



# An Innovative and Inexpensive Pork Ribs Model for Teaching Tube Thoracostomy

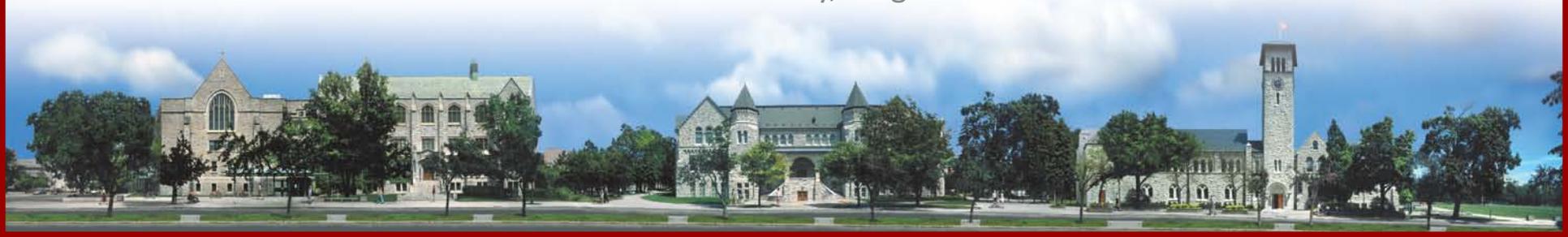
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# Background

- Chest tube insertion is a common and often life-saving procedure. <sup>1,2</sup>
- Risk of procedural complications is highest among inexperienced operators. <sup>1,3-6</sup>
- Commercially available task trainers can be used to acquire the basic skills of tube thoracostomy but these models are often expensive and not widely available. <sup>7-12</sup>



# Objective

- Evaluate the use of a novel, cost-effective task-trainer model utilizing pork ribs compared to a current commercially available simulation task trainer (TraumaMan<sup>®</sup>)



# The Porcine Model





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# Methods

- 38 residents and practicing physicians performed tube thoracostomy on both simulation models in a cross-over design.
- All participants were asked to indicate their personal preference of model (z-score for proportional data).



# Methods 2

- Participants who had previously successfully placed a minimum of 3 chest tubes in live patients were also asked to compare their perceptions of each model compared with the “real life” experience of chest tube insertion (Fisher-Freeman-Halton Exact Test).



# Demographics

**TABLE 1. Demographics**

Specialty (All)	Number (%)
Anesthesia	8 (21)
Emergency Medicine	6 (16)
Family Medicine	6 (16)
General Surgery	3 (8)
Orthopedic Surgery	3 (8)
Respirology	3 (8)
Urology	1 (2)
Not Specified	8 (21)
Year of Training (All)	
PGY-1 or 2	21 (55)
PGY-3 or 4	7 (18)
PGY -5 or more	2 (5)
Physician (in practice)	6 (16)
Not Specified	2 (5)

Specialty (>3 Chest Tubes in Live Patients)	
Anesthesia	4 (25)
Emergency Medicine	4 (25)
Critical Care	2 (12.5)
Respirology	2 (12.5)
General Surgery	1 (6)
Family Medicine	1 (6)
Not Specified	2 (12.5)



# Results 1: Preference

- 84% of participants (32/38,  $Z=4.22$ ,  $p<0.001$ ) preferred the new porcine model over the commercially available task trainer.

