Linking Process to Outcome: Are We Training Pediatricians to Meet Evolving Health Care Needs?

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ABSTRACT

The Residency Review and Redesign in Pediatrics (R³P) Project began in 2005 and will have been completed in 2009. The purpose was to conduct a comprehensive reassessment of general pediatric residency education. The project convened 3 major colloquia supplemented by numerous meetings of an R³P committee and by surveys of residents, subspecialty fellows, and generalist and subspecialty practitioners. A principal conclusion was that resident learning opportunities should be more flexibly directed toward the variety of career choices available to pediatricians. Another conclusion was that reasonable expectations for residency education are most likely if learning is regarded as an integrated continuum, beginning in medical school and continuing throughout a career in practice. The R³P Committee declined to create a list of recommendations for immediate changes in residency education; instead, it recommends that changes be based on evidence of education outcomes that are important to improving the health of children, adolescents, and young adults. Pediatrics 2009;123:S1–S7

Despite rapid and ongoing changes in the environment in which residency education occurs, 30 years have passed since the last comprehensive examination of general pediatric residency education by the pediatric community as a whole. In 2000, the Future of Pediatric Education (FOPE) II Project made important suggestions for modification of residency education, and the Accreditation Council for Graduate Medical Education (ACGME) considers these suggestions along with other proposals when its review committee for pediatrics periodically revises the program requirements for pediatric residency education.

However, the FOPE II Project was not able to delve into fundamental aspects of the purpose and scope of pediatric residency training, and that is not the function of periodic revisions of ACGME program requirements. Given the magnitude of changes in the context in which residency education occurs, a thorough reappraisal is in order. Thirty years have seen primary care pediatric practice move from preoccupation with treatment of common infectious diseases to greater emphasis on the management of well-child care, behavioral and developmental aspects of growth and development, and the supervision of care for the child with special health care needs. The structure of pediatric health care has also changed. The small, private office caring for members of a relatively homogeneous community has been replaced with a fragmented “system” in which patients and families move in and out of a complicated web of hospitals, practice networks, insurance plans, home health services, laboratory and imaging units, and various care settings. The racial, ethnic, and financial demographics of children, adolescents, and young adults and their families are different. Scientific advances in understanding the molecular, chemical, and genetic nature of health and illness move at such a rapid pace that “up-to-date” care can easily lag behind knowledge about best care. The practice of medicine has also been altered by the permeation of technology into health care delivery, diagnosis and treatment, patient-provider communication, and lay and professional education.

The American Board of Pediatrics Foundation, a charitable foundation associated with the American Board of Pediatrics, concluded that in view of the magnitude of these changes, the health of children would be served by a project to reexamine both the structure of pediatric residency education and the assumptions on which it is based. The result was the Residency Review and Redesign in Pediatrics (R³P) Project. Oversight has been provided by an R³P committee constituted to represent a diversity of viewpoints within the pediatric community.

Frequent committee meetings were supplemented by 3 intense colloquia. For those, the committee was joined by an even more broadly constituted project group (Table 1), 4 project advisors, and, for colloquium II, topic experts from the project group and outside organizations. Colloquia were facilitated by InnovationLabs LLC, an organization with expertise in using collaborative approaches to advance complex, multistakeholder deliberations. The general...
approach was to have small, constantly reconfigured groups engage in parallel, interactive exercises designed to identify, develop, and dissect complex topics. All participants, regardless of background, were regarded as equals. The process involved a variety of approaches to maximize the likelihood that concepts and ideas were expressed and evaluated. As an example, individual small groups were asked to imagine the responses of a particular constituency to a topic under consideration; groups were then shuffled and reconstituted, often several times, and asked to critique the perceptions and conclusions of the previous groups. Each colloquium was scripted carefully with the understanding that scripts would change depending on the directions that conversations took. Participants were not permitted to be passive; they immersed themselves in challenges and solutions. At the end of each day, and especially at the end of the colloquium, participants emerged drained by the intensity of the process and humbled by the complexity of the challenges. They were also exhilarated by the quality of thinking and were often surprised by an outcome that was quite different from their preconceptions.

