38	42.10
Age Squared	1,798	1,914	1,849	1,820	1,804	1,863	1,922	1,899
White	74.8 percent	75.2 percent	77.5 percent	75.0 percent	75.6 percent	74.2 percent	69.8 percent	69.9 percent
Black	17.9 percent	19.5 percent	15.9 percent	17.1 percent	18.1 percent	17.1 percent	21.3 percent	25.2 percent
Hispanic	4.2 percent	3.2 percent	3.8 percent	5.2 percent	4.0 percent	5.6 percent	5.3 percent	2.3 percent
Native American	0.6 percent	0.3 percent	0.7 percent	0.7 percent	0.5 percent	0.9 percent	0.7 percent	1.1 percent
Asian	2.2 percent	1.5 percent	2.2 percent	1.9 percent	1.8 percent	2.2 percent	2.9 percent	1.6 percent
Other Race	0.3 percent	0.4 percent	0.0 percent	0.0 percent	0.0 percent	0.0 percent	0.0 percent	0.0 percent
U.S. Born	94.4 percent	96.0 percent	95.3 percent	94.3 percent	93.6 percent	93.9 percent	93.2 percent	95.0 percent
Citizen by Naturalization	3.0 percent	2.5 percent	1.8 percent	2.6 percent	3.8 percent	3.7 percent	4.2 percent	2.2 percent
Not a U.S. Citizen	2.7 percent	1.5 percent	2.9 percent	3.1 percent	2.6 percent	2.4 percent	2.6 percent	2.8 percent
No More Than a High School Education	24.6 percent	20.2 percent	17.5 percent	19.5 percent	21.0 percent	20.9 percent	19.6 percent	15.4 percent
Some College	31.2 percent	33.2 percent	36.1 percent	35.0 percent	36.1 percent	38.8 percent	30.0 percent	35.0 percent
AA Degree	40.1 percent	41.4 percent	39.8 percent	40.3 percent	36.3 percent	36.7 percent	44.1 percent	44.9 percent
Bachelor, Master, PhD, or Professional School Degree	4.1 percent	5.1 percent	6.6 percent	5.2 percent	6.6 percent	3.6 percent	6.3 percent	4.7 percent
Employed/Working	94.1 percent	94.8 percent	94.9 percent	93.7 percent	92.9 percent	95.6 percent	95.4 percent	93.7 percent
Full-time (30+ hours per week)	88.1 percent	87.6 percent	86.4 percent	87.1 percent	88.2 percent	89.0 percent	87.7 percent	91.0 percent
Usual Hours Worked Per Week	36.95	36.76	37.08	37.29	37.19	37.03	37.26	37.79
Usual Weekly Earnings before Deductions (Year 2001 Dollars)	$496.20	$478.96	$484.60	$480.62	$487.46	$500.54	$504.22	$515.73
Wage=usual weekly earnings/usual hours worked per week (Year 2001 Dollars)	$13.64	$13.48	$13.36	$13.00	$13.37	$13.77	$13.67	$13.97
Predicted Wage	$13.50	$13.50	$13.33	$13.00	$13.42	$13.79	$13.70	$14.03
Own Wage if Working; Else Predicted Wage	$13.62	$13.49	$13.38	$13.01	$13.40	$13.82	$13.66	$13.99
Family Characteristics								
Household Earnings (Weekly earnings of all household members except LPN)	$451.22	$432.79	$433.27	$485.21	$455.48	$457.17	$466.89	$513.81

