



A Novel Cesarean Section Simulation Model for Transition to Residency Surgical Training



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INTRODUCTION

Cesarean sections are one of the first major surgeries an Obstetrics and Gynecology (OB/GYN) resident performs after they transition from medical school to residency training. Prior to surgery on a patient, it is essential that trainees have exposure to practice-based learning and simulation. We propose a low-fidelity, high-impact model which aligns with the ACOG Cesarean Section Evaluation Form (Figure 1) created by the CREOG Surgical Skills Task Force to improve trainee understanding and comfortability with this important major surgery.

The proposed model allows OB/GYN residents the opportunity to walk through the steps of a cesarean section. The cesarean model includes visual and tactile representations of the skin, subcutaneous tissue, muscle, anterior and posterior fascial layers, peritoneum, uterine serosa and the uterus itself. This model is easy to use, teach with, produce, and replicate. Each model costs less than \$5 to produce and is made of recyclable materials.

OBJECTIVES

Primary Aim: Develop a low-fidelity, high-impact model that aligns with the ACOG Cesarean section Evaluation form for use of OBGYN trainees

Secondary Aim: Utilize low cost model to teach Cesarean section surgical technique

Tertiary Aim: Increase junior resident confidence and competency in Cesarean section surgery

MATERIALS



Figure 2. Cesarean Section model

METHODS

Model Design

- Low-cost, reproducible model of the abdomen
- Easily accessible materials
- Model can be easily replicated
- Allows trainees to:
 - Practice entry to the abdomen
 - Visualize abdominal layers
 - Practice creation of the hysterotomy
 - Rehearse instrument calls
 - Review C section steps in a risk free environment

Implementation

- Facilitates teaching of surgical anatomy, layered dissection, and team communication
- Each model can be used at least 2 times
- Designed for use during OB/GYN intern orientation/ boot camp to practice Cesarean section

Materials Used

By equating each tissue layer with familiar textures, the model reinforces both anatomical knowledge and procedural sequence through sensory memory – ideally creating a memory hook for learners. Each layer is simulated using the materials listed below in Table 1. The model is depicted in Figure 2. Individual layers are demonstrated in Figure 3.

