Published in final edited form as:

South Med J. 2019 June ; 112(6): 331–337. doi:10.14423/SMJ.0000000000000986.

Availability of Hospital Resources and Specialty Services for Stroke Care in North Carolina

Mehul D. Patel, PhD, Gilson Honvoh, MSPH, Antonio R. Fernandez, PhD, Rhonda Cadena, MD, Emma R. Kelly, BSPH, Philip McDaniel, MA, and Jane H. Brice, MD, MPH

Department of Emergency Medicine, the Department of Biostatistics, and the Davis Library, University of North Carolina at Chapel Hill.

Abstract

Objectives: Effective regionalization of acute stroke care requires assessment and coordination of limited hospital resources. We described the availability of stroke-specific hospital resources (neurology specialty physicians and neuro-intensive care unit [neuro-ICU] bed capacity) for North Carolina overall and by region and population density. We also assessed daily trends in hospital bed availability.

Methods: This statewide descriptive study was conducted with data from the State Medical Asset Resource Tracking Tool (SMARTT), a Web-based system used by North Carolina to track available medical resources within the state. The SMARTT system was queried for stroke-specific physician and bed resources at each North Carolina hospital during a 1-year period (June 2015–May 2016), including daily availability of neuro-ICU beds. We compared hospital resources by geographic region and population density (metropolitan, urban, and rural).

Results: Data from 108 acute care hospitals located in 75 of 100 counties in North Carolina were included in the analysis. Fifty-seven percent of hospitals had no neurology specialty physicians. Western and eastern North Carolina had the lowest prevalence of these physicians. Most hospitals (88%) had general ICUs, whereas only 17 hospitals (16%) had neuro-ICUs. Neuro-ICUs were concentrated in metropolitan areas and in central North Carolina. On average, there were 276 general ICU and 27 neuro-ICU beds available statewide each day. Daily neuro-ICU bed availability was lowest in eastern and southeastern regions and during the week compared with weekends.

Conclusions: In North Carolina, stroke-specific hospital subspecialists and resources are not distributed evenly across the state. Daily bed availability, particularly in neuro-ICUs, is lacking in rural areas and noncentral regions and appears to decrease on weekdays. Regionalization of stroke care needs to consider the geographic distribution and daily variability of hospital resources.

Keywords

stroke therapy; hospitals; health resources; regional health planning; healthcare disparities

Correspondence to Dr Mehul D. Patel, Department of Emergency Medicine, University of North Carolina, 170 Manning Dr, CB #7594, Chapel Hill, NC 27599. mehul_patel@med.unc.edu.

G.H. has received compensation from the National Center for Complementary and Integrative Health (T32AT003378-11). The remaining authors did not report any financial relationships or conflicts of interest.

Stroke is a leading cause of mortality and morbidity. In the United States, approximately 1 in every 19 deaths is caused by stroke, and an estimated 795,000 people experience a stroke each year.¹ Furthermore, stroke is a major contributor to long-term disability and results in substantial personal, societal, and financial burden. North Carolina has especially high stroke mortality rates and is therefore part of a multistate region of the country called the stroke belt.² Stroke-related hospitalizations and deaths are highest in eastern North Carolina, where there are more rural areas.³

An acute stroke is a time-sensitive condition and requires immediate medical attention. An untreated acute stroke can lead to death or serious long-term disability. Moreover, the present gold standard therapies, namely intravenous thrombolytics and intraarterial clot retrieval, are more effective and safer when administered within hours after symptom onset.⁴ Certified stroke centers are specially equipped to provide optimal acute stroke treatment and management, which includes prompt evaluation and emergent treatment by neurologists and other specialists as well as admission to a specialized stroke care unit or a neurological intensive care unit (neuro-ICU) for observation.⁵ Acute management and admission in these facilities is associated with increased guideline recommended care and better outcomes.⁶