The first colloquium addressed the projected health care needs of children, adolescents, and young adults and their families. The second colloquium explored concepts of medical education, especially methodologies for evaluating learning outcomes, and examined residency learning in the context of medical school and postresidency learning. The third colloquium refined concepts from the first two and considered strategies for implementing change. Also conducted were a series of surveys of residents, subspecialty fellows, and recently certified pediatricians to gather their perspectives. The R3P Committee corresponded frequently with individuals and groups within pediatrics and in other specialties to harness the experience and knowledge of a community of individuals deeply committed to residency education.

The series of articles in this supplement to Pediatrics represents a summary of the R3P Project from 2005 to 2008. Completion of what is intended to be only the first phase of an ongoing effort is anticipated in early 2009. In addition to this introductory article, the supplement consists of an article that provides historical context for the R3P Project,9 articles that summarize each of the colloquia,10–12 and articles that describe results of the surveys requested by the R3P Committee and Project Group,13–16 along with a commentary,17 an article that describes the likely consequences of maintenance of certification on residency education,18 and an article that projects the likely long-term future of evolutionary change in pediatric graduate medical education.19

The colloquium summaries document a dramatic change in thinking that occurred during the course of the project. At inception, the product, following past examples,1,2 was to be a carefully considered set of recommendations intended to facilitate redesign of general pediatric residency education. As the project unfolded, it became clear that a list of recommendations was not appropriate. A better alternative was a process of ongoing exploration and learning about residency education that matches the anticipated pace of change in the context in which it occurs.

The articles vary in style. Descriptions of the colloquia
are written from the perspective of participants. Articles that describe the results of surveys are more conventional in format. Together, they capture the deliberations and activities of the R³P Project.

**COLOQUIUM I: THE FUTURE OF PEDIATRIC HEALTH CARE DELIVERY AND EDUCATION**
Participants of colloquium I discussed changes in pediatric patients, practice, and practitioners and their implications for pediatric residency education. Among the most important are changes in the epidemiology of serious pediatric illness. Chronic illnesses are now far more likely than acute conditions to cause death and serious morbidity in children, adolescents, and young adults in the United States. The result is what Paul Wise, one of the project’s advisors, called an emerging “dichotomization” of pediatric health care needs. He suggested that a pediatrician’s time will increasingly be spent with either high-volume ambulatory care (including management of mental and behavioral health, oral health, and environmental health) or, alternatively, management of complex chronic conditions in both hospitals and clinics. These categories call for professional competencies that are both similar and distinct, with important implications for residency education. Other changes, including the changing sociodemographics of pediatric patients and their families, were also highlighted.

Participants in colloquium I discussed possible consequences of ongoing changes in the structure of pediatric health care delivery. Much of what was once managed in a hospital is now managed in the outpatient clinic or at home. Regardless of site, pediatric health care is increasingly delivered by teams and partnerships of pediatricians or family physicians and combinations of nurse practitioners, physician assistants, and mental health and education professionals. In some cases, care that was once provided only by pediatricians is delivered by nonmedical providers in retail clinics who claim to deliver care equivalent to that of pediatricians. Although the percentage of children cared for by pediatricians seems to be increasing relative to family physicians, the future is not clear. Some have speculated that, in time, much of what is now done by primary care pediatricians will be done by nurse practitioners, physician assistants, and nonmedical mental health and education specialists.

Although the size and composition of the pediatric provider workforce were part of discussions in colloquium I, the R³P Project did not consider workforce per se. There is a range of opinions about the numbers of pediatricians needed for the future. R³P conversations along with resident and practitioner surveys have highlighted progressive segmentation of practice, even among general pediatricians. Competencies are different enough that considerable adaptation, even additional training, will likely be needed to switch from one practice setting to another. A general pediatrician who spends years as a hospitalist is unlikely to be able to make an immediate transition to a busy ambulatory setting and vice versa. The consequences for workforce are not clear.

