

Anatomical Knowledge Retention in Changing Curricula

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Background

Traditionally anatomy is one of the first subjects taught in medical school. However, practicing physicians have commented on medical students' poor retention of anatomical knowledge in surgically oriented clerkships. Literature shows that correlating clinical and anatomical sciences throughout early medical education may improve anatomical knowledge retention (1). With major medical school curricular changes happening across the nation, more quantitative data confirming this correlation is needed (2). The undergraduate curriculum at the George Washington University School of Medicine (the first 4 years of medical school) recently underwent reorganization, transforming an earlier discipline-based curriculum to that of an organ- system-based one.

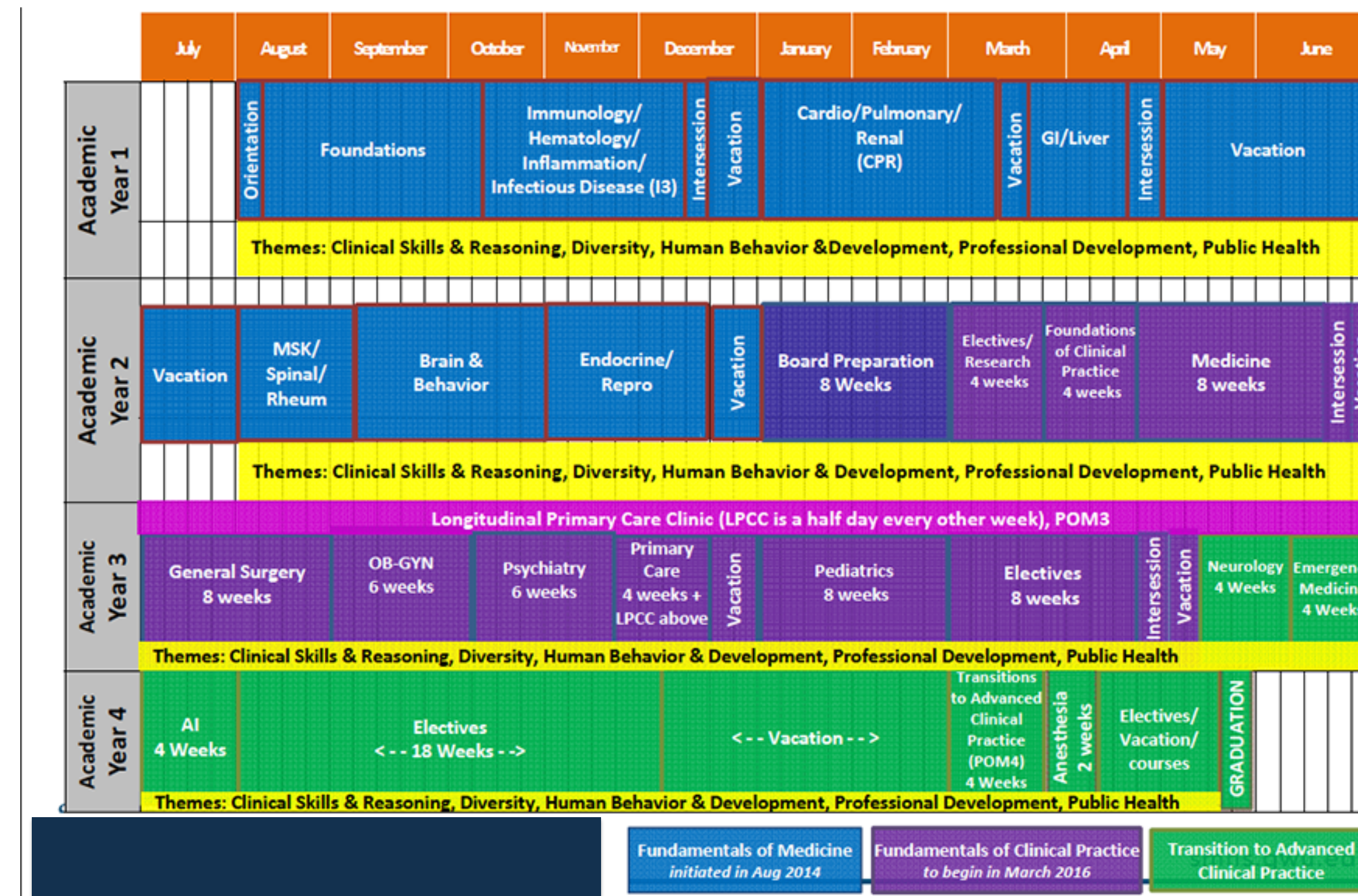


Figure 1: Organ System-based MD Curriculum
 This is a depiction of the 4-year medical school curriculum. Within each block, all disciplines are covered. For example, GI/ Liver block would include all pertinent anatomy, pharmacology, physiology, pathology, and microbiology.

