



# CT Chest in the Evaluation of Pediatric Thoracic Trauma

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**No Disclosures.**

# Pediatric Thoracic Trauma

- Thoracic trauma 2<sup>nd</sup> most common cause of trauma-related death
  - Associated with 15-25% mortality
- >80% pediatric thoracic trauma secondary to blunt forces
  - High energy impact
  - Multiple regions of body



# Lack of Consensus Guidelines in Initial Evaluation



# Pediatric Injuries Difficult to Diagnose

- Unable to cooperate with exam
- More compliant chest wall
  - High energy impact
  - Severe injury without fracture
- Major life threatening chest trauma rare
  - 0.1% incidence of thoracic aortic injury
  - 85% die at the scene
- CT Scan – accurate and rapid diagnosis of intra-thoracic injury
  - Overused in pediatric population

# Admission CXR as a screening tool

	Chest Xray	CT Chest
Relevant Organ Radiation Dose <sup>1</sup>	0.01mSv	2-20mSv
Cost <sup>2</sup> (CMS fees)	\$25	\$275

- Identification of majority of major thoracic injuries
- Determine who would benefit from a CT Chest

<sup>1</sup>Brenner and Hall, N Engl J Med 2007

<sup>2</sup>CMS.gov Physician Fee Schedule

# Hypothesis

Limiting CT Chest to patients with a widened mediastinum identifies patients with intra-thoracic vascular injuries not otherwise seen on CXR.

All other injuries requiring a change in management are visible on CXR.

# Methods

- All pediatric blunt trauma activations (2005-2013)
  - Level 1 pediatric trauma center
  - Admission CXR
- Radiologic findings
- Outcomes
  - Missed injuries on CXR, change in patient management after CT scan, chest tube, operation for intra-thoracic injury



