

Improving the Pediatric MRI Experience: A Multidisciplinary Team Approach Using Lean Sigma Methodology

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Johns Hopkins Children's Center

- Tertiary care children's center with 11 subspecialty floors; 205 beds
- Annually, we perform about 6,000 Pediatric MRI's
 - ~120/month are assisted with General Anesthesia (GA)



Purpose

- Based on our high volume Pediatric General Anesthesia cases, we aimed to improve parent/patient satisfaction by 15% within 12 months
 - Project Y: Reduce the wait time from registration to scan start time from 1 HR and 40 minutes to <60 minutes
- To achieve our goal, we implemented Lean Sigma Methodology for health care with a multidisciplinary team.

The Lean Sigma Methodology

- Lean Sigma approach, following the DMAIC methodology:
 1. Define
 2. Measure
 3. Analyze
 4. Improve
 5. Control



Define

- Gathered the stakeholders at the table
- Discussed and finalized the goal
- Gained buy-in from all disciplines
 - Radiology and Anesthesiology players
 - Including front line staff, management, nursing, Child Life, scheduling and registration
- Information at this stage generated the project charter
- Sought out best practices from our colleagues at other Children's Hospitals
 - Children's Hospitals 1 and 2

Define: Project Charter

Project Name: Improve Patient Satisfaction in Peds GA Cases	Champions: Peg Cooper and Dr. Aylin Tekes						
Belt: Emily Lee	Master Black Belt: Paul Nagy						
Problem Statement: During April 2013, Pediatric Radiology patient satisfaction scores were in the 9 th percentile and wait times exceeded 2 HRS per patient scan, resulting in patient dissatisfaction and going to other Children's hospitals and referring physician dissatisfaction	Project Goal: To improve patient satisfaction by 15% within 12 months						
Project Y: Reduce wait time	Scope: Outpatient Pediatric MRI General Anesthesia Patients Zayed 4 th Floor						
Team Members: Peg Cooper, Operations Administrator: Champion Dr. Aylin Tekes, Pediatric Radiologist: Physician Champion Dr. Thierry Huisman, Radiology Pediatric Medical Director: Member Emily Lee, Radiology Manager: Project Leader Elyce Wolfgang, Pediatric Radiology Manager: Member Joanne Shay, MD: Anesthesiology: SME Alison Owens, Radiology Scheduling Nurse/patient care coordinator (PCC): Member Myrna Mamaril, PACU Nurse Manager: SME Clint Morris, Nurse Manager, Member Cheryl Shoats, MRI Manager: Member Brendan Morrison, Radiology Financial Analyst, SME Mollie Young, Child Life Specialist: Member-SME Sue Mead, Parent Advocate	Benefits: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Hard</th> <th>Soft</th> </tr> </thead> <tbody> <tr> <td>Increase MRI GA throughput and volumes</td> <td>Enhance anesthesia and radiology collaboration</td> </tr> <tr> <td></td> <td>Improve referring physician satisfaction</td> </tr> </tbody> </table>	Hard	Soft	Increase MRI GA throughput and volumes	Enhance anesthesia and radiology collaboration		Improve referring physician satisfaction
Hard	Soft						
Increase MRI GA throughput and volumes	Enhance anesthesia and radiology collaboration						
	Improve referring physician satisfaction						
	Timeline: Define/Measure: May 2013 Analyze: December 2013 Improve/Control: March 2014						

Define: Benchmark Data

	JH CBCC	Children's Hospital 1	Children's Hospital 2
Daily Peds MRI GA Patient per day	5.5	14	20
Number of scanners in use	2	2	3
Anesthesia Team	Remote	Remote	Dedicated, 1 Att; 3 CRNA
H&P	Done before arrival	On-Site by NP	On-Site
Anesthetic Medication	Sevoflurane with LMA	Propofol	Propofol
Registration Process	Done on-site upon arrival	TBD	Registered before arrival
Scan Time for Brain MRI	39 min	40 min	45 min
Time added to actual scan time for patient prep	30 min	0 min	0 min
Check in to Anesthesia Start time	1 hour before scan	1 hour before scan	1 hour before scan
Registration--PACU Discharge Time	3 HR 41 MIN	<3 Hours	2 Hours

Measure

Gathered the baseline data utilizing patient satisfaction surveys and measuring cycle times

- **Patient satisfaction**
 - Generated Surveys focusing on pre-procedure, during procedure and post-procedure experience
 - Surveys completed onsite as the patient progressed during the process
 - Analyzed the surveys
- **Cycle times**
 - Observed the process
 - Defined each step of the process from entering the hospital to discharge
 - Measured time between each step



Value Stream Map

Measure: Sample of Survey

Family Survey – The Johns Hopkins Pediatric MRI Experience

We are committed to making your MRI experience the best it can be! Thank you for sharing your impressions with us.