The article by Lister et al summarizing the proceedings at colloquium I, portrays invigorating and dynamic interactions. It captures appreciation of the uncertainties in projecting the future, which was a key to the later conclusion that the originally proposed product (a static collection of recommendations to be implemented uniformly across all pediatric residency programs) would not serve the needs of patients and families or their health care providers.

**COLOQUIUM II: THE THEORY AND PRACTICE OF GRADUATE MEDICAL EDUCATION**
Participants of colloquium II, described in the article by Carraccio and Sectish, It examined pediatric residency education in the context of general trends in medical education, none more important than the movement toward greater emphasis on outcomes and away from a focus on educational process (eg, number of months on a specific rotation). The primacy of outcomes is exemplified by the commitment of the ACGME, the American Board of Medical Specialties, and others (eg, the Federation of State Medical Boards) to the 6 general competencies of patient care: medical knowledge, practice-based learning and improvement, systems-based practice, professionalism, and interpersonal and communication skills. Greater emphasis on outcomes permits the exploration of different educational processes, provided satisfactory outcomes are documented. Various methods of measuring learning outcomes were reviewed by invited experts.

Participants of all 3 colloquia, especially in colloquium II, questioned the fundamental rationale of pediatric generalist education: exposure of all residents to the greatest possible breadth of knowledge and experience. First, this has become progressively difficult as knowledge and varieties of practice have increased. Second, a seldom-noticed negative consequence is that this concept of residency education implicitly supports hospital and teaching faculty requests for involvement of residents in almost any aspect of the clinical environment, even when requests arise primarily out of a desire for assistance with clinical service. Third, unless learning goals are clear and mentoring is attentive, the greatest possible breadth of clinical experience can become 33 disjointed months with residents struggling to “connect the dots.” Finally, focus on breadth at the expense of depth ignores the important finding that competence in pediatrics, as in any field, is acquired and enhanced only with what Ericsson has called “deliberate practice.”

Krummel has observed that residency education has traditionally been “education by random opportunity.” This shortcoming is worsened by the long-standing reality that random opportunity in training settings is not random from the perspective of population epidemiology; it is weighted toward serious illnesses. This mirrors the epidemiology of serious morbidity and mortality in pediatrics and may be appropriate for some proportion of residents. It does not, however, mirror the epidemiology of pediatric practice for residents who will later be charged with ambulatory health maintenance and preventive care, as well as management of minor acute conditions.4,5,23

**COLOQUIUM III: THE FUTURE OF PEDIATRIC HEALTH CARE RESEARCH**
Participants of colloquium III, described in the article by Haidasz et al, discussed changes in the epidemiology of serious pediatric illness. Chronic illnesses are now far more likely than acute conditions to cause death and serious morbidity in children, adolescents, and young adults in the United States. The result is what Paul Wise, one of the project’s advisors, called an emerging “dichotomization” of pediatric health care needs. He suggested that a pediatrician’s time will increasingly be spent with either high-volume ambulatory care (including management of mental and behavioral health, oral health, and environmental health) or, alternatively, management of complex chronic conditions in both hospitals and clinics. These categories call for professional competencies that are both similar and distinct, with important implications for residency education. Other changes, including the changing sociodemographics of pediatric patients and their families, were also highlighted.

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illnesses and injuries and disorders of mental and behavioral health. Even experience with serious illness can be distorted. Sub-specialized units (eg, cardiac intensive care units) are often staffed by faculty and subspecialty fellows rather than by general pediatric residents. Specialized ambulatory programs (eg, for eating disorders) may not include residents or may include them only as observers. The need for thoughtful attention to the content of experience and then to the balance between breadth and depth, with in-depth experiences tailored to later career aspirations, crystallized during colloquium II.

In colloquium II, factors that contribute to the cost of educating residents was also discussed. Education is inherently inefficient; “down time” for reflection and consolidation of learning is essential. Efficiencies, however, can be found in the environment. Residents often perform clerical tasks at the expense of time needed to learn, reflect, and consolidate learning. Clerical tasks could almost always be performed more efficiently by others. Efficiency can also be improved by clear educational goals and objectives, reliable evaluation, and timely feedback, along with use of supplementary educational tools, including simulation. These thoughts were introduced in colloquium II and developed thereafter. They appear in the list of goals for innovation in pediatric residency education in the article that summarizes colloquium III.