	1994	1995	1996	1997	1998	1999	2000	2001
Married	59.9 percent	55.9 percent	61.9 percent	62.9 percent	60.4 percent	61.3 percent	63.3 percent	60.7 percent
Previously Married	27.1 percent	32.0 percent	27.2 percent	25.4 percent	28.8 percent	25.0 percent	23.6 percent	25.9 percent
Single, Never Married	12.9 percent	12.1 percent	10.9 percent	11.7 percent	10.7 percent	13.7 percent	13.1 percent	13.4 percent
Presence of Kids Aged 0-5 in Household	23.3 percent	20.7 percent	22.1 percent	22.7 percent	20.4 percent	22.1 percent	21.2 percent	22.2 percent
Presence of Kids Aged 6-12 in Household	27.3 percent	27.7 percent	28.1 percent	30.3 percent	27.7 percent	30.7 percent	27.5 percent	31.2 percent
Presence of Kids Aged 13-17 in Household	26.3 percent	24.9 percent	26.3 percent	21.6 percent	25.6 percent	23.0 percent	19.8 percent	24.0 percent
Market Characteristics								
LPN Market Wage (Yr 2001 Dollars)	$13.43	$13.17	$13.10	$13.05	$13.22	$13.58	$13.72	$13.60
Percentage of LPNs Unionized in State	16.3 percent	16.3 percent	15.7 percent	13.1 percent	10.9 percent	13.6 percent	11.9 percent	12.2 percent
Northeast	22.1 percent	23.1 percent	22.0 percent	23.3 percent	22.1 percent	21.1 percent	18.2 percent	18.0 percent
Midwest	25.2 percent	26.4 percent	28.5 percent	28.4 percent	23.2 percent	29.9 percent	28.2 percent	26.7 percent
South	37.8 percent	37.8 percent	36.1 percent	36.6 percent	44.5 percent	38.5 percent	41.5 percent	45.2 percent
West	15.0 percent	12.7 percent	13.4 percent	11.7 percent	10.1 percent	10.4 percent	12.0 percent	10.1 percent
No Information on MSA Size	73.9 percent	69.6 percent	0.0 percent	0.0 percent	0.0 percent	0.0 percent	0.0 percent	0.0 percent
Not an MSA/CMSA	8.7 percent	10.1 percent	30.2 percent	31.2 percent	34.8 percent	37.4 percent	33.7 percent	35.4 percent
MSA Population 100,000-499,999	4.9 percent	6.1 percent	18.3 percent	15.4 percent	14.9 percent	17.4 percent	16.0 percent	17.5 percent
MSA Population 500,000-999,999	3.2 percent	2.2 percent	11.4 percent	12.2 percent	11.2 percent	8.4 percent	10.5 percent	10.0 percent
MSA Population 1,000,000-2,499,999	4.4 percent	3.8 percent	15.7 percent	17.2 percent	18.0 percent	13.8 percent	14.6 percent	13.2 percent
MSA Population 2,500,000+	5.0 percent	8.1 percent	24.4 percent	24.0 percent	21.1 percent	23.1 percent	25.3 percent	23.9 percent
Work Setting/Industry Type								
Private Employer	86.7 percent	84.9 percent	86.3 percent	87.3 percent	88.1 percent	89.0 percent	87.9 percent	89.1 percent
Government Employer	12.6 percent	14.0 percent	12.9 percent	11.6 percent	10.9 percent	10.5 percent	11.1 percent	10.6 percent
Self Employed	0.7 percent	1.1 percent	0.8 percent	1.1 percent	1.0 percent	0.5 percent	0.9 percent	0.4 percent
Personnel Supply Services	3.1 percent	3.3 percent	1.7 percent	2.8 percent	3.5 percent	3.2 percent	4.0 percent	4.9 percent
Private Households	0.3 percent	0.5 percent	0.3 percent	0.8 percent	0.3 percent	0.0 percent	0.3 percent	0.2 percent
Offices and Clinics of Physicians	8.7 percent	8.4 percent	9.1 percent	11.5 percent	11.0 percent	10.9 percent	10.4 percent	13.1 percent
Hospitals	39.2 percent	36.9 percent	36.5 percent	35.3 percent	38.9 percent	36.3 percent	36.6 percent	31.6 percent
Nursing and Personal Care Facilities	35.3 percent	33.9 percent	37.0 percent	32.5 percent	30.6 percent	34.2 percent	31.6 percent	32.8 percent
Health Services (not else where classified)	8.9 percent	11.2 percent	10.5 percent	13.5 percent	10.6 percent	10.6 percent	12.5 percent	11.2 percent

	1994	1995	1996	1997	1998	1999	2000	2001
Other Industry	4.6 percent	5.8 percent	4.9 percent	3.6 percent	5.1 percent	4.9 percent	4.6 percent	6.1 percent
Instruments for Wage								
Number of Physicians Per 100,000 People in State	226	238	236	243	249	250	241	244
Average Manufacturing Wage in State	$14.39	$14.29	$14.24	$14.40	$14.31	$14.67	$14.52	$14.47
Sample Size	*683*	*659*	*570*	*579*	*543*	*498*	*524*	*560*

Source: Current Population Survey Outgoing Rotation Group Files, 1994-2001; Area Resource File (February 2003 release); and Bureau of Labor Statistics.

