

ORIGINAL ARTICLE

Implementation of novel simulation scenarios to improve multidisciplinary care teaching to medical students

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Abstract

Background: Care delivered via multidisciplinary teams (MDTs) is becoming increasingly prevalent in clinical medicine. Medical students are often encouraged to observe MDT meetings to learn about multidisciplinary care; however, this approach presents potential barriers to learning. We describe a novel teaching exercise which engages students in adopting roles in a simulated MDT, with the aim of improving understanding of how MDTs operate to deliver cancer care. **Methods:** A simulation exercise was designed which assigned individual students to one of 10 MDT roles. Each student was given specific information about a fictional patient which pertained to their role and asked to collectively discuss management options. Feedback forms were distributed to students to assess self-reported understanding of MDTs and perceived teaching quality of the simulation exercise compared to facilitated observation of a formal MDT meeting. **Results:** Sixty-five students participated in both the simulation exercise and the facilitated MDT observation session and provided feedback. Most students (78%) rated the simulation exercise as either ‘good’ (40%) or ‘excellent’ (38%), with a statistically significant improvement in mean score for the role-play compared to facilitated formal MDT observation [mean difference 0.46, $P < 0.001$, 95% confidence interval (CI) 0.23–0.69]. Fifty-three students (82%) reported that participation in the simulation exercise improved their understanding of MDTs. **Conclusions:** Multidisciplinary care teaching can be delivered to medical students in an acceptable and effective form using simulation-based training. Potential further developments for simulated MDTs include use of parallel pre- and post-test questions to assess learning and use of anonymised patient data to create authentic vignettes.

Keywords: surgery; gastrointestinal system; cancer; multidisciplinary; simulation; gamification

Introduction

Multidisciplinary teams (MDTs) are internationally recognised as a cornerstone of cancer care.¹ The complexity of cancer investigation, management and prognosis means that individual patients will interact with a wide range of healthcare professionals across primary and secondary care, and potentially across multiple hospital sites. In the United Kingdom, MDT management is commonly undertaken for non-cancer conditions as well, such as heart failure, stroke and inflammatory bowel disease.

It is clear that MDTs are playing an increasing role in the delivery of healthcare and will continue to take a substantial role in future practice. It is therefore essential for medical students to become familiar with how MDTs are conducted. The learning benefits for students at MDT meetings extend

beyond the biomedical curriculum, as meetings are an excellent opportunity to observe team-working, and navigation of ethical and treatment dilemmas. Such non-technical skills are essential for healthcare working, yet are difficult or impossible to teach with didactic or private study alone.²

However, observation of MDT meetings is often challenging for students. By their rationale, MDT meetings are a forum for discussion of complex medicine and it is recognised that engagement with the process requires a high degree of clinical knowledge.³ Discussion is often fast paced owing to pressures on clinical services, with a large volume of technical language and little opportunity to ask team members for clarification. These are negative themes which feature regularly in local student feedback following MDT meeting observation sessions. The high degree of team familiarity

can also make it difficult to be an external observer, as team members rarely introduce themselves or outline their roles for the benefit of the students. MDTs also consist of a high volume of senior clinicians which could also be perceived as an intimidating environment by students.²

In response to local feedback on student MDT meeting observation sessions, we developed and implemented a teaching session for third-year medical students on their general surgery rotation, which simulated a gastrointestinal cancer MDT meeting and engaged students as MDT members.

The aim of this study was to assess the student-reported quality of teaching and learning from our simulation exercise compared with a facilitated formal MDT observation session. We hypothesise that engaging students in active participation within the MDT environment using our simulation exercise will improve familiarity with MDT working compared to facilitated observation of formal MDTs alone.

Materials and methods

Four fictional patient vignettes with specific predetermined learning objectives were devised by a team of junior teaching fellows led by a consultant general surgeon. Each vignette described the investigation into suspected oesophago-gastric or colorectal cancer, comprising the following data:

- Case history
- Basic blood tests
- Endoscopy report with associated image
- Histopathology report with associated image
- Radiology report (CT and/or PET, MRI)

Ten MDT roles were also devised: MDT co-ordinator, endoscopist, radiologist, histopathologist, oncologist, upper GI surgeon, lower GI surgeon, Macmillan nurse, theatre/clinic co-ordinator, stoma nurse. An example of one of the vignettes can be found in the Supplementary material.

