

Cover Page

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Menu Item: **Children’s Clinical Value:** Improving patient care through use of technology

National Patient Safety Goals (NPSG) and/or a National Priorities Partnership (NPP) goal or goals addressed through health IT for which this submission is based, if applicable.

<i>Hospital National Patient Safety Goals (NPSG)</i>	Select all that apply.
• Improve accuracy of patient identification.	
• Improve the effectiveness of communication among caregivers.	X
• Improve the safety of using medications.	X
• Reduce the risk of healthcare associated infections.	
• Identify safety risks inherent in the patient population.	
• Prevent wrong site, wrong patient, wrong person surgery.	

<i>National Priorities Partnership (NPP) Goals</i>	Select all that apply.
• Engage patients and families in managing health and making decisions about care.	X
• Improve health of the population.	X
• Ensure patients receive well-coordinated care across all providers, settings and levels of care.	X
• Safety: improve liability and eliminate errors wherever and whenever possible.	X
• Compassionate palliative and end-of-life care.	
• Remove waste and achieve effective, affordable care.	X

Executive Summary

Children’s Medical Center introduced imbedded clinical pathways into hospital workflows using its Electronic Health Record (EHR). The goal was to decrease variation care, and improve patient outcomes and quality of the care. While program goals are not yet fully met after two seasons, there have been significant achievements as evidenced by the reductions in median length of stay (from 2.4 to 1.95 days), chest x-rays (from 59 to 39 percent), bronchodilator use (27 to 14 percent) and antibiotic use (from 32 to 25 percent). Compliance with clinical guideline recommendations has been improved with education, easy-to-use order sets, and data sharing. The knowledge gained from the first pathway paved the way for five additional pathways (with more to follow), creating a solid foundation for prospective payment in September 2013.

Background Knowledge

Children's serves the fourth largest metropolitan area in the U.S., and has the highest projected pediatric population growth expected over the next 20 years.

The hospital footprint consists of three locations totaling 200+ acres. The organization serves two full-service inpatient hospitals, licensed for 595 beds (418 operating of which 100 are intensive-care beds), 54 specialty care clinics, and 6 pediatric primary-care physician offices/medical homes. Over 2,100 medical staff members, as well as day-to-day staff of over 5,000 full-time employees support the various locations.

Local Problem Being Addressed and Intended Improvement

In 2010, Children's evaluated its data surrounding length of stay and charges (these are indicators of how efficiently a hospital is handling the volume of patients), and its findings indicated variations in practice for the organization—in other words, a lack of standardized processes for treating patients with similar conditions.

With these findings in hand, Children's made the decision to use its electronic health record (EHR) as a foundation to support clinical pathways. The aim, of course, was to decrease variation, increase efficiency, and improve outcomes and the quality of the care through the standardization of care delivery. The challenge for the organization was how to demonstrate the value so that providers and staff would be inclined to adopt the technology.

Children's identified the first clinical pathway for development: Bronchiolitis & RSV Pneumonia. This condition was selected because Bronchiolitis and RSV Pneumonia is the number one cause of hospitalization in the US and accounts for approximately 1,000 inpatient admissions every year at Children's. Despite the high prevalence of bronchiolitis, considerable variation existed in the management of the condition.

The goals for the Bronchiolitis and RSV pneumonia Pathway were to reduce length of stay from 2.4 days to 2.0 days, reduce use of chest x-rays from 60% to 25%, decrease use of antibiotics from 37% to 25% and decrease inhaler use from 21% to less than 20. This paper will focus on Bronchiolitis & RSV pneumonia as Children's initial foray into clinical pathways.

Design and Implementation

The organization began developing the Bronchiolitis and RSV pneumonia pathway in November 2010. By July 2011, development was completed and deployed to all inpatient areas in September 2011. The pathway was expanded to the Emergency Department (ED) with the use of ED-specific order sets. The electronic health record provided the foundation with order sets, BestPractice Advisories and electronic forms.

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The data collected by the electronic health record was also used to determine priorities and measure success of the program. Process and outcome measures report cards and analysis for each guideline were developed from the EHR.

