Badger OHE Model

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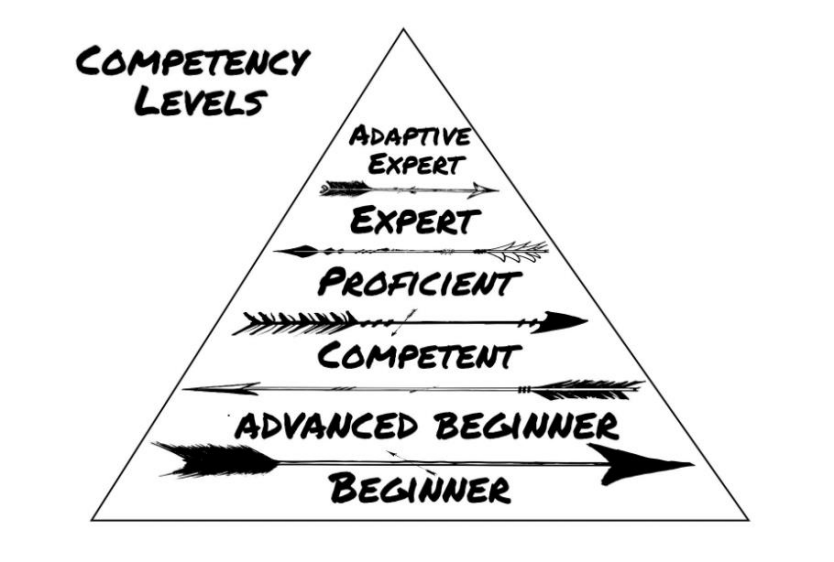
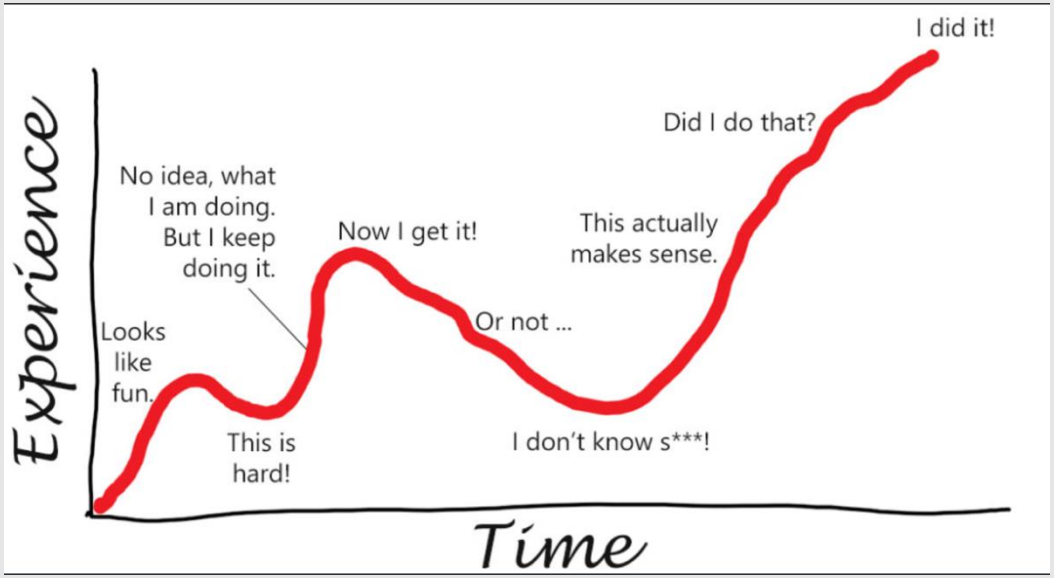
The Jr Sx Challenge: accelerated proficiency



- Most students enter VM2 surgery fundamentals course at beginner level
- Most progress to advanced beginner by the end of VM2
- Most revert to beginner level by end of summer/start of VM3

