

By Jeffrey D. Colvin, Matt Hall, Cary Thurm, Jessica L. Bettenhausen, Laura Gottlieb, Samir S. Shah, Evan S. Fieldston, Adam B. Goldin, Sanford M. Melzer, Patrick H. Conway, and Paul J. Chung

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Hypothetical Network Adequacy Schemes For Children Fail To Ensure Patients' Access To In-Network Children's Hospital

ABSTRACT Insurers are increasingly adopting narrow network strategies. Little is known about how these strategies may affect children's access to needed specialty care. We examined the percentage of pediatric specialty hospitalizations that would be beyond existing Medicare Advantage network adequacy distance requirements for adult hospital care and, as a secondary analysis, a pediatric adaptation of the Medicare Advantage requirements. We examined 748,920 hospitalizations at eighty-one children's hospitals that submitted data for the period October 2014–September 2015. Nearly half of specialty hospitalizations were outside the Medicare Advantage distance requirements. Under the pediatric adaptation, there was great variability among the hospitals, with the percent of hospitalizations beyond the distance requirements ranging from less than 1 percent to 35 percent. Instead of, or in addition to, time and distance standards, policy makers may need to consider more nuanced network definitions, including functional capabilities of the pediatric care network or clear exception policies for essential specialty care services.

Jeffrey D. Colvin (jdcolvin@cmh.edu) is an associate professor in the Division of General Academic Pediatrics, Children's Mercy Hospital, in Kansas City, Missouri.

Matt Hall is principal biostatistician at the Children's Hospital Association, in Overland Park, Kansas.

Cary Thurm is a research analyst at the Children's Hospital Association.

Jessica L. Bettenhausen is an associate professor in the Division of Pediatric Hospital Medicine, Children's Mercy Hospital.

Laura Gottlieb is an associate professor in the Department of Family and Community Medicine, University of California San Francisco.

Samir S. Shah is a professor and the James M. Ewell Endowed Chair in the Division of Hospital Medicine, Cincinnati Children's Hospital Medical Center, in Ohio.

Evan S. Fieldston is medical director of clinical operations, Children's Hospital of Philadelphia, and an assistant professor of pediatrics in the School of Medicine, University of Pennsylvania, in Philadelphia.

Adam B. Goldin is an associate professor of surgery, Division of Pediatric General and Thoracic Surgery, Seattle Children's Hospital, in Washington.

The Affordable Care Act (ACA) prohibits insurers from excluding or charging higher premiums to people with preexisting conditions or restricting access to certain medications or medical services. These restrictions prevent insurers from reducing costs (and resulting premium prices) through the exclusion of high-cost patients. To reduce costs, insurers have instead turned to paying providers less.^{1–3} Most plans offered on the Marketplaces have reduced provider compensation (and premium prices) by adopting narrow network strategies.^{1,4} Using these strategies, insurers contract with fewer providers, which allows insurers to exclude some high-cost providers and to engage in more aggressive reimbursement negotiations with potential providers.^{5,6} Approximately half of the plans offered on the Marketplaces are

considered to be narrow,³ and narrow networks are becoming increasingly prevalent outside the Marketplaces as well. Patients in narrow networks potentially risk delays in receiving appropriate care or high out-of-pocket spending if care is required out of the network.

Insurers' use of narrow provider networks has come under increasing regulatory scrutiny. State regulations of health plan network adequacy generally provide qualitative requirements (for example, requiring "reasonable" or "sufficient" access to providers), as do federal regulations in Medicaid and the Children's Health Insurance Program (CHIP).⁷ The Department of Health and Human Services (HHS), however, has adopted quantitative network adequacy standards for Medicare Advantage plans. Approximately half of the state regulations of Marketplace plans have done so as well.^{1,8,9} The HHS regulations

Sanford M. Melzer is executive vice president for networks and population health, Seattle Children's Hospital.

Patrick H. Conway is president and CEO of Blue Cross and Blue Shield of North Carolina, in Durham.