While in-hospital care and outcomes have improved substantially across the United States and in North Carolina,^{7,8} rural populations are significantly less likely to receive optimal acute stroke care.^{9,10} Urban–rural and other regional disparities are in part driven by the lack of access to high-quality acute stroke evaluation, treatment, and management.^{11–13}

Specialized physician services and hospital resources are expensive and not feasible to maintain in smaller community hospitals and thus often are concentrated in more urban and populous cities.¹² Statewide assessments of North Carolina hospitals from 1998 to 2008 observed a persistent concentration of certified stroke centers in the central region of the state, leaving large regional gaps.¹⁴ According to Goldstein, almost one-fifth of the state's population, predominantly in rural areas, was underserved with respect to hospital-based stroke resources.¹⁴

Regionalized systems of stroke care are needed to ensure that all patients have accessible high-quality care.¹⁵ Tiered systems for trauma and acute cardiac care have been designed and implemented to much success and are needed for stroke care as well.¹⁶ In North Carolina, to improve timely access to stroke care, emergency medical services (EMS) transport destination plans allow bypassing a local community hospital for a primary stroke center.^{17–19} Furthermore, ongoing research is investigating the benefit of direct transport of acute stroke patients to an endovascular-capable hospital based on symptom onset and severity.^{20–23} Many stroke centers use a network of hospitals for providing telemedicine and facilitating interfacility transfers with community hospitals.²⁴ Effective regionalization of stroke care requires further assessment and coordination of limited, geographically concentrated resources.

Here, we describe the availability of stroke-specific hospital resources (ie, neurology physician services and ICU bed capacity) for the entire state of North Carolina by geographic region and county-level population density. We hypothesized that resources

would not be evenly distributed across the state. Using a novel database, we also assessed daily trends in the availability of general and neuro-ICU beds for 1 year (June 2015–May 2016).

Methods

The state of North Carolina has 118 acute care hospitals, including for-profit healthcare systems, academic medical centers, small community facilities, and Department of Veterans Affairs hospitals. These hospitals are located throughout the state in 83 of 100 counties. At the time of this study, there were four Joint Commission-certified comprehensive stroke centers and >30 primary stroke centers in the state. These stroke centers were predominantly located in metropolitan and urban areas (Fig. 1A). Furthermore, certified stroke centers are the least likely to be located in North Carolina counties with the highest stroke mortality and hospitalization rates (Fig. 1, B and C).

This statewide descriptive study was conducted with data from the State Medical Asset Resource Tracking Tool (SMARTT; <https://www.emspic.org/applications/smartt>), a Web-based system used by North Carolina and other states to track available medical resources within the state (from 2008 to 2017). This system is designed to monitor hospital, EMS agencies, and healthcare centers on an ongoing basis to provide emergency management personnel with timely access to resource availability in the event of a local or regional disaster. Hospitals provide information on physician specialty services and number of licensed beds by type, including inpatient ward (“floor”) and ICUs. Furthermore, North Carolina acute care hospitals were expected to update counts of physically available (vacant) beds every day, including weekends. If the daily update was not made any time between 12 and 8 AM of each day, then a reminder alert was sent to the hospital’s administrative contacts.

For this analysis, stroke-specific hospital resources included physician subspecialties (neurology, interventional neurology, and neurosurgery) and ICU beds (general and neurological). The SMARTT system was queried for stroke resources in each North Carolina hospital during a 1-year period (June 1, 2015–May 31, 2016), including the daily availability of ICU beds. We compared statewide hospital resources by hospital size, population density, and geographic region. Hospital size was categorized by total number of adult floor beds. County-level population density was defined by the Office of Management and Budget’s 2013 Rural-Urban Continuum Codes, a classification scheme that assigns metropolitan, urban, and rural designations to all of the counties in the United States.