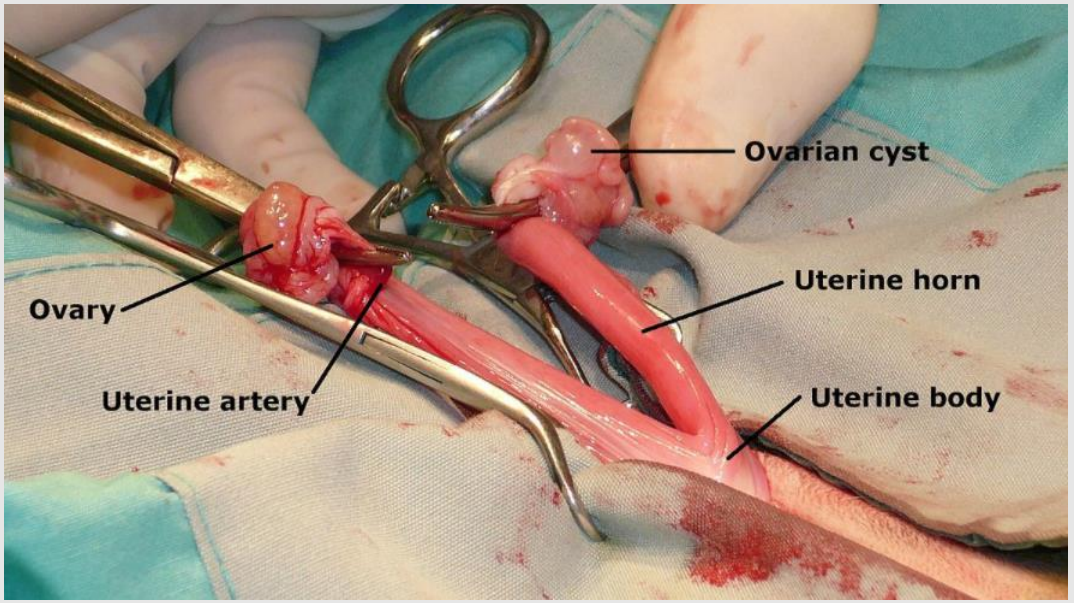


VM3 students have 4 weeks to achieve proficiency before live animal labs begin!!!

Jr Sx Surgical Learning Outcomes

At the end of this semester a student will be able to:

- Identify and describe the function of common surgical instruments
- Identify and describe the important properties of common suture materials and understand the indications for their use
- Demonstrate proficiency with various surgical techniques, including but not limited to the creation and closing of an incision, proper tissue and instrument handling and appropriate suture patterns and knot tying



Clinical skills required for live OHE labs

Surgical instruments

- Identify general surgical instruments & define usage(s)
- Properly use common instruments
  - Scalpel- how to hold, load, and make incision
  - Scissors- how to properly hold & how/when to use various types
  - Ringed instruments- how to properly hold and why

Suture indications

- Taper vs. cutting needle
- Absorbable vs. non-absorbable
- Monofilament vs. multifilament

Suturing techniques

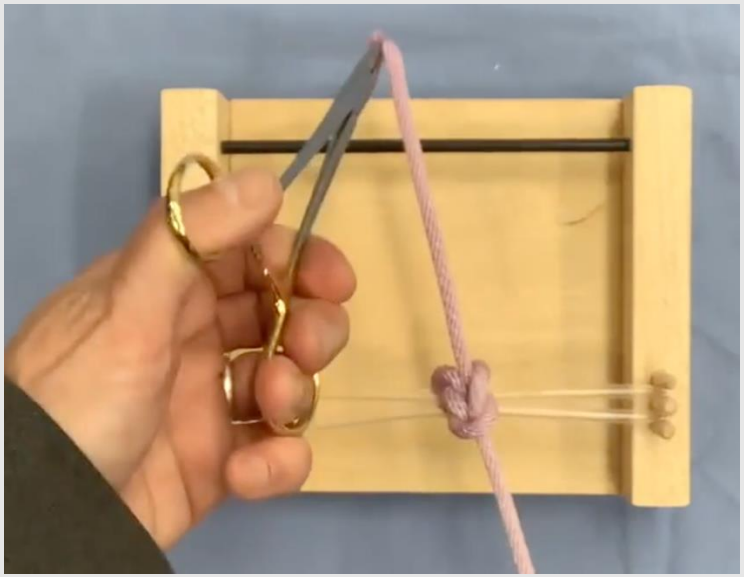
- Throw/knot creation (slip/hitch, granny vs. square, single vs. surgeon)
- Basic suturing tenets (plastic deformation, apposition and tension mitigation)
- Ligature tying (simple encircling, double encircling, transfixational)
  - Modified miller's knot, miller's knot, figure 8, etc.
- Ligature surgical techniques (3-clamp technique, flashing the clamp & the crush)
- Suturing (simple interrupted, simple continuous)
- Advanced techniques (buried knots, intradermal, smurfing, etc.)

