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Availability of common pediatric radiology studies: are rural patients at a disadvantage?



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ABSTRACT

Background: Many families wish to have radiologic tests performed locally, especially when obtaining these tests in specialized pediatric centers would require long-distance travel with associated costs and inconveniences. The differential availability of specialized and common pediatric urologic tests in rural and urban areas has not been described. We undertook this study to describe the availability of common radiographic tests ordered by pediatric urologists, and to identify disparities in the availability of radiographic tests between urban and rural locations.

Materials and Methods: We surveyed all freestanding hospitals in Washington State on the availability of flat-plate abdominal radiograph (AXR), renal-bladder ultrasounds (RBUS), voiding cystourethrograms (VCUG), MAG-3 renal scans, and nuclear cystograms (NC) for children, as well as testing restrictions, availability of sedation for urology tests, and presence of onsite radiologists. Rural and urban hospitals were compared on these characteristics.

Results: The survey was completed by 74 of 88 institutions (84.1%); 17 (23.0%) were rural (population <2500), 32 (43.2%) were in urban clusters (population 2500-50,000), and 25 (33.8%) were in urban areas (population >50,000). Seventy-three (98.6%) institutions offered AXR, 68 (91.9%) offered RBUS, 44 (59.5%) offered VCUG, 26 (35.1%) offered MAG-3, and 15 (20.3%) offered NC to children. All urban and most (16/17; 94.1%) rural institutions had shareable digital imaging capability. AXR (100% versus 96%, $P = 0.88$) and RBUS (70.6% versus 96%, $P = 0.15$) availability was similar in rural and urban settings, whereas VCUG (11.8% versus 72%, $P = 0.001$), MAG-3 (5.9% versus 60%, $P = 0.006$), and NC (0% versus 44%, $P = 0.017$) were more commonly available in urban settings. Fewer rural hospitals employed full-time, in-house radiologists (35.3% versus 96%, $P < 0.0001$) or offered sedation (6.3% versus 36%, $P = 0.01$) for testing, but an equal proportion had age restrictions on the tests offered (40% versus 17.6%, $P = 0.50$). Fellowship-trained pediatric radiologists (0% versus 16%, $P = 0.39$) and child life specialists (0% versus 20%, $P = 0.28$) worked exclusively in urban settings. Most hospitals offering specialized radiographic tests (VCUG: 90.9%; $P < 0.0001$ and MAG-3: 92.3%; $P = 0.002$) had onsite radiologists.

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Conclusions: The geographically widespread availability of AXR and RBUS may represent an opportunity to offer families care closer to home, realizing cost and time savings. Anxious children and those requiring more specialized studies may benefit from referral to urban centers. The lack of rural radiologists may be an actionable barrier to availability of specialized radiology testing.

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Introduction

Outreach services increase access to specialty care in rural and distant locations, and offer patients the benefit of a specialist clinician's skills while decreasing the time and cost associated with the visit.¹⁻⁶ Community-based outreach clinics may be particularly attractive to families who wish to limit children's time away from school and parent's time away from work to attend medical appointments. An important quality issue for the parent institution sponsoring the outreach clinic is the ability to maintain the same standard of care in the local setting as is available at the parent institution. These quality initiatives must be considered in the context of the rural-urban health care disparities that have been well described for various health conditions: structural and operational differences in rural and urban communities may be linked with geographic variations in health status secondary to environmental influences, patient utilization of medical services, and quality of medical care.⁷⁻¹⁰ Regionalization of care to higher-volume, more specialized centers has been advocated to optimize clinical outcomes in complex medical conditions. However, smaller, community-based hospitals may have similar outcomes to larger academic centers for commonly performed procedures and diagnoses, raising the question of what components of specialty health care can "stay in the community."¹¹ Thus, identifying differences in the availability and quality of services for patients in rural and urban locations is crucial to the success of outreach clinics. Inadequate provision of services hampers the provider's ability to provide high-quality care, and patients who must travel to obtain radiographic tests not available locally derive less benefit from the outreach model.

For pediatric surgical subspecialists, ancillary (e.g., radiology, laboratory) services are central to provision of medical care. Outreach clinics often are based in settings with clinic facilities, but without ready access to laboratory and/or radiology facilities such as would be found in a hospital-based clinic. Patients, therefore, often obtain their radiology tests before the appointment at another site and then review the imaging study with the provider at the clinic appointment. However, the availability of community-based ancillary services has not been well described, although it has significant implications for the ability of the traveling provider to diagnose and treat patients locally. To preserve the proposed patient-level benefits of outreach clinics, then, patients must be able to obtain radiographic testing locally rather than having to travel to the parent institution. Limited access to pediatric radiographic testing may arise secondary to lack of availability of certain tests at particular institutions, lack of staff familiarity with testing techniques for tests that are not commonly performed, or reduced staff comfort with children

(as well as fewer child-focused resources such as child life or sedation that may improve patient comfort and reduce anxiety during testing). However, these relationships are all postulated, and understanding the association between institutional and community characteristics and availability of radiographic studies is an initial step in identifying potentially modifiable factors.

We undertook this study to evaluate the relative ease of obtaining pediatric radiology procedures in urban and rural settings in Washington State. We hypothesized that the availability of five commonly performed pediatric urologic tests (renal-bladder ultrasound [RBUS], voiding cystourethrogram [VCUG], abdominal radiograph [AXR], MAG-3 renal scan [MAG-3], and nuclear cystogram [NC]) would be at least 50% greater in urban compared with rural settings.

Methods

We conducted a cross-sectional survey of all hospitals in Washington State to describe variations in the availability of pediatric urologic studies. All hospitals within Washington State were identified by querying the Washington State Licensing Commission. We excluded hospitals treating only adults and those limited to a single specialty (e.g., psychiatry). Institutional radiology departments were contacted by phone and asked to identify any restrictions on population served (e.g., if radiology testing was limited to members of a particular health maintenance organization or to patients of a particular medical center), whether patient counseling and/or medication information was available in languages other than English (and if so, what languages, and if in written and/or spoken format), and whether an onsite radiologist was always available or whether some or all of the radiology image interpretation was provided by offsite radiologists. [Appendix 1](#) contains the standardized script. A maximum of five contact attempts were made for each site. Sites that refused to participate and those for whom we could not establish contact with a knowledgeable person capable of answering our questions after five attempts were not contacted further. Institutions were then asked whether they routinely performed a number of radiographic tests commonly ordered by pediatric urologists: RBUS, VCUG, AXR, MAG-3, and NC, if there were any age or other restrictions on the availability of these tests. We also asked whether procedural sedation or child life specialists (pediatric medical professionals trained to provide emotional support and relieve medical care-related distress) were available to make children undergoing radiology procedures more comfortable.

Zip code was collected to identify the physical location of the hospital, and hospitals were characterized as urban

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