E2. Means of Variables, 1990-2000 – Hospital Demand for Licensed Practical Nurses

Variable	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Number of Full-time Equivalent LPNs	31.61	31.59	30.33	28.88	28.92	28.24	27.41	27.74	27.20	26.60	25.77
Number of Full-time Equivalent RNs	149.87	157.12	162.77	166.71	171.56	173.25	176.13	180.39	187.47	191.79	197.28
Ratio of LPNs to All Licensed Nurses	24.6 percent	23.9 percent	22.6 percent	21.4 percent	21.2 percent	20.7 percent	19.7 percent	19.6 percent	18.8 percent	18.5 percent	18.0 percent
Scope of Practice											
Specific											2.34
Restrictive											1.95
Hospital and Patient Characteristics											
Inpatient Days	42,265	42,120	42,178	41,346	39,912	38,791	38,119	38,509	38,677	39,210	39,706
Medicaid's Share of Inpatient Days	15.2 percent	16.3 percent	17.3 percent	18.1 percent	18.6 percent	18.7 percent	18.0 percent	18.1 percent	17.3 percent	17.6 percent	18.3 percent
Length of Stay	10.00	10.32	10.44	10.73	10.48	10.18	10.13	9.85	9.78	9.71	9.92
Case Mix	1.20	1.22	1.23	1.23	1.24	1.24	1.25	1.26	1.28	1.28	1.25
Technology (Saidin Index)	1.79	1.85	1.97	2.06	2.12	2.14	2.16	2.21	2.18	2.34	2.47
Non-profit Owner	58.6 percent	58.8 percent	59.4 percent	59.3 percent	59.3 percent	59.1 percent	58.9 percent	59.1 percent	60.0 percent	60.5 percent	61.1 percent
For-profit Owner	13.6 percent	13.4 percent	13.1 percent	13.1 percent	13.3 percent	13.8 percent	14.0 percent	14.9 percent	14.5 percent	14.1 percent	14.1 percent
Government Owner	16.5 percent	16.6 percent	16.2 percent	16.0 percent	15.9 percent	15.4 percent	15.5 percent	14.7 percent	14.1 percent	14.0 percent	13.7 percent
Hospital District/Authority Owner	11.3 percent	11.3 percent	11.3 percent	11.6 percent	11.5 percent	11.7 percent	11.6 percent	11.4 percent	11.4 percent	11.4 percent	11.1 percent
Market Characteristics											
LPN Market Wage	$12.23	$12.50	$12.71	$12.77	$12.81	$12.71	$12.62	$12.57	$12.88	$13.12	$13.29
RN Market Wage	$18.85	$19.26	$19.56	$19.59	$19.58	$19.25	$19.11	$18.83	$18.96	$19.24	$19.40
Nurse Aide Market Wage	$7.51	$7.49	$7.48	$7.39	$7.36	$7.44	$7.45	$7.51	$7.62	$7.78	$7.97
Number of HMOs Operating in County	6.60	6.85	7.03	6.67	6.56	6.95	7.79	8.00	8.36	7.63	6.30
HMO Penetration	12.9 percent	13.9 percent	14.4 percent	14.9 percent	15.6 percent	15.8 percent	18.3 percent	20.4 percent	22.1 percent	21.7 percent	21.0 percent
No. of HMOs In County x HMO Penetration	1.33	1.41	1.44	1.40	1.47	1.65	2.06	2.26	2.42	2.48	1.90
Per Capita Income in County	$17,057	$17,375	$18,384	$18,957	$19,844	$20,908	$22,018	$22,718	$24,375	$25,506	$26,208
Percentage of LPNs Unionized	12.6 percent	12.5 percent	14.8 percent	14.6 percent	15.1 percent	14.7 percent	13.4 percent	11.1 percent	11.0 percent	12.9 percent	12.3 percent

