ABSTRACT. The growth of managed care has brought a new focus on physician competency in the appropriate use of resources to help patients. The community of pediatric educators must improve residency curricula and teaching methodologies to ensure that graduates of their programs can effectively and efficiently meet the needs of children and their families. The educational approach in many pediatric residency programs is an implicit apprenticeship model, with which the residents follow the actions of attending physicians with little attention to scrutiny of the clinical evidence for and against diagnostic and treatment strategies. Evidence-based medicine stresses the importance of the evaluation of evidence from clinical research and cautions against the use of intuition, untested pathophysiologic reasoning as sufficient for medical decision-making. Managed care also has helped to create a heightened awareness of the need to educate residents to incorporate the preferences of patients and families into diagnostic and treatment decisions. Trainees must know how to balance their duty to maximize the health of populations at the lowest resource use with their duty to each individual patient and family.

Changes in the residency curriculum will bring change in educational settings and the structure of rotations. Potential barriers to implementation will include the need for faculty development and financial resources for information technology. Pediatrics 1998;101:762–767; 

managed care; graduate medical education; cost-effectiveness; clinical decision-making; decision theory.

ABBREVIATIONS. MCO, managed care organization; UTI, urinary tract infection.

THE EFFECTIVENESS/EFFICIENCY IMPERATIVE IN MANAGED CARE

As in other medical disciplines, managed care has stimulated a renewed interest in the reform of pediatric education. The new rules of our changing health care system place an importance on competencies that have not been emphasized in the past. To understand these competencies, one must differentiate managed care from what preceded it. The attribute that best distinguishes managed care from nonmanaged care is the explicit recognition that financial resources are finite and that money spent on a clinical service is not available to spend elsewhere (managing a budget). Therefore, the managed care organization (MCO) attempts to maximize the health of the population it serves within the constraints of its budget.

The notion that the physician uses resources to help the patient has always been accepted. However, before managed care, there was no direct incentive to maximize the effectiveness of clinical care, and judgments about the appropriateness of care were left up to the individual physician. The literature on variation in health care shows that there is a wide divergence in what physicians see as appropriate even when there are data to show the benefit of one strategy over others. Those who are attempting to reduce unwanted variation realize that changing the behavior of physicians already in practice is a formidable task.

In addition to educating physicians on how to judge the effectiveness of strategies, there is a need to teach them how to incorporate the patient/family values for the possible outcomes of care into the process, when choosing a course of action. The move to managed care and the recognition that the patient has rights as a consumer of care have served to highlight the necessity of joint decision-making between the patient and clinician.

Although their motives may differ, the present situation finds most MCOs providing direction and incentives to maximize the effectiveness of medical care and trying to get physicians to work with them to maximize efficiency and effectiveness. Teaching the skills necessary to use resources effectively and to work collaboratively with patients and families is an important part of the curriculum of any pediatrics training program. What can be done to improve the education of pediatricians to maximize the health of children and the satisfaction of their families with the system of care, at the lowest resource use?

EVIDENCE-BASED MEDICINE: SCRUTINIZING TECHNICAL STRATEGIES TO MAXIMIZE HEALTH

If our goal is indeed to maximize the health of the children we serve at the lowest cost, then pediatricians must be trained to look for evidence to judge the effectiveness of medical strategies and to be cautious in acting purely on clinical intuition and personal experience. This paradigm of evidence-based medicine necessitates making the science of clinical reasoning the foundation of medical education. The discipline of clinical reasoning consists of the evaluation of information in making diagnoses and choos-
An Example: The Apprenticeship Model

A PL-II on the newborn rotation in a teaching hospital is asked by the mother of a 1-day-old boy about circumcision. The mother has heard on a television show about the dangers of noncircumcision and asks specifically about the risk of urinary tract infection (UTI) if her infant is not circumcised. The resident tells the mother that the risk is high and advocates for the procedure after informing the mother about the danger of untreated UTI. After leaving the bedside, a third-year medical student asks the resident about the risk of UTI and the resident reminds the student that on rounds the day before, the attending neonatologist had stated that all male infants should be circumcised.