Children's developed a Clinical Effectiveness Program (CEP), which is led by a Nurse PhD, and is comprised of two physicians and a project coordinator. The CEP team develops pathways through collaboration with multidisciplinary teams whose shared goal is to improve quality by making it easier to do the right thing and reduce variation in practice.

The criteria for pathway development includes variation in care delivery, outcomes, cost of care, volume, and medical risk. Variation in care is identified by length of stay and charges. High volume cohorts of patients with variation in length of stay and/or charges provide the greatest opportunities for improvement.

Clinical Guideline Development Process

Step	Scope
1. Define scope and Population	<ul style="list-style-type: none"> a. Limited to one specialty/clinical area b. Across the continuum of care (multiple specialties/clinical areas)
2. Assemble Team (Scope will influence team composition)	<ul style="list-style-type: none"> a. Limited Scope-team members from specialty with involvement from other areas as indicated b. Continuum of care-team members from all specialties/areas involved
3. Review existing guidelines (internal and external)	<ul style="list-style-type: none"> a. Evaluate applicability of existing guidelines b. Identify areas not applicable and clinical questions to be addressed
4. Review additional literature as necessary	
5. Review internal data as necessary	
6. Develop recommendations from existing guidelines, literature, and consensus	
7. Develop algorithm and pathway documents	<ul style="list-style-type: none"> a. Use template b. Emphasize key recommendations
8. Obtain approvals	<ul style="list-style-type: none"> a. Team members are responsible for obtaining feedback from their respective departments b. Team leaders are responsible for obtaining Division Chief(s) approval for impacted clinical services c. Submit to CEC for approval d. CEC to facilitate MEC approval
9. Develop order sets/forms	
10. Educate providers and staff	
11. Implement and monitor	

The guideline development process was followed to complete the development of the clinical pathway. The vetting process was achieved through discussions and feedback from all of the stakeholders. The bronchiolitis clinical pathway was completed in July 2011, and the order set and SmartForm build immediately followed—both were completed in time for training. Clinical

Pathways were developed for appendicitis, asthma, bronchiolitis, septic shock, pyloromyotomy, and cecostomy.

The clinical practice guideline (CPG) eligible population was defined as all previously healthy children less than two years old with a primary or secondary diagnosis of bronchiolitis (ICD-9: 466.11 and 466.19). For data analysis, all complex medical cases were excluded. Direct transfers from outside Children's facilities and children requiring critical care were also excluded.

Electronic order sets are based entirely on guideline recommendations and allow providers to select the best practices for similar cohorts of patients. This pathway takes advantage of medication BestPractice Advisories for weight dosing and medication to medication interaction alerts. There were no additional BestPractice Advisories provided; however, BestPractice Advisories are an integral portion of standardizing care delivery. First season data suggested that this pathway had the potential to significantly reduce variation and improve quality of care. Based on these preliminary indications, an ED-specific additional pathway was developed and supported by an order set.

Face to face education, coaching and mentoring by the Clinical Effectiveness Program (CEP) was provided prior to implementation. Children's educated providers relative to Pathways, providing case studies on how evidence-based information being available for staff makes it easier for providers to deliver the highest quality care. As a result, the go-live in September 2011 was well received with wide adoption. The ED implementation was also successful as reflected by the 2nd season outcomes.

How was Health IT Utilized?