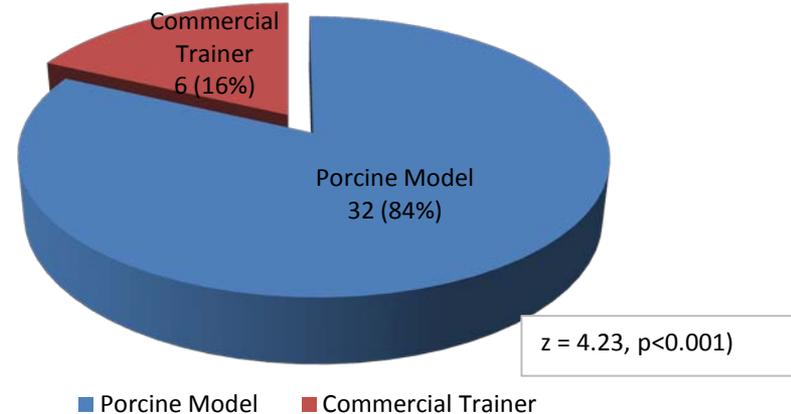
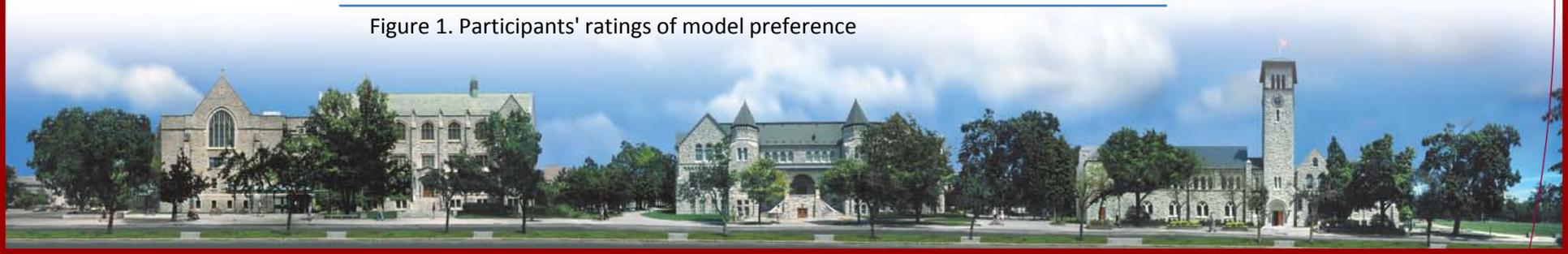


Figure 1. Participants' ratings of model preference



# Results 2: Realism

- Of the participants ( $\geq 3$  chest tubes):
    - all except one (15/16\*) either “agreed” or “strongly agreed” that **overall** “*inserting a chest tube using the porcine model was a realistic experience*”
    - compared to 8/16 for the commercial trainer
- (\* $p = 0.0054$ ).



# Results 3: Realism

- Participants ( $\geq 3$  chest tubes) rated pork ribs having
  - significantly more realistic “blunt dissection” ( $p=0.0054$ )
  - non-significant trend towards more realistic “skin” ( $p=0.26$ ) and more realistic “entering the pleura” ( $p=0.29$ ).



# Results 2: Realism

**Table 2. Inserting a chest tube on the model is a realistic experience**

Aspect of the model	Likert Scale of Realism— number of responses			
	Strongly Disagree	Disagree	Agree	Strongly Agree
<b>Overall (*p = 0.0054)</b>				
Porcine		1	12	3
Commercial Trainer		8	8	
<b>Skin (p=0.26)</b>				
Porcine		4	8	4
Commercial Trainer		8	7	1
<b>Blunt Dissection (*p=0.0054)</b>				
Porcine		1	12	3
Commercial Trainer	3	7	5	1
<b>Entering the pleura (p=0.29)</b>				
Porcine	1	3	10	2
Commercial Trainer		8	7	1

\* Significant  $p < 0.01$



# Results 3: Ethics

- None of the participants perceived any ethical concern with the use of the pork ribs model.



# How much does it cost?

## Trauma Man®

- **\$2600.00** to rent two
  - With skins for 16 learners
  - 2 tubes each
  - 3 other surgical skills
    - Pericardiocentesis
    - DPL
    - Tracheotomy

## Porcine Model

- **\$260.00** to buy 10 racks and assemble
  - Multiple attempts on each
- One-time purchase of a drill, 2X4 wood, screws, wire
  - \$150.00



# Conclusions

- This study supports the validity of the porcine model
  - a cost-effective teaching tool for chest drain insertion.
- Participants in this study perceived the porcine model a more realistic experience
- They did not express any ethical concerns regarding its use.



# Conclusions 2

- The low cost of this model makes it appealing
  - Could improve access to procedural training in tube thoracostomy.



# Areas of further study

- Further study is required
  - to evaluate if the use of this model could be associated with other tangible outcomes, such as accelerated acquisition of skills, fewer procedural complications, and improved learner confidence.



# Funding

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