Each teaching session was conducted using Microsoft Teams for groups of up to 10 students. Local formal MDTs are also conducted using Microsoft Teams, so it was felt that the use of this platform for the simulation would confer appropriate authenticity. For each vignette, students were designated one of the 10 MDT roles and were only given information and objectives pertaining to that role (Table 1). Students were given approximately 5 min to study their information before discussing the vignette as a group. The aims of the discussion were: for students to decide collectively on a plan for either further investigation or management of the case; to decide which team members would be required to enact and support this management plan; and to plan how this decision would be communicated to the patient. Though some roles such as theatre/clinic co-ordinator would not be expected to contribute to a discussion on clinical management in a formal MDT meeting, all students were encouraged to take part in the discussion on management within the MDT simulation. As part of their role, the MDT co-ordinator was expected to lead the discussion with the session instructor, typically a teaching fellow, observing the discussion. Students were given as much time as was needed to decide on management and communication, after which the session instructor conducted a debrief to reinforce predetermined learning objectives.

Students also participated in facilitated observation of formal MDTs, in which they observed a gastrointestinal cancer MDT with a teaching fellow who helped to explain concepts and promote discussion within the group of students in real time.

Table 1. Examples of clinical information given to each role as appropriate

Role	Example of information provided
MDM co-ordinator	Brief summary of patient history and investigations to date
Endoscopist	Endoscopy report, associated image
Radiologist	Radiology report, stock images from Google images
Histopathologist	Histopathology report, associated image
Oncologist	Detailed clinical history, summary of non-operative treatment options
Upper GI surgeon	Detailed clinical history, summary of operative treatment options
Lower GI surgeon	Detailed clinical history, summary of operative treatment options
Macmillan nurse	Detailed social history and initial impressions of expectations
Theatre/clinic co-ordinator	List of available theatre and clinic appointments
Stoma nurse	No prior information; however, expected to support decision making and management

Over a two-week rotation, students typically attended one formal MDT prior to the simulation exercise and attended one further formal MDT after the simulation.

Between January and December 2021, feedback on both observation and simulation sessions was gathered using Microsoft Forms. Students were asked to rate the quality of the teaching sessions on a 5-point Likert scale (1 = ‘very poor’, 5 = ‘excellent’), as well as being asked whether participation in the simulation exercise improved their understanding of MDTs. Students were also invited to submit free-text feedback for both sessions and informal feedback at the end of the teaching session was also recorded. The mean difference in average Likert scores between the simulated MDT and the formal MDT observation was compared using a paired *t*-test.

Students were informed that their feedback was anonymous and non-compulsory. This teaching exercise was conducted as part of a scheduled teaching programme during clinical rotation and the medical school was aware that the sessions were being conducted. The sessions were non-compulsory and a register of attendance was not kept. The simulated MDT exercise did not use data from real patients and did not directly affect patient care. Formal ethical approval was sought from both the medical school and the local hospital, and deemed not required by either organisation.

Results

Between January and December 2021, feedback was obtained for 65 students who attended both the simulated MDT session and at least one facilitated observation of a formal gastrointestinal cancer MDT.

Most students rated the simulation exercise as ‘good’ (26 students – 40%) or ‘excellent’ (25 students – 38%) quality on a 5-point Likert scale. By contrast, few students rated the facilitated formal MDT observation session as ‘excellent’ (10 students – 15%), with most rating the observation session as ‘good’ (29 students – 45%) or ‘average’ (21 students – 32%) – these results are displayed in Fig. 1. Comparison of mean Likert scores between the two sessions revealed a statistically significant improvement in mean score for the simulated MDT exercise compared to the facilitated formal MDT observation [mean difference 0.46, $P < 0.001$, 95% confidence interval (CI) 0.23–0.69]. Fifty-three students (82%) reported that participation in the role-play exercise improved their understanding of MDTs.

Free-text feedback on simulation sessions was scarce and varied, with a total of seven responses obtained. Some students reported that the sessions were ‘useful’, that sessions ‘helped me appreciate the different roles in an MDT much more’ and that they ‘love the principle’, while others described it as ‘not particularly useful’ or even ‘useless’. Constructive feedback included the preference to hold the session earlier in the rotation to gain greater benefit from subsequent MDT observation; use more detailed and complicated cases to stimulate discussion; and limit the number of vignettes to two per session.

Discussion

The results support our hypothesis that active participation of students in a simulated MDT environment improves learning of how MDTs operate over passive observation of formal