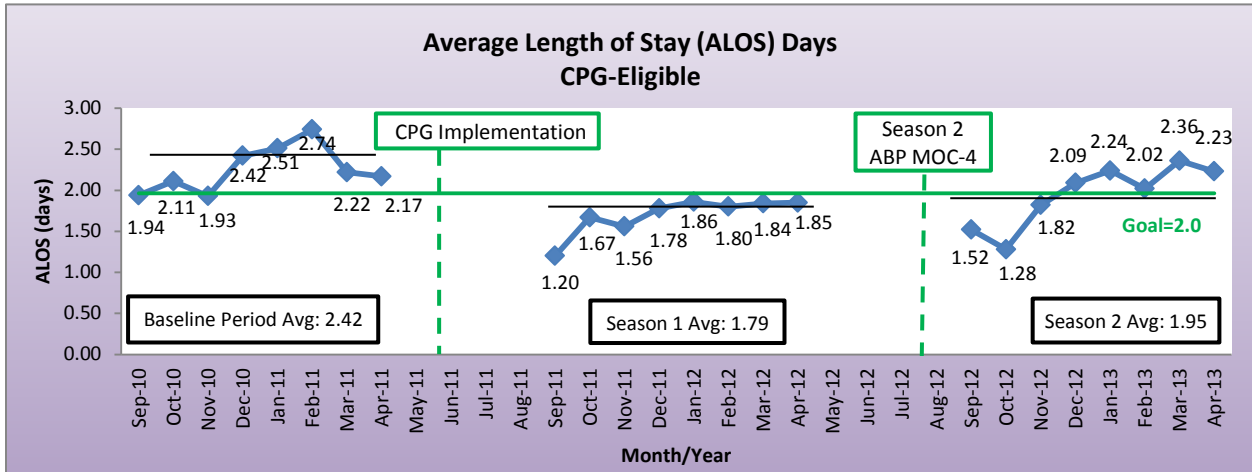
Health IT enabled every aspect of the clinical path development. Data obtained from the EHR was used to determine priorities for clinical pathways, identify variances and to prioritize implementation. Through the EHR, Children's was able to develop intuitive order sets and SmartForms, which helped standardize care for the patient bronchiolitis population. In addition, the EHR enabled Children's to provide educational materials to patients and families through the organization's Web portal.

The patients who were selected to participate in the clinical pathway were screened and identified based on the CPG criteria, which was validated against EHR data. To measure the progress of the implementation, Children's developed dashboards which provided feedback on where the program was going well and where providers needed additional guidance. Every Pathway had metrics by which to monitor success and failures.

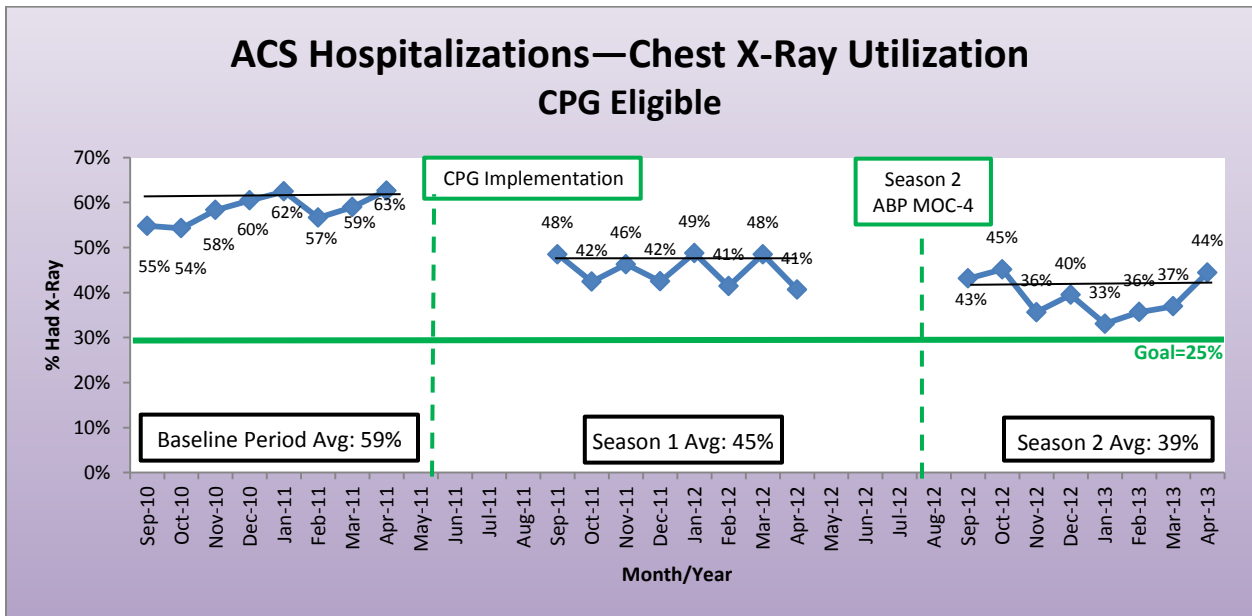
Value Derived/Outcomes

After two seasons, the full complement of project goals are not yet met; however Children's has achieved success in most areas, and data continues to trend in the right direction.

