

Erin Fraher PhD, MPP, Connor Sullivan PhD, Shweta Pathak PhD, Colleen Tapen MPH, MBA Policy Brief, May 2025

I. Introduction

The COVID-19 pandemic disrupted historical trends in the nursing workforce in the United States (US). As hospital leaders grappled with registered nurse (RN) shortages, financial pressures, and increased patient acuity during the pandemic, alternative nurse staffing models were implemented as a short-term strategy to meet patient health care needs (Anderson et al., 2020; Cross et al., 2021). Some of these staffing models sought to ameliorate RN shortages by utilizing "team-based nursing" approaches that maximized the use of LPNs and nursing assistive personnel (NAP) to work alongside RNs and take on tasks that do not require an RN's expertise.

Although alternative staffing models grew during the pandemic, team-based nursing models surfaced before the pandemic to optimize the use of nurses to their full scope of practice (Fernandez et al., 2012; MacKinnon et al., 2018). Evaluations of teambased staffing models (Beckett et al., 2021) found mixed results, with one study suggesting that lower RN skill mix— a lower proportion of RNs relative to LPNs, NAPs and other assistive personnel—resulted in avoidable patient deaths, higher readmissions, and lower patient satisfaction (Lasater et al., 2024).

Nurse staffing models vary considerably by state and some states have implemented legislation mandated ratios in California, public reporting requirements, and legislated staffing committees in other states—to influence hospitals' nurse staffing models (Han et al., 2021). While there is some evidence of an increased use of alternative nursing staffing models during the pandemic in specific states and health systems (Executive Insights, 2021; Steaban

Policy Implications

This study used data from the American Hospital Association's annual survey and revealed significant shifts in nurse staffing in general acute care hospitals between 2017 and 2020. Findings provide preliminary data on the pandemic's impact on hospital nurse staffing and suggest potential implications for state and federal policy makers, hospital employers, and licensure bodies.

- Up until 2020, average registered nurse (RN) full time equivalents (FTE) were increasing but then in 2021 they decreased and held steady at that lower rate in 2022. Data support concerns voiced by other researchers about whether RNs will return to hospital employment at current pay scales, working conditions, and rates of workplace violence.
- Considerable state variation exists in RN staffing intensity which warrants further investigation.
- There was a significant uptick in licensed practical nurse (LPN) FTE in 2022 after a steady decrease in LPNs employed in hospitals. If hospitals continue to increasingly rely on LPNs, it may decrease the ability of long-term care facilities to staff beds and hospitals may find it increasingly difficult to discharge patients in need of long-term care.
- State and federal policymakers may want to increase investments in LPN education and career laddering opportunities that increase the ability of NAPs to become LPNs.
- Nursing regulatory bodies may want to collaborate with LPN employers to provide education on LPN scope of practice so that employers have the knowledge to utilize LPNs to their full scope of practice according to state-specific regulations.

et al., 2024), little national data exist showing if historic trends in hospital nurse staffing were disrupted after the pandemic.

This study investigated trends in the utilization of RNs, LPNs and Nurse Assistive Personnel in general acute hospitals at the state and national levels from 2017 to 2022. We sought to understand whether, even after controlling

This work is funded through HRSA Cooperative Agreement #U81HP26495: Health Workforce Research Centers Program. Carolina Health Workforce Research Center University of North Carolina at Chapel Hill



for hospital and geographic characteristics, nurse staffing models changed after the pandemic began in 2020 compared to the pre-pandemic period from 2017 to 2019 and if differences existed between states.

II. Methods

Data and Sample

This study used data from the American Hospital Association's (AHA) Annual Survey from 2017 to 2022. Of the 6,533 unique hospitals in the sample, 1,154 (17.7%) did not respond to the AHA survey (Appendix A). Of the 5,379 respondent hospitals, we excluded 1,235 long-term care and children's hospitals (23%), 93 federal hospitals (1.7%), 29 (0.5%) hospitals outside the 50 states, 405 (7.5%) hospitals with missing data on RN staffing, and 38 hospitals with outlier values above 3 standard deviations on the dependent variables of RN skill mix (defined as the percentage of RNs relative to LPNs, NAPs and other assistive personnel) or RN staffing intensity (defined as RN FTEs per adjusted inpatient days) (0.7%) were excluded. We also excluded 2 hospitals due to missing Health Professional Shortage Area (HPSA) data. The final sample included 16,453 observations nested within 3,577 (66.5%) general acute care hospitals.

