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# Improved Coordination of Care for PICU Patients with Newly Diagnosed Anterior Mediastinal Masses

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# Improved Coordination of Care for PICU Patients with Newly Diagnosed Anterior Mediastinal Masses

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**Primary Mentor: Keith August, MD**

**Research Days May 13, 2019**



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# Disclosures

- I have no conflicts to disclose
- Quality Improvement Award- 2018
- Poster Presentations
  - ASPHO 32<sup>nd</sup> Annual Meeting May 1-4, 2019
  - 10<sup>th</sup> Annual Quality Improvement Project Poster Session Oct 2018
  - 5<sup>th</sup> Annual Vijay Babu Rayudu Quality and Patient Safety Day May 2018

# Background

- Anterior mediastinal (AM) masses are medical emergencies
- Multi-disciplinary approach needed for prompt surgical intervention to establish diagnosis

# Background

- Previously no standardized process at Children's Mercy Hospital
- This created delays in surgical diagnosis which has dangerous implications

# Background

- 32 patients diagnosed with AM mass between 2010-2017
  - 22 required surgical procedure
    - Average 155 hours before treatment initiated
  - 10 had diagnosis made from non-invasive procedures
    - Average 58 hours before treatment initiated

# Aim(s)

- Decrease the time from presentation to surgical diagnostic procedure to <24 hours for all patients with newly diagnosed AM masses starting in January 2018

# Identify Root Cause

- Fault tree identified poor communication among subspecialists as the root cause for delays
  - Overnight and weekend admissions
  - Multiple phone calls
  - Lack of attending to attending conversations



# Countermeasures

- Bedside huddle
  - Oncologist, intensivist, anesthesiologist, interventional radiologist, ENT surgeon, +/- radiologist determine:
    - Optimal diagnostic procedure and who will perform
    - Location and time of procedure
    - Additional staging procedures needed
  - Huddle note

# Countermeasures

## ■ Mediastinal mass power plan

Mediastinal Mass Work-up (Planned Pending)		
Nursing		
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Mediastinal Mass Notification	Powerplan notification for QI purposes.
Consults/Therapy		
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Consult to Anesthesia	Reason for consult: Other (use special instructions), Special instructions: Mediastinal Mass
<input type="checkbox"/>	<input checked="" type="checkbox"/> Consult to Hematology/Oncology General	Reason for Consult: Mediastinal mass
<input type="checkbox"/>	<input checked="" type="checkbox"/> Consult to Radiology Interventional	
<input type="checkbox"/>	<input checked="" type="checkbox"/> Consult to ENT	Reason for Consult: Mediastinal mass
Laboratory		
<input type="checkbox"/>	<input checked="" type="checkbox"/> Type and Screen	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> CBC w/Differential	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Hepatic Function Panel	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Basic Metabolic Panel	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Magnesium (Mg) Level	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Phosphorus Level	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Calcium Ionized Level (Ionized Calcium)	Specimen type Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Lactate Dehydrogenase (LDH)	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Uric Acid	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Prothrombin Time(Prottime)/INR (PT - Prothrombin Time/INR)	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> PTT - One Time Order	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Fibrinogen	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Path Review of Peripheral Smear	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Pathology Consulting Request	
	Additional labs if infectious etiology is suggested:	
<input type="checkbox"/>	<input checked="" type="checkbox"/> Histoplasma Antibody Scr	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Histoplasma Antigen Blood S	Blood
<input type="checkbox"/>	<input checked="" type="checkbox"/> Histoplasma Antigen Ur S	Urine
Radiology		
<input type="checkbox"/>	<input checked="" type="checkbox"/> XR Chest 1 View	Sob/Dyspnea/Difficult Breathing/Wheezing, R/O Mediastinal Mass
<input type="checkbox"/>	<input checked="" type="checkbox"/> CT Chest w/ Contrast	Lesion/Mass/Tumor (Indicate type in Comments) Mediastinal mass
Diagnostic Tests/Procedures		
<input type="checkbox"/>	<input checked="" type="checkbox"/> Echocardiogram - Complete	Reason for echo: Other: Use Order Comments tab Mediastinal mass



# Countermeasures

- Organizational standard protocol

**Children's Mercy Hospital  
Anterior Mediastinal Mass Recommended Pathway**

Perform Clinical Assessment:

Clinical Assessment (automatic PICU admission if any of the following are present):

1. Orthopnea, stridor, wheezing, cough, dyspnea, large or clinically significant pleural effusion, accessory muscle use
2. History of syncope
3. Upper body edema/superior vena cava syndrome

Evaluation (use 'Mediastinal Mass Work-Up' power plan in Cerner):