Length of Stay-Bronchiolitis variations are attributed to spikes in patient volumes and providers who have elected to not participate in the process. (It should be noted providers who are not following the clinical pathway are approached and re-introduced to the clinical pathway by the CEP team.) As a result of clinical pathway development, length of stay criteria met Children's goal of improvement from 2.4 days to 2.0 days; as the averages for Season 1 and 2 are 1.79 and 1.95, respectively—both below the original goal.

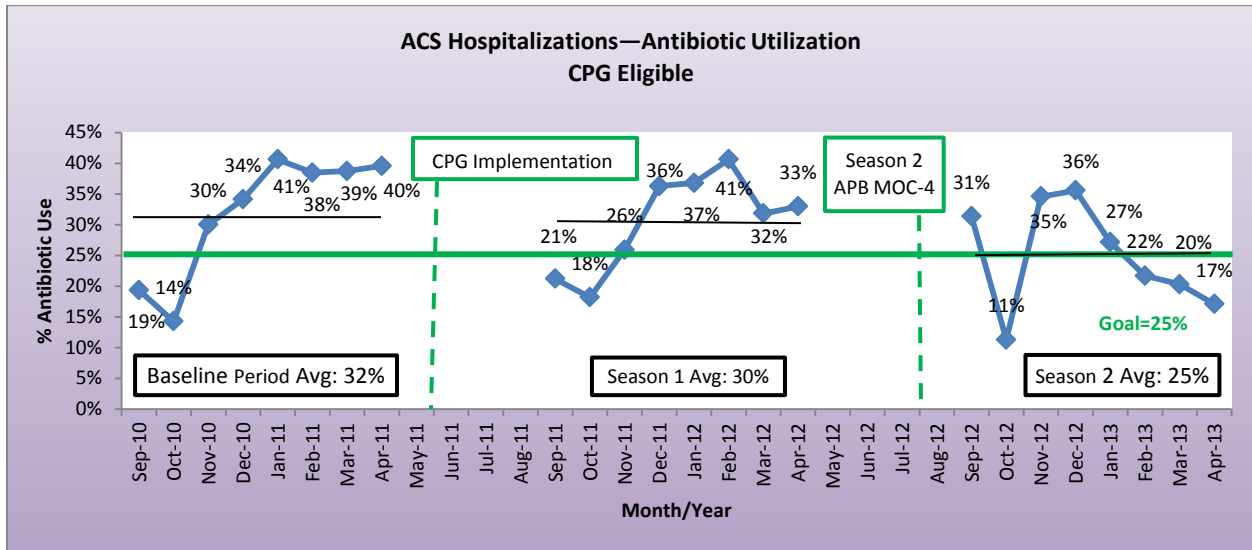


The organization's goal of reducing chest x-rays from 60 to 25 percent was not met; however positive movement was noted in comparison to the baseline average of 59 percent. The 1st season improved to 45 percent and the 2nd season decreased to an average of 39 percent. This downward trend is expected to continue as acceptance of the clinical pathway continues.

