



An Inexpensive, Easily Constructed, Reusable Task Trainer for Simulating Ultrasound-Guided Pericardiocentesis

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Introduction

- Pericardiocentesis is a low frequency, high-risk procedure integral to the practice of emergency medicine.
- Ultrasound-guided pericardiocentesis is the preferred technique for providing this critical care.
- Traditionally, emergency physicians learned pericardiocentesis real time, at the bedside, on critically ill patients.
- Medical education is moving toward simulation for training and assessment of procedures such as pericardiocentesis, because it allows learners to practice time-sensitive skills without risk to patient or learner.
- There are mannequin-based simulators capable of supporting landmark-guided pericardiocentesis, but they are expensive.
- No commercially available simulation models enable physicians to practice pericardiocentesis under ultrasound guidance.

Materials

- 14 oz plain gelatin
- 1 16-inch diameter "punching bag" balloon
- one golf ball
- red and green food coloring
- non-stick cooking spray
- one wooden cooking skewer
- 4 oz Betadine™
- 14 oz water plus 200-250 mL water
- 3-quart cubical Tupperware container
- 6-quart tall stock pot or saucepan
- candy thermometer
- refrigeration and a stove

Instructions

- Mix cold water and gelatin in Tupperware container.
- Cool gelatin mixture in refrigerator for two hours.
- Place golf ball inside of 16-inch punching bag balloon. Add 200-250 mL of water dyed with red food coloring to balloon. Tie off balloon to seal.
- Coat 3 quart tupperware container with non-stick cooking spray.
- Remove gelatin mixture from refrigerator and heat over stovetop in 6 quart pot until gelatin is liquefied. Use candy thermometer to ensure mixture does not exceed 130° F. Add several drops of green food coloring and 4 oz Betadine™ as the gelatin liquefies.
- Pour liquefied gelatin mixture to depth of 2cm in tupperware container and cool in the refrigerator until firm.
- Place balloon on top of set gelatin mixture in center of Tupperware container with tied end facing upward. Secure balloon in this position by feeding wooden skewer through the tied balloon knot and wedging skewer inside tupperware container.
- Fill Tupperware container with the liquefied gelatin mixture until a level just below wooden skewer and again cool in the refrigerator until firm.
- Remove wooden skewer and fill Tupperware container to brim with remaining liquefied gelatin.
- Cool in refrigerator until entire mold is firmly set.
- Remove model from tupperware container and begin use.



Benefits of this Model

- Provides a realistic real time ultrasound image for residents to guide pericardiocentesis
- This model will sustain several dozen needle punctures without significant damage or leakage.

Cost & Longevity

- Total cost for the model is approximately twenty dollars.
- Once the materials are acquired the assembly time is approximately 90 minutes.
- The model lasts for approximately two weeks at room temperature.
- With refrigeration between use the pericardiocentesis model lasts for over two months.
- When the model begins to show signs of wear, the gelatin may again be melted down at 130° F and reused.

References

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