# Methods

All Blunt Trauma Activations (2005-2013)  
<19yo, CXR on Admission  
N=1035

CXR only  
N=896

CXR and CT chest  
N=139

Normal CXR  
N=714

Abnormal CXR  
N=182

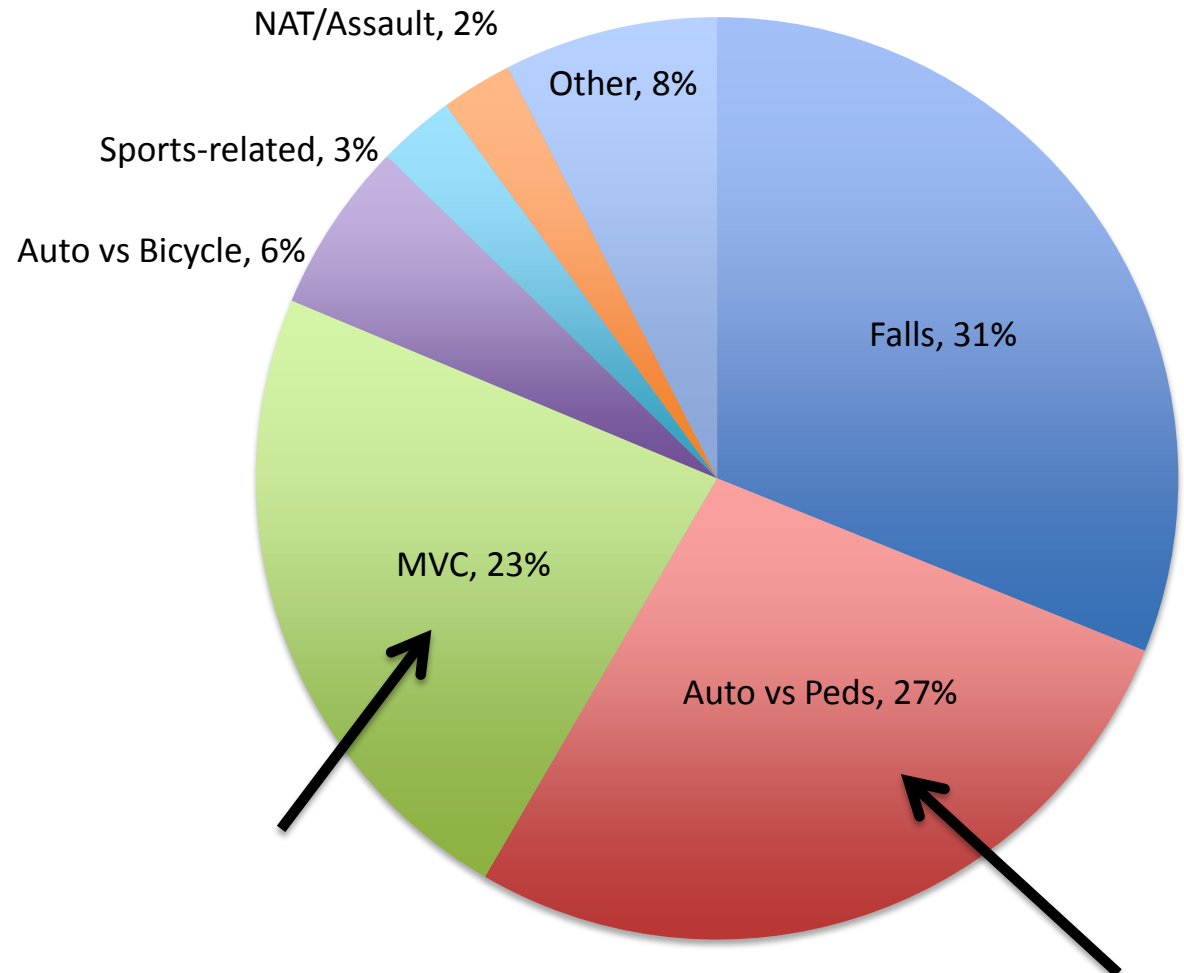