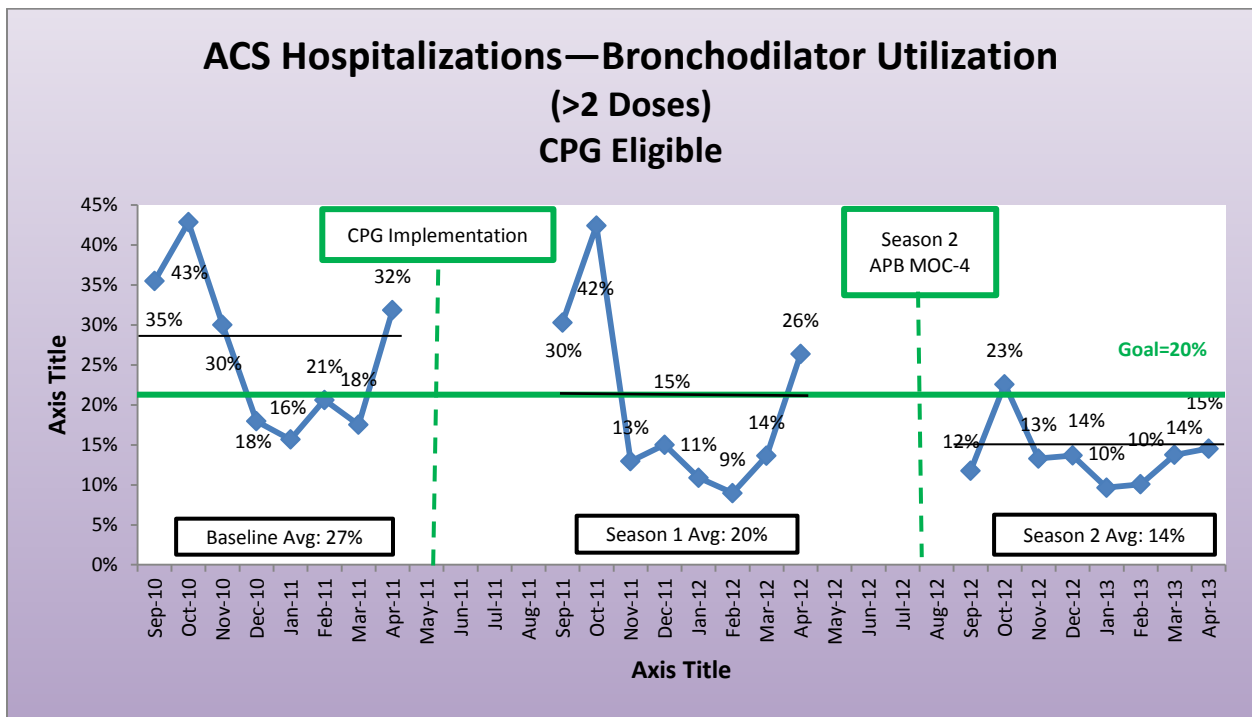


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Medication variation improvements were attributed to provider engagement and use of the pathways (improvement was noted as the CEP team provided additional one on one education). The second season showed decreased use of antibiotics from 37 to 25 percent, meeting the goals of the pathway, establishing the effectiveness of the additional training and coaching.



The use of bronchodilator medication was also reduced to the expected goal of 20 percent during the first season and well below during the second season (14 percent).