In the AHA survey, FTE is defined as the total number of hours worked by all employees over the 12-month reporting period divided by the "normal" number of hours worked by a full-time employee for the same period. The FTE data include nurses employed in both inpatient and outpatient settings, but the data do not distinguish between settings. For this reason, we used the AHA's "adjusted inpatient days" variable which is imputed by multiplying inpatient days by the ratio of outpatient to inpatient revenue (inpatient days + inpatient days * [outpatient revenue/inpatient revenue]).

Hospitals located in metropolitan counties were coded as metropolitan and hospitals in nonmetropolitan and micropolitan counties were coded as nonmetropolitan using 2020 definitions from the Office of Management and Budget (The United States Office of Management and Budget (OMB), 2020). A county's status as a primary care Health Professional Shortage Area (HPSA) was obtained from the Area Health Resource File and was coded as a categorical variable indicating whether a county is designated as a part, whole, or non-HPSA county.

Analysis

We conducted descriptive and bivariate analyses to examine trends in general acute care hospitals regarding: 1. average FTEs of RNs, LPNs and NAPs between 2017 and 2022; 2. RN skill mix measured as RNs as a percentage of the total nursing workforce between 2017 and 2022 (RN FTE / [RN + LPN + Assistive Personnel FTE]); and 3. RN staffing intensity, measured by average RN FTEs per 1,000 adjusted inpatient days between 2017 and 2022. We then used hierarchical linear modeling (HLM) to investigate changes in RN staffing intensity in general acute care hospitals between 2017 and 2022. Our dependent variable in the HLM was RN adjusted staffing intensity, measured as RN FTEs per 1,000 adjusted inpatient days. The HLM controlled for hospital characteristics (teaching hospital status [yes/no], ownership [public, non-profit, private], total staffed beds, and occupancy rate [Inpatient days / (total staffed beds * 365]. We also controlled for county characteristics where the hospital was located including the county' metropolitan status [yes/no], and designation as a HPSA [whole county, part county, non-HPSA].

We hypothesized that even after controlling for hospital and geographic characteristics, RN staffing intensity would vary over time. To measure these effects, we used year dummy variables with 2017 as the reference category so that changes due to the pandemic could be easily compared to our baseline values of RN adjusted staffing intensity. We also hypothesized that there would be heterogeneity in states' pandemic policies that could have affected COVID-19 admissions and staffing, so we treated states as fixed effects in our HLM. Since New York was the hardest state hit initially, we used New York as the reference category. We created an interaction term between metropolitan status and year to test whether nonmetropolitan counties fared differentially over time given that RN staffing shortages were present in nonmetropolitan counties even before the pandemic (Sablik, 2022; Skillman et al., 2006).

III. Findings

Figure 1 shows changes in average RN, LPN, and NAP FTE employment in hospitals between 2017 and 2022. Average RN FTE per hospital increased 9% from 373.1 in 2017 to 407.1 in 2020 before decreasing to 396 FTE in 2021 and 2022. The number of LPNs employed in hospitals is much smaller than RNs and their average FTE held relatively steady with some variation between 2017 and 2019 before declining to an average of 16.7 in 2021 and then increasing to an average 17.8 in 2022. Average NAP FTEs per hospital (including certified nursing assistants and equivalent unlicensed staff) increased over the study period, growing by 12% from an average of 94.8 FTE in 2017 to 106.2 FTE in 2022.

RN skill mix (RN FTE / [RN + LPN + Assistive Personnel FTE]) decreased slightly from 72.2% to 71.8% between 2017 and 2022 but this decline was neither statistically nor numerically significant (Table 1). Trends in adjusted inpatient days reveal an inflection point in 2020. Average inpatient days per hospital increased by 6% between 2017 and 2020, decreased by 5% between 2019 and 2020, and then recovered, increasing by 13% between 2020 and 2022 (p < .001). As a result, average RN staffing intensity (RN FTEs per adjusted inpatient days) increased from 3.5 in 2017 to 3.7 in 2020, then fell to 3.3 in 2021 and 3.2 in 2023 (p < .001). No other hospital or geographic characteristics had statistically significant changes over the period except for the average hospital occupancy rate (inpatient days / [total staffed beds * 365) which dipped slightly in 2020 and then increased in 2021 and 2022 (p < .01).