Normal CXR  
N=71

Abnormal CXR  
N=68

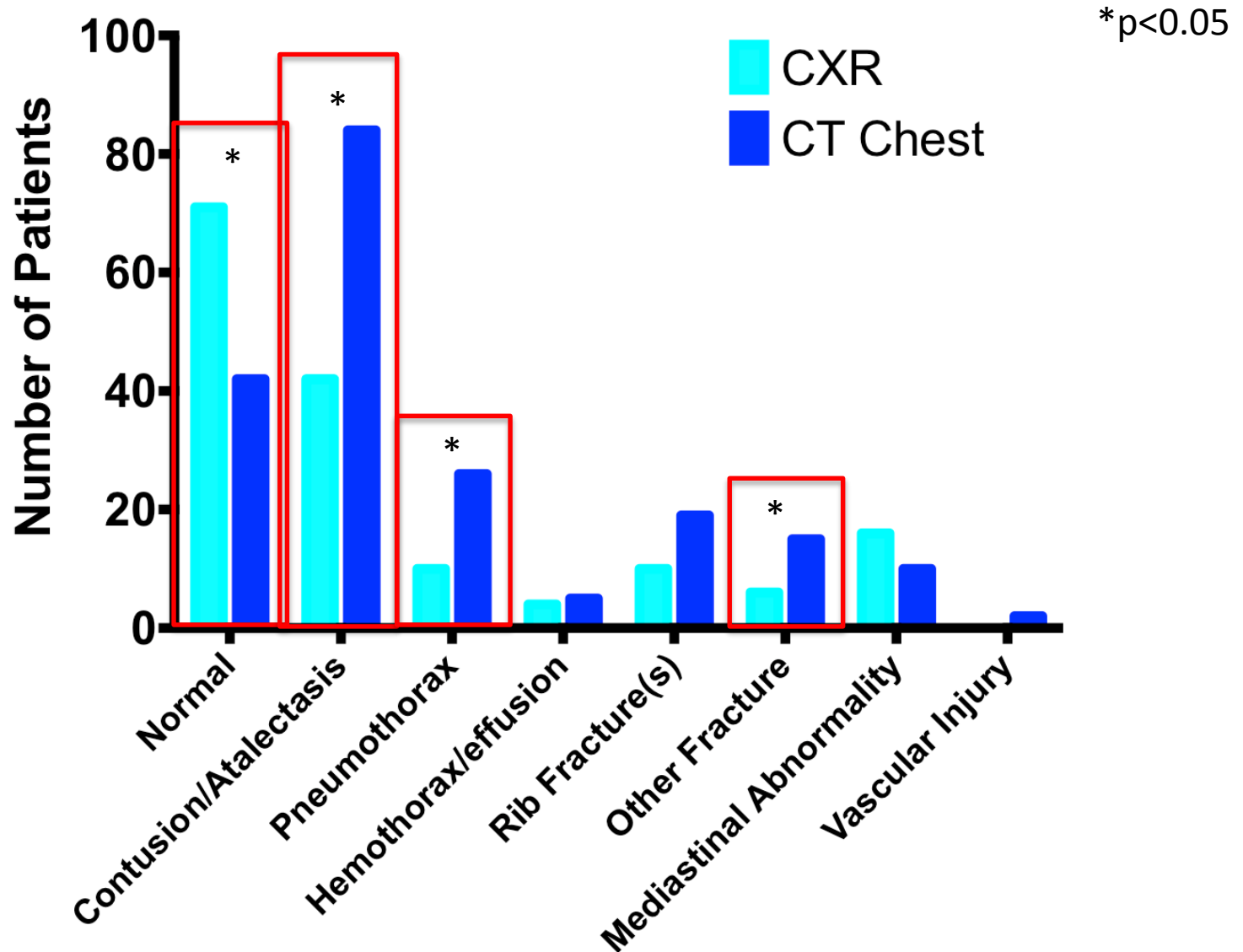
97% Panscan

# Demographics and Mechanism

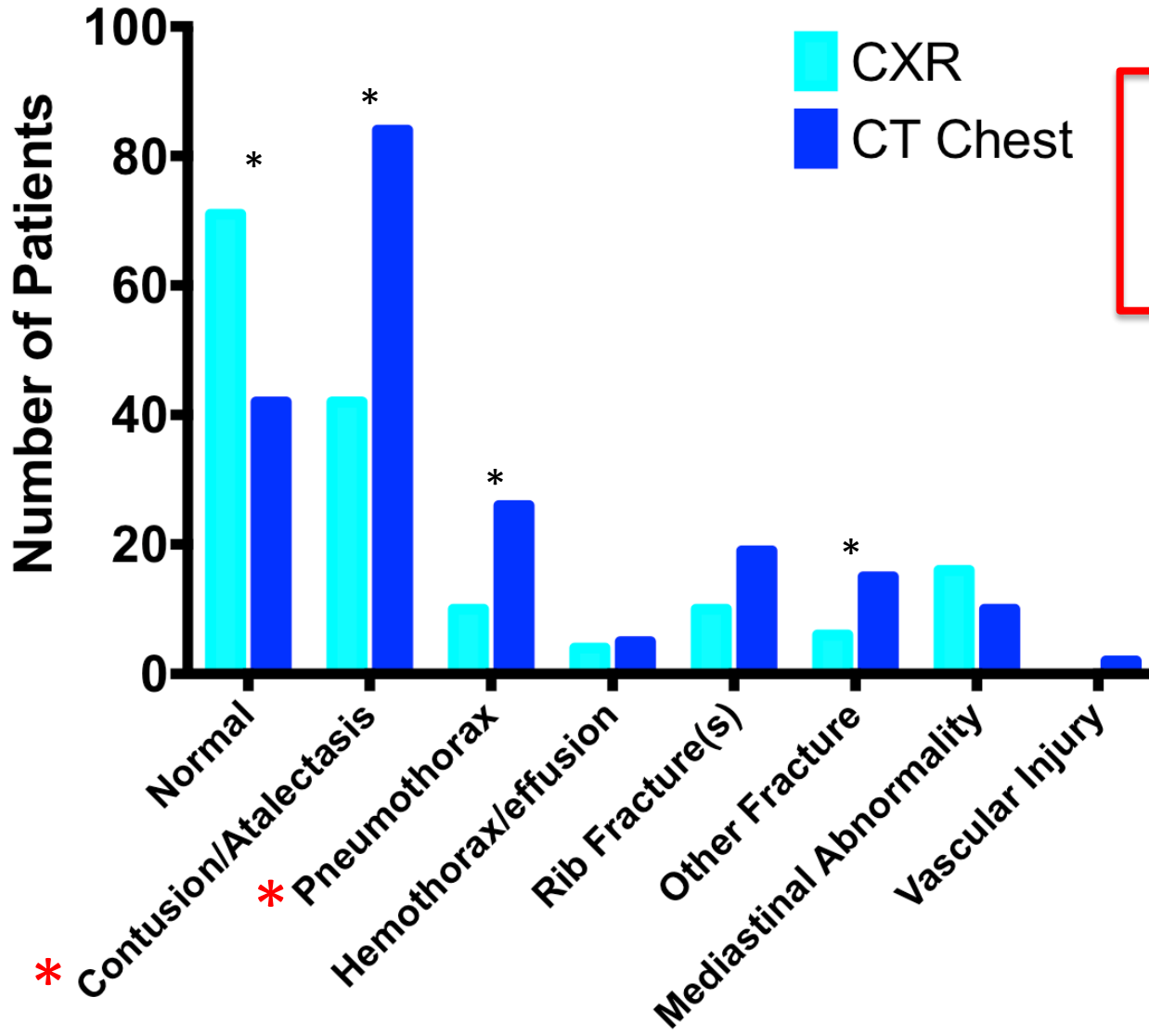
- Average age 7.1 +/- 4.7 years
- 64% Male
- 36% Female