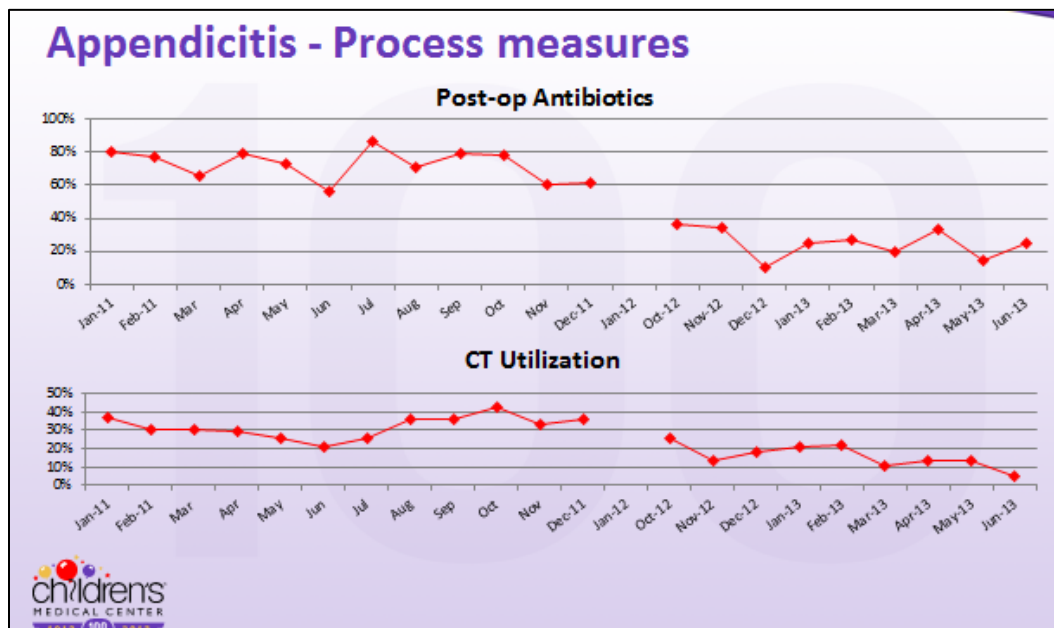


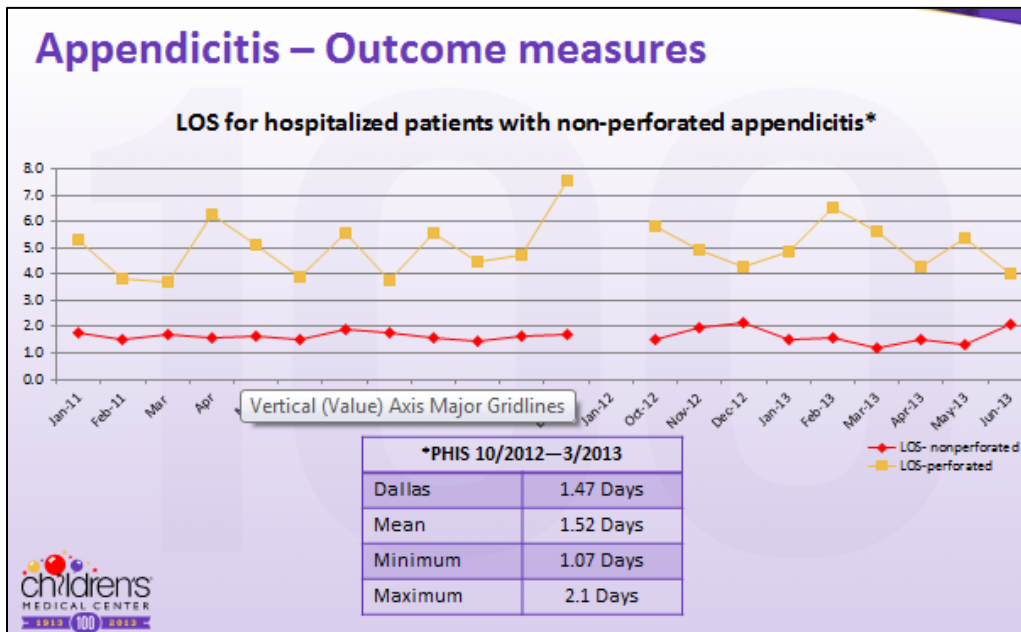
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The ED implementation after the first season was also successful. The median ED length of stay was reduced from 176.95 minutes to 149.84 minutes, and the chest x-ray rate was reduced from 33.6 to 25.9 percent. Modest reductions in the use of antibiotics and bronchodilator treatments were also seen.

ED Visits—Epic CPG Eligible			
Bronchiolitis & RSV Pneumonia	Pre-implementation (Sept. 2010—Apr 2011)	Season 1 (Sept. 2011—Apr 2012)	p-value
Volume (Healthy Cases)	1,946	2,362	
Length of Stay (LOS)	176.95 ± 93.11	149.84 ± 72.71	0.00
Average LOS (Min) Median	160.00	138	
Chest X-Ray Rate	33.61%	25.91%	0.00
Inhalation Rate (>2 Doses)	1.85%	1.57%	0.47
Antibiotics Rate	2.00%	2.33%	0.47
GREEN:	Statistically significant difference from previous season		
RED:	Opportunity for Improvement		

The Appendicitis Clinical Pathway utilizes a Pediatric Appendicitis Score (PAS) including a body/mass index calculation to guide care. The score guides providers to utilize evidence based order sets. This Pathway has led to a significant drop in the use of post-operative antibiotics and lower CT utilization.