Paul J. Chung is a professor of pediatrics and of health policy and management, University of California Los Angeles.

for Medicare Advantage plans mandate that at least 90 percent of enrollees within each county have access to at least one in-network provider or health care facility within specific time and distance limits across a wide range of medical specialties and health care facilities.¹⁰ The time and distance limits are also specific to the rurality of the county. HHS recently proposed quantitative distance and time network adequacy standards similar to those for Medicare Advantage for Marketplace plans on HealthCare.gov.¹¹

Within this discussion of network adequacy, increasing attention has been paid to network adequacy rules pertaining specifically to children.^{7,12} Plans that are adequate for adults may be entirely inadequate for children, who typically rely on pediatric specialists and children's hospitals for the care of chronic or complex illnesses.⁷ Relative to adult specialists, pediatric specialists are much fewer in number and thus more geographically concentrated, practicing predominantly at children's hospitals and academic tertiary care centers where essential support and technologies are accessible.^{7,13-16} The exclusion of children's hospitals from plans offered through the ACA Marketplaces has already resulted in litigation.¹⁷

Proposed federal legislation—the Advancing Care for Exceptional Kids Act (ACE Kids Act)—calls for HHS to define pediatric network adequacy.^{18,19} Given the trend toward quantitative standards of network adequacy at both the federal and state levels through both Medicare Advantage and Marketplace plans,^{1,10,11} policy makers may attempt to define pediatric network adequacy by miles and minutes to in-network providers and hospitals rather than by qualitative standards (such as “reasonable” and “sufficient”). However, how far children travel for specialty care at children's hospitals is unclear.^{20,21} In this study we sought to examine children's travel distances to children's hospitals for specialty care and the percentage of specialty hospitalizations that could be considered out-of-network if the discharging children's hospital was excluded because it was located beyond the distance from the patient's home set by a network adequacy limit. We used the distance standards of the current Medicare Advantage network adequacy regulations. As a secondary analysis, after we found that a high percentage of specialty hospitalizations were outside of the Medicare Advantage distance requirements, we examined the percentage of specialty hospitalizations that would be considered out-of-network under our pediatric adaptation of the Medicare Advantage regulations. The percentage of hospitalizations that were beyond the distance requirements of each potential regulatory scheme provides esti-

mates of the degree to which children currently receiving care at children's hospitals might be at risk for delayed care or high out-of-pocket spending if these quantitative network adequacy regulations were enacted.

Study Data And Methods

DATA We examined all inpatient hospitalizations at eighty-one children's hospitals that submitted data for the period October 1, 2014–September 30, 2015, to the Children's Hospital Association for inclusion in its Inpatient Essentials database. These eighty-one hospitals are the major full-service children's hospitals in the United States, and they offer nearly all pediatric specialty services. (See online appendix exhibit A1 for a list of included hospitals.)²² For every hospitalization, the database included patients' demographic information; payer; and up to forty-one *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM), diagnosis and procedure codes. Data quality and reliability are jointly ensured by the Children's Hospital Association, Truven Health Analytics, and the participating hospitals.

The database also includes the home ZIP code of each patient, making it possible to calculate the distance from that ZIP code to the discharging hospital's ZIP code. The database also allowed us to assign the rurality of the patient's home county (using HHS methodology) to one of five categories. Under current Medicare Advantage quantitative regulations, travel times and distances to in-network specialists and hospitals are based on rurality category of the patient's home county.

Children's hospitals provide a mix of general care (which could likely be provided by other facilities) and specialty care (which likely benefits from or even requires location within a children's hospital.) Thus, we categorized each hospitalization into one of two groups, “general care” and “specialty care,” based on the likelihood of the child's requiring the service of a pediatric specialist during the hospitalization. Hospitalizations were defined as requiring specialty care if at least one of two conditions were met. First, a surgical procedure had to be performed that either the American Academy of Pediatrics or the American College of Surgeons recommends be performed by a pediatric specialist²³⁻²⁵ (see appendix exhibit A2).²² Second, the patient had to have a complex chronic condition, defined as “medical conditions that can be reasonably expected...to require specialty pediatric care.”^{26(p2726)} Complex chronic conditions were identified using ICD-9-CM codes and a previously reported classification algorithm.^{26,27} Hospi-

talizations not meeting these conditions were classified as general care. We excluded hospitalizations for normal newborns and pregnancy-related conditions as well as the 1.8 percent of hospitalizations that were missing patient ZIP code data.

ANALYSIS Our primary outcome was the percentage of specialty hospitalizations that would be outside the Medicare Advantage network adequacy distance requirements for hospital care specific to the rurality category of the patient's home county. Our secondary outcomes included distances traveled for specialty and general care and reason for hospitalization. As a secondary analysis, we examined the percentage of specialty hospitalizations that would be beyond the distance required by a pediatric adaptation of the Medicare Advantage regulations that we created.

