

Improving Anatomical Knowledge through Interactive Modules on the OB/GYN Clinical Clerkship



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The goal of this study is to evaluate the impact of a newly designed interactive method of teaching clinically relevant anatomy to medical students on the OB/GYN clerkship.

A 20-question multiple-choice exam was administered to 143 consenting third-year medical students at the beginning and end of each OB/GYN rotation. Students participated in a skills lab with preparatory e-modules that linked anatomy to clinical applications during each rotation. Topics included perineal muscle anatomy (laceration), anterior abdominal wall anatomy (cesarean section), vulvovaginal and uterine anatomy (IUD), and pelvic organ, vasculature, and neural anatomy (hysterectomy).

Mean scores improved significantly after the nesting of interactive modules, increasing from 55.1% to 67.4% ($p < 0.001$). In comparing mean scores from questions that were covered in the e-modules (intervention) and questions that were not covered in the e-modules (non-intervention), students improved significantly after receiving an intervention (9.4% difference; $p < 0.001$). Therefore, completing the clerkship without an intervention did not yield significant improvement in relevant anatomical knowledge, compared to intervention.

Thus, nesting anatomical science into the clinical curriculum through preparatory e-modules and hands-on anatomy lab sessions may improve clinically-significant anatomy knowledge. This data may be used to increase longitudinal integration of the various disciplines across the undergraduate medical curriculum.

OBJECTIVE

Deficits in retention of anatomy knowledge from the preclinical years to clinical application on the wards have been well documented in medical education literature. We developed and evaluated interactive clinically-oriented basic anatomy modules that were nested longitudinally in the curriculum to increase anatomical knowledge during the obstetrics and gynecology (OB/GYN) clinical clerkship.

METHODS

PARTICIPANTS:

- 143 consenting third-year medical students

MCQ EXAMINATION (29 QUESTIONS):

- Baseline and final anatomy assessment
- Topics: uterus, vasculature, fallopian tube, perineum, placenta

CURRICULUM:

- Four interactive e-modules
- Hands-on gross laboratory experience with three stations (Figure 1)

