Published in final edited form as:

J Pediatr. 2009 February ; 154(2): 164–168. doi:10.1016/j.jpeds.2008.11.004.

Interspecialty Differences in the Care of Children with Chronic or Serious Acute Conditions: A Review of the Literature

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Little is known about the specific roles of pediatric subspecialists and other physician providers, such as general specialists, internist subspecialists, and general pediatricians, in the care of children in the United States.^{1–4} The involvement of various types of providers in the care of children with chronic or serious acute conditions raises concerns about interspecialty differences in quality. Many studies of adult populations have demonstrated interspecialty differences in care for various conditions.^{5–7} These studies generally found that specialists are more knowledgeable than generalists for specific conditions, adhere more closely to current recommendations and guidelines, and have better condition-specific outcomes. Others found that generalists have better knowledge of immunization recommendations,⁸ similar outcomes and patient satisfaction levels,^{6,9} and lower costs.¹⁰ Systematic reviews have identified persistent interspecialty differences in knowledge, patterns of care, costs, and outcomes for a wide variety of chronic conditions affecting adult patients.^{11,12} To explore these issues, we conducted a review to determine what is currently known about interspecialty differences in the care of children and the quality of the existing literature.

METHODS

Search Strategy

We searched MEDLINE and PUBMED to identify English-language articles using original US data published in the content areas of interest between January 1, 1992 and December 31, 2005. Inconsistencies in Medical Subject Heading (MeSH) term assignment required an exhaustive list of MeSH terms to identify articles. We cross-referenced all articles with the following terms: “infant,” “child,” “adolescent,” or “pediatrics.” We excluded articles on nonphysicians and primary care issues, such as minor illnesses (eg, upper respiratory tract infections), immunizations, and reproductive health, because these rarely involve specialty care. We included articles on acute illnesses treated in emergency department settings or surgically, because the care of serious acute conditions often involves nongeneralists and nonpediatric specialists. Studies using facility-level comparisons were excluded.

Abstracts were first reviewed by 2 of 3 reviewers. Relevant abstracts meeting inclusion criteria were retained, and then full articles were obtained and reviewed. Two reviewers

independently abstracted each article and omitted those articles that met the exclusion criteria.

Each article was classified into 1 of 5 categories reflecting the comparison type: generalist versus pediatric subspecialist, generalist versus other specialist, general pediatrician only versus pediatric subspecialist, pediatric subspecialist versus internist subspecialist, or pediatric subspecialist versus other specialist. Methods were classified by the most rigorous statistical approach used: none, descriptive, bivariate, analysis of variance, regression, or survival analysis. Finally, the articles were classified by 1 or more outcomes of interest: physician beliefs and attitudes; diagnostic accuracy (ie, concordance between provider diagnosis and a gold standard); patient education, satisfaction, or adherence; consistency with established guidelines; treatment patterns; outcomes; and utilization or costs.

Grading the Evidence

Using elements listed for observational studies in the Agency for Health Care Research and Quality's Systems to Rate the Strength of the Scientific Evidence, we adapted the following measures of methodological quality: study question clearly stated; provider specialties clearly defined; inclusion of sample size justification; comparability of patients at baseline; generalizability; clear definition of outcomes; outcome standard, valid and reliable; and appropriateness of statistical analysis.¹³ For each element, articles were scored using a tripartite scheme, as described in the Table.

Search Results

Our initial search strategy identified 2037 articles; of these, 361 were retained for full review. After review by both authors, 49 articles were included in the final review. Most articles were excluded because they did not involve an interspecialty comparison (36%). Other reasons for exclusion included no original data or analyses (20%), focus on adult population (8%), no relevance to the topic (9%), facility-level comparison (8%), and other reasons, such as involving nursing care and taking place outside the United States (18%).

RESULTS

Quality of Evidence

Studies varied in the extent to which they adequately addressed various study elements. Only 40% of the articles included a clear study question or research hypothesis. Approximately half of the included articles defined the provider specialty and cited a valid means of identifying specialty, such as membership in a particular society or section of a trade organization, such as the American Academy of Pediatrics. Unverified definitions of specialty included parental self-report of physician specialty or vague labels, such as "asthma specialist."

Nearly 75% of the studies had clearly defined outcomes of interest; however, only 14% justified the outcome measure selected in terms of its appropriateness, validity, or reliability. Similarly, 98% of the included articles failed to include a discussion of sample size justification or power, leaving questions about the ability of the study to detect significant differences unanswered.

Statistical analyses were deemed moderate or weak for 86% of the studies. In addition to these threats to validity, the generalizability of the findings was quite limited, with only 14% of the studies considered generalizable to the US pediatric population and 47% generalizable to a state or a selected patient population, such as managed care or Medicaid enrollees.