INSTRUCTIONS: Please rate your MRI experience received from our facility. Check the box that best describes your family's experience. If a question does not apply to you, please skip to the next question. We would love and be honored to receive additional comments from you, please see additional space provided. When you have finished, please return to a staff member or request a stamped envelope. Your participation is voluntary. Completing this survey will serve as consent to be included in this patient satisfaction study.

Registration Staff Only:

General Anesthesia Sedation Child Life with Valium Child Life Support Only

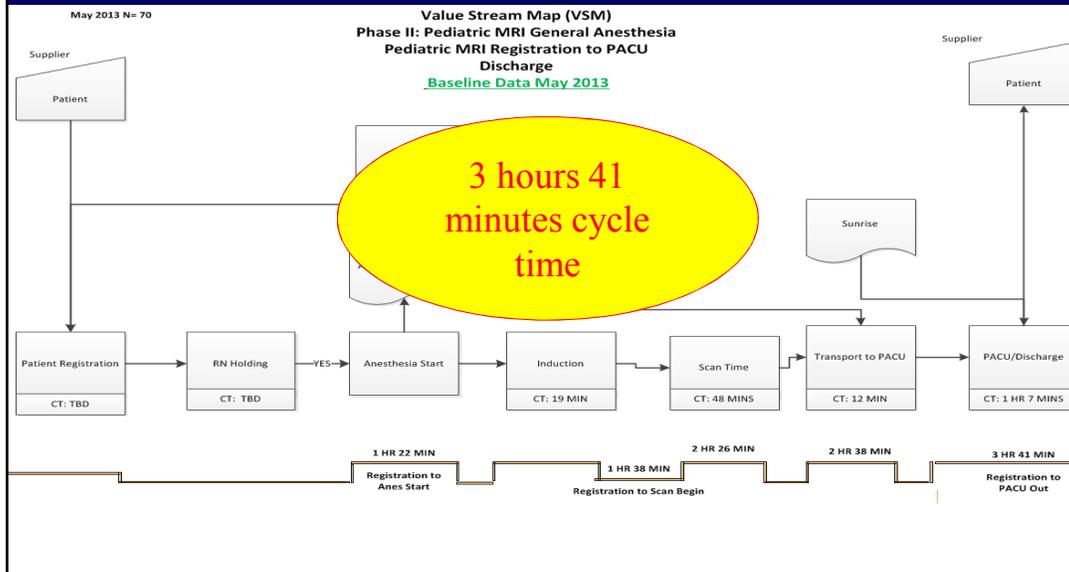
1. Pediatric MRI Preparation	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. I feel that the information I received prior to the MRI scan regarding time of arrival met my expectations					
b. I feel that the information I received prior to the MRI scan regarding how to prepare my child for general anesthesia and fasting instructions met my expectations					
c. I feel that the information I received prior to the MRI scan on when/how to cancel and/or reschedule my child's MRI met my expectations					
d. I feel that the directions provided were clear					
e. I feel that it was easy to find the Radiology Registration Desk					

Measure: Baseline Family Satisfaction Survey

	% Satisfaction
Information you received prior to the MRI scan regarding time of arrival	65
Information you received prior to the MRI scan regarding how to prepare your child for GA and fasting instructions	70
Information received prior to MRI scan on when/how to cancel and/or reschedule your child's MRI	60
Clarity of directions and finding parking	62
Ease of finding the Radiology Registration Desk	68
Wait time before procedure	58
Updates regarding wait time	57
Physical environment is child friendly	74
Care provided to make your child comfortable	78
Did you feel fully informed by the people who provided care?	82
PACU Nurses' concern for your child's comfort after the MRI	86
Do you feel comfortable caring for your child at home after receiving discharge instructions?	86
Overall rating of care received during your visit	80
Duration of visit	70
Degree to which our staff worked together to care for your child and family	82
After your experience, if your child needed future scans, would you return to JHH?	89
Likelihood you would refer others to Johns Hopkins Pediatric Radiology	82