1. CXR
2. CT chest with contrast: determine degree of airway and/or great vessel compromise/compression
3. Complete ECHO: evaluate great vessels for compression/flow, evaluate for pericardial effusion, tamponade physiology and function
4. Labs: CBC, type/screen, BMP, Mg, Phos, iCal, LDH/uric acid, PT/INR, fibrinogen, PTT, peripheral smear

High Risk

Pt is high risk with any one of the following:

1. Any symptom listed in clinical assessment above
2. Inability to lie flat
3. Tracheal involvement with >50% compression
4. Mediastinal mass ratio >0.45%
5. Great vessel involvement
6. Evidence of pericardial effusion and/or tamponade or ventricular dysfunction with EF <35%
7. Evidence of infectious pulmonary process

Bedside Huddle with Consultants

0715 if overnight admit, otherwise upon admission

1. Oncology Team
2. Anesthesiologist
3. Interventional Radiologist/ENT Surgeon
4. Pediatric intensivist if in PICU
5. Notify Pathologist
6. Consider general surgery team/ECMO core team notification if concern for potential ECMO need

Discuss with Oncologist

If patient high risk and must have tissue biopsy, consider the following prior to procedure:

1. Preoperative steroids
2. Chemotherapy
3. Radiation

Huddle Discussion Topics

1. Diagnostic Procedure
  - a. Goal to have at least one anesthetic
  - b. Best route for biopsy: open vs core
  - c. PICC or central line necessity
  - d. Bone marrow biopsy/LP necessity
  - e. Optimal timing of procedure for safety
2. Pathologist availability- should be in house at time of biopsy
3. Hem/Onc fellow to complete 'Huddle Note' in Cerner
4. Strive to achieve diagnostics and initiation of therapeutics within 48hrs of admission

# PDSA Cycle

What changes are we going to make based on our findings?

What exactly are we going to do?



What were the results?

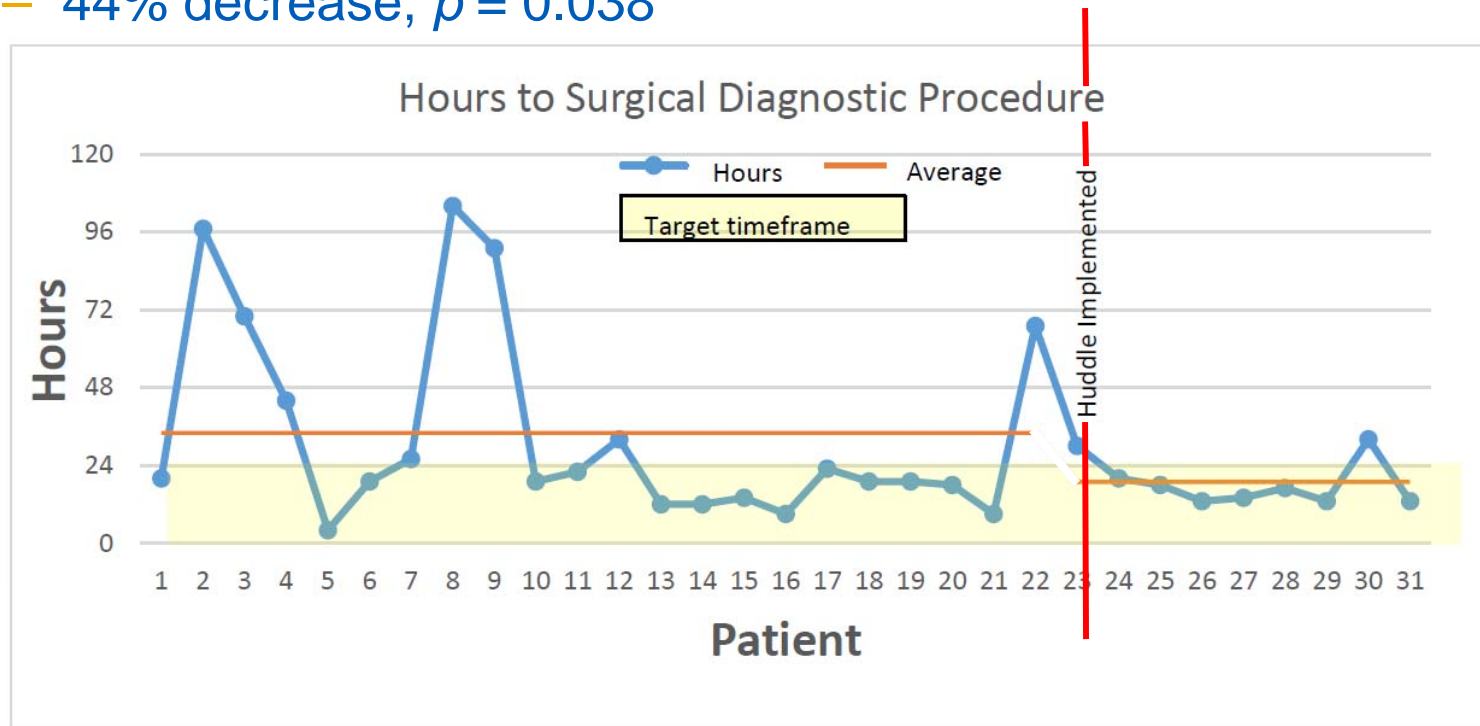
When and how did we do it?