Diagnostic Accuracy

Two studies found that general pediatricians and “community pediatricians” had lower specificity than pediatric cardiologists in the identification of heart murmurs,^{14,15} even when the patients studied were identical.¹⁴ In another study, presumptive and postconsultation diagnoses on a sample of children referred for subspecialist care found that diagnoses were concordant in 78% percent of cases for which both diagnoses were available.¹⁶

Consistency With Guidelines

Several studies found evidence that adherence to guideline recommendations was less than optimal across all physician groups examined.^{17,18} Studies comparing specialists’ and generalists’ care of children found no differences in guideline compliance for the treatment of otitis media with effusion¹⁸ but better compliance by specialists in the care of asthma,¹⁹ controlling for disease severity and patient demographics. Two studies of the management of febrile infants found that pediatric emergency medicine physicians were significantly more likely to comply with guideline recommendations than general emergency medicine physicians.^{17,20}

Patient Education, Satisfaction, and Adherence

Parents of children seen by asthma specialists were more knowledgeable about asthma and had higher satisfaction levels than parents whose children saw generalists, even when statistical models controlled for potential confounders.^{21,22} In a study of children with various chronic medical conditions, parents reported greater satisfaction with their specialists compared with their generalists.²³

Treatment Patterns

Many studies have compared treatment approaches between generalists and pediatric subspecialty providers. We divided these articles into 2 comparison groups: generalists versus pediatric specialists and pediatric specialists versus nonpediatric specialists.

Generalists versus pediatric specialists—General pediatricians were no less likely than other specialists to refer children with cerebral palsy to physical therapy,^{24,25} less likely than otolaryngologists to recommend surgery for ankyloglossia,²⁶ and less likely than pediatric cardiologists to recommend cardiac follow-up for suspected heart disease.²⁷ Vignette-based studies found that emergency medicine physicians were more aggressive than generalists in their diagnostic evaluation and management of febrile infants^{28,29} and minor head injuries.³⁰ In contrast, the management of febrile children with petechial rashes was comparable in general pediatricians, pediatric infectious disease physicians, and pediatric emergency medicine physicians.³¹

Interspecialty differences also have been noted in studies of children with mental health problems. A study of stimulant use in children found that psychiatrists were more likely than general pediatricians to perform psychotherapy, more likely to order specific follow-up, and less likely to perform “other counseling.”³² Another study of a large managed behavioral health population found that in children with attention deficit/hyperactivity disorder without a comorbid mood/ anxiety disorder, generalist physicians were significantly less likely than child psychiatrists to prescribe antidepressants, clonidine, and bupropion but equally likely to prescribe stimulants.³³

Finally, studies of children with asthma found greater use of inhaled steroids in children treated by asthma specialists than in children treated by generalists,^{34–36} even when disease severity is comparable between patient groups.³⁵ Other studies have found that children seen

by asthma specialists are significantly more likely than those seen by generalists to have a written asthma plan³⁵ and to have a prescription for a cromoglycate³⁶ or an antihistamine.³⁴

Pediatric specialists versus nonpediatric specialists—Studies comparing pediatric and general emergency medicine physicians have found differences in the use of ultrasound for trauma evaluation;³⁷ prescription of drugs for sedation, seizure, and asthma;³⁸ management of febrile children;²⁰ and management of resuscitation efforts.³⁹ A study of children with false-positive screening results found that general and pediatric ophthalmologists had comparable spectacle prescription rates for children with no refractory error, but general ophthalmologists were more likely than pediatric ophthalmologists to prescribe spectacles for children with mild refractory error.⁴⁰ Previous research also has demonstrated that pediatric nephrologists are significantly more likely than adult nephrologists to recommend peritoneal dialysis versus hemodialysis for pediatric patients.⁴¹ Studies comparing general and child psychiatrists' management of children with attention deficit/hyperactivity disorder have been somewhat inconsistent; one study found greater use of antidepressants in children treated by general psychiatrists,³³ whereas another found no difference.⁴² In both of these studies, the use of stimulants was comparable in the 2 groups of children, however.^{33,42} Studies of pediatric surgical specialists and their general counterparts have found differences in treatment recommendations for the management of vesicoureteral reflux,⁴³ the surgical approach and follow-up for prepubertal varicoceles,⁴⁴ and follow-up after tympanostomy tube placement.⁴⁵

Clinical Outcomes

Pediatric surgical subspecialization has been associated with decreased risk of bradycardia during surgery,⁴⁶ shorter length of stay and lower complication rates in children with perforated appendix,⁴⁷ decreased risk of mucosal perforation postpyloromyotomy, and greater precision in tumor removal.⁴⁸ In contrast, pediatric surgical subspecialization has not been consistently associated with decreased length of stay for simple appendectomy^{47,49} or lower postoperative complication rates.^{47,48,50} Survival rates were comparable in children whose cancer care was managed by a pediatric oncologist only and those whose care was managed collaboratively by pediatric oncologist and a community-based primary care physician.⁵¹ In contrast, children treated by allergists had significantly greater improvements in 5 of 24 measures of health-related quality of life compared with children treated by generalists.³⁴