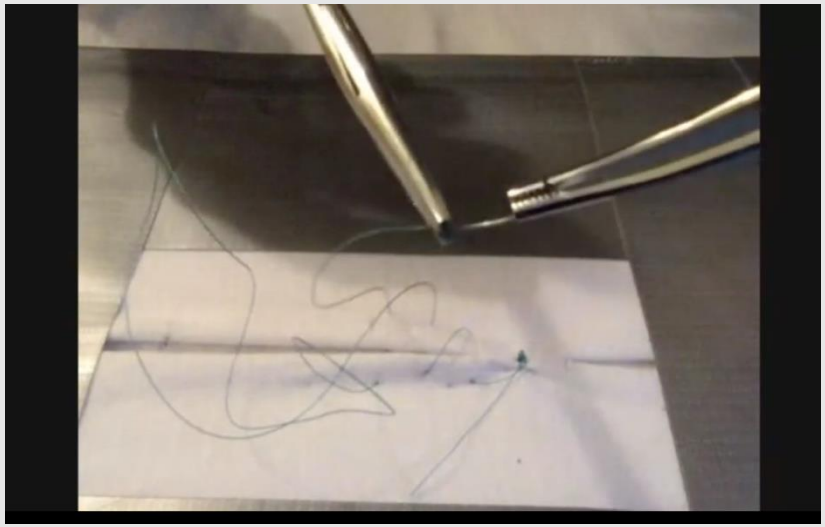
The process: how to become proficient

Utilization of active learning

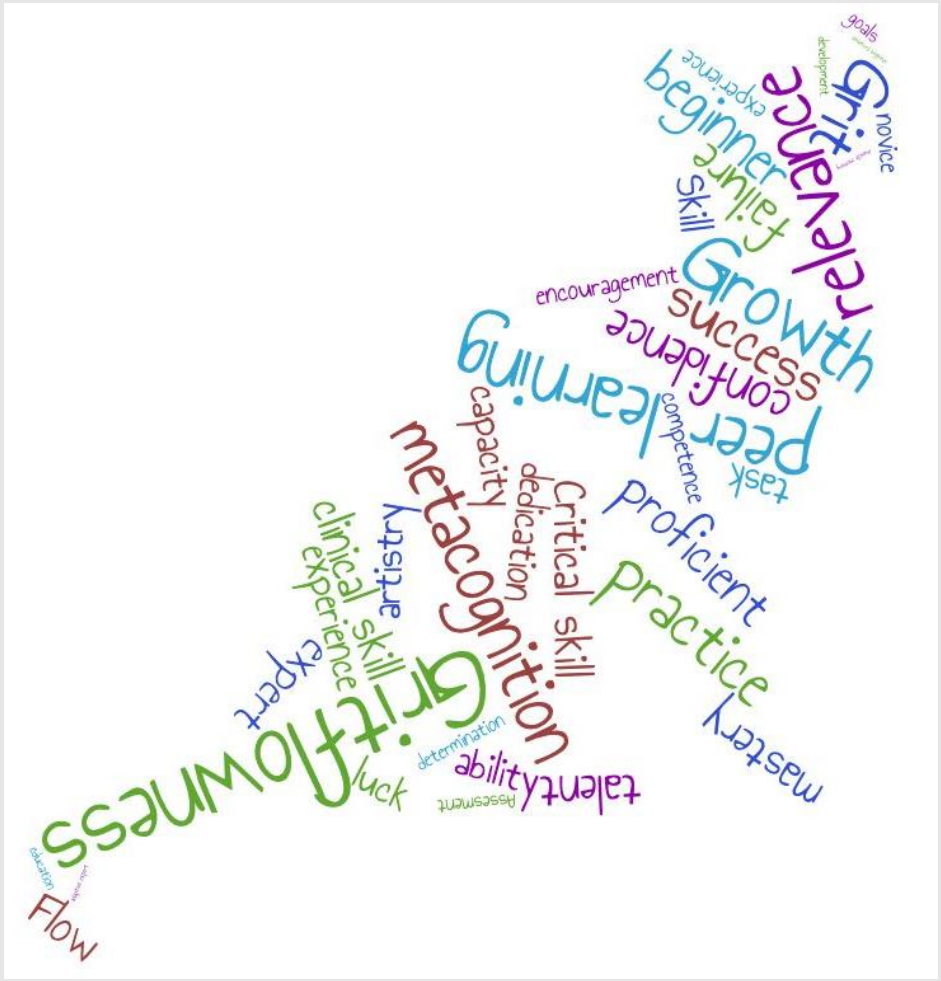
Absorb, do & connect

- Deliberate practice
- Growth mindset
  - Appreciate set-backs as learning opportunities
- Repetition & **muscle memory**
  - Prefect practice makes perfect
- Peer teaching
- Low-stakes environments initially, higher stakes with higher-order learning
- Increasing complexity in conjunction with increased realism
- Assessment of critical skills via one-on-one hands-on practical examination (OSCE)
