

Standardize to Excellence: Improving the Quality and Safety of Care with Clinical Pathways

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KEYWORDS

• Quality • Safety • Clinical pathways • House staff • Hospitalist

Clinical pathways, also known as clinical practice guidelines, have a fundamental role in the delivery of high quality, safe care. Far from being “cookbook medicine” or interfering with physician autonomy in directing their patients’ care, clinical pathways improve care by reducing or eliminating many barriers to the delivery of safe, effective, and efficient care.

High quality care can be defined as care that is safe, timely, effective, efficient, equitable, and patient and family centered.¹ The first of five barriers or challenges to high quality care addressed by clinical pathways is the widespread unnecessary variation in care.² Unnecessary variation in care can be defined as diagnostic or therapeutic interventions performed at the discretion of the ordering physician and not required by the patient’s condition. Whether looked for at the national, regional, or local level, unnecessary variation can be found. Similar patients should be treated similarly based upon the best available evidence or expert consensus while patients with important differences in their condition should be treated differently. Unnecessary variation in any process, including clinical care, leads to two important and unwanted outcomes—increased cost and decreased quality. Clinical pathways, when based upon the best available evidence or consensus of experts, combined with significant input from local practitioners standardize care processes and have the potential to reduce unnecessary variation in care, improve clinical outcomes, and reduce the costs of care. At Rady Children’s Hospital, we have more than a decade of experience with clinical pathways and have repeatedly documented improved clinical outcomes and reduced costs of care via the use of clinical pathways.³ We call this approach

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“standardize to excellence.” Standardizing care processes for all eligible children also helps reduce and avoid disparities in care delivery. If there is a best way to manage a specific condition, all children with that condition should be, and are, treated that way. With significant financial pressures on all providers of health care, if two practices yield similar clinical outcomes yet one approach is consistently less expensive, all patients should be managed using the less expensive approach.

A second barrier to high quality care that is addressed by clinical pathways is the gap between knowledge and practice. This gap, which can be as large as 17 years, is the time it takes a proven new practice to go from the medical literature into routine clinical care. In our approach to developing clinical pathways, the pathways are living documents that must be reviewed and updated on a regular basis. Our current approach to updating pathways, including the involvement of house staff, is described herein. By updating pathways on a predetermined schedule and modifying pathways in real time when an important new medication or treatment approach is reported in the literature, clinical pathways help physicians provide the most up to date care possible. Each pathway has designated “content” experts who evaluate the importance and relevance of new information before it is considered to be included in a pathway for general use. With this approach, the gap between knowledge and practice can be reduced from years to months or even weeks.

The third barrier to high quality care addressed by clinical pathways is the failure of many physicians to appreciate, understand, and work within the complex systems of care that exist within hospitals today. Inpatient care is multi- and interdisciplinary and involves a large number and variety of patient-provider interactions and therapeutic interventions. Much more is involved in the care of most inpatients than simply the primary physician-patient relationship. The process to develop clinical pathways includes all providers who will take part in caring for the patient, including nurses, social workers, dietitians, pharmacists, and respiratory therapists. By including all involved disciplines in the development of clinical pathways, we can explicitly address issues of care coordination by examining the many interacting systems needed to provide safe, high quality care to a child with a given condition. When designed and used in this way, clinical pathways also help physicians meet the American Board of Pediatrics certification requirement of system-based learning.⁴

A fourth challenge to high quality care that is addressed by clinical pathways and currently attracting a great deal of national attention is the need to improve patient safety. Beginning with the Institute of Medicine’s publication of “To Err is Human,”⁵ the focus of patients and their families, payers, regulators, and providers is on ways to reduce or eliminate harm and improve patient safety. Any given care process that varies and is implemented differently from provider to provider and from patient to patient presents a greater risk for error and potential harm. Standardizing via clinical pathways the way in which clinical interventions and processes are chosen and performed improves the safety of those interventions.