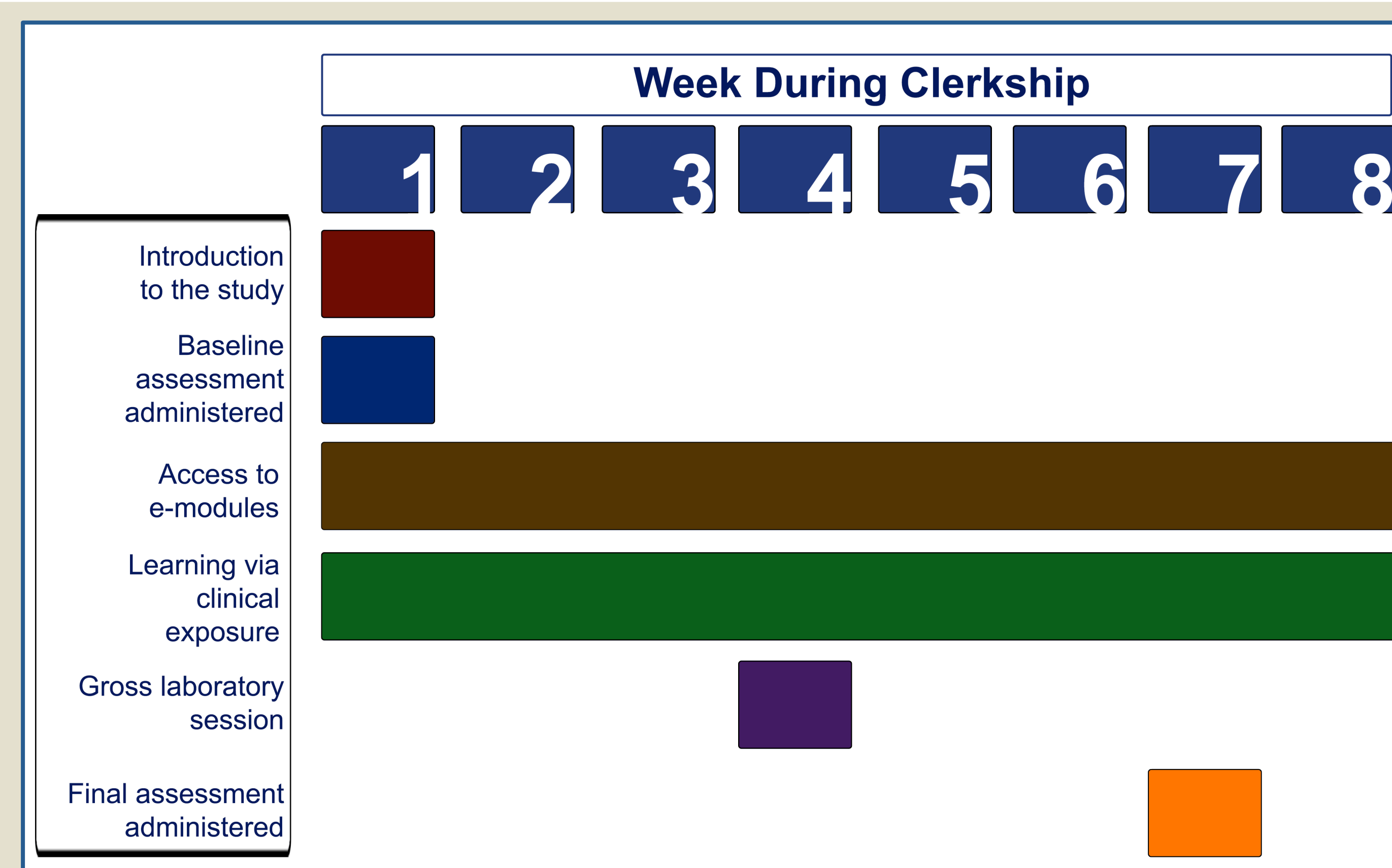


FIGURE 1: Timeline of the curriculum with the nested modules.

TOPICS:

- Perineal muscle anatomy (OB laceration repair)
- Anterior abdominal wall anatomy (cesarean section)
- Vulvovaginal and uterine anatomy (IUD insertion)
- Hysterectomy (Pelvic organ and neurovasculature)

DATA ANALYSIS:

- Univariate ANOVAs with paired t-tests

RESULTS

STUDENT PERFORMANCE:

- Mean final scores for all questions increased by 10.12% ($p < 0.001$) after nesting of interactive modules
- Questions nested within the modules ("Curriculum questions"), the mean final scores increased by 14.3% ($p < 0.001$); contrastingly, final scores of questions with no respective e-modules ("Non-curriculum questions"), only increased by 5.97% ($p = 0.31$) (Figure 2)