The Asthma Clinical Pathway uses data captured during clinical assessment to assign an asthma score, which results in the creation of order sets specific to each phase of care. Medications are prescribed at discharge based on the severity of the episode and control of symptoms. To date, metrics indicate improvements in care delivery with steroid administration (within an hour of encounter) and decreasing chest x-ray utilization. In the beginning of 2013, Children’s length of stay was 1.53 days and continues trending downward to 1.4 days as of June of 2013 (See Appendix A).

The Septic Shock Pathway is a newly-developed protocol that relies on clinical data and recorded assessments to fire BestPractice Advisories when clinical symptoms indicate the potential for sepsis. In pediatrics, the signs of sepsis can be subtle, and can differ by age. The BestPractice Advisory provides a “safety net” for identifying this risky condition early, and an evidence-based medicine order set is then recommended to the provider. Metrics for septic shock include: length of stay, 30 day readmission, time to first fluid bolus; time to first antibiotic; oxygen administration; and BPA specificity and sensitivity. This pathway is in its very early stages with very little to report. However, the identification of septic shock as a diagnosis increased in 2013, indicating positive response to this pathway.

Lessons Learned

The development of order sets was for most part uneventful and fully supported by the providers. Although education was provided, the usage of order sets is only at 75 percent, suggesting that more work needs to be done to make the order sets readily available and easy to use.

As pathways are developed, there is a tendency to identify a large number of outcome and process measures to support guideline recommendations. As the team tried to evaluate pathway impact after the initial implementation, it became clear that there were too many measures. It was also clear that each measure has to be clearly defined so that the data can be extracted from the EHR.

Once these challenges were identified, the team worked to provide a clear definition of the patient population with specific inclusion and exclusion criteria. Outcome and process measures were prioritized based on clinical significance and variation. Only significant clinical measures and those with a wide baseline of variation (posing the greatest potential for improvement) were selected.

After the second season, the order sets and measures were examined again, and the team is in the process of making more changes to improve compliance and capture the impact of guideline recommendations.

The expectation for order set usage was set at the beginning of the Epic implementation. The order sets were designed and built by Children's provider staff members. When the pathway work started, physician leadership identified the physicians who were assigned to each pathway. Those physicians were the champions to their peers to promote compliance with order set use. Children's also limited access to any alternative orders that were live in Epic in conjunction with the go live of each pathway, thus driving providers to use the approved order sets.

Children's staff members have also noted that movement to more discrete data in the medical record resulted in improved ability to get more metrics data.

Financial Considerations

In 2010, a plan was outlined to develop a Clinical Effectiveness Program with a goal of improving quality, making it easier to do the right thing and reducing variation in practice. A director was hired in 2011, and two physicians were allocated with dedicated time to participate. The budget for the department was initiated with activities funded from operations. There was no additional funding allocation for participation in the program.

The Clinical Effectiveness Program has proven successful as illustrated with a decrease in length of stay of ~ 0.5 days, in addition to reducing time in the emergency department by approximately 22 minutes per visit for this cohort of patients. Under current reimbursement methodology, there are no financial gains; however Prospective Payment System (PPS) for Inpatient begins in the State of Texas September 1, 2013. There was a reduction in the cost of

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the health care delivery for these patient populations as noted with decreases of 20% in chest x-rays, and decreased use of antibiotics by 7%. An average inpatient hospitalization cost is \$5,000 per day. Decreasing the length of stay from 2.4 to 1.95 has a potential financial impact of \$2,250 per case or \$2.25M for 1000 patient stays—this is a significant impact with Prospective Payment where Children's will be paid a set amount per APR-DRG regardless of length of stay.

As an organization, Children's has been preparing for PPS and focusing on delivering the right care, at the right place, at the right time. The organization's return on investment will be seen with successful financial navigation of PPS and in the quality of care patients receive.

Appendix A