After adjusting for hospital and geographic characteristics as well as state fixed effects (Table 2), the HLM showed that relative to 2017, RN adjusted staffing intensity increased by 0.12 RNs per 1,000 patient days in 2020 (p < .01), but then decreased by 0.11 RNs in 2021 (p < .01), and further decreased by 0.27 RNs per 1,000 patient days in 2022 (p < .01). Hospitals in metropolitan areas had 0.66 more RNs per 1,000 adjusted inpatient days compared to nonmetropolitan counties. However, after 2020, the RN adjusted staffing intensity decreased at a faster rate in metropolitan counties than nonmetropolitan counties, decreasing by 0.13 RNs per 1,000 adjusted inpatient days in 2021 (p < .01) and by 0.18 RNs in 2022 (p < .001).

Additionally, the HLM model showed differences in average RN adjusted staffing intensity by state (Figure 2). Relative to New York, 14 states had statistically significantly different RN adjusted staffing intensity, ranging from Utah having 2.2 more RNs per 1,000 adjusted inpatient days to West Virginia having .79 fewer RNs (p < .05) per 1,000 adjusted inpatient days.

IV. Conclusions

This study revealed shifts in nurse staffing intensity after the pandemic began in 2020. Up until 2020, hospital RN FTE was increasing but then in 2021 it decreased and held steady at that lower rate in 2022. Our findings are consistent with Auerbach et al.'s finding that although overall RN supply rebounded in 2022, much of this growth took place outside hospitals (Auerbach et al., 2024). If RN FTEs continue to decline in hospitals, this may further accelerate the use of team-based nursing care models to optimize the scarce resource of RN staffing.

Even after controlling for time and state fixed effects, as well as hospital and geographic characteristics, considerable variation in RN staffing intensity exists between states that warrants further investigation. California is the only state with mandated staffing ratios and yet Utah, which has a staffing plan that enables nurses and hospitals to determine how to allocate resources, had higher RN staffing intensity (Krishnamurthy et al., 2024) than California. By contrast, West Virginia also has a staffing plan approach, but they had the lowest statistically significant staffing intensity in the sample.

A surprise finding was the significant uptick in LPN FTE in 2022 after a steady decrease in the LPN utilization in hospitals (Li et al., 2017; Staggs & He, 2013). This increase in LPNs in hospitals in 2022 occurred after a 9.1% decline in the LPN workforce nationally between 2018 and 2022 and also in the context of a forecasted shortage of over 300,000 LPN FTEs in 2037 (National Center for Health Workforce Analysis et al., 2024). If hospitals continue to increase their use of LPNs, it may decrease the ability of long-term care (LTC) facilities to hire LPNs since hospitals salaries are higher than

in LTC (Bureau of Labor Statistics, 2024). If LTC facilities are unable to staff beds, hospitals may find it increasingly difficult to discharge patients in need of long-term care, a phenomenon that reflects the interconnectedness of health employment sectors.

Our findings on LPN utilization in hospitals are preliminary and may not reflect future trends. However, if LPN employment in hospitals continues to increase, state and federal policymakers may want to increase investments in LPN education and career laddering opportunities that increase the ability of NAPs to become LPNs. Beyond ensuring an adequate supply of LPNs, the increase in LPN employment in hospitals may require changes in LPN education and regulation (Weaver et al., 2021). Nursing regulatory bodies may want to collaborate with LPN employers to provide education on LPN scope of practice so that employers have the knowledge to utilize LPNs to their full scope of practice according to state-specific regulations.

Nursing assistive personnel grew steadily from 2005 until 2020 and then leveled off in 2021 and 2022, the point at which LPN utilization increased. It will be important to continue to monitor whether these two trends continue, as it could signal a preference by hospitals facing RN shortages for licensed nursing personnel.

Limitations

Although changes in nursing skill mix were observed over the study period, we cannot discern from the data whether they reflect a shift to team-based nursing models that include delegation of care and coordinated care planning. The AHA data do not distinguish between direct care RNs and those in indirect or management roles, which may impact estimates of staffing levels (Kovner et al., 2002). Data on contract RNs were not collected until after 2022 and, thus, nurses not employed by the hospital are not included in the data which may mean that our analyses underestimate RN FTEs.

This project was supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under Cooperative Agreement #U81HP26495, Health Workforce Research Centers Program. The information, content and conclusions are those of the authors and should not be construed as the official position or policy of, nor should any endorsements be inferred by HRSA, HHS or the U.S. Government.