The Medicare Advantage regulations for network adequacy set distance requirements for hospital care. These regulations—which have also been proposed for qualified health plans under the ACA, including those serving children—require that at least 90 percent of enrollees in each county type (for example, metropolitan or micropolitan) have access within specific time and distance limits to at least one in-network provider or health care facility across a wide range of specialties.¹⁰ The distance requirements range from 10 miles to 100 miles, based upon the rurality of the patient's home county.

After finding a high percentage of specialty hospitalizations that required travel outside the Medicare Advantage distance requirements, we performed a secondary analysis that examined specialty hospitalizations under a pediatric adaptation of the Medicare Advantage regulations. Similar to the Medicare Advantage regulations themselves, the adaptation based the distance limits for in-network hospitals on the 90th percentile of distance traveled for all included hospitalizations, but only across all of the children's hospitals in this study. Using all discharges and hospitals included in this study, we calculated the 90th percentile of distance traveled from the patient's home ZIP code to the discharging hospital. This distance was calculated separately for each of the five HHS rurality categories as follows: large metropolitan, 21.7 miles; metropolitan, 79.9 miles; micropolitan, 157.6 miles; rural, 166.3 miles; and counties with extreme access considerations, 404.0 miles. Collectively, these distance requirements constitute what we call the children's hospital 90th percentile regulatory scheme.

We summarized categorical patient characteristics using frequencies and percentages, and we used medians with interquartile ranges to summarize distances. We compared differences be-

tween general and specialty hospitalizations using the chi-square test for categorical variables and the Kruskal Wallis test for continuous variables.

All statistical analyses were performed in SAS, version 9.4. This study was approved by the Institutional Review Board of Children's Mercy Hospital.

LIMITATIONS Our study had several limitations that should be considered. First, it included only major, full-service children's hospitals; smaller centers that provide some specialty pediatric care were excluded. Therefore, we were unable to determine whether specialty patients traveled to the closest hospital that could have met their specialty needs. For nearly a quarter (22.4 percent) of the hospitalizations involving specialty care in this study, the patient lived closer to another hospital with some pediatric specialty services. For those discharges, it is unknown whether the children's hospital was chosen because the child or family preferred it, it offered a service unavailable at the closer hospital, or the closer hospital was not included in the patient's network of providers.

Second, because of the lack of provider information in our data source, we could not confirm that specialty care was in fact provided by specialists during the hospitalizations. Some care designated as specialty might have been performed solely by general pediatricians or pediatric hospitalists.

Third, our definition of *specialty care* did not include children who required a children's hospital because of the acuity of the child's condition, such as children who required a pediatric intensive care unit.

Lastly, insurance plans may choose to include children's hospitals within their networks even if those hospitals are beyond distance limits. It is unclear how likely it is that plans will do so without a mandate. A recent study revealed that approximately two-thirds of silver-tier Marketplace plans included fewer than 10 percent of the available pediatric physicians, and 20 percent of the plans included no pediatric physicians at all.²⁸ That study also demonstrated that the percentages of silver-tier plans without providers in specific pediatric specialties ranged by specialty from 14 percent (pediatric infectious disease) to 28 percent (pediatric psychiatry). However, the study examined the inclusion of pediatric physicians by rating area. Rating areas can vary greatly in geographical size. For example, there is one rating area in the District of Columbia and only three in the entire state of Alaska.²⁹ Therefore, it is difficult to apply that study's findings to our study—which is based on distance, not rating area.

Study Results

GENERAL VERSUS SPECIALTY CARE A total of 748,920 hospitalizations in the eighty-one children's hospitals met our inclusion criteria (exhibit 1). Although significantly different because of the large sample size, general care and specialty care hospitalizations were proportionally similar in patients' age, sex, and race/ethnicity and in type of payer. Of the hospitalizations categorized as specialty, 24.5 percent involved a specialty surgical procedure, and 92.5 percent involved a complex chronic condition. The percentage of specialty patients admitted for surgical conditions (24.5 percent) was more than twice that of the general care group (12.2 percent). The most frequent medical reasons for hospitalization for specialty patients included chemotherapy, spinal fusion, sickle cell anemia crisis, and major repair of a heart anomaly (see appendix exhibit A3).²² The most common reasons for admission for general care were asthma, appendectomy, and bronchiolitis.