Geographic region was defined by the six multicounty regions as established by the North Carolina Healthcare Association. Using geographic information systems, we produced several maps of hospital locations, population density, stroke mortality and hospitalization rates, and hospitals with neuro-ICUs by region. To visualize regions with limited access, 20-, 40-, and 60-minute driving time areas were created surrounding each hospital with a neuro-ICU with ArcGIS’s Network Analysis toolbox (ESRI, Redlands, CA).

Daily general ICU and neuro-ICU bed availability for the entire state was plotted during the 1-year period. Median (and interquartile range) daily bed availability for the year was

reported overall and by hospital characteristics and day of the week. We also examined the proportion of the days out of the year that no neuro-ICU beds were available in a particular region. Although hospitals were able to enter the daily availability of specialty physician services in SMARTT, we found that the majority did not enter these data consistently or at all. Therefore, we did examine the daily variability of neurology and neurosurgery in this study.

As a descriptive study of the entire state, no formal statistical testing was conducted. Because hospital staff may not have updated bed counts daily, any hospital missing counts for >75% of the year was excluded from this analysis. For hospitals with remaining missing bed counts, daily values were assigned using a last observation carried forward approach, in which a date with missing data was assumed to have the same value as the most recent date with a recorded value.

Results

Of the 118 acute care hospitals in North Carolina, 113 entered data in SMARTT in 2015–2016. Five hospitals were missing >75% of daily reports and were excluded, leaving 108 (92%) hospitals for this analysis. The median size of hospitals was 74 (interquartile range 34–132) adult floor beds; the majority (63%) had <100 adult floor beds (Table 1). Only six hospitals were located in rural counties. Raleigh-Durham and the surrounding area included 11 hospitals, whereas other North Carolina regions included 18 to 21 hospitals each.

For stroke-specific physician services, 45 (42%) hospitals reported neurology, 25 (23%) reported neurosurgery, and 22 (20%) reported interventional neurology (Table 1). Twenty-one hospitals (19%) reported all 3 physician services. As expected, these physicians were more common in larger hospitals. In fact, all of the hospitals with ≥200 adult floor beds had both noninterventional and interventional neurologists and neurosurgeons. In contrast, no hospitals located in rural counties reported any of these physicians. When compared by geographic region, there appeared to be a greater prevalence of stroke-specific physician services in the central part of the state.

Across the entire state, there were 1069 total general ICU beds located in 95 hospitals (88%; Table 1). There were far fewer neuro-ICU beds (173 total) in only 17 hospitals (16%); 13 hospitals had no ICU at all. General ICU beds were located in hospitals across all sizes, population densities, and regions. However, neuro-ICU beds were concentrated in larger hospitals, metropolitan areas, and the central regions of the state (Fig. 1D). Furthermore, a substantial geographic area is beyond 40 or 60 minutes driving time from a North Carolina hospital with a neuro-ICU (Fig. 1E).

In Figure 2, the numbers of available general and neuro-ICU beds for the entire state varied by day during the 1-year period. Bed availability appeared to peak during the weekend as compared with weekdays. There were no major seasonal trends, although availability tended to be lowest in the winter. On average, there were 276 general ICU and 27 neuro-ICU beds available statewide each day (Table 2). While the largest hospitals had the highest total number of general ICU beds (Table 1), median daily availability was less than other hospital

sizes (Table 2). Metropolitan counties tended to have the most available general ICU beds. Furthermore, neuro-ICU beds were on average only available in metropolitan counties. While all of the regions included hospitals with neuro-ICUs, daily bed availability was the lowest in eastern and southeastern regions. In the Greenville and eastern area, there were no neuro-ICU beds available for 192 days, or 52% of the days that year (Fig. 1F). In the Piedmont and surrounding area, however, there were no neuro-ICU beds available for only 1% of days. Lastly, median general ICU bed availability was lowest on Wednesdays (251) and highest on Sundays (293; Table 2). Similarly, median neuro-ICU bed availability was lowest on Fridays (22) and highest on Mondays (35).