  - Assessment with meaningful feedback drives learning





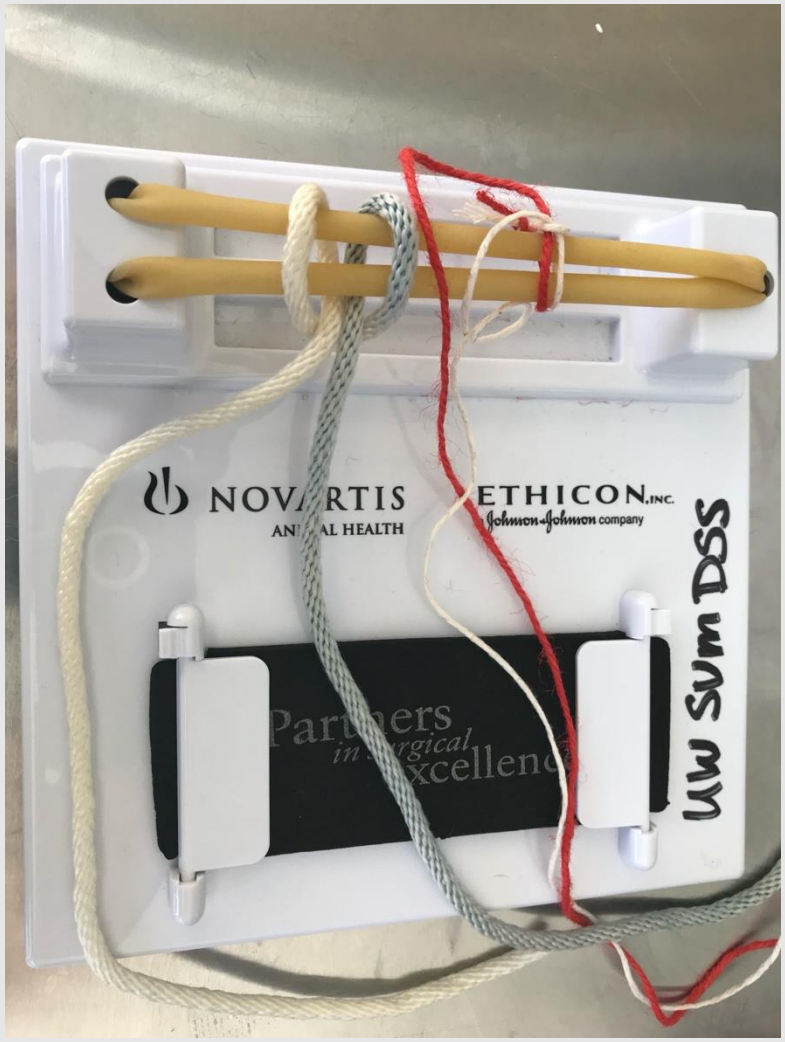
Functioning at the proficient level…



- Builds confidence
- Elevates entrustment scores
- Enhances student success rates under duress
  - Increased success with core clinical skills
- Improves student experience
  - Overall feeling of a successful day/week/semester
- Improves patient outcomes due to increased efficiency & skill
  - Improved tissue handling
  - Decreased surgical/anesthesia times
  - Fewer post-op complications (hopefully)