# Results

- 9 new patients have been diagnosed with AM mass since implementation of interventions
- Clinical data collected, with special attention paid to:
  - PICU admission to diagnostic procedure
  - PICU admission to initiation of chemotherapy

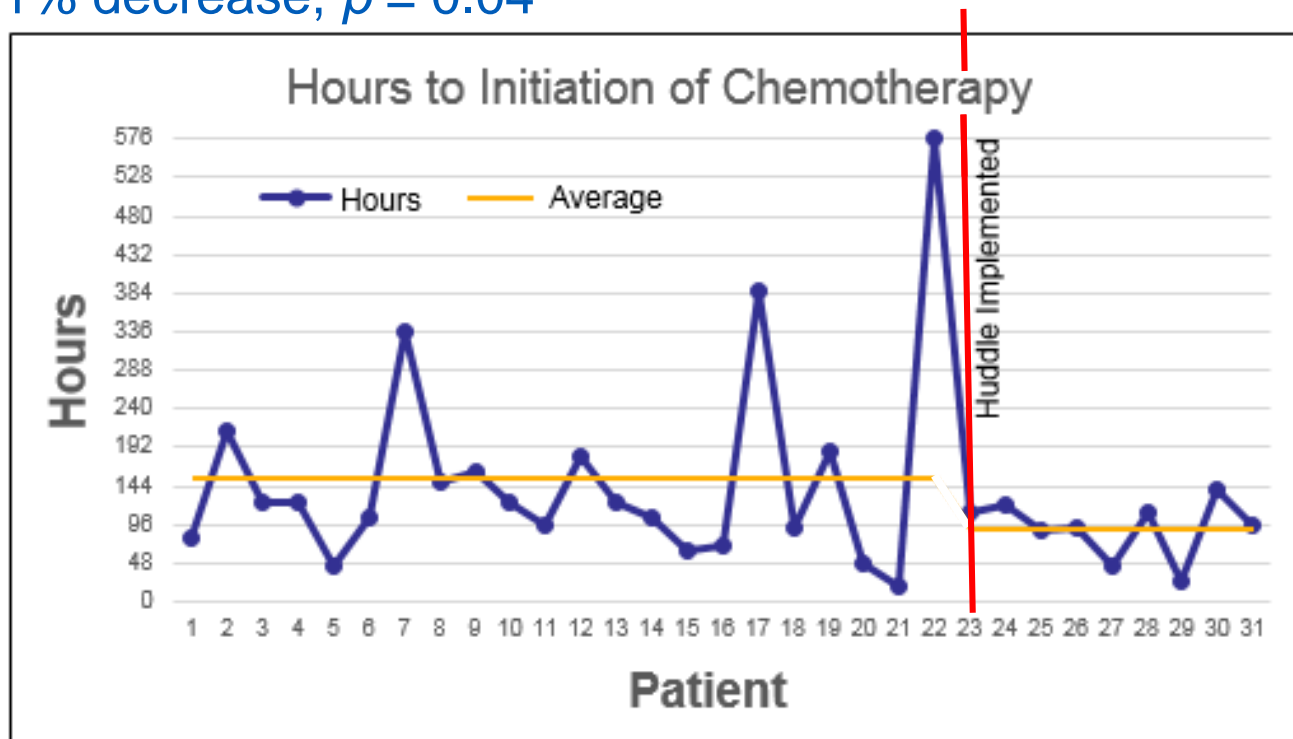
# Results

- Average time to surgical diagnostic procedure has decreased from 34 to 19 hours
  - 44% decrease,  $p = 0.038$



# Results

- Average time to initiation of treatment has decreased from 155 hours to 92 hours
  - 41% decrease,  $p = 0.04$





# Conclusions

- Improved communication leads to quicker diagnostic procedure
  - Earlier initiation of treatment
  - Decreased risk of cardiovascular compromise
  - Shorter PICU stay?
  - Shorter overall hospitalization?

# Future Directions

- Target of < 24 hours will be the new standard for time from PICU admission until diagnostic surgical procedure
- Attributing factors to problematic cases will be charted on an abnormality tracker to help identify problems that need more attention

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- Questions?