The fifth challenge to high quality care addressed by clinical pathways is the slow adoption and routine use of practices by providers that can improve clinical outcomes and patient safety. One root cause of this slow adoption of proven practices is the lack of a “business case” for quality. In brief, providers spend considerable resources (eg, people, technology, training) to improve care while the financial benefits of these quality improvement efforts often go to the payers. In our experience,⁶ as we improved care processes and patient outcomes, including shortening lengths of stay for many common conditions, our reimbursement for this improved care actually fell. Because we are paid on a per diem basis, as days in the hospital decreased, reimbursement also decreased. This decreased revenue has been at least partially offset by our

widespread use of clinical pathways and our ability to actually document improved clinical outcomes that has helped us gain significant market share. Clinical pathway development and routine use are also potentially helpful in pay for performance programs in which providers are rewarded for reliably and routinely delivering well-specified, evidence-based processes of care. When firmly embedded into routine care processes and the organization's clinical culture, pathways can make it easy for providers to "do the right thing" and deliver the expected care.

A component of our pathway process that supports widespread use is the explicit statement that nothing interferes with physician autonomy when it comes to the care of a specific child. Physicians are free to deviate from the pathway if they feel such a course would improve the care of their patient. These deviations from expected practices are reviewed to determine if the pathway needs to be altered to include the care required by that one patient. In addition, physicians routinely receive feedback information on their adherence to specific components of pathways and on their patients' outcomes, such as their length of stay, readmission rate, or transfer to a higher level of care. No physician should be expected to change their practices without knowing on a regular and timely basis the impact of those changes on their patients' outcomes. Transparency with pathway results helps to build physician confidence and comfort with the pathway process.

The potential benefits of pathway use as described previously provided enough information and motivation for early adopter physicians to at least try clinical pathways;⁷ however, it was a vote by the medical staff making pathways the default mechanism of care that lifted the pathway adherence rate from 30% to 40% to greater than 90% for the past decade (**Table 1**). Early results of pathway outcomes comparing patients on a pathway with patients with the same condition but not on a pathway showed that pathway patients consistently did much better. Rigorously analyzing clinical care processes and outcomes and then widely sharing that information forms the foundation of our clinical pathway efforts.

Until the full potential of the electronic health record is realized, obtaining actionable information from clinical practice involves a trade-off between the clinical robustness and expense of chart review versus the relatively easy yet less detailed search through administrative databases. We use a hybrid approach in which analysis of administrative databases is supplemented with chart reviews when more clinical detail is needed.

Sharing valid, risk-adjusted data on practice patterns and outcomes with physicians provides motivation for change to improve patients' outcomes. The perceived need for change arises when physicians see that their patients' outcomes are not as good as they might like when compared with the outcomes reported by other local providers or national databases. Most physicians do not routinely receive or review data on the outcomes of their patients other than for poor outcomes reviewed at clinical morbidity and mortality meetings. Even less frequently are those results compared with the results of other providers caring for similar patients. Once physicians become comfortable with the reliability and validity of their own data and with the comparisons in performance being made, they will actively seek ways to improve their performance. In addition to identifying differences in outcomes, this approach to assessing physician practices always, in our experience, reveals wide variation in the care of similar patients. Reducing this variation in care when not clinically necessary provides the opportunity to improve clinical outcomes by standardizing processes of care with evidence-based, consensus-driven, locally adapted clinical pathways.

The creation of pathways takes time and resources; therefore, there must be an approach to prioritize pathway development. Our approach to prioritization includes

Table 1

Pathway report example: rates for use and select key pathway measures

Parameter	Baseline	April–June 2006	July–September 2008	PHIS 2007 Average	RCHSD Target
Asthma					
Eligible patients (number)	105	112	97	—	—
Preprinted order set use	77%	86%	99%	—	90%
Chest radiography	62%	59%	58%	67%	<45%
Systemic steroids	98%	99%	100%	96%	98%
Relievers	—	100%	100%	95%	100%
Average length of stay (days)	1.70	1.46	1.30	2.34	—
Readmits within 7 days	—	—	1.0%	0.6%	0
Parameter	Baseline December 2005	April–June 2006	July–September 2008	PHIS 2007 Average	RCHSD Target
Appendicitis					
Eligible patients (number)	49	141	191	—	—
Preprinted order set use	—	64%	100%	—	90%
CT at RCHSD	51%	49%	62%	39%	—
Perforation rate	—	36%	38%	35%	—
12-Month rolling average perforation rate	39%	39%	33%	—	—
Appropriate use of antibiotics	71%	95%	99%	—	90%
Average length of stay (days)	4.50	3.12	3.36	3.4	—
Readmits within 30 days	—	4.2%	3.1%	5.2%	0

Percentages noted equal use/eligible patients.