Pairing models to critical clinical skills

Suture Board



Clinical skills learned using this model

Suturing techniques

- Throw/knot creation
  - Slip/hitch
  - Granny vs. square
  - Single vs. surgeon
- Basic suturing tenets
  - Plastic deformation
  - Apposition and tension mitigation
- Ligature tying
  - Simple encircling
  - Double encircling
    - Modified miller's knot

Pairing models to critical clinical skills (cont.)

Suturing techniques

- Throw/knot creation
  - Slip/hitch
  - Granny vs. square
  - Single vs. surgeon
- Basic suturing tenets
  - Plastic deformation
  - Apposition
  - Tension mitigation
- Suturing
  - Simple interrupted
  - Simple continuous
- Advanced techniques
  - Buried knots
  - Intradermal
  - Smurfing

Silicone suture pads

Pairing models to critical clinical skills (cont.)

Superficial & deep pedicle model

Suturing techniques

- Throw/knot creation
  - Slip/hitch
  - Granny vs. square
  - Single vs. surgeon
- Basic suturing tenets
  - Plastic deformation
  - Apposition
  - Tension mitigation
- Ligature surgical techniques
  - 3-clamp technique
  - Flashing the clamp
  - Ligating in the crush

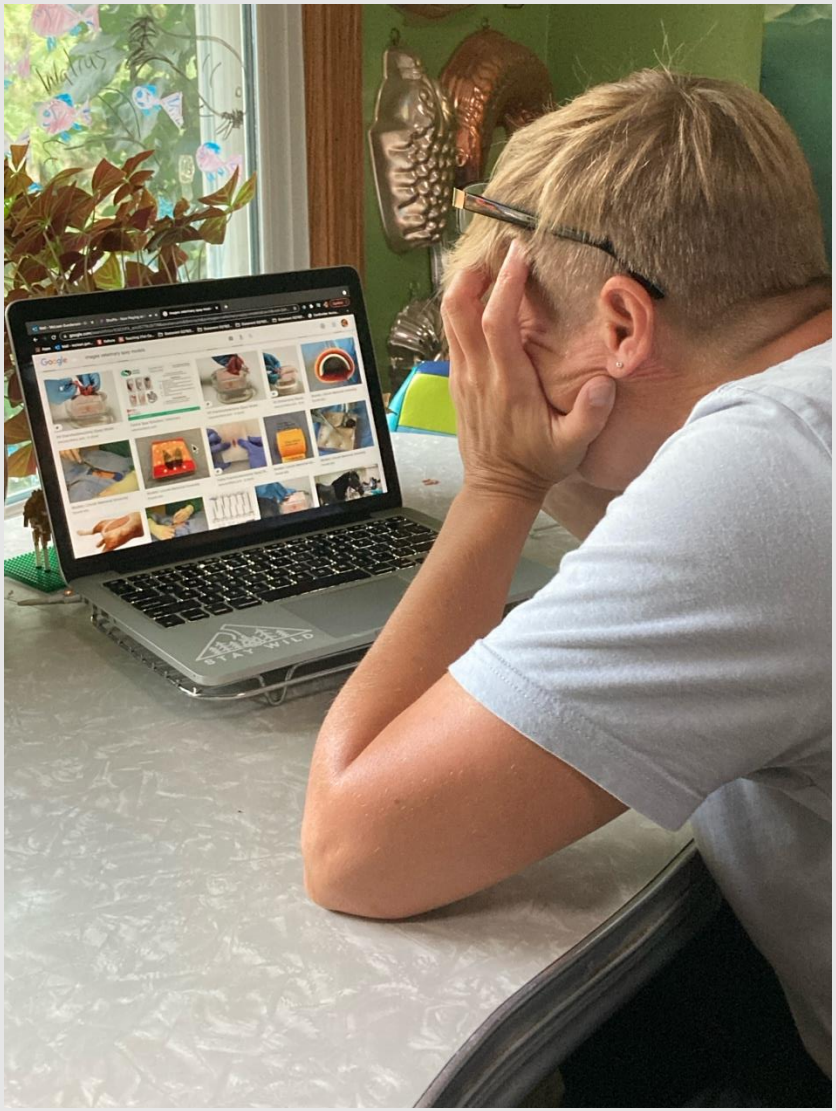
Other advantages of deep model

- Embed into a stuffed animal to obtain cranial/ caudal orientation
- Work inside of a cavity (↑ difficulty)