Discussion

In this descriptive study of North Carolina hospitals, fewer than half reported stroke-specific physician services, and only 16% of hospitals had a neuro-ICU. In comparison, the Florida-Puerto Rico Collaboration to Reduce Stroke Disparities recently reported almost half (49%) of the registry hospitals in Florida had a dedicated neuro-ICU, whereas only 1 hospital (11%) provided this care in Puerto Rico.¹³ Furthermore, in North Carolina, stroke-specific hospital resources were not evenly distributed by geographic region and were generally least prevalent in the eastern part of the state, where stroke mortality rates are highest. In addition, we found that less densely populated counties were less likely to report access to stroke specialty physicians and were more than a 1-hour drive from neuro-ICUs. These urban-rural differences are consistent with prior studies from other regions of the United States.^{10,12} Although it is reasonable to concentrate specialty services and resources in highly populated areas, the burden of stroke is disproportionately high in the rural parts of North Carolina.³

Although the entire state included 173 neuro-ICU beds, we found only 27 beds available statewide on any given day. Moreover, these beds were largely available in the central region of the state, and for the eastern region of North Carolina, there were no neuro-ICU beds available for half of the year. Although many stroke patients do not require admission to an ICU, care in a neuro-ICU can be lifesaving for more severe strokes or in the event of complications following acute treatment.^{25,26} An estimated 15% to 20% of acute ischemic stroke patients are admitted to an ICU, and this proportion is believed to be growing as more of these patients are receiving endovascular therapy.²⁷ Furthermore, many patients with hemorrhagic strokes are admitted to an ICU. Therefore, such tertiary care should be readily available as the need arises.

The number of median neuro-ICU beds available throughout North Carolina ranged from 22 to 35/day during the week, and this pattern appeared to remain consistent throughout the year. Daily ICU bed availability was generally highest on Sunday and Monday, which we believe coincides with elective surgeries scheduled earlier in the week. As transfers to stroke centers continue to increase, there is a greater potential for hospital crowding, which has been shown to delay stroke unit admission.²⁸ Moreover, Rincon et al found that delayed admission to the neuro-ICU for critically ill stroke patients was associated with poor outcomes at discharge.²⁹ Our findings suggest the need for hospitals, critical care transport services, and other healthcare providers to consider both place and time when planning and coordinating acute stroke triage.

There are some noteworthy limitations of this study. First, SMARTT data are self-reported and are neither validated nor collected for research purposes. Second, there were significant missing data for daily bed counts, although it was believed that this resulted largely from administrative reasons, such as lack of staff. Five hospitals were excluded from the analysis. Because these hospitals were located in metropolitan and urban counties, minimal impact on differences by population density was expected. Statewide total beds counts and median daily counts were underestimated to some degree because not all North Carolina hospitals were represented in the database or included in the analysis. In addition, the assignment of missing bed availability to the prior date's value would have artificially stabilized daily variability. Nonetheless, we observed appreciable trends by day of the week.

Third, our assessment of stroke-specific hospital resources were limited to the basic data elements captured in SMARTT. Although stroke center designation was known for North Carolina hospitals at this time, results were not reported by certification level to preserve the confidentiality of the few comprehensive stroke centers. Lastly, hospitals in bordering states are able to provide care to stroke patients but they were not included in this analysis. Our findings are from a single state and may not be representative of other states and geographic areas. However, North Carolina includes a wide range of population density, stroke burden, and hospital resources and provides a useful context for addressing knowledge gaps in stroke resource availability. Future research should investigate similar and different states and regions using our techniques and results.

Conclusions

North Carolina stroke-specific hospital resources are not distributed evenly by geographic region or population density. Specialty physicians and neuro-ICUs are concentrated in populous areas but are largely absent in rural areas with high stroke burden. Bed availability, particularly in neuro-ICUs, also is lacking in rural areas and non-central regions. Furthermore, EMS transport and interfacility transfer plans may need to consider daily variation in ICU bed availability, especially during the weekend. In future studies, we will survey North Carolina hospitals and EMS systems as to current stroke care resources, capacity, and protocols. To optimize regionalized stroke care, our findings suggest that stroke systems of care should consider the distribution of hospital resources within and across regions and the daily variation in resource availability.