Utilization and Costs

Studies have demonstrated lower costs and/or shorter length of stay in children treated by pediatric surgical specialists compared with those treated by general surgeons for appendectomy,⁴⁹ uncomplicated pyloromyotomy,⁵² ureteroneocystostomy,⁵⁰ and appendectomy complicated by perforation.^{47,49,51} In contrast, a study of children with one of multiple conditions found significantly lower health care expenditures for chronically ill children in predominantly generalist arrangements compared with those in predominantly specialist arrangements, even after adjusting for demographic variables, morbidity, and clustering.⁵³

DISCUSSION

Although we found interspecialty differences in all areas that we examined, the evidence is not consistent enough to allow us to make recommendations about care delivery. Only studies of asthma-related care and surgical procedures consistently suggest a beneficial effect of specialty care; however, these studies are hampered by limited generalizability. It is possible that some of the differences in care provided may be due to training patterns, social

factors in a community, or specific economic factors. Unfortunately, little data exist to provide insight into either the choice of therapy or the impact of this therapy. Many studies have investigated differences in treatment approaches, which are important process measures,⁵⁴ but few studies have investigated clinical and financial outcomes. The extent to which interspecialty differences influence outcomes is a fundamentally important question that remains unanswered.

The nature of the specific condition under investigation may have important implications for the types of comparisons that are feasible given the typical time and budget constraints facing most studies. Studies comparing generalists and pediatric specialists rely heavily on comparisons of attitudes, consistency with guidelines, and treatment approaches. In contrast, studies comparing pediatric subspecialists with other specialists, which often involve surgical procedures, focus more heavily on comparisons of clinical outcomes, utilization, and costs. Process measures may be the most feasible outcomes available for comparing interspecialty differences in the care of pediatric conditions that are medical in nature and lack useful short-term outcome measures. Increased availability of clinical guidelines would provide gold standards with which process measures of care can be compared. The study of interspecialty differences in pediatric surgical procedures may be more feasible given the availability of inpatient data sets; however, existing data sets often lack the physician specialty data required to fully answer these questions in a nationwide sample.

There is a notable lack of studies comparing pediatric medical subspecialists and their internist counterparts in the care of children. With the exception of children with rheumatic diseases and adolescents with neoplasms, the role of internist physicians in providing care to children and adolescents with chronic conditions remains largely undocumented. The adequacy of the supply of pediatric medical subspecialists is unclear; in some regions of the US, few or no pediatric medical subspecialists are available.⁵⁵ If internist specialists are managing the care of chronically ill children who reside in these areas, more research is needed on the extent to which these providers are capable of providing quality pediatric care. Our review highlights the need for improvements in research on interspecialty differences in pediatric care. Generally, the studies reviewed have major deficiencies in design, execution, or analysis that limit their validity and generalizability. Although randomized controlled trials comparing pediatric subspecialty care with generalist care may be feasible for common conditions such as asthma, allergies, and attention deficit disorder, such trials are more difficult to execute for rare pediatric conditions.

Many studies have examined interspecialty differences in the care of children over the last decade, finding interspecialty differences across a variety of measures. Overall, the strength of the evidence reported in these studies constrains assessment of the relative quality of different types of providers. Additional outcomes studies are essential and should include efforts to assess cost-effectiveness.

Acknowledgments

Supported by Agency for Healthcare Research and Quality (ARHQ) Grant 1-K02-HS013309-01A1. The ARHQ was not involved in the performance of the study in any way.

Special thanks to the Sprint Manuscript Team, Department of Health Policy and Administration, School of Public Health, University of North Carolina at Chapel Hill.

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Table**Strength of evidence criteria by study element**

	Strong	Moderate	Weak
Study question clearly stated	Research hypothesis or study question stated	Lacks a specific research question but states study's aims in general terms	No clear hypothesis, question, or purpose
Provider specialties clearly defined	Provider specialties and source defined	Provider specialties listed but source of specialty not clear or by parental recall	Groups not clearly defined
Sample size justification	Sample size justification present	Stratification by group to ensure sufficiently large sample, although size required not explicit	No sample size justification or stratification
Comparability of patients at baseline ¹	Groups randomized, patients identical across each provider group, or survey- based "exposure" identical (ie, clinical vignettes)	Groups not randomized but shown to be equivalent on key variables	Groups not comparable or not assessed
Generalizable	Nationally representative data or random or stratified provider or patient survey with a RR > 60%	Generalizable to a state or setting (eg, HMO) or provider/patient survey with a RR of 40% to 60%	Convenience sample, poor response rate (< 40%), or too few providers in one or more specialty categories
Outcomes clearly defined	Outcome variables listed & defined	Outcome variables described but lack clarity	Outcome variables not clear
Outcomes standard, valid, and reliable	Authors justify the outcome variables selected in the manuscript or references	Authors cite qualities of the measure but do not provide references for validity or reliability	Outcome selection not justified/discussed by the authors.
Statistical analysis appropriate	Confounding controlled for through design (ie, randomized patients or identical exposure) or statistical controls; appropriate statistics used	Statistical analyses fail to address one or more issues (eg, confounding, multiple comparisons, clustering within providers)	Inappropriate test or insufficient information