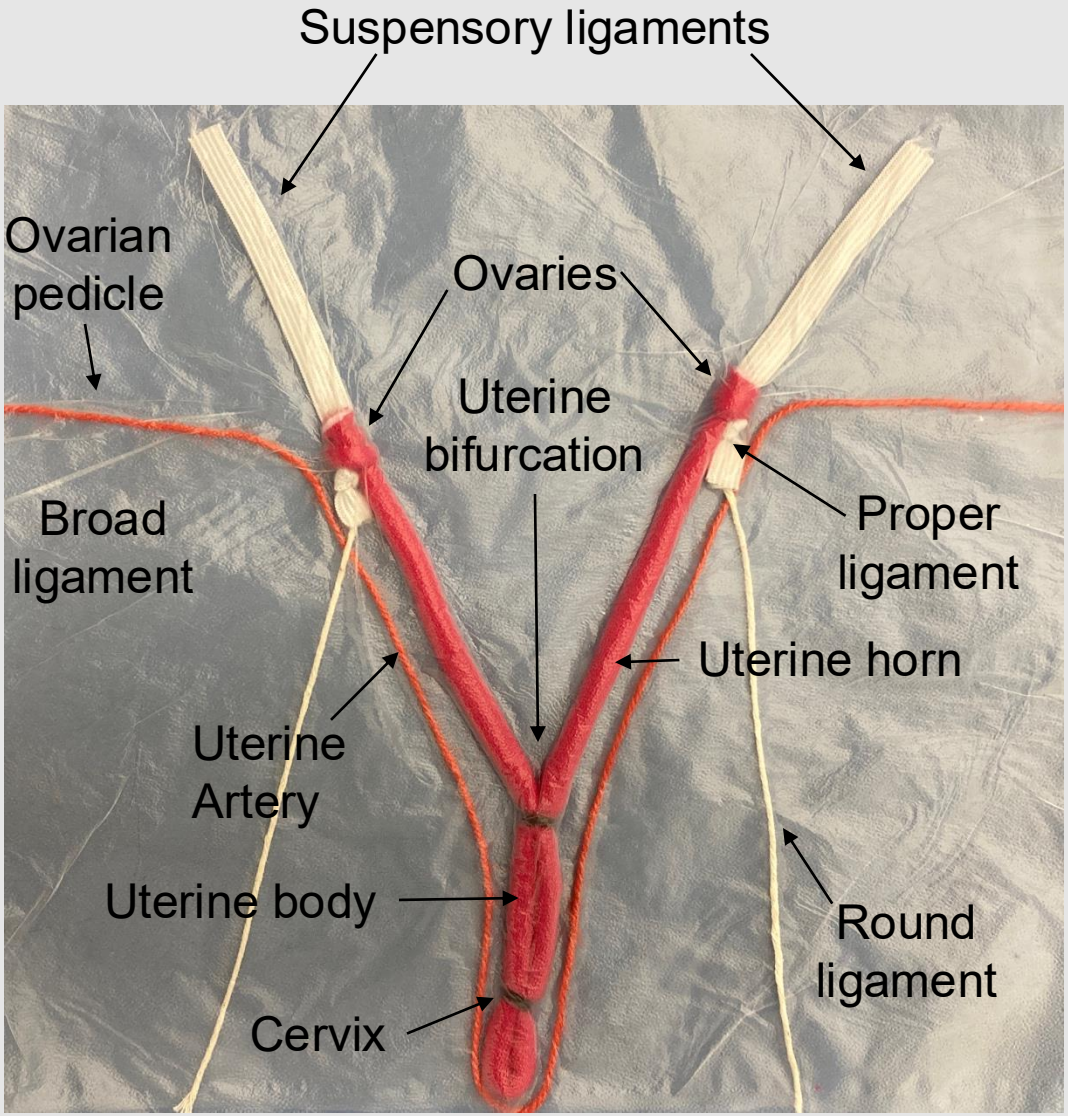
Limitations of our previous models

Core clinical skills that could not be taught on previous models

- Transfixation techniques
  - Simple
  - Figure 8
- Pairing relevant anatomy with the relevant surgical technique
  - Ligatures vs. sutures
  - Cutting vs. tearing
  - Break down suspensory (dog) or not (cat)
- Flow
  - Disjunct tasks
  - Students unable to assemble tasks into a proper surgical order



One model to rule them all…



Badger OHE model

- Highlights relevant anatomic structures
- Allows for step-by-step completion of relevant intra-abdominal surgical techniques
- Inexpensive to make
- Easy to create & duplicate from household items
- Portable
- Size adjustable (kitten, cat, dog)
- Scalable (basic to complex)

Utilization in junior surgery

- Pre-covid students used in pairs in lab
  - Break down suspensory
  - Fan fingers to fenestrate
  - 3 clamp technique
  - Broad ligament & round ligament management
  - transfixation of uterine body
- During Covid students had models, instruments and suture at home to practice