**73%
Overall
Satisfaction**

Measure: Baseline Value Stream Map



Analyze

Satisfaction Surveys

- Our survey results told us that families were most dissatisfied with the information received before their child's scan & wait times before the MRI scan started

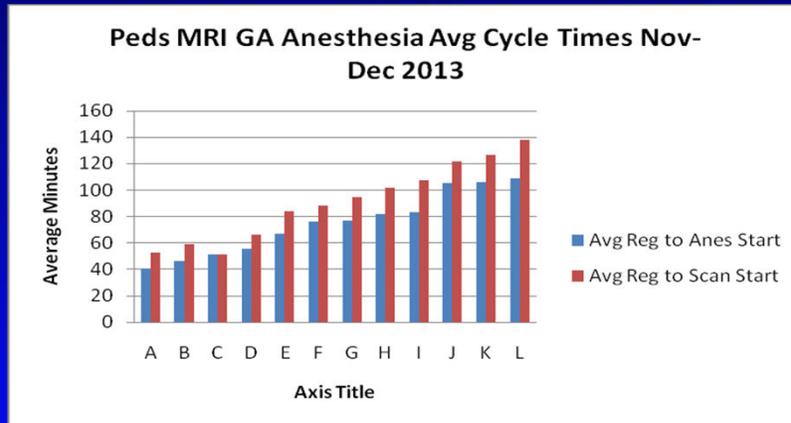
Value Stream Map

- Our baseline value stream map told us that we didn't need families to arrive an hour ahead of time – there was too much downtime

What IMPROVEMENTS could be implemented based on our analysis?

Analyze: Variation in performance

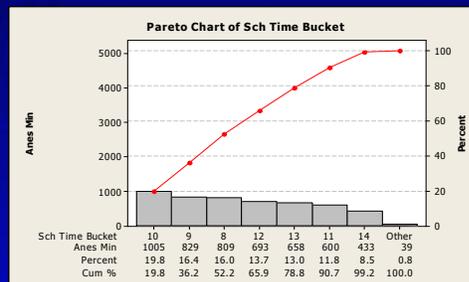
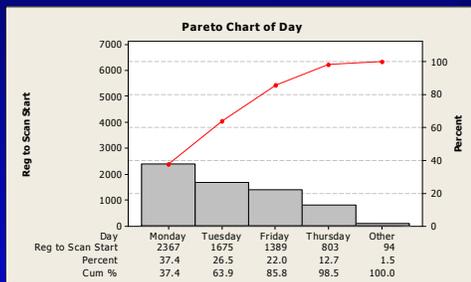
This chart shows us the amount of average minutes from Registration to Anesthesia Start per Anesthesiologist



Analyze: Variations in Performance: Per Day and Time of the Week

Day of Week

Time of Day



Pareto charts show that Monday mornings need attention: Major number of delays occur on Mondays starting around 10 am

Communication errors between systems resulted in delays

- Anesthesia used ORMIS for scheduling
 - ORMIS had 7:20 am as start time
- Radiology used EPIC for scheduling
 - EPIC had 7: 00 am start time
- ORMIS and EPIC do not talk to each other
- This resulted in discrepancy in perceived start times for each group



- **Change ORMIS start time to 7:00 am**

Improve: Pilot Phase 1

Process Step	Waste / Defects	Proposed Intervention	Implementation Leader
Scheduling	Low satisfaction	Send Epic SMART Source Letter and PCC letter to include parking, registration, NPO instructions, email them if we have address	MRI Nurse Coordinator (PCC)
Scheduling	Anesthesia delay & late MRI start times	PCC's schedule Anesthesia Time 20 minutes before MRI Scan Start time in ORMIS	PCC/Scheduler
Patient/Family Arrival	Lack of patient centered care	MRI Tech Coordinator provides update when patient is on the scanner, Tech will provide scan update when taking parents to PACU waiting room	MRI Manager/Peds Manager
MRI Registration	Communication to Clinical staff when patient arrives	Registration staff pages or uses ASCOM phones to notify Anesthesia, RN, and Tech staff that patient has checked in and is ready	Registration Staff
MRI Registration	Patient late b/c getting lost, Lack of clear directions	Create a map and provide clear directions from parking to radiology registration via email and/or letter	PCC
Nurse Holding	Late MRI starts	Patient in RN Holding 40 minutes before scan. Allows time for 10 min RN, 10 Anes, 20min induction	Anesthesia leadership, Radiology Nursing