WORKS CITED

- 1. American Hospital Association. Team-Based Models of Care. January 2022 2022. (<u>https://www.aha.org/system/files/media/file/2022/01/pa-workforce-solutions-team-based.pdf</u>).
- Anderson, B. R., Ivascu, N. S., Brodie, D., Weingarten, J. A., Manoach, S. M., Smith, A. J., Millerman, K., Yip, N. H., Su, G., Kleinschmidt, C., Khusid, F., Olson, M., Hochman, B. R., Hill, L. L., & Burkart, K. M. (2020). Breaking Silos: The Team-Based Approach to Coronavirus Disease 2019 Pandemic Staffing. Critical Care Explorations, 2(11), e0265. https://doi.org/10.1097/cce.0000000000265
- 3. Auerbach, D. I., Buerhaus, P. I., Donelan, K., & Staiger, D. O. (2024). Projecting the Future Registered Nurse Workforce After the COVID-19 Pandemic. *JAMA Health Forum*, *5*(2), e235389. https://doi.org/10.1001/jamahealthforum.2023.5389
- 4. Beckett CD, Zadvinskis IM, Dean J, Iseler J, Powell JM, Buck-Maxwell B. An Integrative Review of Team Nursing and Delegation: Implications for Nurse Staffing during COVID-19. Worldviews Evid Based Nurs 2021;18(4):251-260. (In eng). DOI: 10.1111/wvn.12523.
- 5. Bureau of Labor Statistics. (2024). *Occupational Employment and Wage Statistics*. Retrieved December 6, 2024 from https://www.bls.gov/oes/current/oes311131.htm
- Cross, K., Bradbury, A., Burnham, N., Corbett-Carbonneau, D., Peterson, K., Phelan, C., & DeSanto-Madeya, S. (2021). A nurse staffing model for an unprecedented event. *Nursing Management*, *52*(3), 34-42. <u>https://doi.org/10.1097/01.NUMA.0000733632.80809.7d</u>
- 7. Executive Insights. (2021). *Rethinking Nurse Staffing Models: Changes in nurse staffing models and care delivery post-COVID-19*. <u>https://www.aonl.org/system/files/media/file/2021/05/Exec_Insights_Chamberlain_rev5_0.pdf</u>.
- 8. Fernandez R, Johnson M, Tran DT, Miranda C. Models of care in nursing: a systematic review. Int J Evid Based Healthc 2012;10(4):324-37. (In eng). DOI: 10.1111/j.1744-1609.2012.00287.x.
- Griffiths P, Maruotti A, Recio Saucedo A, et al. Nurse staffing, nursing assistants and hospital mortality: retrospective longitudinal cohort study. BMJ Qual Saf 2019;28(8):609-617. (In eng). DOI: 10.1136/bmjqs-2018-008043.
- Han X, Pittman P, Barnow B. Alternative Approaches to Ensuring Adequate Nurse Staffing: The Effect of State Legislation on Hospital Nurse Staffing. Medical care 2021;59(Suppl 5):S463-s470. (In eng). DOI: 10.1097/mlr.00000000001614.
- Kovner C, Jones C, Zhan C, Gergen PJ, Basu J. Nurse staffing and postsurgical adverse events: an analysis of administrative data from a sample of U.S. hospitals, 1990-1996. Health Serv Res 2002;37(3):611-29. (In eng). DOI: 10.1111/1475-6773.00040.
- Krishnamurthy, N., Mukherjee, N., Cohen, B., Mazor, M., & Appel, J. M. (2024). Hospital Nurse Staffing Legislation: Mixed Approaches In Some States, While Others Have No Requirements. *Health Aff (Millwood)*, 43(8), 1172-1179. <u>https://doi.org/10.1377/hlthaff.2023.01521</u>
- 13. Lasater KB, Muir KJ, Sloane DM, McHugh MD, Aiken LH. Alternative Models of Nurse Staffing May Be Dangerous in High-Stakes Hospital Care. Medical care 2024;62(7):434-440. DOI: 10.1097/mlr.00000000001990.
- 14. Li, S., Pittman, P., Han, X., & Lowe, T. J. (2017). Nurse-Related Clinical Nonlicensed Personnel in U.S. Hospitals and Their Relationship with Nurse Staffing Levels. *Health Serv Res*, *52 Suppl* 1(Suppl 1), 422-436. <u>https://doi.org/10.1111/1475-6773.12655</u>
- MacKinnon K, Butcher DL, Bruce A. Working to Full Scope: The Reorganization of Nursing Work in Two Canadian Community Hospitals. Glob Qual Nurs Res 2018;5:2333393617753905. (In eng). DOI: 10.1177/2333393617753905.
- National Academies of Sciences E, and Medicine,. Rapid Expert Consultation on Staffing Considerations for Crisis Standards of Care for the COVID-19 Pandemic. July 28, 2020 2020. (<u>https://nap.nationalacademies.org/catalog/25890/rapid-expert-consultation-on-staffing-considerations-forcrisis-standards-of-care-for-the-covid-19-pandemic-july-28-2020).</u>
- National Center for Health Workforce Analysis, Bureau of Health Workforce, & Department of Health and Human Services. (2024). Nurse Workforce Projections, 2022-2037. https://bhw.hrsa.gov/sites/default/files/bureau-health-workforce/data-research/nursing-projections-factsheet.pdf