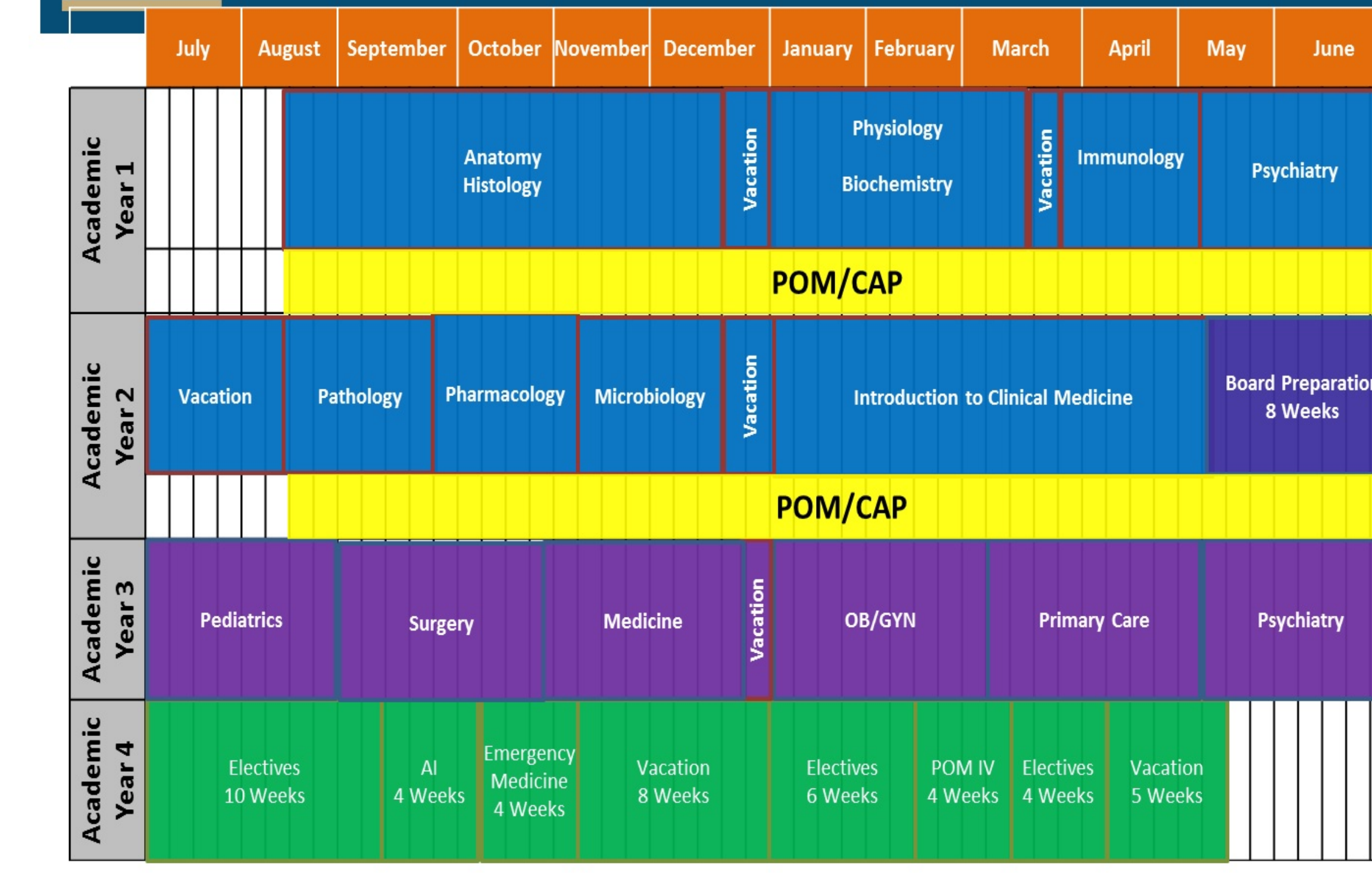


Figure 2: Discipline-based (previous) MD Curriculum
 A medical student entering GW prior to 2014 would have this traditional medical education. Each subject was taught, as depicted, unfocused around body systems.

Discussion and Conclusion

When comparing the 2013 to the 2016 data there were overall decreases in retention for anatomy knowledge as it relates to general surgery and OB/Gyn; however improvements were noted for specific topic areas. These results suggest that the change in retention is apparent and multifactorial.

Retention: The differences between surgical anatomy retention and OB/Gyn anatomy retention scores may be related to the way the subject matter was organized and presented, or how the anatomic foundational knowledge was integrated with