References

1. Benjamin EJ, Virani SS, Callaway CW, et al. Heart disease and stroke statistics—2018 update: a report from the American Heart Association. *Circulation* 2018;137:e67–e492. [PubMed: 29386200]
2. Voeks JH, McClure LA, Go RC, et al. Regional differences in diabetes as a possible contributor to the geographic disparity in stroke mortality: the REasons for Geographic And Racial Differences in Stroke Study. *Stroke* 2008;39:1675–1680. [PubMed: 18388336]
3. Bertoni AG, Ensley D, Goff C. 30,000 fewer heart attacks and strokes in North Carolina. *NC Med J* 2012;73:449–456.
4. Powers WJ, Derdeyn CP, Biller J, et al. 2015 American Heart Association/American Stroke Association focused update of the 2013 Guidelines for the Early Management of Patients With Acute Ischemic Stroke Regarding Endovascular Treatment: a guideline for healthcare professionals

from the American Heart Association/American Stroke Association. *Stroke* 2015;46:3020–3035. [PubMed: 26123479]

5. Jauch EC, Saver JL, Adams HP Jr, et al. Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke* 2013;44:870–947. [PubMed: 23370205]
6. Stroke Unit Trialists' Collaboration. Collaborative systematic review of the randomised trials of organised inpatient (stroke unit) care after stroke. *BMJ* 1997;314:1151–1159. [PubMed: 9146387]
7. Fonarow GC, Reeves MJ, Smith EE, et al. Characteristics, performance measures, and in-hospital outcomes of the first one million stroke and transient ischemic attack admissions in get with the guidelines-stroke. *Circ Cardiovasc Qual Outcomes* 2010;3:291–302. [PubMed: 20177051]
8. Goldstein JH, Denslow SA, Goldstein SJ, et al. Intra-arterial therapy for acute stroke and the effect of technological advances on recanalization findings in a community hospital. *NC Med J* 2016;77:79–86.
9. Gonzales S, Mullen MT, Skolarus L, et al. Progressive rural–urban disparity in acute stroke care. *Neurology* 2017;88:441–448. [PubMed: 28053009]
10. Shultis W, Graff R, Chamie C, et al. Striking rural-urban disparities observed in acute stroke care capacity and services in the Pacific northwest: implications and recommendations. *Stroke* 2010;41:2278–2282. [PubMed: 20813997]
11. Mullen MT, Wiebe DJ, Bowman A, et al. Disparities in accessibility of certified primary stroke centers. *Stroke* 2014;45:3381–3388. [PubMed: 25300972]
12. Desai A, Bekelis K, Zhao W, et al. Association of a higher density of specialist neuroscience providers with fewer deaths from stroke in the United States population. *J Neurosurg* 2013;118:431–436. [PubMed: 23198833]
13. Ciliberti-Vargas MA, Gardener H, Wang K, et al. Stroke hospital characteristics in the Florida-Puerto Rico Collaboration to Reduce Stroke Disparities Study. *South Med J* 2017;110:466–474. [PubMed: 28679016]
14. Goldstein LB. Statewide hospital-based stroke services in North Carolina: changes over 10 years. *Stroke* 2010;41:778–783. [PubMed: 20167914]
15. Fargen KM, Fiorella D, Albuquerque F, et al. Systematic regionalization of stroke care. *J Neurointerv Surg* 2015;7:229–230. [PubMed: 25766730]
16. Fargen KM, Jauch E, Khatri P, et al. Needed dialog: regionalization of stroke systems of care along the trauma model. *Stroke* 2015;46:1719–1726. [PubMed: 25931466]
17. Asimos AW, Ward S, Brice JH, et al. A geographic information system analysis of the impact of a statewide acute stroke emergency medical services routing protocol on community hospital bypass. *J Stroke Cerebrovasc Dis* 2014;23:2800–2308. [PubMed: 25294057]
18. Schlemm E, Ebinger M, Nolte CH, et al. Optimal transport destination for ischemic stroke patients with unknown vessel status: use of prehospital triage scores. *Stroke* 2017;48:2184–2191. [PubMed: 28655816]
19. Patel MD, Brice JH, Evenson KR, et al. Emergency medical services capacity for prehospital stroke care in North Carolina. *Prev Chronic Dis* 2013;10:E149. [PubMed: 24007677]
20. Southerland AM, Johnston KC, Molina CA, et al. Suspected large vessel occlusion: should emergency medical services transport to the nearest primary stroke center or bypass to a comprehensive stroke center with endovascular capabilities? *Stroke* 2016;47:1965–1967. [PubMed: 26896433]
21. Grover JM, Morales CI, and Brice JH. EMS and acute stroke care: evidence for policies to reduce delays to definitive treatments. *Curr Cardiovasc Risk Rep* 2016;10:21.
22. Benoit JL, Khatri P, Adeoye OM, et al. Prehospital triage of acute ischemic stroke patients to an intravenous tPA-ready versus endovascular-ready hospital: a decision analysis. *Prehosp Emerg Care* 2018;22:722–733. [PubMed: 29847193]
23. Holodinsky JK, Williamson TS, Demchuk AM, et al. Modeling stroke patient transport for all patients with suspected large-vessel occlusion. *JAMA Neurol* 2018;75:1477–1486. [PubMed: 30193366]
24. Miller JB, Merck LH, Wira CR, et al. The advanced reperfusion era: implications for emergency systems of ischemic stroke care. *Ann Emerg Med* 2017;69:192–201. [PubMed: 27600649]