Abbreviation: RCHSD, Rady Children's Hospital San Diego.

the following variables: (1) the number of patients potentially impacted by a pathway (the more patients, the higher the priority); (2) the cost of caring for children with a specific condition (the higher the cost, the higher the priority); (3) the need for high-risk procedures when patient safety might be a concern; and (4) the physician's interest and requests for pathways to be developed to help them care for their patients. Because the use of pathways is a foundation of our clinical care, even if the number of patients to be managed with a pathway is small, we develop a pathway when requested by a physician.

Over time, pathway use in our organization has spread to create a consistent continuum of care (inpatient, emergency department, specialty clinics, primary care office, and home care) for common chronic conditions such as asthma. Pathways specific for caring for patients in the emergency department and in various specialty clinics have also been developed.

When creating multidisciplinary pathways, a representative from each included discipline is a member of the pathway team. In addition to providing discipline-specific content to the pathway, each representative is also expected to be a "champion" for pathway dissemination and use by their peers. The quality management department of the hospital is responsible for tracking pathway process and outcome metrics and routinely reporting them back to the pathway users. These results are also shared with the medical staff executive committee and with the hospital board. Visible board and chief executive officer support as well as strong support from the organized medical staff are critical in gaining and maintaining staff interest and involvement in the pathway process.

The Joint Commission recognized our work in clinical pathways by awarding its Ernest A. Codman Award in 2002 to Rady Children's Hospital San Diego. Our approach to the development and implementation of clinical pathways is well described in a recent book entitled "Organizing for Quality: The Improvement Journeys of Leading Hospitals in Europe and the United States."⁸

THE ROLE OF HOSPITALISTS IN CREATING, IMPLEMENTING, AND SUSTAINING CLINICAL PATHWAYS

Hospitalists, physicians whose primary professional focus is the general medical care of hospitalized patients, gained attention in 1996 when Dr. Robert Wachter coined the term in the *New England Journal*.⁹ Hospitalist activities may include patient care, teaching, research, advocacy, and leadership related to hospital care. Hospital medicine is a "geographic" specialty organized around a site of care rather than a body system, age, or disease state. Hospitalists practice beyond the traditional ward setting, often providing care, consultation, and special services (such as sedation) throughout the hospital system. Pediatric hospitalists have been rendering care in this manner for over 3 decades, with the oldest division of hospital medicine having started in at Rady Children's Hospital San Diego in 1978.¹⁰ The culture of hospital medicine, and in particular of pediatrics, is one of advocacy for the patient and the system that is centered around excellence in clinical care. Pediatric hospitalists are board certified or eligible pediatricians working in varied settings and numbered over 600 as of 2008 (personal communication, N. Alexander, MPP, American Academy of Pediatrics Section on Hospital Medicine, February 2008). A 2007 Pediatric Research in the Inpatient Setting survey of 208 pediatric hospitalists at over 40 sites in the United States and Canada reported that 92% spend some time in administration, with 53% spending 20% or more.¹¹ Most (85%) are on hospital committees and lead initiatives in practice guidelines (61%) or quality improvement (52%).

Although only 7% reported time spent in research, of these, 57% focused on quality improvement or health services delivery.