Colloquium II participants also discussed how residency, as only a portion of a career-long continuum of learning, can help pediatricians close the gap between care that is recommended and care that is actually delivered. Restated, what role does residency have in the formation of habits by which new competencies are acquired and incorporated into daily practice? This is especially important when pediatricians change practice focus in midcareer or reenter practice after time away. These issues are developed further in the article that examines maintenance of certification as a tool for lifelong learning and reflective self-evaluation.

COLOQUIUM III: CHALLENGES FOR PEDIATRIC GRADUATE MEDICAL EDUCATION AND HOW TO MEET THEM

This colloquium might well have been titled “From a Prescriptive to an Emerging Process.” By the third colloquium, the committee and other participants had concluded that a list of recommendations was inappropriate for the task of improving residency education. A list of recommendations was too ambitious because, first, no committee or group, no matter how carefully chosen, would be judged to provide suitable representation for residents, patients, parents, educators, and hospital administration, not to mention the myriad accredited residency training programs. Second, no single list of recommendations would be right for all residents. Third, decisions about which changes in residency education to pursue and how to pursue them are best made at the level of training programs by a blend of residents, teaching faculty, parents, and hospital administrators. On the other hand, a list of recommendations was not ambitious enough; a list of recommendations is, at best, an occasional event. As such, it is incapable of responding to dynamic challenges.

The R3P Project determined that it could best begin the process of evolutionary change in pediatric education by identifying compelling challenges that invite innovative solutions. A final draft, slightly modified by subsequent discussions, was a principal product of colloquium III.

A second locus of colloquium III was how to promote exploration of innovative solutions across pediatric residency training programs. We learned much from similar projects in internal medicine and family medicine. These specialties share with pediatrics the problem that residency education has not adjusted to differences in knowledge and skills required for different practice settings. Some have suggested a residency model in which one portion is “fixed” and another is “variable,” as determined by the resident’s likely career choice. These specialties also share with pediatrics the realization that residency learning must be integrated with learning after residency with explicit preparation for lifelong learning and concluded that change in residency education needs to be more continuous and adaptive. Participants in change efforts in internal medicine and family medicine were involved in all 3 colloquia. Their experience, ideas, and comments played a major role in shaping our deliberations.

RESIDENT, SUBSPECIALTY FELLOW, AND PRACTITIONER SURVEYS

The R3P Project surveyed residents, subspecialty fellows, and recently certified general and subspecialty pediatricians. Almost one third of current residents stated that they intend to enter general pediatric ambulatory practice, with little or no contact with hospitalized patients, compared with only a few who plan hospitalist practice and <15% who plan to practice in both the ambulatory and hospital settings. It is clear that “traditional” pediatric practice, with pediatricians providing both ambulatory and hospital care, is no longer traditional. More than 40% of the residents stated that they are considering subspecialty training. Residency education must accommodate the reality that although the competencies needed for these different pediatric careers overlap, they are not identical. Surveys of residents, fellows, and practitioners have shown that most programs provide some flexibility in selection of subspecialty electives or access to particular groups of patients, but only one third provide both, and only a few allow residents maximum flexibility to organize their education to match their preferences.

Surveys revealed that most third-year pediatric residents decided on a specific career path early in their third year. This makes it possible to use a portion of the third year, and perhaps of the second, to prepare for a particular career. This would be possible now. If subspecialty experiences are selected according to what would be most useful for a particular career emphasis, the ACGME program requirements for pediatric residency education allow as many as 16 of the 33 months to be used toward that end. Combination of a core of general
pediatric experiences with more focused education is not new; it has been used for many years for individuals in programs that combine training in pediatrics with training in internal medicine, emergency medicine, dermatology, medical genetics, and other specialties. It is also seen in pathways that lead to certification in both pediatrics and pediatric neurology and, uncommonly, to special competence in research.