Variable	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
in State											
Percentage of RNs Unionized in State	17.3 percent	17.0 percent	16.7 percent	15.8 percent	17.1 percent	16.5 percent	16.3 percent	15.3 percent	14.5 percent	16.3 percent	16.9 percent
Instruments for Scope of Practice											
Per Capital State Debt/Per Capita Income											6.27
State Government Controlled by Democrats											9.5 percent
State Government Control Divided											52.3 percent
Governor Does Not Have Line Item Veto											9.6 percent
percent Democrats in Lower Legislative House											53.7 percent
percent Democrats in Upper Legislative House											51.1 percent
Instruments for LPN Wage											
LPN Average Age											42.32
percent of Total Workforce Unionized in State											13.9 percent
Sample Size	*5,220*	*5,152*	*5,076*	*5,042*	*4,991*	*4,943*	*4,888*	*4,810*	*4,772*	*4,703*	*4,661*

Sources: American Hospital Association Annual Survey of Hospitals, Current Population Survey Outgoing Rotation Files, and Area Resource File (February 2003 release). Managed care data courtesy of Douglas R. Wholey (Wholey et al., 1997). Political variables courtesy of Mark W. Smith, Health Economics Resource Center, VA Palo Alto Health Care System.

Appendix F

F1. Findings From Focus Groups

Patient care is the major role for both RNs and LPNs

Despite the differences in their licensure and employer, LPNs and RNs Stated that direct patient care is their main responsibility. While LPN and RN licenses specify different scopes of practice, and LPNs predominate in the long-term care setting with RNs more prevalent in acute care facilities, the focus group respondents cited similar overall duties in their current jobs. Specifically, direct patient care is the most often-mentioned responsibility with most of the participating LPNs and RNs claiming this duty. In descending order of importance, both groups also Stated responsibility for: patient education, supervision of other nurses, education of other staff members, and supervision of non-nursing staff.

When LPNs and RNs work side-by-side in a particular facility or department, the actual patient-care duties performed by each differ, with LPNs serving in a more hands-on, technical capacity and RNs more likely to supervise and to perform specific highly skilled tasks. However, when RNs greatly outnumber the LPNs in a particular setting, their duties may be fairly similar, except for those activities the LPN is not licensed to perform. When LPNs greatly outnumber the RNs in a setting, usually in long-term care, the LPNs report to an RN, but may take on broader responsibilities.

Relationships between RNs and LPNs are positive

The relationships between the LPNs and RNs in the focus groups and the other nursing staff members with whom they work are generally positive. LPNs Stated that the RNs with whom they interact are, for the most part, supportive and respectful, while the RNs Stated that they appreciate the contributions of the LPNs and rely on them to get the job done. In the acute care setting, some LPNs resent their lower pay and perceived lower status, although not all hospital LPNs felt this way. The few specific instances of friction cited by focus group respondents were believed to be isolated examples of personality clashes or the occasional frustrated or overworked individual.

There are significant barriers for LPNs in obtaining RN education and licensure

If it were easier for LPNs to get their RN license, more LPNs would be interested in doing so. Although some of the focus groups' LPNs are not interested in obtaining an RN license, many would like to obtain the more advanced license. In each of the LPN focus groups, at least one individual was currently enrolled in an RN program, and several others Stated an intention to enroll in the future. Still others in each group claimed to have been interested in an RN license in the past, but to have shelved their aspirations for a variety of reasons. The major obstacles to LPNs obtaining an RN license appear to be:

- The need to take prerequisite courses such as math and science
- The difficulty of finding time off from work to take courses
- The expense of financing additional education

Some LPNs who Stated that they are not interested in obtaining a RN license said that they would be paid less as a newly licensed RN than as an experienced LPN. Some LPNs said that they perceive RNs to have more non-patient-care responsibilities, such as paperwork, and that they personally did not want to leave bedside nursing.

The following ideas were proposed by the group to help LPNs address barriers in gaining RN licensure were suggested by focus group participants:

- Have RN programs that give substantial credit for the expertise and knowledge of an experienced LPN
- Offer employer-sponsored programs that provide financial assistance and scheduling flexibility to LPNs interested in pursuing the RN license
- Offer LPNs who meet certain criteria an opportunity to challenge the RN boards without further course work
- Offer more LPN–RN ladder programs such as those offered at most Iowa Community Colleges

Most participants agree with the LPN scope of practice in their State

The four States visited varied in LPN scope of practice. The majority of focus group participants were generally familiar with their State's scope of practice for LPNs. In each group, several individuals were able to articulate the LPN scope of practice and could specify how it differed from the RN scope of practice. Even many respondents who did not feel comfortable articulating the guidelines appeared knowledgeable about what RNs and LPNs are and are not permitted to do in the workplace. In each focus group, a few individuals seemed unsure about what the regulations specify.

