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Student-led Workshops as a Means to Improve Students' Performance and Engagement in Health Systems Science Coursework in Undergraduate Medical Education

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ABSTRACT

Health systems science (HSS) is a key component of medical education, focusing on workflow, community needs, and health-care delivery. This study examines the effectiveness of integrating HSS into medical school curricula through student-led workshops. The goal is to promote thoughtful discussion and reflection on the value of HSS for medical students and future healthcare providers. The study proposes a format of brief workshops in order to maximize engagement with material without adding significant burden to the existing medical school curriculum. A one-hour workshop was conducted for first-year medical students at A.T. Still University School of Osteopathic Medicine in Arizona. The workshop focused on teaming and interprofessional education, with a pre- and post-quiz to assess students' understanding of HSS teaming principles. The results showed a significant improvement in students' quiz scores on the post-assessment, indicating a greater short-term understanding of HSS teaming concepts. By integrating HSS materials into peer-led workshops in the undergraduate medical school curriculum, students can actively engage with the material and demonstrate improved understanding of teaming in health systems science, as evidenced by the significant improvement in assessment scores.

Keywords: Health systems science, Medical education, Student-led workshops, Peer-assisted learning, Educational outcomes.

Introduction

Health systems science (HSS), along with clinical and basic sciences, is an integral part of medical education [1]. The introduction and integration of HSS into medical education improves students' capacities to deliver health care, fortifies collaboration skills, and proves vital to medical students' growth as it resurfaces countless times throughout their careers in the form of workshops, interviews, and professional development experiences [2]. The goal is to equip medical professionals with skills to face the challenge of improving population health and patient care at lower costs [3,4]. Overall, HSS aims to prepare prospective doctors to make systems and patient-centered improvements in healthcare and their communities [5].

Given its valuable significance, medical programs are continuously

integrating more HSS into their curricula; however, various obstacles have surfaced in their attempts to do so [4]. To elaborate on some, the rigor of medical school curricula does not provide substantial leeway to incorporate additional courses as students' time is already stretched thin with the primary focus on standardized exam and board preparation [3]. Additionally, while HSS is best taught using interdisciplinary methods, many medical programs follow a "systems-based" approach whereby disciplines are taught separately and focus on, say, specific organs; this method remains not conducive to the very nature of HSS [6,7]. Most significantly, however, is medical students' own perception of the futility of studying HSS, whereby they can recognize its significance in modern medicine, but feel unempowered, underprepared, and thus unable to confront the disparities that exist [6,8]. This dichotomy

has gone as far as to compare HSS to the “broccoli of medicine,” a necessary evil that, while perhaps good to examine, remains distasteful to consume [6].

As HSS continues to grow in the limelight of undergraduate and graduate medical education curricula, so too has the number of textbooks published related to HSS domains as well as areas of research focused on advancing HSS education grown in the past two decades [9-12]. For example, HSS topics have been taught using interactive, experiential learning environments whereby students directly engage with patients, populations, and communities; this integration readily engages the learner with the subject matter and encourages the mindset that they can have an effect on healthcare systems [9,13]. Additionally, facilitated small-group and case-based discussions as well as team-based activities have been used to promote collaboration and debate when examining health systems, health disparities, and social determinants [11,14].

Yet, while the current methods for implementing HSS into medical education remain promising, another method that has yet to be thoroughly examined includes the incorporation of student-led workshops into HSS courses as a means to facilitate discussions on HSS topics [11,15]. Although student-led workshops foster discussion amongst peers as well as provide opportunities for students to research and present in specific areas of focus, limited studies have evaluated the effectiveness of incorporating student workshops into HSS coursework [11,15]. This study aims to address the effectiveness and student response towards the implementation of a student-led workshop into an ongoing HSS course and concludes that this method remains an untapped resource for improving student engagement with HSS concepts as a part of their pre-clinical education.

Materials and Methods

The framework for this project was designed as a collaborative effort between faculty and student project leaders at A.T. Still University School of Osteopathic Medicine in Arizona as part of an HSS grant. It was decided that the student project leaders would facilitate two 1-hour-long workshops to their first year medical student cohort that included a pre- and post-workshop voluntary knowledge assessment. The date and time of the workshops was seamlessly integrated into an upcoming scheduled week dedicated to various professional development activities and no modifications to the schedule were necessary.