An Example: The Evidence-based Model

When the mother inquires about the risk of UTI, the resident realizes that she does not know the answer to the question but recognizes that it is an important variable in the mother’s decision-making about circumcision for her son. She excuses herself and goes to a networked computer at the nurses’ station where she does a Medline search using the medical subject headings circumcision and UTI. She finds a large cohort study from a military hospital. She reviews the paper critically, using the skills that she has been taught, and finds that the study meets design criteria for the estimate of risk to be valid. The study’s estimate of the relative risk of diagnosed UTI is 20 in noncircumcised males in the first year of life. She finds that the probability estimate for a UTI in the first year of life without circumcision is 4%. The resident shares this information with the infant’s mother in language that she can understand and helps her use this, and information about available anesthesia, to make her decision.

To practice this way, the resident needs to understand the concepts of disease prevalence, risk, assessing patient utilities, research methodology, and critical evaluation skills. In addition, the technology to find evidence and review it live, where care is being delivered, must be available.

Most clinicians readily accept the concept of evidence-based medicine. The dilemma, however, is that for many if not most clinical scenarios, the evidence is lacking. What is the logical decision-maker to do in these instances? The application of the hypothetico-deductive reasoning process and the rules of clinical epidemiology allow the clinician to formulate diagnostic problems in ways that allow them to be solved more efficiently. Frequently, merely by formally structuring the problem and stating the assumptions, the clinician can choose the most effective strategy without perfect evidence. In addition, the clinician who has a basic knowledge of the psychology of decision-making and understands how mental shortcuts can sometimes help but sometimes lead to error is better able to use information to help the patient. For example, a pediatrician confronted with a child with a rash consistent with Lyme disease may not be able to find a good estimate of the probability of this disorder in patients with similar rashes, but if the pediatrician frames the problem appropriately, s/he may be better able to decide whether empiric treatment or expectant management while awaiting laboratory results is a better strategy.

LISTENING TO THE CHILD AND FAMILY: INCORPORATING PATIENT PREFERENCES INTO MEDICAL DECISIONS

US citizens are demanding a greater voice in health care decisions. Beyond collecting evidence, physicians must improve their ability to incorporate the patient’s needs and preferences into diagnostic and treatment decisions. In the circumcision example, although the evidence is clear that boys who are not circumcised run a significantly higher risk of UTI in the first year of life than do those who are circumcised, it also is clear that circumcision without anesthesia causes significant pain. Beyond religious and cultural preferences, how a mother and father accept circumcision without anesthesia may play a pivotal role in their treatment choice when they are given the evidence. This underscores the importance of pediatricians learning to present evidence to patients in ways that facilitate understanding. While presenting information to patients or parents in this manner is truly a part of the art of medicine, a clinician’s performance can be improved if s/he learns a number of skills.

The physician must learn to judge the patient’s verbal or nonverbal cues to see whether the patient is ready to receive the information. S/he then must attend to the physical environment of the discussion (privacy, freedom from distractions). The clinician must pay attention to his/her own mannerisms, tone of voice, and language. S/he must use active listening with feedback to ensure that the information sent is the same as the information received.

After having presented information, the physician must elicit the patient’s or parent’s preferences for health and other outcomes. It is not enough to give a family the probability that a child will be left with significant morbidity after a potentially life-sustaining procedure, it also is necessary to have the parents consider what the morbidity may mean to them and
their child. This discussion should include the child’s somatic and psychological well-being in the context of family life and the financial repercussions to the family of specific clinical decisions.