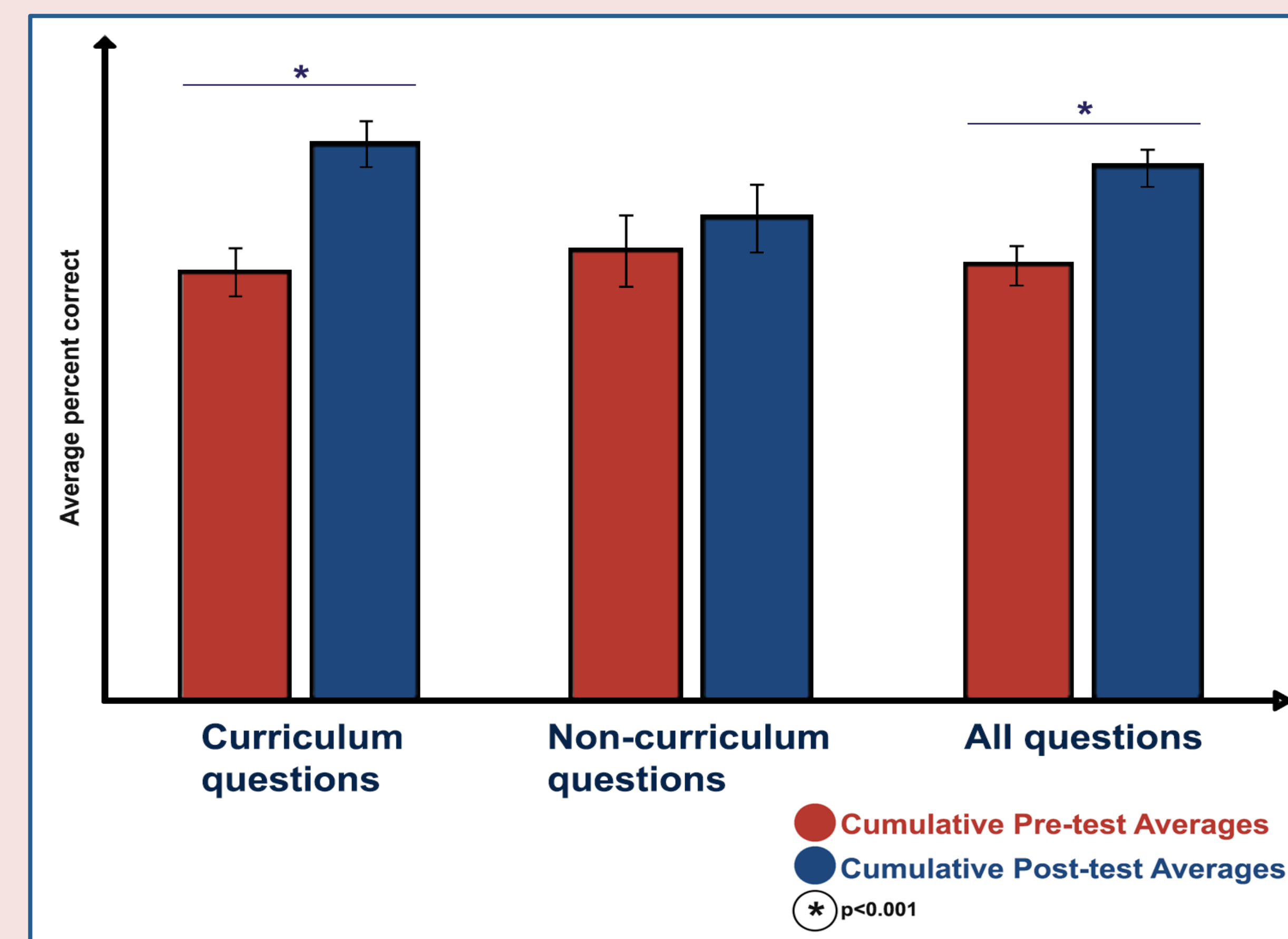


FIGURE 2: Percent-correct of curriculum questions, non-curriculum questions, and all questions. Represented as an average percent correct in the pre-test, and post-test. Significant comparisons ($p < 0.001$) are denoted by an asterisk.

INCREASE IN POST-TEST SCORES:

Greatest gains for final scores:

- Uterus-related questions (30.34% increase, $p = 0.002$)
- Vasculature (15.84% increase, $p < 0.001$)
- Fallopian tube (25.96% increase, $p = 0.004$)

NON-CURRICULUM QUESTIONS:

The same level of improvement was not seen in final scores for non-curriculum questions. With the exception of embryology (mean difference = 7.98%; $p = 0.002$), anatomical knowledge did not improve significantly for topics not covered in the curriculum with the nested e-modules.

- Final scores for non-curriculum questions targeting the fallopian tubes/placenta exhibited insignificant gains with 7.49% and 4.98% changes, respectively
- Non-curriculum questions which targeted muscles and ligaments, the opposite trend was seen – an insignificant 0.57% decrease in final scores as compared to baseline scores (Table 1)

Anatomical Topic	Curriculum questions			Non-curriculum questions			All questions		
	Baseline score	Final score	Difference (\bar{d})	Baseline score	Final score	Difference (\bar{d})	Baseline score	Final score	Difference (\bar{d})
Uterus	47.46%	77.80%	30.34%	—	—	—	47.46%	77.80%	30.34%
Vasculature	56.32%	72.16%	15.84%	—	—	—	56.32%	72.16%	15.84%
Perineum	63.68%	73.17%	9.49%	—	—	—	63.68%	73.17%	9.49%
Peritoneum	85.78%	94.81%	9.03%	—	—	—	85.78%	94.81%	9.03%
Fallopian Tubes	41.52%	67.48%	25.96%	67.57%	75.07%	7.49%	54.55%	71.27%	16.72%
Muscles and Ligaments	54.95%	63.33%	8.38%	86.51%	85.94%	-0.57%	65.47%	70.87%	5.40%
Embryology	—	—	—	45.33%	53.30%	7.98%	45.33%	53.30%	7.98%
Placenta	—	—	—	77.95%	82.93%	4.98%	77.95%	82.93%	4.98%
All topics									
Mean	58.86%	73.20%	14.33%	61.33%	67.31%	5.97%	59.75%	69.87%	10.12%
SEM	2.38	1.97	—	4.39	3.88	—	2.07	2.04	—

TABLE 1: Mean percentage of answers for baseline and final tests by anatomical topic and inclusion of the topic in curriculum review implemented for third-year medical students rotating through the OB/GYN clerkship from 07/13 – 06/14. (Indicates $p < 0.05$)

CONCLUSIONS

Medical students' baseline anatomical knowledge before entering the OB/GYN clerkship is poor. Nesting anatomical science into the clinical curriculum through preparatory e-modules and hands-on anatomy lab sessions may improve clinically-significant anatomy knowledge of the pelvis.

FUTURE DIRECTIONS

This curriculum may serve as a model of vertical integration of basic science and clinical concepts. Components of this model may be adapted and incorporated into an anatomy course or during the clinical clerkship. Active coordination between clinical and anatomy faculty was a strength of this curriculum. This collaboration is necessary as many institutions move forward with vertical integration of the medical curriculum.

DISCLOSURES

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