The workshop was focused around a single domain of the HSS, namely, teaming in healthcare was selected as the subject of the workshop based on the important role that teams are now recognized to play in successful health outcomes as well as because of the relatively easy to conceptualize foundational principles that apply to this subject [7]. The students worked alongside faculty to design and present a lesson plan outline to the faculty overseeing the project; adjustments were made accordingly before the final lesson plan was approved. A fundamental resource that student leaders used to gain insight and understanding in this project was the AMA Education Consortium Health Systems Science first and

second editions by editors Skochelak et al. Specifically insightful was chapter seven from the first edition, “Principles of Teamwork and Team Science” by Higginson and Lake. In addition to examining current literature on teaming, physician faculty members were selected and asked to speak to their experiences with teams in healthcare. Faculty responses were recorded in both audio and video segments and their responses were incorporated into the presentation.

Students’ responses to the information presented was evaluated using a pre- and post-workshop multiple choice assessment. This quiz consisted of seven multiple choice response questions that modeled exam-style questions; they were designed by student project leaders and later approved by faculty. To accomplish this, student project leaders referred to various exam and board preparation question banks that were made available either by faculty or by online subscription that students could access. Project leaders screened HSS questions to compile a potential list of questions specifically related to teaming and then modified materials to ensure that the final questions were original content. The final set of seven questions were approved by faculty members before moving forward. Questions were written into Microsoft Forms, and QR codes were generated and incorporated into the powerpoint presentation so students could access the quizzes from personal devices when prompted.

An IRB determination of non-jurisdiction was approved by the IRB based on contingencies that this project remain overseen by HSS faculty and inline with improving educational practices, that students be informed by faculty that completion of the pre- and post-workshop comprehension evaluations was encouraged yet completely voluntary, and that student project leaders would receive data from students’ responses that had been de-identified by faculty members.

Faculty provided an introduction before student leaders began the workshop. Students were informed that completion of the comprehension quizzes was voluntary and participating students completed the pre-quiz on personal devices by following a QR code prompt. During the workshop, student leaders focused on engaging with the cohort. Students were encouraged to share experiences and opinions of the subject matter both within small groups and as an entire class. Throughout the workshop, faculty remained present for any additional help if needed. Succeeding the workshop, students willing to complete the post-quiz did so by following another QR code prompt. Students were excused after completion of the quiz, if they chose to complete it. Student leaders and faculty remained available afterwards for any questions or comments about the workshop. The powerpoint presentation was made available to students for future reference, and students were invited to share their perspectives and opinions about the workshop to student leaders and faculty either in-person or via email. Student leaders received the results of the pre- and post-quizzes after it had been de-identified by faculty; data analysis was completed with the use of preset analysis tools in Microsoft Forms as computing statistical analysis using Microsoft Excel.

Results

The two workshops were both successfully completed with a good turnout of students present at both sessions. The workshops were considered mandatory, however no attendance was recorded at either of the workshops. It was evident that more students attended the first workshop than the second, and while students were scheduled to attend a specific session, it is likely that some students decided to attend the session that more conveniently worked with their schedule. The total number of students attending the workshops was estimated to be 140, based on the total class size of the first year medical school cohort.

During the workshops, students engaged with the material and participated in discussions by sharing their opinions and perspectives, and asking questions both with the entire class as well as within small groups. Discussion topics and tasks were assigned to participants and, in general, they readily obliged to complete them. The project leaders circulated throughout the classroom during activity sessions and joined small groups to listen in, and provide further insight into conversations. Following small group discussion, there were opportunities to share amongst the entire class in a large discussion if participants desired to do so; on numerous occasions these larger discussions proved insightful.

Of the 140 students that attended the mandatory HSS workshop, 89 (59.3%) of students completed the pre-quiz. Following the discussion, 68 (45.3%) participants completed the post-quiz learning assessment. The average time it took for participants to complete the pre- and post- quiz decreased from 06:07 minutes to 01:51 minutes by the time students completed the second quiz.