its clinical relevance. Although organ-based curricula has been associated with better retention, more studies will have to be conducted to validate this statement (3). This study focused on how the material was presented to students, not how the students' studied or learned the anatomical topics.

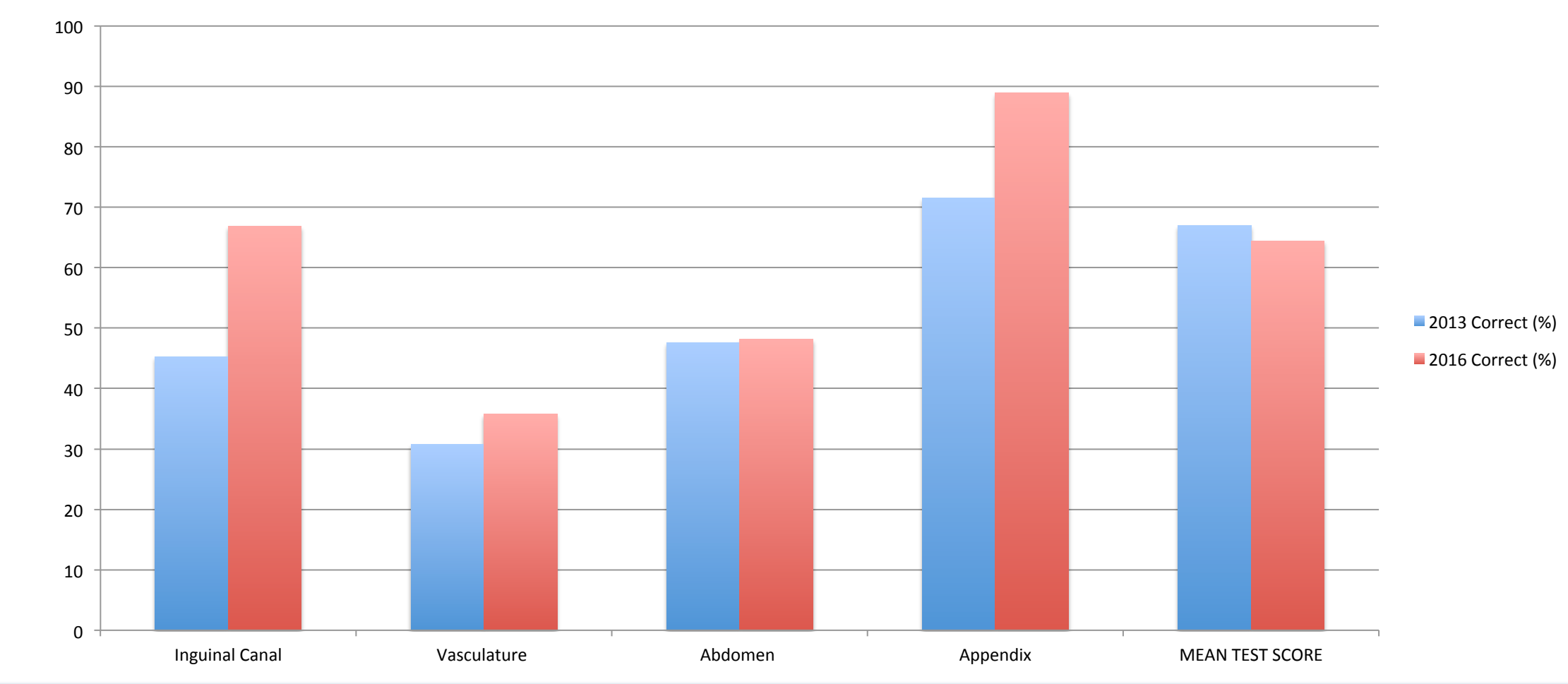
Curriculum Schedule: Finally, it should be noted that there are variations in the timing of courses taken and when the examination was given (Figure 3). For example, in the discipline-based curriculum anatomy was taught during the first 4 months of medical school. In the organ system-based curriculum, relevant content being taught for OB/ Gyn, for example, was in the "endo/ repro" block, 3 months before the anatomical retention exam was administered during "FCP."