While focus group members generally understood the LPN scope of practice in each of the four States, there are a few differences between what the regulations State and what members believed that LPNs are permitted to do. Those areas of discrepancy mostly centered on patient assessment, IV therapy, and treatment with blood products.

Most focus group participants were in agreement with their State's scope of practice, although a few respondents, particularly LPNs, felt that the scope is too restrictive. Those who support the current scope of practice believe that it appropriately captures the level of training and skills possessed by LPNs. Those who felt that the scope of practice is too limiting expressed the following perspectives:

- Some LPNs mentioned that they are not permitted to perform all the activities outlined in the scope of practice. LPNs Stated that they are guided more by employer-specific policies and procedures stating their specific job tasks and responsibilities than by everyday knowledge of the State's scope of practice. Employers have the prerogative to establish internal practice guidelines that are more limited than the legal scope of practice.
- In reality LPNs often perform many RN tasks, with the RN signing off on their completion.
- Many LPNs with experience have greater technical abilities than junior RNs
- LPNs are more practiced at the technical, hands-on aspects of nursing while RNs spend more time doing administrative work.
- Another limiting factor in LPN scope of practice is that of what RNs are allowed to delegate to other health professionals, including LPNs. For example, in the State of Louisiana, the RN scope of practice limits the tasks that an RN may delegate to an LPN, thereby *de facto* reducing the LPN scope of practice.

Some LPNs felt that they have responsibilities that go beyond the State's regulations.

According to the focus group participants, when the LPNs functioned outside the scope of practice, it was usually for one of the following reasons:

- In some units/department (e.g., ER, ICU, cardiac catheterization lab), the pace is so hectic that everyone must pitch in and do what is required, regardless of regulatory boundaries.
- If an RN has confidence in a particular LPN's knowledge and skills, that LPN may be permitted to bend the rules.
- In long-term care facilities and on night and weekend shifts, there may be few or no RNs available, so LPNs must perform tasks outside of the scope of practice.
- In emergency situations LPNs may perform tasks outside their scope of practice.
- A relatively junior RN may have a lower skill level than a more senior LPN, who therefore is asked to perform a task in his/her stead.

Several LPNs who had knowingly practiced outside their scope of practice expressed discomfort with this both because of legal liability and because they are paid less than RNs and should therefore not be expected to take on RN tasks.

Many LPNs are interested in earning an RN license

In each LPN group, one or more individuals are either currently studying for their RN license, or are very interested in doing so. Still others considered getting an RN license at some time in the past, but were unable to complete the process. Among the reasons LPNs cited for wishing to become an RN are:

- Higher pay
- Greater respect from patients, physicians, other staff members
- Ability to supervise other and less hands-on work
- Already do everything RNs do, but not paid as much
- RNs work at a slower pace with more paperwork to do
- Greater opportunities for advancement
- To gain more knowledge and skills
- Priority in scheduling work-shifts (acute care)

Several LPNs also Stated that they were not interested in becoming RNs. Among the reasons they wished to remain an LPN were:

- Because of seniority, earn more than most RNs
- Not a risk-taker
- Not sure I have what it takes to get the RN license
- LPNs today have more opportunities than they did in the past
- Can't afford to quit work to pursue the RN license
- Would have to take the various prerequisite courses (math, science, history)
- LPNs have less responsibility and lower legal liability
- RNs don't do as much direct patient care

Barriers to LPN education and licensure are fewer than for RN licensure

The LPNs in the focus groups cited few barriers to earning their LPN license, saying they found it fairly easy. The obstacles mentioned by individual respondents included difficulty in the following areas:

- Finding information about LPN programs in the area
- Fulfilling prerequisites
- Attending the program as a single mother or when raising a family
- Lack of employer tuition reimbursement
- Obtaining paid time off from work to attend school

- Competing with other students for prerequisite courses

Once initial barriers such as finding a program and completing prerequisites were completed, most of the LPNs Stated that they had few barriers to completing LPN educational programs. The major barrier cited was the need to work and attend school as well as juggle family responsibilities.