DISTANCES TRAVELED Patients in the specialty group traveled 42 percent farther than those in the general care group (median: 18.7 miles versus 13.2 miles) (exhibit 2). Within the specialty group, patients hospitalized for surgical procedures traveled farther than those hospitalized for medical conditions (median: 21.7 miles versus 17.9 miles). Patients with private insurance traveled farther than those with public or other insurance (median: 20.7 miles versus 16.6 miles and 20.4 miles, respectively; data not shown). A higher percentage of specialty hospitalizations were also from out of state, compared with general care hospitalizations (11.5 percent versus 8.2 percent). However, there was great diversity among hospitals in the median distances traveled for specialty care, ranging from 4.1 miles to 60.3 miles, with a median of 18.2 miles (appendix exhibit A4).²²

OUTCOMES UNDER THE MEDICARE ADVANTAGE NETWORK ADEQUACY REGULATIONS We examined the percentage of specialty hospitalizations that were beyond the Medicare Advantage network adequacy distance requirements. Of the hospitalizations that involved specialty care, 46.4 percent would be considered beyond the distance requirements and therefore potentially out of network (exhibit 3). According to the same standards, 63.6 percent of specialty hospitalizations for patients from micropolitan and rural counties were beyond the distance requirements (data not shown). Outcomes under these standards also demonstrated great variability across hospitals in the percentage of hospitalizations for specialty care that were outside the distance requirements: The percentages of specialty hospitalizations outside the requirements ranged from 4.6 percent to 81.0 percent, with a median of 41.8 percent (IQR: 29.2 percent, 54.3 percent) (appendix exhibit A5).²² In a secondary analysis of specialty hospitalizations under the children's hospital 90th percentile regulatory scheme, we found that the percentage of specialty hospitalizations that were outside those distance requirements continued to show great variability among the hospitals: The percentage ranged from 0.4 percent to 35.9 percent, with a median of 7.3 percent (IQR: 2.8 percent, 12.9 percent) (appendix exhibit A6).²²

EXHIBIT 1

Selected characteristics of hospitalizations at 81 children's hospitals, by general versus specialty care

	All (N = 748,920)	General care (n = 374,502)	Specialty care (n = 374,418)
Total	100.0%	50.0%	50.0%
CHILD			
Age range (years)			
<1	27.3	28.2	26.5
1-5	26.5	26.2	26.7
6-10	15.8	16.2	15.4
11-17	27.4	28.0	26.8
18-20	3.0	1.3	4.6
Sex			
Male	53.4	52.0	54.7
Female	46.6	48.0	45.3
Race/ethnicity			
Non-Hispanic white	48.2	47.0	49.5
Non-Hispanic black	18.9	19.3	18.5
Hispanic	20.0	20.4	19.6
Asian	2.8	2.7	2.9
Other	10.1	10.6	9.5
PAYER			
Public	53.4	53.9	52.9
Private	39.7	39.0	40.4
Other	6.9	7.0	6.7
INDICATION FOR HOSPITALIZATION			
Medical	81.7	87.8	75.5
Surgical	18.3	12.2	24.5
COMPLEX CHRONIC CONDITION			
Any	46.2	— ^a	92.5

SOURCE Authors' analysis of data from the Children's Hospital Association Inpatient Essentials database (October 1, 2014–September 30, 2015). **NOTE** All comparisons between general care and specialty care hospitalizations were significant ($p < 0.001$). ^aNot applicable; by study definition, patients with complex chronic conditions were assigned to the specialty hospitalization group.

Discussion

This study is the first attempt, to our knowledge, to examine potential regulatory definitions of network adequacy for the pediatric population. Pediatric network adequacy has attracted increased attention from policy makers because of the shift toward narrower networks for enrollees of all ages.^{7,12,18,19,28} Knowing that pediatric-

EXHIBIT 2
Distance from patient's home to hospital, by indication for hospitalization and likelihood that pediatric specialty care was provided