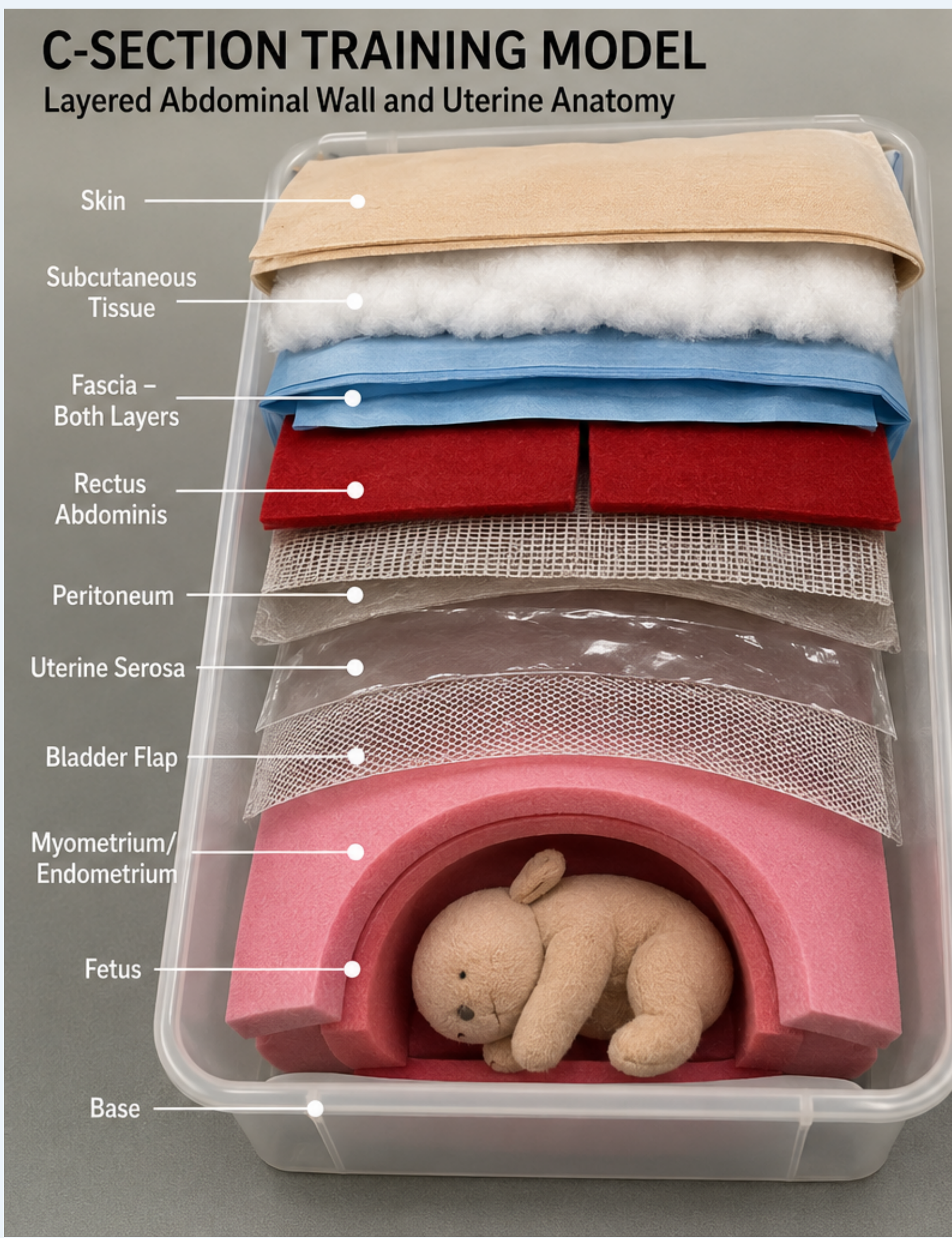


Figure 3. Individual layers of Cesarean section model, illustration generated by OpenAI using prompt table of anatomy and materials as listed above

Cesarean Section Evaluation		
Resident Name:		Date:
Resident Level:		
Evaluator Name:		
Patient Setup		
1. Time out includes: patient identity, allergies, blood available	Yes	No
2. Antibiotics	Yes	No
3. DVT Prophylaxis	Yes	No
4. Describes or places the patient in the supine position	Yes	No
Instrument Setup		
5. Calls for instruments	Yes	No
6. Identifies instrumentation	Yes	No
Abdominal Entry		
7. Describes/performs appropriate abdominal incision	Yes	No
8. Describes/performs identification of layers of the abdomen	Yes	No
9. Describes/performs identification and incision of the fascial layer	Yes	No
Cesarean Section Procedure		
10. Identifies the rectus muscle and separates in the midline	Yes	No
11. Identifies and enters the peritoneal layer sharply or bluntly	Yes	No
12. Identify the uterus	Yes	No
13. Describes the dissection of the bladder flap	Yes	No
14. Performs the incision of the uterus	Yes	No
15. Performs the delivery of the fetus from the uterus	Yes	No
16. Describes the delivery of the placenta	Yes	No
17. Performs clearing of clots/debris from uterus	Yes	No
18. Calls for appropriate suture to close the uterus	Yes	No
19. Closure of the uterus		
a. Re-approximate edges of uterus	Yes	No
b. Performs a running, locked stitch	Yes	No
c. Choose a single or double layer closure	Yes	No
20. Describes closure of the bladder flap (if desired)	Yes	No
21. Performs a re-approximation of the rectus muscle	Yes	No
22. Performs the re-approximation of the fascial layer in a running fashion	Yes	No
23. Performs the re-approximation of the subcutaneous fat layer	Yes	No
24. Performs closure of the skin incisions with staples	Yes	No

Figure 1. ACOG Cesarean Section Evaluation Form

ANATOMY	MATERIAL
Skin	Cotton fabric
Subcutaneous tissue	Polyester batting
Fascia – both layers	Repurposed sterile tray wrap
Rectus abdominis	Felt
Peritoneum	Mesh netting
Uterine serosa	Cellophane
Bladder flap	Fine netting
Myometrium/endometrium	Recycled drink koozie/foam sheets
Fetus	Stuffed animal/doll
Base	Plastic bin

CONCLUSION

An innovative, low-fidelity, high-impact cesarean section model, to be used in conjunction with the ACOG Cesarean Section Evaluation Form, has the potential to enhance trainee competence and confidence in performing cesarean section.

A large 2021 study of 4th year medical students entering the OBGYN field found that many entering trainees had minimal hands-on clinical experience with procedures. Our model provides a method of bridging this gap by introducing additional foundational training in cesarean section.

Using this cesarean section model, we intend to assess if cesarean section simulations during the transition from medical school to OB-GYN residency enhances trainee competency in performing cesarean sections during the first year of OB-GYN residency. Furthermore, we aim to assess the impact of our cesarean section model during a Transition to Residency course on first-year residents' retention of cesarean section skills during their first labor and delivery rotation of residency and attitudes regarding preparation and confidence with cesarean sections.

RESOURCES

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