Pediatric hospitalists are uniquely positioned to engage in quality and safety efforts at the bedside, in units, in the hospital, and within hospital network systems; however, most have not had formal training beyond residency, with 13% having completed a chief residency and 19% a nonhospitalist fellowship.¹¹ Only about a dozen have completed pediatric hospitalist fellowship training, which includes dedicated quality improvement education and projects. Most pediatric hospitalists cite a need for more formal training in quality improvement and safety (>70%), preferring residency tracks or fellowship to attain these skills.¹¹ Despite the lack of formal training, pediatric hospitalists have accepted and developed quality improvement roles from the level of participation in Joint Commission preparations to more objectively clarified and broad positions such as Director of Quality or Clinical Effectiveness. Involvement in quality improvement is rapidly being accepted as part of the hospitalists' job description.¹² The role in development, implementation, and maintenance of clinical pathways, that is, evidence-based algorithms and associated standardized order sets, fits well with pediatric hospitalists who are clinically focused, close to the "sharp end" of patient care, and have experience working with teams. This role at community hospitals is particularly valuable and pairs well with advocacy for the pediatric patient within larger predominantly adult health care systems.

Creation of Pathways

The pediatric hospitalists at Rady Children's Hospital participate in all general pediatric pathway processes. The Medical Director for Quality, a pediatric hospitalist, is responsible for oversight of the entire pathway program in partnership with the Chief Quality and Safety Officer and a quality management department data analyst. Pediatric hospitalists serve in a variety of roles on clinical pathway teams, including the following:

Team leader

- Schedules and chairs team meetings
- Sets the agenda
- Records team activities
- Reports to management

Team facilitator

- Owns the process
- Oversees the dynamics of the team and helps to ensure each team member has a voice
- Clarifies decision-making processes

Team member

- Brings fundamental knowledge about a topic
- Helps with implementation of proposed interventions
- Should evolve into future team leaders
- Represents all of the key process owners, stakeholders

Review of baseline internal data displayed by the group, unit, or physician can result in long and often unproductive discussions regarding the reliability and validity of the data. Pediatric hospitalists at our institution are expected to understand the methods used to obtain the data, assist in its interpretation, and help the group objectively use the information to select specific measures for tracking processes and outcomes of care. Pediatric hospitalists are expected to be system early adopters and to model

features of good teamwork such as inclusiveness, openness, and consensus-seeking behavior. For example, in developing a pathway for complicated pneumonia, divergent discussions involving competing literature on the timing and best method of imaging can often be best resolved by the pediatric hospitalist. Assessment of issues such as the availability of a procedure, sedation risk, radiation exposure, and the likelihood of change in clinical management based on the results requires a view of the whole child and the whole system, which are the realm of the pediatric hospitalist. Final clinical, process, safety, financial, and balancing measures chosen to track the outcomes of the pathway should reflect the interdisciplinary nature of care, internal data capabilities, and the literature.

Implementation of Pathways

Pathway implementation, following the Plan Do Study Act (PDSA) process, often reveals systemic operational and cultural barriers not anticipated during the development process. Pediatric hospitalist programs at nonacademic centers and those established to offset house staff patient load have been created with, among other things, an explicit responsibility for efficiency, adherence to hospital policies, and the flow of patients through the hospital. Pediatric hospitalists' responsibilities at academic centers have grown to include, or have had from inception, an additional responsibility to educate students and house staff. Pediatric hospitalists are constantly involved in team care with respiratory therapists, registered nurses, child life specialists, and others, allowing for real-time observation of "what works." At the authors' center, pediatric hospitalists respond to pathway concerns at the bedside, making the process real and patient oriented rather than separate and didactic. Feedback is given to the pathway team leader for quick incorporation as appropriate, often with same day reimplementation. Examples include adding "stat" to medication orders on a fever without source pathway to ensure timely medication administration or addressing the inability to obtain a routine renal sonogram on a Sunday afternoon for an infant with pyelonephritis.