25. Varelas PN, Schultz L, Conti M, et al. The impact of neuro-intensivist on patients with stroke admitted to a neurosciences intensive care unit. *Neurocrit Care* 2008;9:293–299. [PubMed: 18196477]
26. Knopf L, Staff I, Gomes J, et al. Impact of a neurointensivist on outcomes in critically ill stroke patients. *Neurocrit Care* 2012;16:63–71. [PubMed: 21847702]
27. Menon BK, Saver JL, Goyal M, et al. Trends in endovascular therapy and clinical outcomes within the nationwide Get With The Guidelines-Stroke registry. *Stroke* 2015;46:989–995. [PubMed: 25681065]
28. Darehed D, Norrving B, Stegmayr B, et al. Patients with acute stroke are less likely to be admitted directly to a stroke unit when hospital beds are scarce: a Swedish multicenter register study. *Eur Stroke J* 2017;2:178–186. [PubMed: 31008313]
29. Rincon F, Mayer SA, Rivolta J, et al. Impact of delayed transfer of critically ill stroke patients from the emergency department to the neuro-ICU. *Neurocrit Care* 2010;13:75–81. [PubMed: 20428969]

Key Points

- Stroke-specific physician services and hospital resources are highly concentrated in more urban and populous cities, leaving many rural areas without immediate access to high-quality acute stroke care.
- Our statewide assessment of hospitals in North Carolina contributed important findings on geographic and daily trends in the availability of hospital and physician resources for stroke patients.
- The availability of neurological physician services and intensive care units was substantially lacking in rural areas and varied by geographic region and day of the week.
- Regionalized systems of stroke care need to consider the geographic distribution and daily availability of stroke-specific hospital resources.

Fig. 1. Maps of (A) North Carolina hospitals and county population density, (B and C) 2011–2015 stroke mortality and hospitalization rates (Source: North Carolina State Center for Health Statistics [2016]), and (D–F) location of neurological intensive care units and bed availability. CSC, comprehensive stroke center; ICU, intensive care unit; PSC, primary stroke center.^{AB}

^APlease provide a more complete credit line for Fig. 1.