- 18. Needleman J, Buerhaus P, Mattke S, Stewart M, Zelevinsky K. Nurse-staffing levels and the quality of care in hospitals. The New England journal of medicine 2002;346(22):1715-22. (In eng). DOI: 10.1056/NEJMsa012247.
- 19. Sablik T. The rural nursing shortage. Econ Focus. 2022. (https://www.richmondfed.org/publications/research/econ_focus/2022/q1_feature_1)
- 20. Skillman SM, Palazzo L, Keepnews D, Hart LG. Characteristics of registered nurses in rural versus urban areas: implications for strategies to alleviate nursing shortages in the United States. J Rural Health 2006;22(2):151-7. (In eng). DOI: 10.1111/j.1748-0361.2006.00024.x.
- 21. Sherman R. The Conundrum of Mandated Nurse Staffing Ratios. Nurse Leader 2023;21(5):507-509. DOI: 10.1016/j.mnl.2023.06.011.
- 22. Spetz J, Donaldson N, Aydin C, Brown DS. How many nurses per patient? Measurements of nurse staffing in health services research. Health Serv Res 2008;43(5 Pt 1):1674-92. (In eng). DOI: 10.1111/j.1475-6773.2008.00850.x.
- 23. Staggs, V. S., & He, J. (2013). Recent trends in hospital nurse staffing in the United States. *J Nurs Adm*, 43(7-8), 388-393. <u>https://doi.org/10.1097/NNA.0b013e31829d620c</u>
- Steaban, R. L., Morrison, J., Simmons, S., Ivory, C., France, D., Leming-Lee, S., Hollingsworth, E. K., & Kleinpell, R. (2024). Strategies to Evaluate New Models of Nursing Care to Meet Hospital Staffing and Patient Care Needs. *Nurse Leader*, 22(6), 718-724. <u>https://doi.org/10.1016/j.mnl.2024.05.007</u>
- 25. United States Office of Management and Budget and the United States Census Bureau. 2020 March. Core based statistical areas (CBSAs), metropolitan divisions, and combined statistical areas (CSAs). <u>https://www.census.gov/geographies/reference-files/time-series/demo/metro-micro/historical-delineation-files.html</u>
- 26. Weaver, S. H., de Cordova, P. B., Leger, A., & Cadmus, E. (2021). Licensed Practical Nurse Workforce in New Jersey as Described by LPNs and Employers. *Journal of Nursing Regulation*, *12*(1), 60-70. https://doi.org/10.1016/S2155-8256(21)00024-7





time Equivalents (FTE) per Hospital, 2017-2022



Note. Full-time equivalent (FTE). The shaded portion of the figure indicates the onset of the COVID-19 pandemic.