In addition to writing and overseeing the writing of orders, pediatric hospitalists are physician champions for pathways and influence the culture surrounding their use. Pediatric hospitalists are visible to nonhospitalist general pediatricians, family practitioners, midlevel providers, and house staff who may work with or in parallel to the pediatric hospitalist. In environments in which pediatric hospitalist services are relatively new or in which these services have overlapped with subspecialty services, this interaction can be a challenge. Because key practitioners should always be part of the pathway development team, the pediatric hospitalist can assist in their recruitment with targeted personal e-mail and phone calls before formal implementation and can offer to answer any concerns. Inherent in this collaborative relationship is trust in and an understanding of the evidence-based, consensus-driven pathway process. Depending on the issue raised regarding the use of a pathway, the specific pathway team facilitator, leader, or a content expert can be called upon to speak directly with the concerned physician or midlevel provider. At the authors' center, pediatric hospitalists have been practicing in a collaborative manner for over 30 years, caring for almost 80% of general pediatric admissions. Long-standing relationships have been built, in part, due to turnover of only seven physicians since inception. Solid partnerships with primary care and subspecialty colleagues are a cornerstone of successful pathway implementation. Similar to their physician colleagues, pediatric hospitalists can assist with engagement of key leaders/early adopters from nursing, respiratory therapy, and other disciplines. Our pediatric hospitalists have a presence on many hospital committees and serve as liaisons to or medical directors for multiple

clinical units and nonphysician clinical groups. Through these relationships, pediatric hospitalists can listen to ideas and support changes to pathways suggested by these nonphysician groups.

Maintenance of Pathways

Sustained use pathways are the result of embedded processes, default systems, belief in the pathway process, consistent periodic analysis of outcomes, and new evidence-based information using PDSA cycles and timely action. Pediatric hospitalists can influence each of these components to varying degrees. Variability in practices has been reported to be less for pediatric hospitalists than for community-based pediatricians,¹³ although variation in reported use of unproven therapies by pediatric hospitalists exists.¹⁴ Although this observation suggests that pediatric hospitalists may integrate validated practices with more consistency than generalists whose practice is not hospital based, it also highlights an important point—the need to assess what should not be done as well as what should be done. A pathway may appear to be followed as designed if administrative dataset review excludes, for example, a new therapy being used which is not part of the planned pathway order set. Pediatric hospitalists provide a window into daily operations, often catching small variations in expected practice soon after they surface. These discrepancies in planned care can often be rapidly resolved through e-mail exchange with pathway members. Examples may include the use of acyclovir for all neonates admitted with fever, daily chest radiographs for patients with pneumonia, or placement of a peripherally inserted central catheter for home intravenous antibiotics for a patient with uncomplicated pyelonephritis. Pediatric hospitals should support integration of positive system changes commonly recommended by hospital colleagues from nursing, respiratory, pharmacy, social work, nutrition, and child life. These changes often result in enhancements to the processes, safety, and parent/child satisfaction with care. Pediatric hospitalists are viewed as avid supporters of the entire care team, sharing a common goal of safe, efficient, effective, patient-centered, timely, and equitable care. Pediatric hospitalists are also expected to help expedite agreed upon changes and to educate and hold their physician colleagues accountable for implementing these changes. The PDSA cycle alone, although embedded in the pathway process, will not be successful in sustaining the use of pathways. Pediatric hospitalists are a critical integrated part of the hospital framework necessary to sustain pathways. They possess the teamwork, leadership, and clinical skills necessary to nurture the culture of quality and ensure ongoing pathway development, use, evaluation, and improvement.

Future Directions

Pediatric hospitalist engagement in local, state, and national clinical quality efforts is growing. Hospitalist competencies for internists have been published,¹⁵ with those for pediatric hospitalists anticipated in 2009, which include active participation and leadership in quality improvement. Sharing of pathways is occurring on Web sites and at pediatric hospitalist national meetings and is defining areas for clinical research.¹⁴ Integration of pediatric hospitalists into informal and formal quality improvement roles in a consistent manner should be viewed as a “best or at least promising practice” for institutions. These partnerships between pediatric hospitalists and their local hospitals and between pediatric hospitalists and larger hospitalist networks are a means by which to sustain robust and relevant clinical pathways within and between institutions.