If residency education were better matched to later career emphases, how might that be done? Ideally, a proportion of the overall goals and objectives for residency education would be based on the epidemiology of health care problems that residents are likely to encounter in later practice. This would be supplemented by training in how to use that information to maximize quality of patient outcomes. Unfortunately, epidemiologic descriptions of various practice settings are lacking. In the absence of such data, mentoring by individuals involved in the particular type of practice for which the resident is preparing is vital.

Federal and state funding of resident education is tied to hospital-based service. Some have argued that this makes substantive change impossible. The concern is valid, but it need not produce paralysis. Indeed, pediatrics set an example when ACGME curtailed the number of months that pediatric residents spend in ICUs and specified that at least 40% of residency education must consist of ambulatory experiences. Second, current hospital-based experiences could be organized differently, perhaps more as longitudinal than block experiences, into mentored, cohesive education programs directed at particular career choices. Third, many residency programs have hospital-based primary care clinics that might be more representative of later ambulatory pediatrics if residents were involved for months instead of disjointed half-days. It is worth noting similar discussions and an example of such a change, at the University of Cincinnati, in internal medicine. Finally, we know of numbers of pediatric residency programs that have placed residents in nonhospital clinics, including private-practice offices, for many years because of conviction as to its educational importance and, in some cases, because it fosters positive relationships between academic centers and the community. Thus, change is possible within the current funding environment. However, there is no question that change would be easier and could be more far reaching if the link between funding and resident presence at a hospital-sponsored site were eventually removed.

CONCLUSIONS

Participants of the R3P Project concluded that children, adolescents, and young adults would be best served by a process of deliberate, careful experimentation across residency programs, which would allow for examination of new ways to organize resident learning experiences and different ways of assessing learning outcomes. Members of the R3P Committee are working with members of the review committee for pediatrics and with leaders of the Association of Pediatric Program Directors, the Association of Medical School Pediatric Department Chairs, the Resident Section of the American Academy of Pediatrics, and the Federation of Pediatric Organizations to determine how that might proceed and how results will be measured and shared. As discussed first in colloquium III, the R3P Committee is also committed to creation of an administrative entity involving residents, residency program directors, pediatric department chairs, the American Board of Pediatrics, and others to help initiate and sustain innovative program change, evaluate outcomes, and disseminate lessons.

The important themes from the R3P Project became clearer with each successive colloquium. It is not surprising that they, in part, echo themes of the FOPE I, the FOPE II, and discussions in between. First, no single approach to general pediatric residency education is best for all residents. Flexibility in residency education was recently endorsed again, this time by the Council on Graduate Medical Education.

Second, although the subject has long been debated, we hold that general pediatric residency programs should not attempt to provide all learning that every pediatrician might conceivably need. That goal, as pediatric knowledge continues to grow and as an increasing number of subspecialty disciplines compete for the same 33 months, is incompatible with flexibility. The problem will not be solved by adding another 11 months of residency; eventually, those months, too, will be overcommitted. Acceptance of the reality that all learning cannot occur during residency begs the question of what expectations are reasonable.

This leads to the third major theme: reasonable expectations for each phase of learning (medical school, residency, and postresidency practice) are most likely if the continuum of learning is all considered at once. Residency has an important role to fulfill, but the health of children, adolescents, and young adults depends on a combination of medical school education, focused residency education, and, perhaps most important, reflective, collaborative practice supplemented by a rigorous, focused maintenance-of-certification program. No one of those can compensate for the absence of the other; each must be present in full measure to improve health outcomes.

Fourth, the theme that is the subtext for the other 3 and for all discussions during this project: pediatric residency education will not achieve its potential unless it occurs in an environment committed to principles enunciated by the Institute of Medicine in Health Professions Education: A Bridge to Quality, summarized briefly as a provision of patient-centered care by interdisciplinary teams with practice rooted in evidence and in the use of informatics and other techniques to make constant improvements in quality.

Ongoing changes in pediatric health care require a flexible concept of residency education that can adapt to whatever the future holds, which means that both learning and learning about learning must never stop. Stated succinctly, that is the lesson of the R3P Project. The fruits of our labors are summarized in this supplement with the intent that they will result in continuous improve-
ment in the health of children, adolescents, and young adults.

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