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

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Research Days May 13, 2019

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UMKC School of Medicine

BEST CHILDREN'S HOSPITALS U.S.News & WORLD REPORT RANKED IN 10 SPECIALTIES 2015-16

MAGNET RECOGNIZED AMERICAN NURSES CREDENTIALING CENTER

Disclosures

- I have no conflicts to disclose
- Quality Improvement Award- 2018
- Poster Presentations
  - ASPHO 32nd Annual Meeting May 1-4, 2019
  - 10th Annual Quality Improvement Project Poster Session Oct 2018
  - 5th 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	
Mediastinal Mass Notification	Powerplan notification for QI purposes.
Consults/Therapy	
Consult to Anesthesia	Reason for consult: Other (use special instructions), Special instructions: Mediastinal Mass
Consult to Hematology/Oncology General	Reason for Consult: Mediastinal mass
Consult to Radiology Interventional	
Consult to ENT	Reason for Consult: Mediastinal mass
Laboratory	
Type and Screen	Blood
CBC w/Differential	Blood
Hepatic Function Panel	Blood
Basic Metabolic Panel	Blood
Magnesium (Mg) Level	Blood
Phosphorus Level	Blood
Calcium Ionized Level (Ionized Calcium)	Specimen type Blood
Lactate Dehydrogenase (LDH)	Blood
Uric Acid	Blood
Prothrombin Time(Protime)/INR (PT - Prothrombin Time/INR)	Blood
PTT - One Time Order	Blood
Fibrinogen	Blood
Path Review of Peripheral Smear	Blood
Pathology Consulting Request	
Additional labs if infectious etiology is suggested:	
Histoplasma Antibody Scr	Blood
Histoplasma Antigen Blood $	Blood
Histoplasma Antigen Ur $	Urine
Radiology	
XR Chest 1 View	Sob/Dyspnea/Difficult Breathing/Wheezing, R/O Mediastinal Mass
CT Chest w/ Contrast	Lesion/Mass/Tumor (Indicate type in Comments) Mediastinal mass
Diagnostic Tests/Procedures	
Echocardiogram - Complete	Reason for echo: Other: Use Order Comments tab Medistinal mass

Countermeasures

- Organizational standard protocol

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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

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

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

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?

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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