PATHWAYS AND STANDARD ORDER SETS AS TEACHING TOOLS: THE ROLE OF HOUSE STAFF

The Institute of Medicine and American Board of Pediatrics' expectations for rendering care that adheres to principles of quality and for continuing education and activity in quality improvement send a strong message to all in graduate medical education. The obvious prequel to meaningful quality improvement activities in practice is the learning and application of the theories of quality improvement within residency. The Accreditation Council for Graduate Medical Education (ACGME) Pediatric Residency Review Committee expects residents to "participate in a quality improvement project," "participate in identifying system errors and implementing potential system solutions," and be educated in "systems approach to examining health care delivery practices."¹⁶ Looking more carefully at the ACGME six core competencies, involvement in the pathway process can address medical knowledge, communication skills, practice-based learning, professionalism, and systems-based practice quite readily. In addition, patient care, best evaluated at the bedside, is at least influenced by discussions surrounding the patient/family education included in pathways. Building a continuum of training in the science and practice of quality improvement in the medical profession allows for development of habits for professional success in the twenty-first century; however, a long-term commitment to quality improvement as a daily habit is not merely a reflexive response to external agency mandates and societal pressures. It is a return to basic tenets of medicine which require physicians to "do no harm or injustice" to patients.¹⁷ Harm or injustice can be found in many areas of medical practice, ranging from inappropriate medication ordering to failure to educate families in a culturally competent manner. Although many residency programs address such issues independently, a comprehensive program addressing quality and safety is currently lacking in most US programs and is evident in only a few.¹⁸ In addition, validation of the importance of quality improvement in improving clinical processes and outcomes by the academic sector is leading to evolution of quality improvement as a science and, with it, more research focused on improving health care delivery.

Resident involvement in the pathway process is an effective method for teaching skills such as literature search and evidence-based medicine critical review. At the authors' center, the Innovative Quality Improvement Research in Residency (INQUIRY) program was begun in spring 2006 to better address the need for focused quality improvement didactic and hands-on learning. Quality improvement theory, tools, data analysis, and data presentation are topics covered in core didactic sessions. Residents are taught the basics of statistics, including common and special cause variation and control charts. As part of the pathway team, they work in triplets, choosing an algorithm branch point or other specific question of interest to address (**Fig. 1**). Working in groups of three allows for attendance of at least one member at all face-to-face meetings and accommodates the need to balance pathway work with resident schedules. House staff collaborate with content experts to review their work and draft recommendations that are sent to the pathway team. Residents are critical to the annotation of the entire algorithm under review and receive recognition for their work, with names posted on the hospital intranet pathways page.

Engagement of house staff in pathway work presents both challenges and opportunities. The INQUIRY program is a longitudinal process, which is a more realistic method by which to embed lifelong learning habits, yet is difficult to maintain in the current resident block schedule structure. It is also hospital focused, although discussions and algorithms often extend from emergency department to outpatient care. Participation in the INQUIRY program is elective; therefore, it attracts early adopters