- Students make replacement inserts for additional practice

Shout out to Tina Wahl for building all of the models last year and this year (200+ models)!

Badger OHE Model fully supported on LMS (Canvas)

- Learning management system (LMS) content presents each individual skill and as a whole procedure
- Rubrics present critical clinical skills
- Culminates in students utilizing the model alone or in pairs to simulate OHE
- Students watch classmates in synchronous rounds and learn from each others success and failures
- Low-stress environment

Badger OHE model is fully scalable

- Change size to simulate a kitten, cat or dog
- Can change size of structures to simulate
  - increased vasculature
  - Increased size of uterus
  - Variable suspensory ligament
- Embed in a stuffed animal to increase realism

Further support of the model

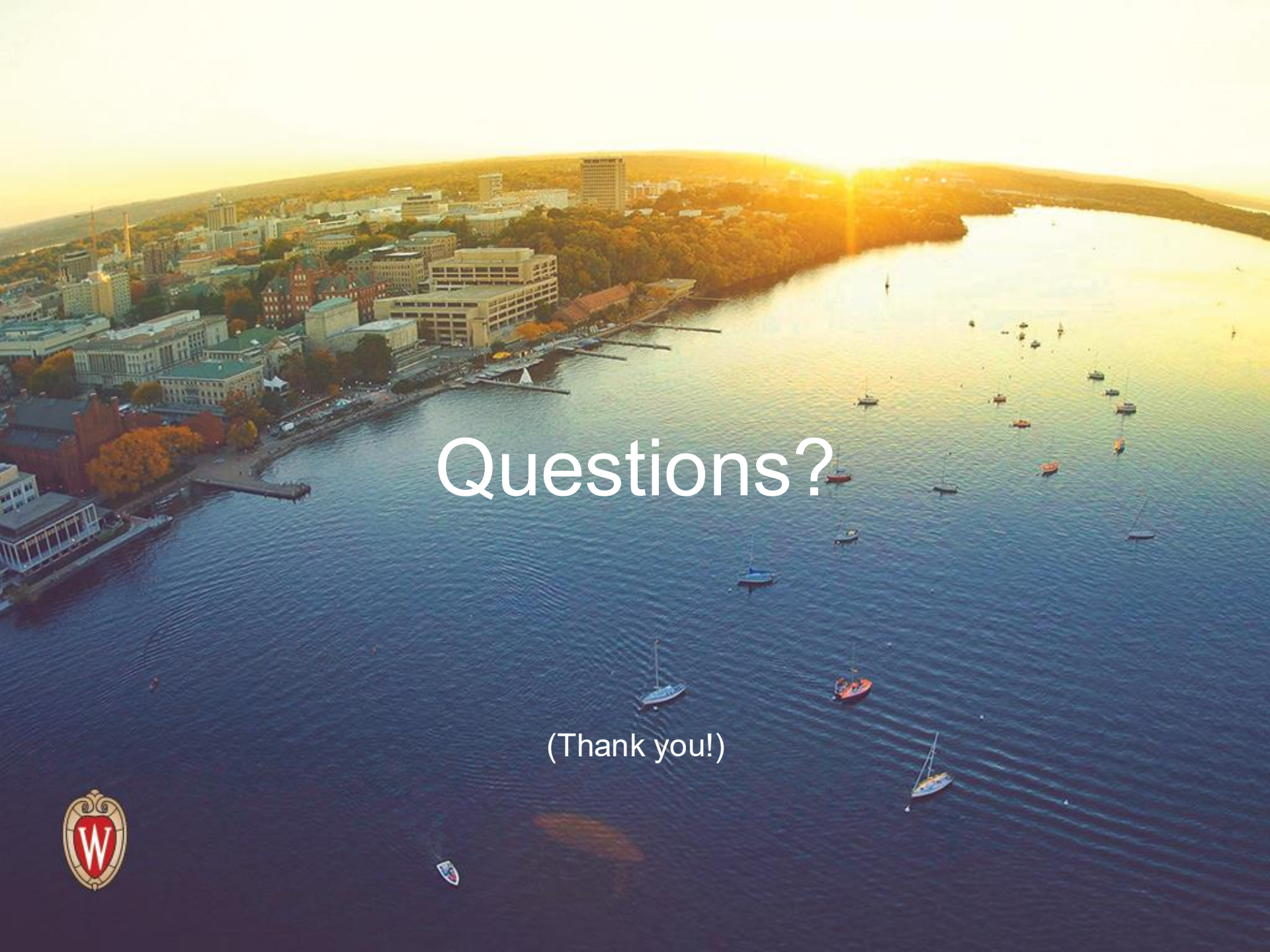
- Rubrics for core clinical skills
- Assessments (OSCE's) for core clinical skills
- Entrustment scoring/Badging for core clinical skills