Improve: Pilot Phase 1

- Parent communication before, during and after the MRI
 - Patient Care Coordinators (PCC) make phone calls within 3 days from scheduled MRI to walk the parents through the process step by step, and give them an estimated time for the entire process
- Standardization of the entire process from patient registration through PACU discharge
- Parent involvement during induction of anesthesia

Improve: Pilot Phase 1

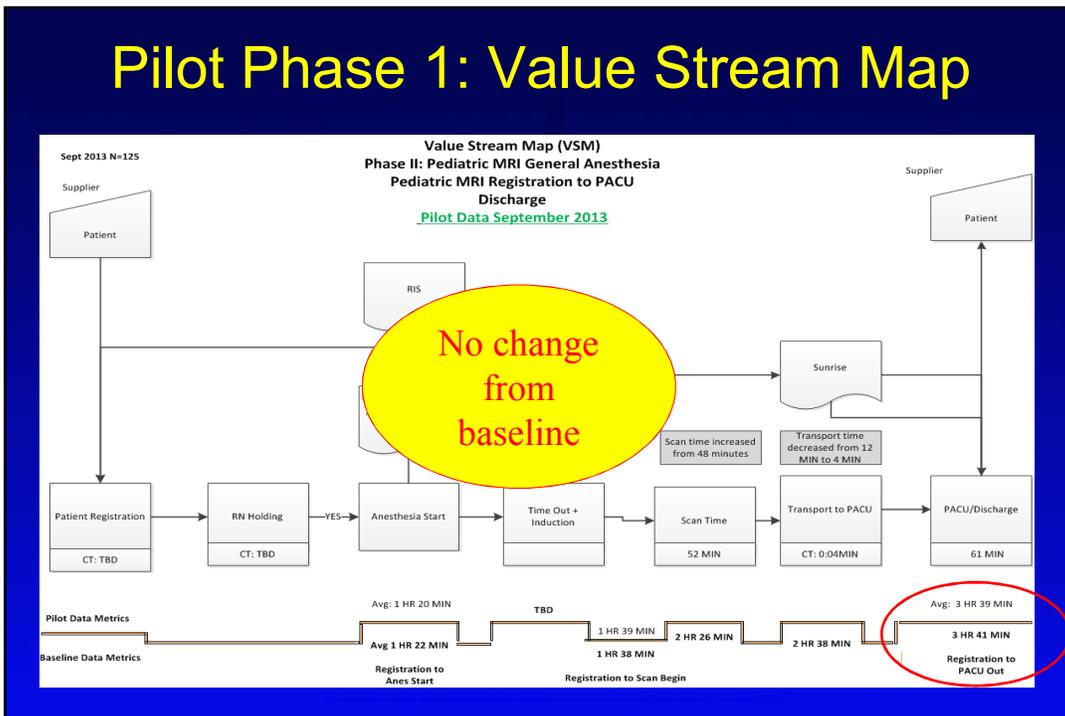
- Implemented a “Radiologist meets the parents” and “One Last Time” procedure prior to induction of anesthesia
 - Radiologist explain what MR imaging involves, estimated time for the study, and how the results will be conveyed to the parents
 - “One last time”: This process mimics the WHO OR Patient Safety initiative by bringing the **entire healthcare team** to confirm the patient identity, planned MRI exam, and create a safe environment to raise concerns and answer questions any team member or patient/parent might voice prior to the induction of Anesthesia and MRI scan
 - Avoid using the term “TIME OUT”