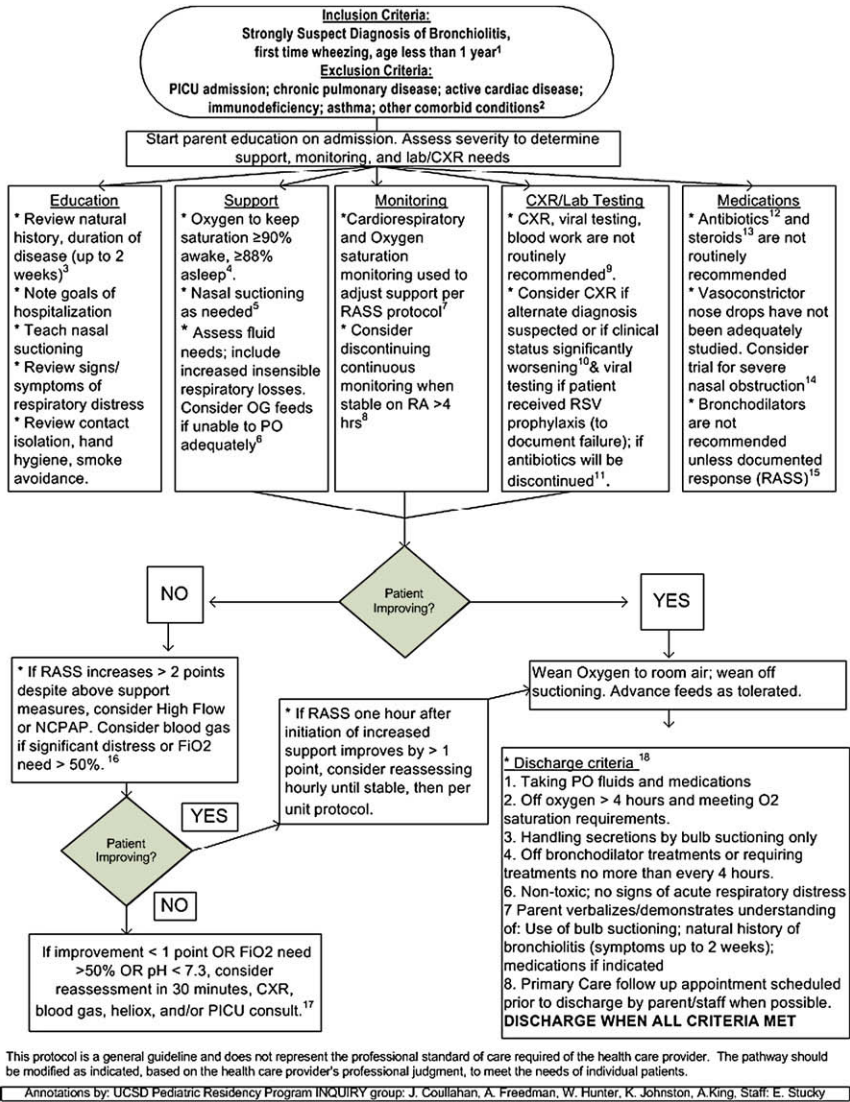


Fig. 1. Example of Rady Children's Hospital San Diego algorithm with annotations for bronchiolitis. (Courtesy of Rady's Children's Hospital, San Diego, CA; with permission.)

and change leaders. The obvious benefit is the ability for residents to educate their peers on the use and relevance of quality improvement and specific pathways. Working with hospital staff outside of the typical ward environment has lead to more awareness of teamwork and collaboration when on the wards. Focus on specific algorithm branch point questions has lead to a "pride of ownership" and interest in follow-up on outcomes of instituted interventions. Understanding of basic statistics and recognition of the clinical impact of measurable change has lead to formal research projects. Hospital staff, residents, and physician faculty agree that residents offer unique and important contributions to pathway processes, and residents, in return, gain valuable skills to lead future institutional initiatives.¹⁹

Future Directions

Resident education in quality improvement should emphasize exposure to and collaboration with hospital and outpatient administrative structures and staff, offer experience using basic quality improvement tools, and allow ample time for active involvement in specific clinical projects. To best allow for true education in and assessment of the six core competencies, current block-based electives will need to be restructured to allow quality and safety rotations, integrate quality improvement into continuity clinic curriculum, and foster quality improvement as research. Ideally, these resident quality improvement projects could extend into fellowship and clinical practice and could be part of initial board certification as well as recertification.

SUMMARY

Providing practitioners with locally developed, consensus-driven, evidence-based clinical pathways can improve the quality of care by (1) incorporating national guidelines and recommendations into routine care practices, increasing the use of validated practice; (2) reducing unnecessary variation in care by a single physician or group of physicians, improving efficiency, timeliness, and reducing disparities; and (3) standardizing care processes and improving safety. Pathways make it easier to identify opportunities for future improvements in care processes while simultaneously making those improvements easier to enact. In the authors' experience, pediatric hospitalists have a vital role in all aspects of creating, implementing, evaluating, and improving clinical pathways. Involving house staff in the pathway process enriches the scholarly components of pathway development while also actively engaging them in the science and practice of quality improvement.

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