# CT chest decreases normal studies



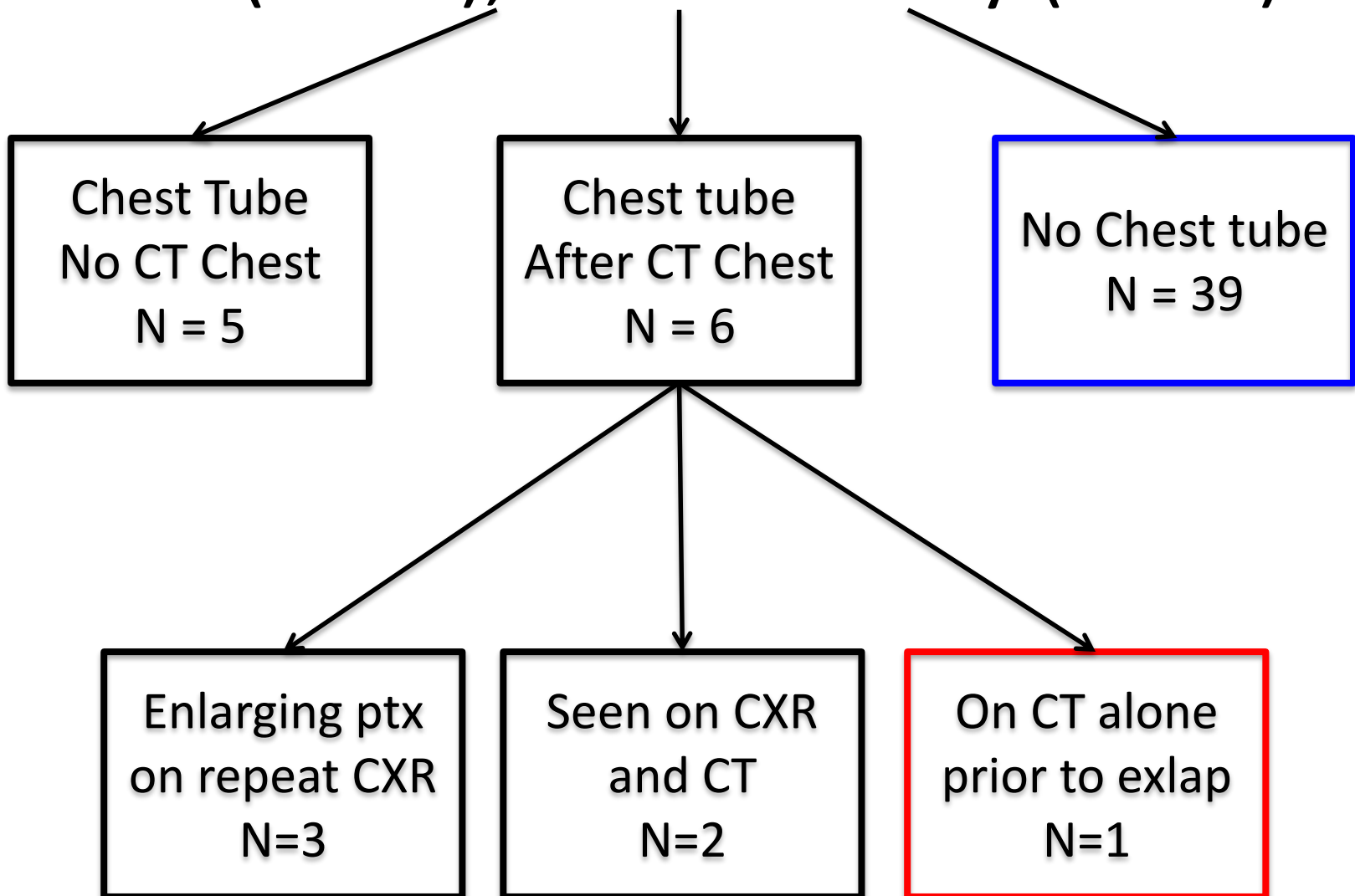
# Added diagnoses on CT Chest



Added diagnoses

• 42%

# Pneumo/Hemothorax (N=50) CXR (N=25), CT Chest only (N=25)



# Mediastinal abnormalities on CT Scan

CT Chest Finding	CXR Finding	Added N	Change in Management
Pneumo-mediastinum (6)	Pneumomediastinum (4) Contusions (2)	2	None
Mediastinal Hematoma (2)	Abn mediastinum (1) Contusions (1)	1	None
Pericardial Effusion (1)	Contusions	1	None
Esophageal Injury (1)	Clavicle fx	1	Esophagram → No injury
Aortic Injury (2)	Widened mediastinum	0	1 CTA → no injury 1 thoracotomy, interposition graft

# CXR is an adequate screening tool

- No missed injuries patients with CXR only
- CT Chest changed management in only 2.9% of patients
  - No change in management after normal CXR
- Use of CT chest for widened mediastinum on CXR only
  - 27 patients, 1 thoracic aortic injury
  - 80% fewer CT Chest

# Conclusion

- CT Chest is overused in pediatric trauma
  - Increased cost and radiation exposure
  - Adds diagnoses but rarely changes management
- Most injuries are identified on CXR
  - Can be managed clinically or followed with CXR
- Use of CT Chest should be limited to patients with widened mediastinum
  - For identification of vascular injuries not visible on CXR



# Thank you

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