The Need for Pathology: A Modular Approach to Pathology Integration in the Gross Anatomy Laboratory

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RATIONALE/NEED

- Pathology is an integrative medical field that exemplifies the unity of basic science and clinical medicine in patient care. All physicians will collaborate and benefit from pathology services in their career.
- Without a required pathology clerkship/rotation requirement, many medical students are not adequately exposed to pathology.
- In response, numerous institutions have investigated methods of introducing students to pathological concepts and the duties of a pathologist. The gross anatomy laboratory has emerged as a suitable environment for investigating methods of pathology introduction as cadavers are the students' "first patient" and there are opportunities to observe lesions.
- All methods currently described in the literature require the physical presence of a pathologist in the laboratory.
- Digital learning has been shown to be an effective means of helping students learn independently.
- This study aims to investigate student perception of the use of digital pathology modules in the gross anatomy laboratory as a means of introducing first year students to pathology.

RESEARCH QUESTIONS

1. Do the modules help students learn basic pathology?
2. Do the module help students gain understanding of how a pathologist practices?
3. Are the modules a viable method of pathology introduction for medical students in the future?

METHODS

Medical students entering the class of 2023 were recruited via e-mail to participate in the research study on a voluntary basis. Four interactive pathology modules were designed in Microsoft PowerPoint under the guidance of members of the Department of Pathology and Laboratory Medicine. Each module was tailored to the specific organ system being studied in the gross anatomy dissection lab. Module topics included Osteoporosis (Spine), Grave's Disease (Head and Neck), Myocardial Infarction (MI; Thorax), and Muscular Dystrophy (Lower Limb).

Each module contains the following elements:

1) Learning objectives
2) Review of the basic anatomy and histology associated with the organ system under study (e.g., the cardiovascular system)
3) Introduction to a standard pathology diagnosis algorithm (simplified)
4) One specific pathology and histopathology correlate (e.g., myocardial infarction)
   a) Gross findings of the lesion (e.g., infarction of the inferior wall of the left ventricle)
   b) Histopathological findings of the lesion (e.g., coagulative necrosis)
   c) Relevant laboratory data with explanations (e.g., troponin)
5) Post-module quiz
6) Survey to assess student feedback of the modules.

RESULTS

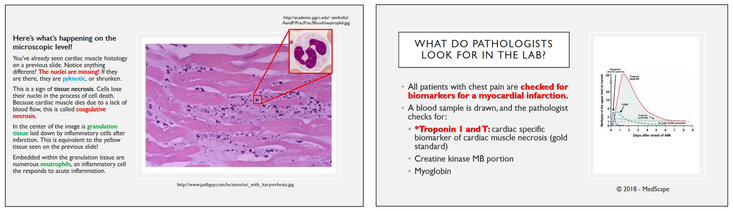

Figure 1. Samples from Interactive Pathology Module. A. Example slide describing the pathology of an MI. B. Example side describing pertinent lab values for an MI.

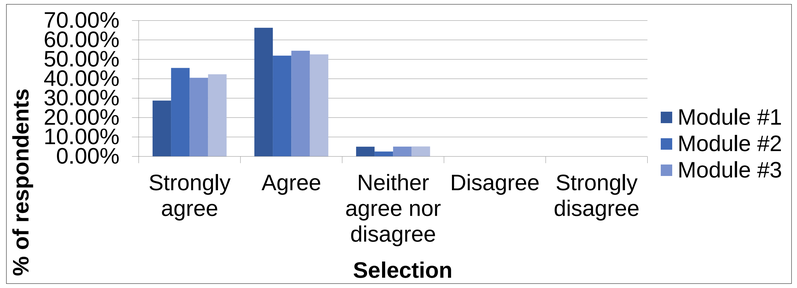

Figure 2. Percentage of survey respondents indicating agreement with the survey question: "Did the modules improve your understanding of basic concepts of pathology?" in order of module (n=80).

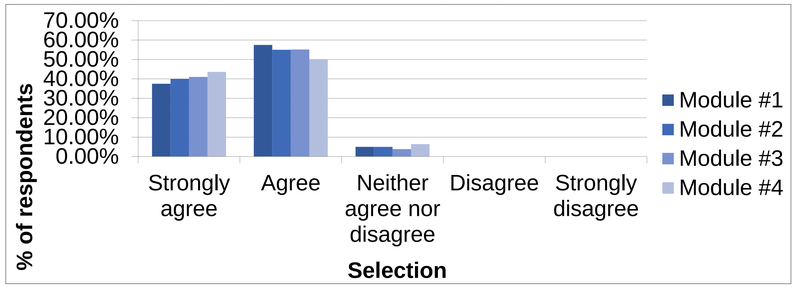

Figure 3. Percentage of survey respondents indicating agreement with the survey question: "Did the module increase your awareness for how the pathologist contributes to patient care?" in order of module (n=80).

Theme	Description	Frequency
Learning from modules was easy	The modules provided information without being exhaustive, allowing learners to move through them relatively easily.	10
Implementing multiple media modalities and clinical correlations was beneficial	The use of multiple types of media (description, images, and illustrations) in the modules helped students engage with the modules.	37
Learners desired more content to be included in modules	Learners would benefit from more information being added to the modules.	15
Modules occasionally contained poor formatting or errors	The formatting and organization of the slides are occasionally inconsistent, and information is not presented in a clear way.	12

Table 1. Themes of short-answer questions from end-of-course survey.

RESULTS (CONT'D)

Theme	Description	Frequency
More media, questions, and clinical elements may be useful in the future	Learners would benefit from more information being added to the modules.	33
Material should align with course content	Learners would benefit from the content in the modules being more closely tied to the content they are learning in the course	4
Learners did not have time to complete the modules	Students were focused on other coursework and did not have time to complete the modules during their scheduled gross anatomy lab times.	13
Material in modules was not testable	The material in the modules was not directly tied to the learner's gross anatomy course material and therefore not testable.	3
Learners not adequately informed about modules	Students did not complete the modules because communication and dissemination was not clear.	2

Table 1 (cont'd). Themes of short-answer questions from end-of-course survey.

CONCLUSIONS

Digital pathology modules are a viable method for introducing medical students to pathology, but the modules need further validation in future studies.

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