To lead discussions of this type, the pediatrician will need to know some of the basic science of utility assessment. The clinician must understand how framing the problem for a decision-maker can affect the decision. The physician must know some techniques for helping the patient or family to deal with probabilities when making a particularly difficult decision. There are methods for eliciting preferences from patients and parents for the outcomes of medical treatment.6

WHAT ABOUT SOCIETAL COSTS?
In addition to helping a family to consider the financial effects on them of their medical care decisions, and helping to find solutions for the underinsured, the pediatrician has a societal duty to consider the effect of his or her actions on the greater good of the community served. When a higher cost strategy provides no added benefit to the patient, then it is appropriate for the pediatrician to use the one of lower cost. Where there are higher cost strategies of some increased anticipated benefit, the pediatrician must be able to frame decisions for families such that they understand the expected added benefit. For example, it is not enough to leave a worried mother with the understanding that one antibiotic is stronger than another when making the decision of which one to use to treat an episode of otitis media. If the causative pathogen is likely to be nonpenicillin-resistant pneumococcus or one not treatable with antibiotics at all, then this has to be discussed if the parent is to participate in the choice. By allowing the parent to state amoxicillin does not work for my child and having this statement lead to the prescription of a broader-spectrum and much more costly antibiotic without a plan for additional education, the pediatrician is not fulfilling his/her expanded role.

THE ETHICAL CHALLENGES OF DECISION-MAKING IN MANAGED CARE
Once the data have been presented to a family clearly, the pediatrician does not have the right to withhold effective therapies chosen by the family simply because they are more costly than others. This is a violation of the patient–physician relationship. For example, a family has the right to demand nonionic contrast media for their child even if the risk of anaphylaxis is small. The pediatrician must inform the family about the risks and aid them in obtaining the more costly contrast if they choose it. If the MCO has policies that would preclude its use, the pediatrician must continue to act as the family’s agent and help them obtain the desired care. When the pediatrician cannot support the desires of the parent, s/he has a duty to make this clear to the family. If the parents continues to see their desire as appropriate, the pediatrician must assist them in finding another physician.7

Because managed care is about providing health care within the budget constraints, the pressure to contain costs by limiting care is significant in most plans. This pressure is strongest in for-profit plans, where breaking even is not enough. The administrators in for-profit plans must retain a percentage of the premium revenue as profit for the owner/investors. The pediatrician must refrain from withholding strategies that are marginally superior to others simply because they are too expensive. Cost-effectiveness analysis is a policy tool. It has no place at the bedside of an individual patient.

It is part of the pediatrician’s role to avoid strategies that provide no benefit to the patient. Practicing evidence-based medicine leads to cost-effective care because data are sought to validate strategies that lead to the best outcome. The medical education community should embrace evidence-based medicine as the most rational way to minimize cost while maximizing health.

THE PEDIATRICIAN, EVIDENCE-BASED MEDICINE, AND HEALTH POLICY
As advocates for children, and far from the bedside of an individual child, the pediatrician also must participate as a scientist in policy decisions, to ensure that we are maximizing the health of our children at the lowest cost to society. For example, it often appears that pediatricians take an all screening is good approach when they voice their opinions on policy decisions for preventive care. Many states spend hundreds of thousands of dollars screening preadolescents for scoliosis when the US Preventive Services Task Force finds no evidence of the effectiveness of this strategy.8 Perhaps these resources would be better applied elsewhere if pediatricians were better prepared for policy discussions of this sort.

A NEW CURRICULUM IN EVIDENCE-BASED MEDICINE FOR PEDIATRIC RESIDENCIES
If the finished product is to be a pediatrician who knows where to get up-to-date information, how to judge its quality, and how to present it to families in a suitable manner, then the new guiding principle for teacher–learner interactions in residency training might be embodied in the question “What’s the Evidence?” This new guiding principle must permeate didactic lectures, discussions on rounds, and case-based sessions. The new curriculum must foster the development of analytic skills.

Within this new curriculum, the core content of pediatric medicine would remain the same, although the focus would be less on memorization of facts and more on how to access current information and how to judge its reliability and validity. The curriculum would contain new content for competencies in analytic skills. These are listed in the Table.