Future Directions

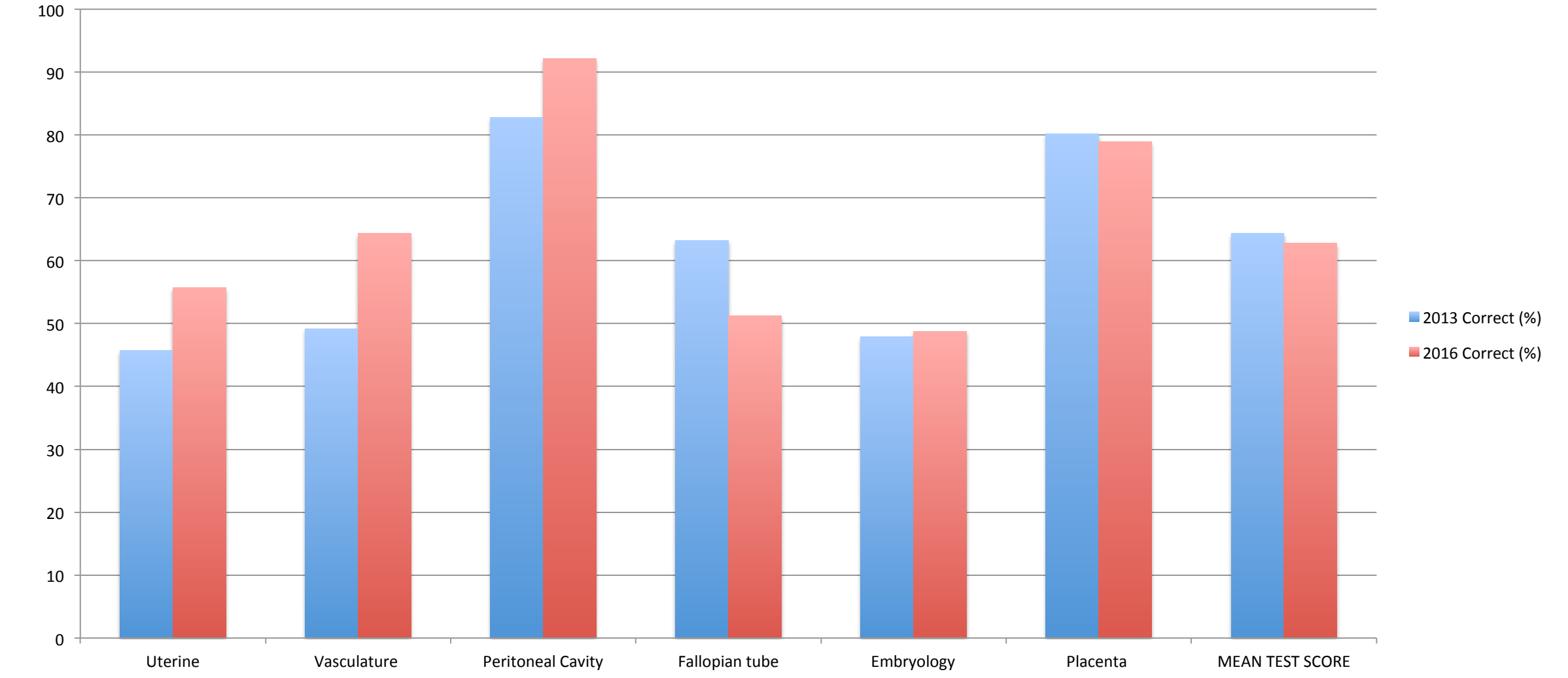
Moving forward, the subject matter, curriculum structure, clinical focus, and objectives should be evaluated. In addition, this project has been funded by the SMHS to conduct an international, multicenter study to analyze various curricular models and retention.