	All		General care		Specialty care	
Median distance, miles	15.5		13.2		18.7	
IQR	7.2–36.9		6.4–28.2		8.5–47.7	
Indication for hospitalization	Medical	Surgical	Medical	Surgical	Medical	Surgical
Median distance, miles	14.7	19.3	12.9	15.9	17.9	21.7
IQR	7.0–34.1	8.7–49.9	6.2–27.4	7.7–35.8	8.4–44.8	9.3–58.4
Percentile of distance, miles						
5	2.3	2.8	2.1	2.6	2.6	2.8
10	3.5	4.4	3.2	4.0	4.1	4.6
20	5.8	7.2	5.2	6.5	6.8	7.6
25	7.0	8.7	6.2	7.7	8.4	9.3
30	8.3	10.4	7.2	9.2	9.8	11.2
40	11.3	14.1	9.7	12.2	13.3	15.4
50	14.7	19.3	12.9	15.9	17.9	21.7
60	19.9	26.7	16.7	21.5	24.6	31.5
70	27.8	40.4	23.0	29.2	35.7	47.1
75	34.1	49.9	27.4	35.8	44.8	58.4
80	43.6	62.5	33.8	45.8	56.1	73.5
90	77.4	111.5	59.6	79.4	99.2	126.0
95	121.3	176.4	91.1	124.1	148.5	196.2
Out of state						
Overall	9.8%		8.2%		11.5%	
By indication	9.4%	11.9%	8.0%	9.5%	10.9%	13.1%

SOURCE Authors' analysis of data for October 1, 2014–September 30, 2015, from the Children's Hospital Association Inpatient Essentials database. **NOTES** All comparisons between hospitalizations for medical and surgical care were significant ($p < 0.001$). IQR is interquartile range.

specific network adequacy requirements are likely to follow the development of regulations for adults, we explored two potential quantitative standards that could inform the definition of network adequacy for pediatric patients. Given that pediatric subspecialty care is heavily concentrated in children's hospitals, achieving pediatric network adequacy may require rules that differ markedly from those for adults. We found that the application of two hypothetical time-and-distance regulatory schemes fared poorly in ensuring that patients would have a children's hospital in network.

These findings have important implications for both families and pediatric health care providers. The use of adult standards could result in delays in needed care and could significantly shift costs to enrollees if they had complete financial responsibility for out-of-network hospitalizations. Alternatively, enrollees could incur additional costs if they chose higher-tier plans with expanded networks that exceeded network adequacy standards but had higher cost sharing. For children's hospitals, significant financial losses could be expected through uncaptured reimbursement shared with enrollees as well as high administrative costs involved in creating

“one-off” reimbursement agreements with insurers for out-of-network hospitalizations.

This study describes the challenge to policy makers seeking to develop pediatric network adequacy regulations that specify travel distance or time standards. Because of the great variability in observed travel distances across children's hospitals, the goal of having 90 percent of hospitalizations be in network is unlikely to be met without large distance allowances. This variability does not simply reflect differences in each hospital's mix of rural and urban patients (since these characteristics were accounted for in developing the pediatric-oriented distance standards for this study) but also likely reflects the high degree of concentration of specialty care in a small number of hospitals. Thus, even children from a large metropolitan area may need to travel a great distance to receive appropriate specialty pediatric care.

The proposed ACE Kids Act would require HHS to develop pediatric network adequacy standards for newly developed care coordination programs based at children's hospitals for children with medical complexity.^{18,19} The act, which has considerable bipartisan support, has been in the Senate Finance Committee since February 2017

EXHIBIT 3

Pediatric specialty hospitalizations within and outside of distance requirements of two potential regulatory schemes, by selected characteristics