Table 1. Nursing, Hospital and County Sample Characteristics, 2017-2022

	2017 (N = 2853)	2018 (N = 2831)	2019 (N = 2693)	2020 (N = 2698)	2021 (N = 2701)	2022 (N = 2677)
	N (%)/M (SD)	N (%)/M (SD)	N (%)/M (SD)	N (%)/M (SD)	N (%)/M (SD)	N (%)/M (SD)
Nursing FTE	•		•	·	·	
RN FTE	373.1 (592.1)	383.0 (600.2)	401.2 (642.4)	407.1 (665.2)	396.4 (660.5)	396.3 (670.9)
LPN FTE	17.3 (33.1)	17.5 (35.2)	17.5 (36.3)	17.1 (36.3)	16.7 (35)	17.8 (34.7)
Nursing Assist. Pers. FTE*	94.8 (153.5)	96.9 (158.1)	102.2 (166.2)	105 (176)	105.4 (177.2)	106.2 (178.4)
RN Skill Mix	72.2% (13.9%)	72.5% (13.9%)	72.6% (13.8%)	72.8% (13.3%)	72.6% (13.3%)	71.8% (13.5%)
RN Staffing Intensity***	3.5 (1.8)	3.5 (1.8)	3.5 (1.8)	3.7 (2)	3.3 (1.8)	3.2 (1.7)
Hospital Characteristics						
Public	600 (21%)	586 (20.7%)	549 (20.4%)	532 (19.7%)	538 (19.9%)	515 (19.2%)
Non-Profit	1,978 (69.3%)	1,961 (69.3%)	1,892 (70.3%)	1,912 (70.9%)	1921 (71.1%)	1,938 (72.4%)
Private	275 (9.6%)	284 (10.0%)	252 (9.4%)	254 (9.4%)	242 (9.0%)	224 (8.4%)
Staffed Beds	188.6 (227.5)	189.2 (225.2)	193.7 (243.9)	196.2 (242.4)	195.3 (240.3)	194.7 (243.9)
Adjusted Inpt. Days (000)**	97,325 (114,833)	99,162 (116,972)	103,358 (124,731)	98,019 (119,409)	105,711 (133,056)	110,375 (138,983)
Teaching Hospital Status	207 (7.3%)	210 (7.4%)	204 (7.6%)	200 (7.4%)	200 (7.4%)	203 (7.6%)
Occupancy Rate***	0.52 (0.22)	0.52 (0.3)	0.52 (0.23)	0.5 (0.21)	0.53 (0.22)	0.54 (0.23)
CBSA Status						
Metropolitan	1,705 (59.8%)	1,727 (61%)	1,677 (62.3%)	1,667 (61.8%)	1,689 (62.5%)	1,657 (61.9%)
Non-Metropolitan	1,148 (40.2%)	1,104 (39%)	1,016 (37.7%)	1,031 (38.2%)	1,012 (37.5%)	1,020 (38.1%)
HPSA Status						
Non-HPSA	240 (8.4%)	251 (8.9%)	233 (8.7%)	243 (9%)	228 (8.4%)	231 (8.6%)
Whole HPSA	296 (10.4%)	288 (10.2%)	270 (10%)	268 (9.9%)	269 (10.0%)	271 (10.1%)
Part HPSA	2,317 (81.2%)	2,292 (81%)	2,190 (81.3%)	2,187 (81.1%)	2,204 (81.6%)	2,175 (81.2%)

Notes: M, mean; SD, standard deviation N, number; inpt., inpatient; RN, Registered Nurse; LPN, Licensed Practical Nurse. * p < .; 05, ** p < .01, *** p < .001. Skill mix=(RN FTE / [RN + LPN + Assistive FTE]). RN staffing intensity=(average RN FTEs/1,000 adjusted.

Variable	Coefficient	SE	95% Cl	
Intercept	3.17***	0.17	2.84	3.49
Year				
2017	ref	ref	ref	ref
2018	0.03	0.03	-0.04	0.09
2019	-0.01	0.03	-0.07	0.06
2020	0.12***	0.03	0.05	0.18
2021	-0.11**	0.03	-0.18	-0.04
2022	-0.27***	0.03	-0.34	-0.20
Teaching Hospital				
No	ref	ref	ref	ref
Yes	0.81***	0.08	0.65	0.97
Hospital Ownership				
Public	ref	ref	ref	ref
Non-Profit	0.33***	0.06	0.22	0.44
Private	0.66***	0.08	0.50	0.82
Beds and Occupancy				
Total Beds	0.0008***	0.0001	0.0006	0.001
Occupancy Rate	-1.33***	0.05	-1.43	-1.22
CBSA Status				
Nonetropolitan	ref	ref	ref	ref
Metropolitan	0.66***	0.06	0.55	0.78
HPSA				
Non-HPSA	ref	ref	ref	ref
Full County HPSA	-0.83***	0.12	-1.06	-0.59
Part County HPSA	-0.19*	0.09	-0.37	-0.003
Year by Metropolitan Interaction				
2018*Metropolitan	-0.03	0.04	-0.12	0.05

Table 2. Hierarchical Linear Model of RN Adjusted Staffing Intensity: 2017-2022

2019*Metropolitan	-0.04	0.04	-0.12	0.05
2020*Metropolitan	0.03	0.04	-0.05	0.12
2021*Metropolitan	-0.13**	0.04	-0.21	-0.04
2022*Metro	-0.18***	0.04	-0.27	-0.10
Random Effects				
	Variance	SD		
Hospital	2	1.41		
Residual	0.57	0.76		

Note. RN staffing intensity is measured as RN FTEs per 1,000 adjusted inpatient days. *p < .05, **p < .01, ***p < .001. HLM model also includes state fixed effects.





Note. All statistically significantly at p < .05.