Methods

In order to determine whether an organ system-based organization of medical school curriculum has an effect on anatomical knowledge retention, comparisons of anatomical knowledge between classes in the different curricula were made (4). Students from the last class of the discipline-based curriculum and students from the first class of the new, organ-based curriculum completed the same 27-question test before beginning their general surgery and obstetrics and gynecology (OB/Gyn) rotations. Scores for specific anatomy categories related to general surgery and OB/Gyn were then analyzed and compared between classes.



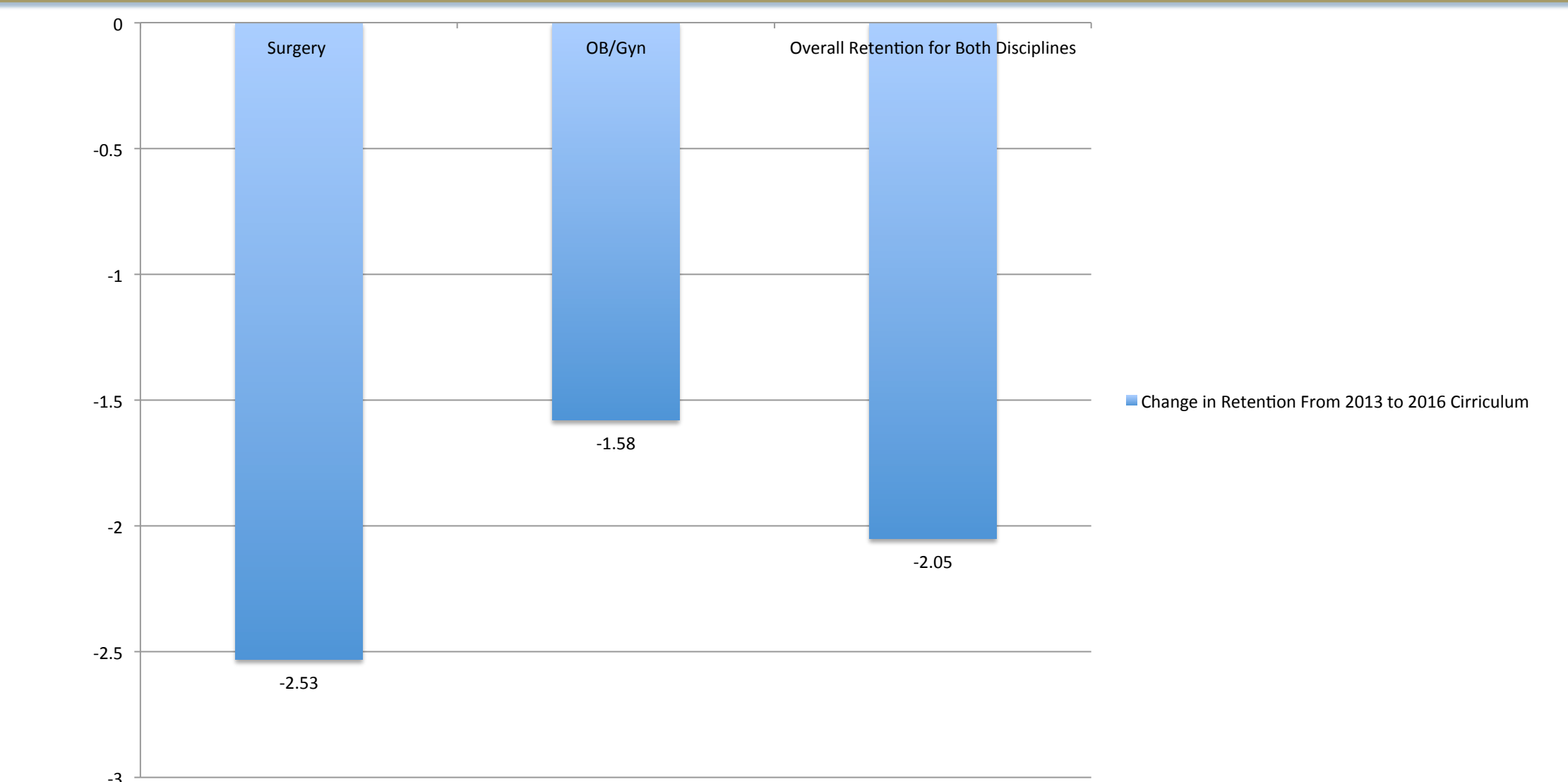
Graph 1: Surgical Anatomy Retention: Organ system-based (2016) vs. Discipline-based (2013) Curriculum
 The above graph demonstrates the varied retention in surgical anatomy between the two curricula. It is evident that the retention was higher for some anatomical regions, such as inguinal canal and appendix, but lower in overall surgical anatomy mean score.



Graph 2: OB/Gyn Anatomy Retention: Organ system-based (2016) vs. Discipline-based (2013) Curriculum
 Here variations in anatomical retention in regions relevant to clinical OB/ Gyn can be discerned between the different curricula. Again, variations in retention in different regions, such as fallopian tube and placental anatomy, were higher in the traditional curriculum in comparison to retention in the integrated curriculum.

Results

Comparing the scores from the 2013 and 2016 medical school classes, there was an overall decrease in anatomical knowledge retention from 65.69% to 63.64%. Item analysis by topic revealed a mean decrease in retention of surgical anatomy and OB/Gyn anatomy of 2.53% and 1.58%, respectively. There was a 21.6% increase in retention of inguinal canal anatomy and a 17.33% increase in appendix related questions. There was also a 12.02% decrease in retention of fallopian tube anatomy.



Graph 3: Retention Comparison 2013 vs. 2016 Scores
 The above graph illustrated the overall decrease in anatomical retention between student cohorts in the traditional and integrated curriculum. Although retention in OB/ Gyn anatomy maintained a smaller change, overall decrease in retention is multifactorial and deserves further analysis.