^BPlease define CSC and PSC

Fig. 2.

Statewide daily availability of general and neurological intensive care unit beds in North Carolina hospital during a 1-year period. ICU, intensive care unit.

Table 1.

Availability of stroke-specific resources in North Carolina hospitals, 2015–2016

	All hospitals (N = 108)	Specialty physicians			General ICU		Neuro-ICU	
		Neurology (n = 45)	Interventional neurology (n = 22)	Neurosurgery (n = 25)	Yes (n = 95)	Total beds	Yes (n = 17)	Total beds
Adult floor beds, no. (%)								
<50	37 (34)	1 (3)	0 (0)	0 (0)	26 (70)	160	0 (0)	—
50–99	31 (29)	14 (45)	1 (3)	1 (3)	29 (94)	248	0 (0)	—
100–199	23 (21)	13 (57)	4 (17)	7 (30)	23 (100)	319	3 (13)	17
200	17 (16)	17 (100)	17 (100)	17 (100)	17 (100)	342	14 (82)	156
Population density, no. (%)								
Metropolitan	63 (58)	36 (57)	20 (32)	23 (37)	58 (92)	776	16 (25)	165
Urban	39 (36)	9 (23)	2 (5)	2 (5)	34 (87)	276	1 (3)	8
Rural	6 (6)	0 (0)	0 (0)	0 (0)	3 (50)	17	0 (0)	—
Region, no. (%)								
Asheville and western area	21 (19)	5 (24)	3 (14)	3 (14)	19 (90)	157	2 (10)	22
Charlotte and surrounding area	19 (18)	10 (53)	3 (16)	5 (26)	18 (95)	264	3 (16)	42
Piedmont and surrounding area	21 (19)	8 (38)	4 (19)	4 (19)	17 (81)	237	3 (14)	38
Raleigh-Durham and surrounding area	11 (10)	8 (73)	5 (45)	6 (55)	11 (100)	128	4 (36)	42
Wilmington and southern area	18 (17)	8 (44)	4 (22)	4 (22)	14 (78)	126	3 (17)	20
Greenville and eastern area	18 (17)	6 (33)	3 (17)	3 (17)	16 (89)	157	2 (11)	9

ICU, intensive care unit.

Table 2.

Median daily ICU bed availability in North Carolina hospitals, 2015–2016

	General ICU beds	Neuro-ICU beds
	Median (IQR)	Median (IQR)
All, N = 108	276 (242–303)	27 (19–35)
Adult floor beds, no. (%)		
	69 (64–74)	—
50–99	81 (73–88)	—
100–199	72 (59–87)	3 (1–8)
200	49 (39–60)	22 (16–30)
Population density, no. (%)		
Metropolitan	162 (136–186)	26 (19–35)
Urban	104 (96–114)	0 (0–1)
Rural	8 (6–9)	—
Region, no. (%)		
Asheville and western area	46 (41–52)	4 (2–8)
Charlotte and surrounding area	51 (40–61)	3 (2–6)
Piedmont and surrounding area	67 (60–75)	11 (6–15)
Raleigh-Durham and surrounding area	24 (19–29)	3 (2–5)
Wilmington and southern area	35 (30–40)	1 (0–3)
Greenville and eastern area	49 (43–54)	0 (0–5)
Day of the week		
Monday	288 (258–314)	35 (25–41)
Tuesday	262 (230–292)	24 (19–32)
Wednesday	251 (220–283)	24 (19–32)
Thursday	253 (229–300)	23 (16–29)
Friday	275 (258–312)	22 (14–31)
Saturday	278 (258–312)	25 (17–35)
Sunday	293 (275–321)	34 (25–42)

ICU, intensive care unit, IQR, interquartile range.