JUNIOR SURGERY PRACTICAL SKILLS ASSESSMENT -- INSTRUCTIONS & SCORING CRITERIA --

SKILL	CRITERIA	SCORING
Two-Handed Ties	**Tools:** ▪ Suture board with bi-colored rope **Instructions:** ▪ Complete a series of two-handed ties to complete 3 square knots **General Pass Description:** ▪ Student demonstrates proper two-handed technique, in a continuous, efficient, alternating pattern **Fail:** ▪ Tied slip knot(s) ▪ Tied granny knot(s) ▪ Technique is not consistent or efficient	Pass/Fail
Ligature (Modified Miller's knot)	**Tools:** ▪ Deep pedicle model, two curved hemostatic forceps, and kite string/dental floss, etc. (approx. 16 inches) **Instructions:** ▪ Complete a modified Miller's knot over clamps, grasp or pinch the knot with your non-dominant hand, grasp the handles of the clamps with your dominant hand, slide the knot into place over the tips of the clamps around the pedicle so that the knot is visible and on the side of the surgeon, pass the clamps back to the assistant, grasp the free end of the suture with your dominant hand, ligate the pedicle, then complete 5 more throws using a two-handed hand tie (modified Miller's throw followed by 5 more throws with two-handed ties). **General Pass Description:** ▪ Student demonstrates proper: creation of modified Miller's knot, control & handling of clamps and string, placement of proximal knot, and transition into two-handed ties. The ligature must be completed with 3 flat square knots, accomplished with a minimum of 6 throws. **Fail:** ▪ Unable to place proper modified Miller's knot around clamp handles and control the knot off of the clamps and onto pedicle ▪ Creates the same throw twice (does NOT alternate between crossed and uncrossed hands) creating a granny knot (asymmetrical knot) ▪ Creates 1 or more slip knots, not noticed or corrected by tying 2 additional proper throws	Pass/Fail

Further innovations

- Simulate the linea alba/ rectus sheath for meltdown versus stab incision
- Silicone pad to simulate skin & subcutaneous layers (incise and suture closed)
- Surgical preparation of model possible with simulated skin
- Simulated cutaneous anatomy allows accurate incisional placement
  - Umbilicus
  - Nipples
  - Pubis
  - Xiphoid


Questions?
(Thank you!)