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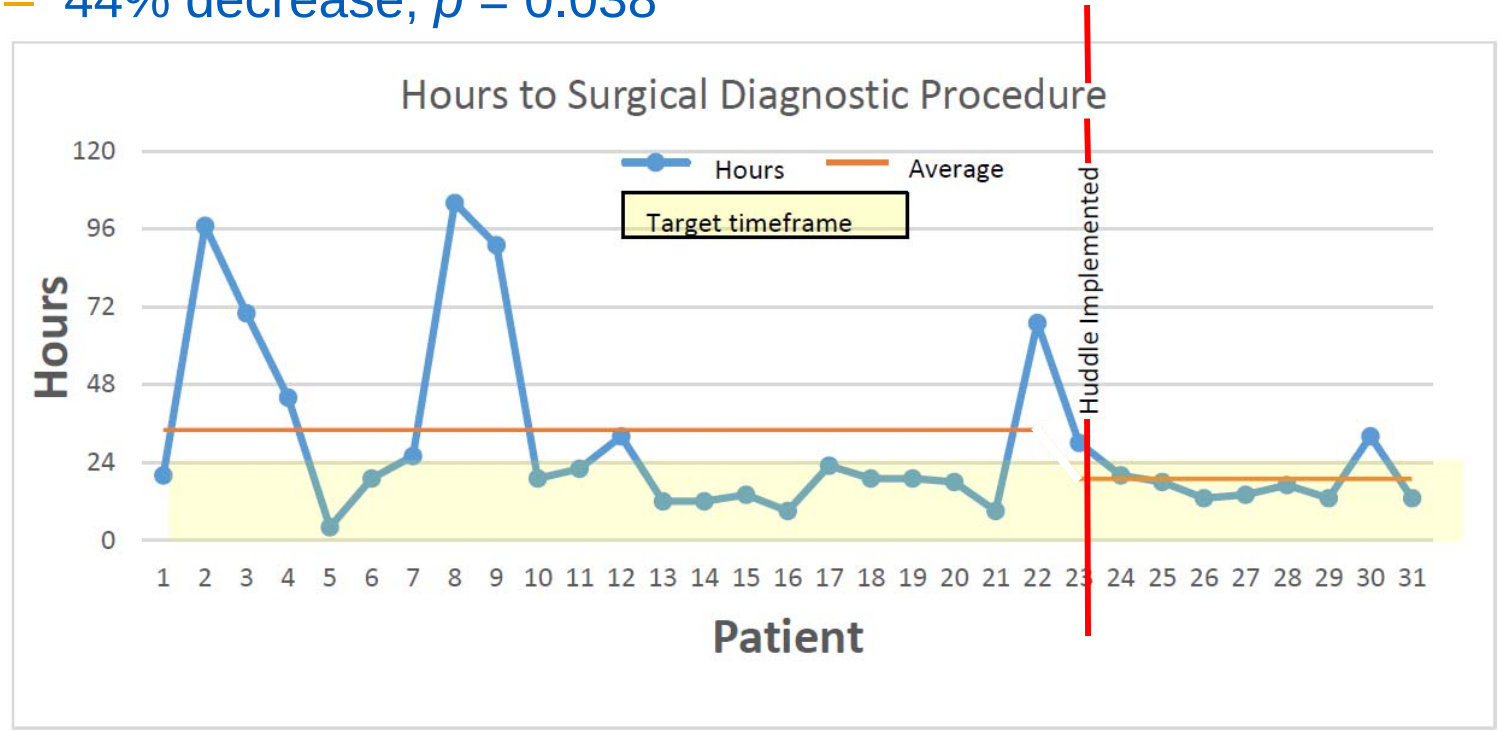
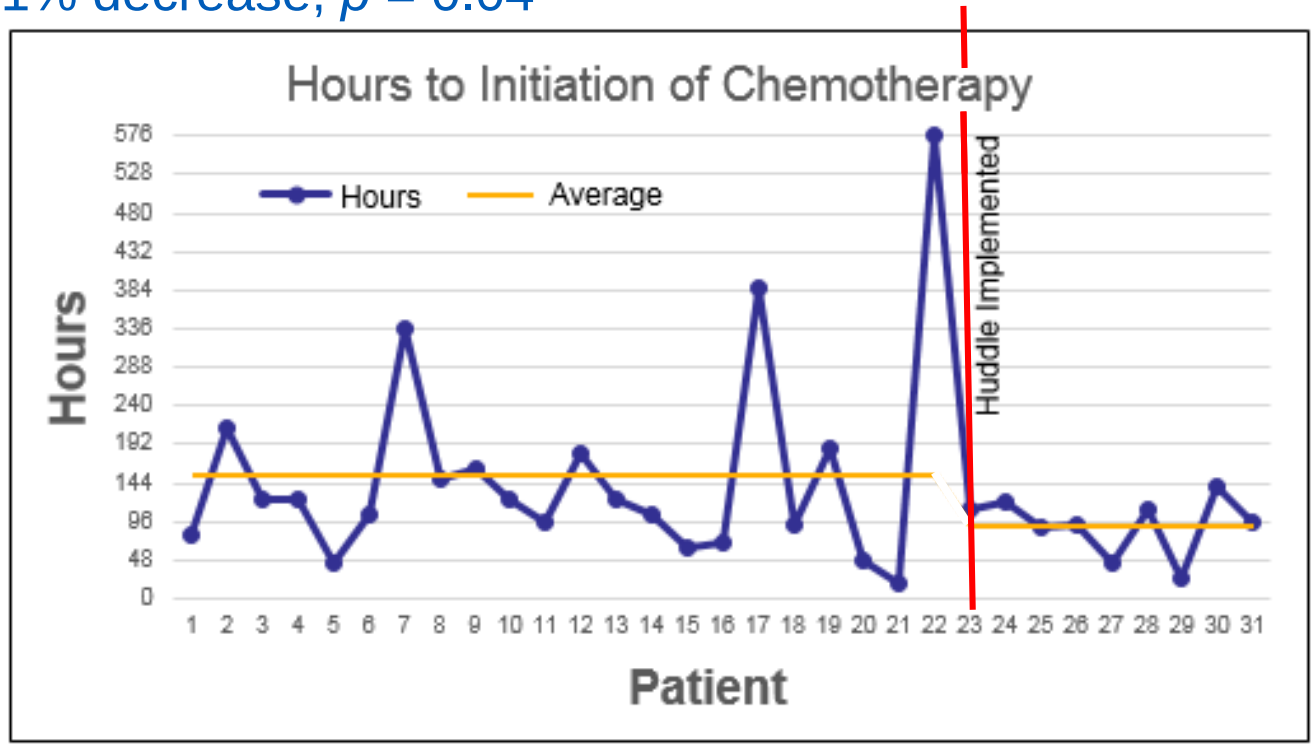
Results

- 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?