Most RNs and LPNs were satisfied with their career and job

Focus group participants were generally satisfied with their choice of nursing as a career and certain aspects of their current jobs. In the written survey of the participants, over half of LPNs (56 percent) and three-fourths (74 percent) of RNs say that they Strongly Agree that they are satisfied with nursing as a career, while over half of LPNs (56 percent) and two-thirds (67 percent) of RNs Strongly Agree that they are not considering leaving the field. Three-fourths of LPNs (73 percent) and half of RNs (50 percent) strongly agree that they like working with a mix of different types of nurses. However nearly half of each group believed that their supervisors value their opinions. The most negative scores were given to salary level. Just 2 percent of LPNs and 12 percent of RNs strongly agree that their pay is satisfactory for their work.

Most RNs and LPNs preferred to work in acute care settings if pay was equal

The written survey results showed that LPNs are more than twice as likely as RNs to work in the long-term care setting, while RNs are more than twice as likely as LPNs to work in acute care hospitals. Part of this is due to the fact that in the 1990s, many acute care hospitals reduced or eliminated LPN positions in an attempt to increase the percentage of RNs in their work forces. In addition, the typically lower skill set of the LPN is adequate to meet the needs of the less acutely ill long-term care patient population.

Nurses who work in the acute care setting Stated that they preferred that setting for several reasons:

- Acute care is a more exciting, fast-paced and challenging
- Use more skills and uses a wider variety of skills
- Greater variety of patient cases
- Pay is generally higher
- Employee benefits are better
- Opportunities for travel and per diem positions

The participants who preferred the long-term care setting cited the following reasons for their views:

- Longer lengths of stay allow staff to get to know the patient and family
- Work hours often shorter and usually more regular
- Mandated overtime rarely exists in long-term care.
- LPNs pay is usually higher in long-term care than in acute care hospitals.
- Pace of work is generally slower

F2. Key Informant Interview Questions

Interview Questions for employers

Questions to be asked in the employer interviews include, but are not limited to:

- To what extent do you employ LPNs in your facility?
- What factors make LPNs attractive to you?
- What factors make LPNs unattractive to you?
- How do LPNs work with other personnel in your facility?
- To what extent do you substitute LPNs for other personnel in your facility?
- Do you believe LPN education is adequate?
- What changes to LPN education would you recommend?
- Do you believe the scope of practice of LPNs in your State is appropriate?
- What changes to the scope of practice would you recommend?

Interview Questions for educators

Questions to be asked in the educator interviews include, but are not limited to:

- What factors help students complete their LPN education?
- What factors are barriers to the completion of LPN education?
- What positions do your LPNs obtain after completion of your program?
- Do you believe LPN educational requirements are adequate in your State?
- What changes to LPN educational requirements would you recommend?
- Do many of your students want to pursue RN education after completing LPN education?
- How difficult is it to pursue RN education after LPN education?
- Do you believe the scope of practice of LPNs in your State is appropriate?
- What changes to the scope of practice would you recommend?

Interview Questions for Boards of LPN/LPN

Questions to be asked in the Boards of LPN/LPN interviews include, but are not limited to:

- What is the philosophy behind the scope of practice of LPNs in your State?
- Do you believe the scope of practice regulations for LPNs in your State are effective?
- What changes to the scope of practice are under consideration?
- How do you accredit LPN educational programs in your State?
- Is adequate LPN education available in your State?
- How difficult is it to pursue RN education after LPN education?
- Where do LPNs work when they complete their education in your State?
- Does there appear to be a shortage of LPNs?

F3. Focus Group Questions

Focus Group Questions for RNs

Questions to be asked in the RN focus groups include, but are not limited to:

- How do LPNs work with other personnel in your facility?
- Do you supervise LPNs?
- What difficulties do you experience working with LPNs?
- To what extent do LPNs substitute for other personnel in your facility?
- Do you believe LPN education is adequate?
- What changes to LPN education would you recommend?
- Do you believe the scope of practice of LPNs in your State is appropriate?
- What changes to the scope of practice would you recommend?

Focus Group Questions for LPN/LPNs

Questions to be asked in the practicing LPN focus groups include, but are not limited to:

- How do LPNs work with other personnel in your State?
- To what extent do LPNs substitute for other personnel in your State?
- What factors are barriers to the completion of LPN education?
- Do you believe LPN education is adequate?
- What changes to LPN education would you recommend?
- How difficult is it to pursue RN education after LPN education?
- Do you believe the scope of practice of LPNs in your State is appropriate?
- What changes to the scope of practice would you recommend?