Pilot Phase 1: Family Satisfaction Survey

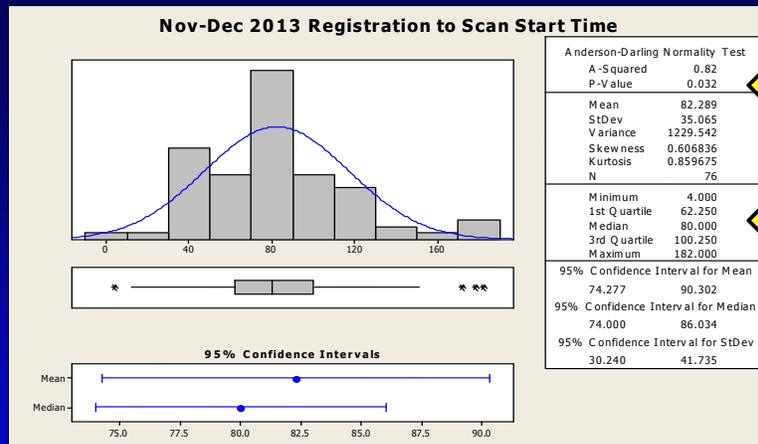
	Baseline % Satisfaction	Pilot 1 % Satisfaction
Information you received prior to the MRI scan regarding time of arrival	65	78
Information you received prior to the MRI scan regarding how to prepare your child for GA and fasting instructions	70	83
Information received prior to MRI scan on when/how to cancel or reschedule your child's MRI	60	81
Clarity of directions and finding parking	62	78
Ease of finding the Radiology Registration Desk	68	78
Wait time before procedure	58	63
Updates regarding wait time	57	69
Physical environment is child friendly	74	88
Care provided to make your child comfortable	78	90
Did you feel fully informed by the people who provided care?	82	90
PACU Nurses' concern for your child's comfort after the MRI	86	97
Do you feel comfortable caring for your child at home after receiving discharge instructions?	86	100
Overall rating of care received during your visit	80	88
Duration of visit	70	92
Degree to which our staff worked together to care for your child and family	82	90
After your experience, if your child needed future scans, would you return to JHH?	89	92
Likelihood you would refer others to Johns Hopkins Pediatric Radiology	82	85

**85%
Overall
Satisfaction**

Pilot Phase 1: Value Stream Map



Analyze: Normality Test



- Using a statistical software (Minitab) to analyze our cycle time data, the p-value is 0.032. Any p-value < 0.05 is considered non-normal. Therefore, we used the median value as our indicator instead of the mean for a registration to scan start time of 80 minutes

Analyze: Next Steps?

- Family Satisfaction Survey increased 12%
 - ✓ We are on the right track!
- Cycle Time didn't change
 - Reevaluate the process!

Improve: Pilot Phase 2

Leader	Intervention
Anesthesiologist and PACU	Place Anesthesia PACU orders before arriving to PACU
Anesthesiology, Rad Nurse, Tech	"One Last Time": Provide name, title, and role in child's care
Anesthesia & Rad RN	Standardize RN and Anesthesia protocols. Use guideline sheet
PCC's	Emphasize to parents the importance of arriving on-time
Child Life Specialist	Pilot patient and parent anxiety level 1-10 (enhance CLS involvement)
MRI Technologists	1) Inform parents scan started 2) Inform parents scan is going well with X mins left 3) escort parents to PACU waiting. Check list
Radiologist Champion & Anesthesiologist Champion	Change anesthesia agent to "Dex"
Parent advocate & PCC Team	1st start cases arrive 45 minutes early, all others arrive 30 minutes early
Parent Advocate and Child Life Specialist	Create a "Caregiver's Guide to MRI with General Anesthesia" – information pamphlet