Overall, the accuracy by which students chose the correct answer increased significantly from before the workshop to afterwards. The overall average pre-quiz score was 46.7% and increased to 82.1% on the post-workshop quiz results. Additionally, the margin of error (95% confidence interval) decreased greatly from 24.7 on the pre-evaluation to 7.9 on the post-assessment. The standard deviation decreased from 26.7 to 8.5 on the second attempt.

Between the initial and follow-up quizzes there was a range of improvement in accuracy, with the smallest percent increase being 4% (question 3 had 78% of student participants answer correctly on the pre-quiz and 82% select the correct answer on the post-quiz) and the largest increase in correct responses being 91% (occurring on question 5 whereby 0% of students answered correctly on the initial response and 91% selected the correct answer on the post-quiz).

Qualitative data was received in the form of comments that participants provided the student project leaders as well as HSS faculty members following the workshop. In general, responses were positive. Students felt that the workshop was more engaging than previous HSS activities conducted earlier in the academic year; additionally, they stated that the concepts covered in this workshop were relatable, and directly correlated with approaching clinical years. Students shared that they found the discussions about healthcare teams and effective communication with care providers to be particularly insightful and interesting, and provided a better

understanding of these concepts as related to their future clinical years. Another trending comment was about the duration of the workshop; students seemed to prefer the 1-hour duration of this workshop, as compared to previous HSS activities which had been scheduled for two hours.

Discussion

The study aimed to evaluate the effectiveness of incorporating student-led workshops into the medical school curriculum to educate first-year students on health systems science (HSS) concepts. Findings suggest that peer-led workshops can be an effective approach to teaching HSS, aligning with previous studies demonstrating the efficacy of such workshops in medical education [1,10,11]. The interdisciplinary nature of HSS makes it conducive to workshops that incorporate small and large group discussions, as seen in this study. Students appeared to be more engaged in these discussions, likely because they were led by peers rather than professors. This format allowed for a more interactive learning experience, potentially enhancing student understanding and retention of the material. The study also found that the shorter duration of the workshop was well-received by students. This modification from previous two-hour sessions may have contributed to increased engagement, as students were able to fully participate without feeling overwhelmed. However, it is important to strike a balance between workshop duration and material covered to ensure optimal engagement.

The results of the pre- and post-workshop evaluations showed a significant improvement in students' quiz scores, indicating a greater understanding of HSS teaming concepts. This suggests that the workshop content was effective in enhancing student learning. Moving forward, future research could include a longitudinal study to assess the 6-month retention of discussed material. Additionally, increasing sample size would provide further insights into the effectiveness of peer-led workshops in teaching HSS. Qualitative measures, such as anonymous surveys, could also be incorporated to gather more in-depth feedback from students. Furthermore, conducting workshops in different HSS domain areas could identify which areas students find most engaging and challenging, aiding in curriculum development and board exam preparation.

Conclusion

The purpose of this study was to evaluate the response and performance of undergraduate medical students to a peer-led workshop that addressed HSS-related subjects. Qualitative as well as quantitative measures were considered in our evaluation and students seemed to respond well to the workshop due to its peer-led nature as well as to the fact that there was significant room for small and large group discussions inherently built into the design of the workshop. Additionally, the 1-hour duration of the workshop was a favorable time that students seemed to respond well to. Quantitatively, students performed better on the follow-up board-style assessment compared to the pre-evaluation, suggesting that the materials discussed during the workshop provided an immediate increase in understanding of HSS concepts that could appear on board exams. Suggestions for future areas of improvement and future research related to student-led HSS workshops

includes incorporating a qualitative survey as well as a 6-month follow-up to the quantitative assessment to provide space for anonymous feedback and evaluate the longitudinal retention of materials discussed during the workshop respectively. While the focus of this workshop was teaming in healthcare, the principles of this study could and are recommended to be applied to other domains of HSS, thereby providing an encompassing education of HSS-related topics, ultimately benefiting medical students both in preparation for board exams as well as providing effective care in an interdisciplinary healthcare setting [11].

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