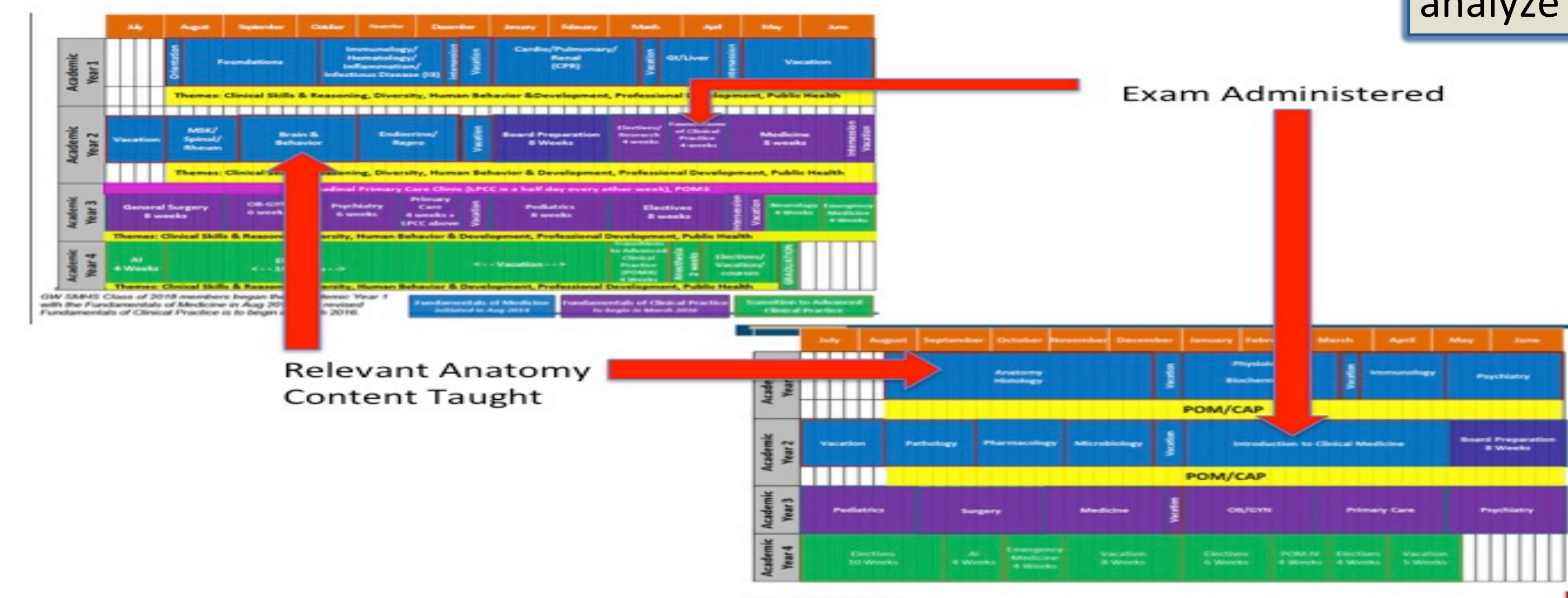


Figure 3: Example of Timing in Relevant OB / Gyn Anatomy Taught in Organ System-based vs. Discipline-based Curricula and Exam Administration
 This figure displays the time variations between content taught and examinations. The curriculum not only varied in how the material was presented, but also the timing of the relevant information in relation to the start of clinical rotations.

References

- Bowen JL. 2006. Educational strategies to promote clinical diagnostic reasoning. *N Engl J Med* 355:2217-2225.
- Nouns Z, Schaubert S, Witt C, Kingreen H, Schuttpeiz-Brauns K. 2012. Development of knowledge in basic sciences: A comparison of two medical curricula. *Med Educ* 46: 1206-1214.
- Custers EJ. 2010. Long-term retention of basic science knowledge: A review study. *Adv Health Sci Educ Theory Prac* 15:109-128.
- Jurjus, R. A., Lee, J., Ahle, S., Brown, K. M., Butera, G., Goldman, E. F. and Krapf, J. M. (2014), Anatomical knowledge retention in third-year medical students prior to obstetrics and gynecology and surgery rotations. *American Association of Anatomists*, 7: 461-468. doi:10.1002/ase.1441