	Overall (N = 374,246)	Medicare Advantage ^a		Children's hospital 90th percentile ^b	
		Within distance (n = 200,684)	Outside distance (n = 173,562)	Within distance (n = 336,840)	Outside distance (n = 37,406)
Total	100.0%	53.6%	46.4%	90.0%	10.0%
CHILD					
Age range (years)					
<1	26.5	27.3	25.4	26.8	23.6
1-5	26.7	26.6	26.9	26.6	28.2
6-10	15.4	15.0	15.9	15.2	17.1
11-17	26.8	26.4	27.2	26.8	26.7
18-20	4.6	4.7	4.5	4.6	4.4
Sex					
Female	45.3	44.5	46.1	45.1	46.9
Male	54.7	55.5	53.9	54.9	53.1
Race/ethnicity					
Non-Hispanic white	49.5	44.6	55.1	48.7	56.7
Non-Hispanic black	18.5	23.3	12.9	19.5	9.5
Hispanic	19.6	19.2	20.1	19.6	19.3
Asian	2.9	3.2	2.6	2.9	2.9
Other	9.5	9.7	9.3	9.3	11.6
Payer					
Private	40.4	38.4	42.7	39.7	46.5
Public	52.9	55.1	50.4	53.7	45.7
Other	6.7	6.5	6.9	6.5	7.9
INDICATION FOR HOSPITALIZATION					
Medical	75.5	77.1	73.6	76.2	9.3
Surgical	24.5	22.9	26.4	23.8	30.7
RURALITY OF CHILD'S HOME COUNTY					
Large metropolitan	35.7	36.2	35.1	35.7	35.7
Metropolitan	50.5	54.4	45.9	50.5	50.5
Micro-politan	7.5	6.1	9.2	7.5	7.5
Rural	5.3	2.8	8.1	5.3	5.3
CEAC	1.0	0.4	1.7	1.0	1.0
COMPLEX CHRONIC CONDITION					
Any	92.5	91.8	93.3	92.2	94.8

SOURCE Authors' analysis of data from the Children's Hospital Association Inpatient Essentials database (October 1, 2014–September 30, 2015). **NOTES** All comparisons between hospitalizations within and those outside of distance requirements were significant ($p < 0.001$). CEAC is counties with extreme access considerations. ^aThis potential scheme is explained in the text. ^bThis potential scheme is a pediatric adaptation of the Medicare Advantage regulations created by the authors.

and was introduced in the House of Representatives in July 2017. Although the statute would require children's hospitals to have a "full complement of health care providers," that qualification is not further specified. However, the act would apply only to the 6 percent of children with medical complexity and only if they had insurance through Medicaid or CHIP. In this study we found that specialty care hospitalizations covered by public insurance involved distances of four fewer miles, on average, compared to hospitalizations covered by private insurance. As a result, even if the ACE Kids Act became law, pediatric network adequacy would still need to be defined for privately insured children who need specialty care and for publicly insured children who need specialty care but are not medically complex.

Instead of, or in addition to, time and distance standards, policy makers could consider network definitions that were more nuanced (such as network adequacy based on the network's functional capabilities for pediatric care), establish a clear exception policy that is dependent on the accessibility of essential specialty care services, or fund the expansion of other processes for pediatric specialty care, such as telemedicine. Consequently, policy makers may find that amending current qualitative network adequacy regulations may do a better job of ensuring access to essential pediatric services than establishing quantitative time and distance rules. Qualitative regulations, for instance, might require the inclusion of the full range of pediatric specialty providers. Given the failure of many networks to include pediatric specialists,²⁸ this

requirement alone would improve network adequacy for children.

However, policy makers would still need to address additional considerations in developing regulations such as these, especially in the context of private insurance coverage. Network adequacy design must balance access to covered care with cost, particularly in areas with a limited number of specialists who serve large percentages of the market and, therefore, have heightened bargaining power.^{7,30} The concentration of these specialists within single institutions such as children's hospitals further increases that power.

Access to needed specialty care could still be hindered if the in-network children's hospital was at a much greater distance from a significant proportion of children within the plan than other institutions providing equivalent services (including other children's hospitals, in or out of state). Thus, some time and distance standards at the margins of families' willingness and ability to travel for specialty pediatric care may be reasonable. How far that distance is, especially if that care is of higher quality, is unknown and likely varies widely by factors including family finances, availability of transportation, and provider quality.³¹ Such determinations might require more granular oversight at the state, rather than the federal, level. Under the current admin-

istration, oversight of network adequacy within the ACA was ceded from HHS to the states.³² That change has largely been viewed as a potential weakening of oversight of network adequacy, rather than an opportunity to establish more regionally appropriate rules.^{33,34} Federal policy makers will need to balance the potential for states to develop more robust pediatric-specific regulations with that for certain states to provide less protection, compared to generalized, federal regulations.

Conclusion

Little is known about pediatric network adequacy or distances traveled by children for specialty pediatric care. This study demonstrated that the application of existing standards for network adequacy, developed for adult health care, is likely inappropriate for children. More generally, the development of standards for pediatric care based solely on distance and time will present unique challenges given the variability among hospitals in the distances children travel for care. A policy solution must balance feasible travel distances to pediatric specialists with the concentration of market share and bargaining power at children's hospitals and other tertiary care centers. ■

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NOTES

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