Improve: Pilot Phase 2

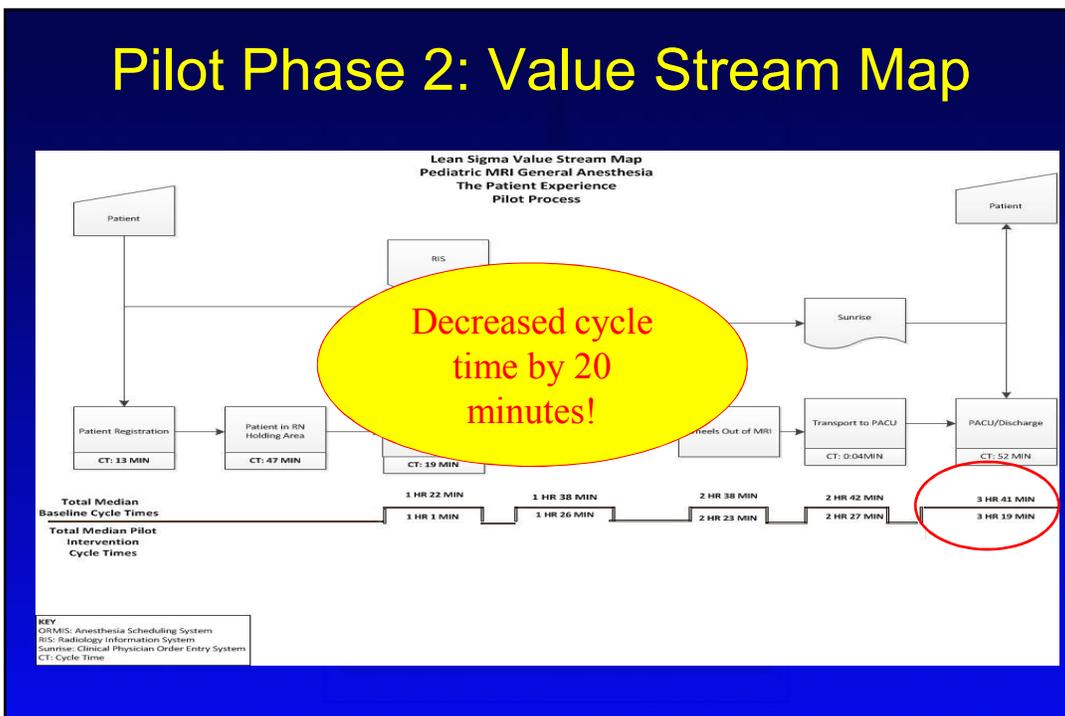
- Eliminated repetitive questions asked by different members of the clinical team and generated a standardized a nursing form
- Involved a parent advocate in our Lean Sigma team
- Enhance the involvement of Child Life Specialist by reviewing anxiety levels for the patient and parents when needed/appropriate
- Provided patient status updates during the scan to the waiting family
- The creation of a Pediatric MRI General Anesthesia Parent Education Guidebook and website to inform parents about the process, what to expect, and how to become more involved

Pilot Phase 2: Family Satisfaction Survey

	Baseline %	Pilot 1 %	Pilot 2 %
Information you received prior to the MRI scan regarding time of arrival	65	78	70
Information you received prior to the MRI scan regarding how to prepare your child for GA and fasting instructions	70	83	72
Information received prior to MRI scan on when/how to cancel and/or reschedule your child's MRI	60	81	63
Clarity of directions and finding parking	62	78	72
Ease of finding the Radiology Registration Desk	68	78	62
Wait time before procedure	58	63	67
Updates regarding wait time	57	69	57
Physical environment is child friendly	74	88	54
Care provided to make your child comfortable	78	90	68
Did you feel fully informed by the people who provided care?	82	90	70
PACU Nurses' concern for your child's comfort after the procedure	86	97	74
Do you feel comfortable caring for your child at home after receiving discharge instructions?	86	100	64
Overall rating of care received during your visit	80	88	69
Duration of visit	70	92	68
Degree to which our staff worked together to care for your child and family	82	90	75
After your experience, if your child needed future scans, would you return to JHH?	89	92	75
Likelihood you would refer others to Johns Hopkins Pediatric Radiology	82	85	75

68%
Overall
Satisfaction

Pilot Phase 2: Value Stream Map



Analyze: Next Steps?

- Family Satisfaction Survey
 - decreased by 5% compared to Pilot 1
- Cycle Time improved
 - ✓ We improved by 20 minutes compared to Pilot 1!



Is surveying a reliable way of measuring satisfaction?

Conclusions

- Our Lean Sigma project focused on patient-centered care to create a safe and satisfactory experience for patients and their families. Patient/family satisfaction was initially improved however the goal of 15% improvement has not been reached yet.
 - Project setting: Tertiary academic center/complexity of work flow
 - Surveys: Is surveying a reliable way of measuring satisfaction?

Conclusions

- We will continue to tap into the group wisdom of the team stake holders to standardize every step of the process to eliminate variability and further reduce the cycle times.
- Ongoing active participation of the parent advocate and feedback from The Johns Hopkins Pediatric Family Advisory Council will be very valuable.