The pediatrician must have knowledge of basic clinical epidemiology. S/he must understand the importance of disease prevalence in arriving at the correct diagnosis for a given patient. In addition, the clinician must understand how to calculate incidence and relative risk to deliver preventive care of the highest quality. A thorough understanding of test characteristics is required to be an excellent diagnostician. The resident must learn to consider the repro-
TABLE. Curriculum in Evidence-based Medicine

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ducibility of diagnostic information before determining whether the information can distinguish validly between one disease and another. S/he must be able to use a test’s sensitivity and specificity along with the pretest probability of disease to determine the most likely cause of a patient’s symptoms.

To evaluate information from the medical literature, the pediatrician needs a fundamental knowledge of research methodology and the assessment of causality. The pediatrician in training must demonstrate knowledge of the hierarchy of research designs to avoid bias and confounding and the strengths and weaknesses of each design. This goal may be achieved most effectively through a structured journal club with a knowledgeable preceptor who can guide the discussion.

The science of decision-making must be taught for a clinician to understand how to minimize error in judgment. A familiarity with probabilistic thinking, the hypotheticodeductive reasoning process, and incumbent biases and mental shortcuts called heuristics will help the physician to do what is right for the patient. A combination of didactic sessions and case-based learning at the bedside can be used to teach these ideas. The generation of evidence-based differential diagnoses can be made easier by making medical literature searching readily available wherever patients are treated.

A basic understanding of how to frame problems for patients and the use of decision analysis to help the patient deal with uncertainty will aide the pediatrician in working collaboratively. Didactic sessions on decision analytic theory and ready availability of the software for hands-on learning will be important.

Finally, an introduction to cost-effectiveness analysis will help the pediatrician to contribute effectively in policy-making. An understanding of how to maximize health outcomes despite scarce resources is an essential skill for true child advocacy. This content probably is best introduced in forums that bring together clinicians and policy-makers such as seminars and reading groups.

The structure for delivering the newly emphasized content will be a blend of educational strategies. Computer-aided learning and traditional lectures will help ensure a basic grasp of the key concepts of clinical epidemiology. Case-based conferences will demonstrate the applicability of these concepts and help the resident to gain mastery of them. Adult learning theory stresses the importance of context in attaining new knowledge.

BARRIERS TO ACTUALIZING THE NEW CURRICULUM IN EVIDENCE-BASED MEDICINE

The barriers to these changes are considerable. Most programs will find that they do not have a critical mass of faculty who can deliver this new curriculum. Besides finding core teachers who are conversant in clinical epidemiology and possess critical analysis skills, the majority of clinician–teachers will need to model evidence-based medicine to the learners for the curriculum to be effective. Therefore, faculty development will be a massive undertaking in most instances.

Evidence-based medicine requires the availability of information in real time. If the teacher and resident must travel to the library every time a question arises, the participants will be frustrated and the program will fail. Information systems are needed to bring evidence to the bedside. The ability to search medical databases such as Medline and to access the Internet for evidence-based reviews is critical to successful implementation of such a curriculum. In this era of shrinking resources, many programs will have difficulty providing adequate information technology.

Competitive pressure to provide a higher level of care, changes in reimbursement for medical education, regulatory mandates, and other factors have caused programs to begin to disassociate training needs from service needs. Programs must continue to focus on their educational plan separately from their institution’s service needs if they are to produce the optimally trained pediatrician.

WORKING TOWARD THE FUTURE STATE: SOLVING TODAY’S PROBLEMS WITH MANAGED CARE BY IMPROVING PEDIATRIC RESIDENCY TRAINING

Health care managers know there is wide variation in medical care, and they have a tendency to believe that most of this variation is unwanted. Therefore, managers push for standardization and frequently implement change with little or no dialogue with pediatricians. Guidelines, algorithms, and pathways that have not been validated may bring lower quality (poorer outcomes) than nonstandardized care. Physicians without evidence-based training are less able to judge the validity of strategies and maximize effectiveness and are unable to focus the initiatives toward
sustainable improvements in the care delivered to children. With evidence-based training, it should be easier for pediatricians to maximize the effectiveness of care and lead policy discussions, thereby allowing them to retain their legitimate leadership role in the health care delivery system for children.

