Safety of pneumothoraces in ventilated pediatric trauma patients: a review

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Declaration of Conflict of Interest

I, Courtney Fulton declare that in the past 3 years:

I have received manufacturer funding from the following companies*****: No

I have done consulting work for the following companies*****: No

I have done speaking engagements for the following companies*****: None

I or my family hold individual shares in the following*****: None

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Background

- Thoracic injuries account for 14% of pediatric trauma deaths
- Incidence of pneumo/hemothorax ranges from 3.7% in children up to 64% in severely injured adults
- Specifically management of occult pneumothoraces, chest tube placement and complications are not well studied in pediatric patients

Objectives

- Primary objective: to look at the safety of pneumothorax management in ventilated trauma patients in terms of
  - Timing of chest tube placement
  - Complications
  - Progression of occult and small pneumothoraces in patients without chest tubes

Methods

- Retrospective review of the Alberta Trauma Registry
  - all ventilated pediatric trauma patients from 2001-2011 with ISS > 12 and a pneumo/hemothorax at the Stollery Children's Hospital
- Total of 90 patients
  - 1334 with ISS > 12
  - 392 in PICU
- Analysed
  - Demographics
  - Type/size/side of pneumothorax
  - Number of chest tubes and complications

Results

Demographics	Average/% (median)
Age	12.7 (15.1)
Male	54.4
Blunt Trauma	91.1
Outside Hospital	60.0
GCS	7.3 (3)
Vent Days	5.4
PICU Stay	6.9
Hospital LOS	17.8
ISS	35.3
Death	13.3

Results

Chest Tubes	Number of Children
Single Side	39
Bilateral	26
No Chest Tube	25
Total	90

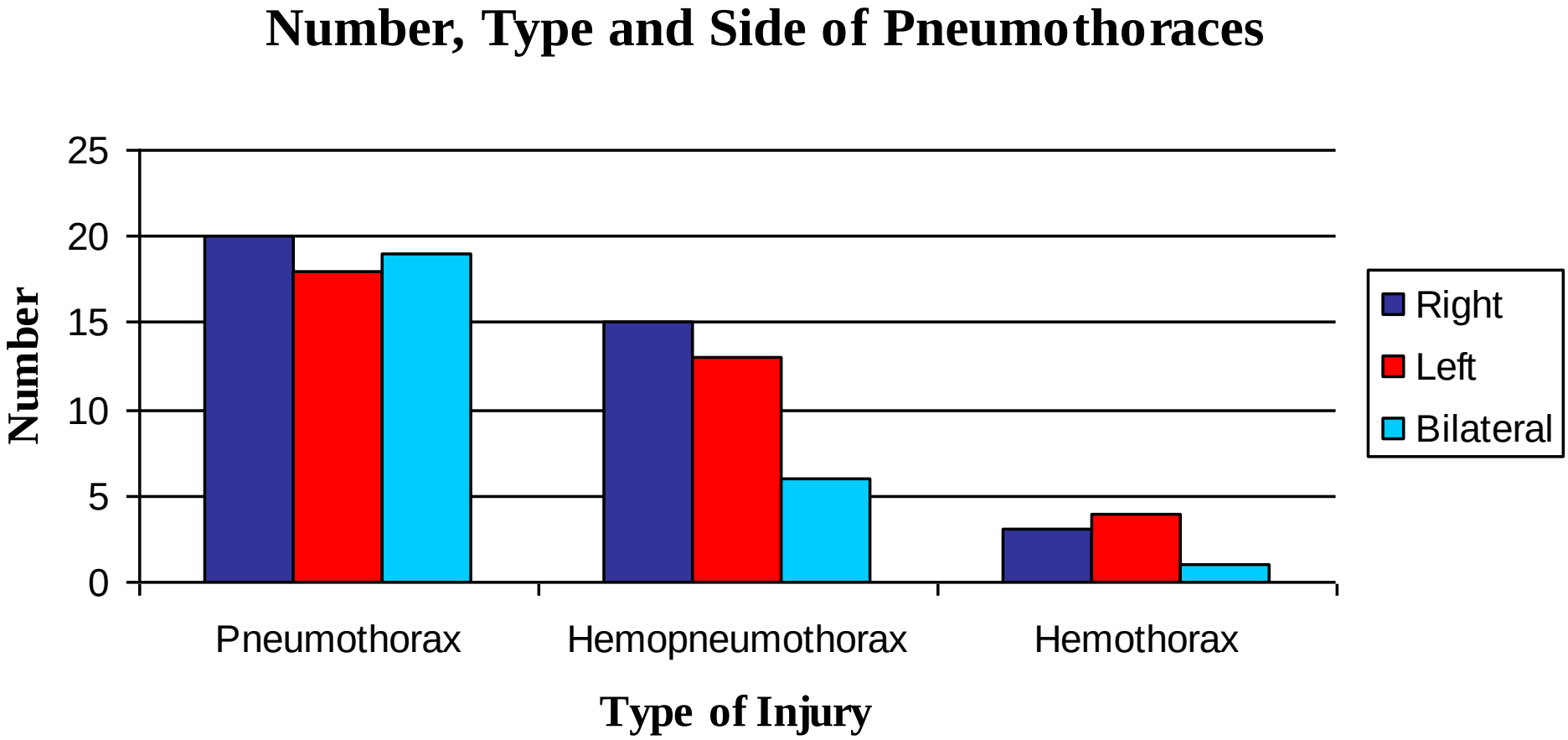
Where chest tube was placed	Number of Children
Outside hospital	25
During transport	1
Stollery	46
OR	2
Total	74

Results

Size of Pneumothorax	Number
Occult	25
Non tension	56
Tension	8
Unknown	36
Total	125

- 30 children with 35 pneumothoraces were initially treated without a chest tube
- 5 children progressed, needing a tube

Results


Number, Type and Side of Pneumothoraces
25
20
15
10
5
0
Number
Pneumothorax
Hemopneumothorax
Hemothorax
Type of Injury
Right
Left
Bilateral

Results

- 123 chest tubes were placed for 125 pneumothoraces
- Average of 1.36 tubes/child
- 67% of tubes were placed within one hour of diagnosis with a further 19% placed within a few hours
- 22 children had issues with chest tubes
  - 16 of these were incorrect tube placement
  - Of these, 10 needed adjustment
  - 12 children needed a second tube
  - 6 were tubes from outside hospitals

Limitations

- Retrospective Review
- Lack of electronic records
- Poor documentation
  - Outside hospitals
  - Chest tube timing
  - Lack of radiology reports
- Chest x rays read by non radiologists

Conclusions

- Over a 10 year period only 90 children in the PICU had evidence of pneumothorax
- 25 children (27.8%) were managed expectantly and ventilated without progression
- 14.2% of pneumothoraces (5/35) managed without a tube progressed
- Rate of complications were 19.5% (24/123) of all chest tubes inserted
  - Most chest tubes needed to be pulled back
  - Physicians may need more training in chest tube placement
- 18.5% of children (12/65) needed multiple chest tubes

Questions?