REFERENCES

COMMENTARY
Teaching Clinical Decision-making to Pediatric Residents in an Era of Managed Care, by John B. Chessare

Dr Chessare makes excellent suggestions for strengthening the pediatric residency curriculum by including topics in evidence-based medicine. These skills would empower pediatricians to deal with many issues they will confront as they enter clinical practice in any setting. As the medical market consolidates, more physicians are practicing in large groups. It is both appropriate and important that physicians within these groups either lead the development of clinical practice guidelines or judge when guidelines produced by others should be adopted. Ideally, such guidelines should not only recommend best practices but also grade the scientific evidence and delineate areas of uncertainty where the evidence is not strong and practice variation is acceptable. The Permanente Medical Group of Northern California, which is the physician group of Kaiser Permanente, has developed evidence-based guidelines for general preventive care and for more than 12 individual conditions, including pediatric asthma, otitis media, and maternal–newborn discharge and follow-up.

One trend in managed care settings not dealt with in residency training is quality monitoring. Individual clinicians are both getting increasing feedback and being made increasingly accountable for their practices. Examples of the type of feedback given include reports on patient satisfaction, immunization rates, and the usage of antiinflammatory and β-agonist medications for asthma. In this context, understanding clinical epidemiology and evidence interpretation is increasingly important. Physicians well-educated in these topics will have the tools to shape quality monitoring so that it promotes rather than hinders good clinical practices. If physicians do not take the lead in determining quality goals, there is a danger of managed care entities choosing suboptimal goals that emphasize cost reduction or ease of measurement at the expense of patient outcomes.

Dr Chessare observes that patient and parent preferences are gaining increasing importance in clinical decision-making. In fact, in some managed care settings, patient satisfaction is one factor used to determine physician compensation. However, I do not think utility assessment as it is formally practiced by decision analysts is practical in clinical settings. These methods, including the standard gamble and time tradeoff, are important research tools but are far too abstract and time-consuming to be used in outpatient settings. A better use of curriculum time would be to talk about practical ways of eliciting parent preferences and meeting the psychological needs of families within the setting of a 10- to 20-minute clinic visit. The Permanente Medical Group encourages its physicians to attend courses in physician–patient communication, and although they are sometimes wryly referred to as “charm school,” even experienced physicians find these courses useful.

In the area of costs and cost-effectiveness, I agree with Dr Chessare that, ideally, physicians should not be placed in the position of making cost-related judgments during individual patient encounters. However, there are many gray areas. If it is not appropriate to withhold non-ionic radiographic contrast media from a family who requests it, is it appropriate to not inform a family who is not aware of its existence and does not know that it is an option? Physicians today practice with an increasing consciousness of resource limitations. They may not be able to avoid mediating—perhaps not at the bedside, but at some level—between the needs of individual patients or patient groups for specific services, and the needs of a population to have limited funding spent equitably and efficiently. Unless physicians have the power and ability to make resource allocation decisions, nonphysician administrators will

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make them, to the possible detriment of patients as well as of doctors.

As doctors practice in increasingly large groups with more financial responsibility for the welfare of large patient populations, they will have increasing power and responsibility to balance individual and group welfare. Although there are no simple solutions to this dilemma, knowledge about costs and cost-effectiveness analysis will give physicians the tools to see that resources are used optimally to improve health. In addition to an evidence-based curriculum, a curriculum in practical clinical ethics would provide an important framework to help pediatricians deal with the decisions they will face as they move into the medical marketplace.

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Teaching Clinical Decision-making to Pediatric Residents in an Era of Managed Care
John B. Chessare
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