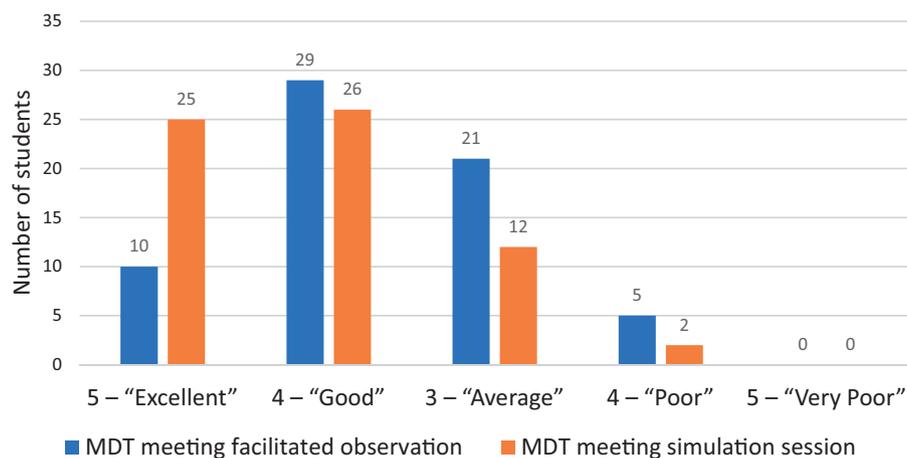
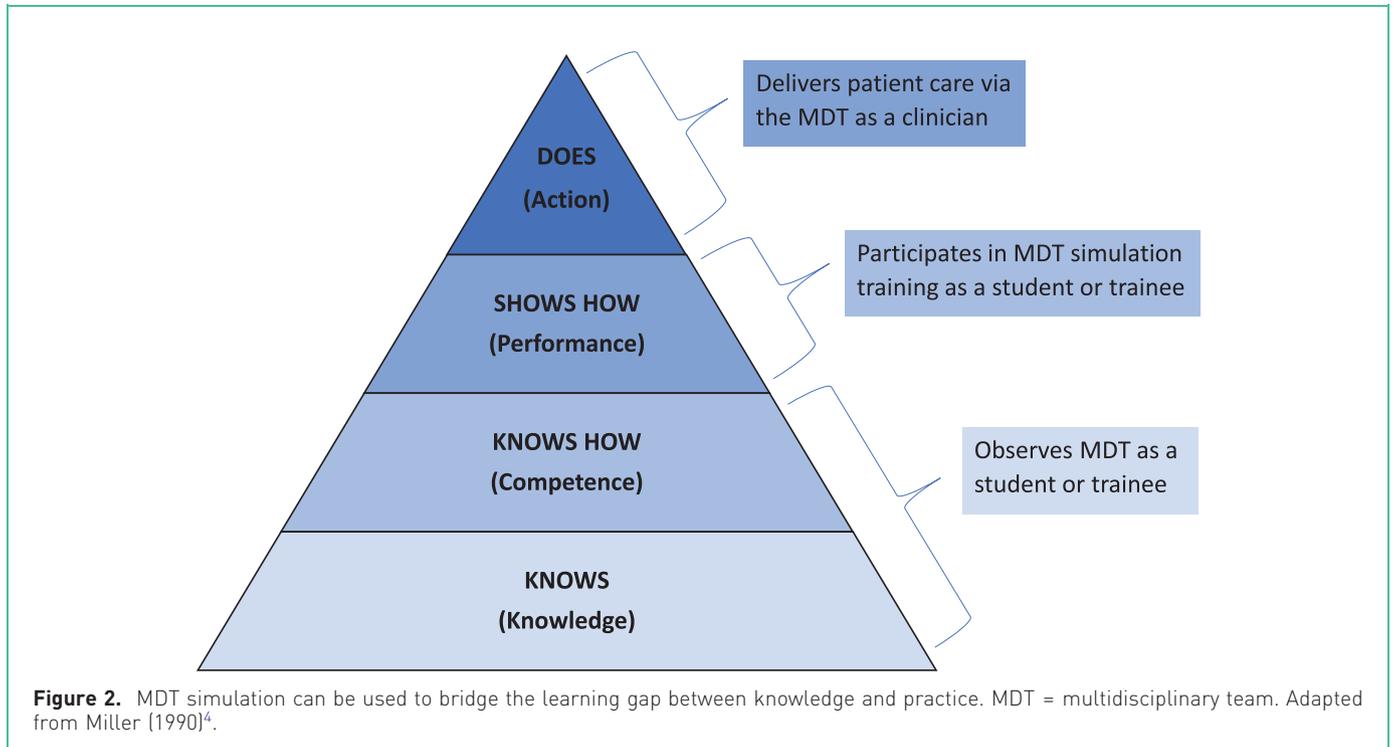


Figure 1. Student rating of perceived quality of teaching between the facilitated MDT observation session and MDT simulation session, demonstrating that students were more likely to rate the simulation session as a better quality of teaching than the facilitated observation session. Figure shows responses to question ‘Please rate the quality of teaching for each of the following activities’. MDT = multidisciplinary team.



MDTs. In assigning roles and promoting discussion with the aim of achieving a common goal, this exercise transforms students from passive observers to active participants and thus places great importance on the value of experiential learning. From a theoretical standpoint the difference between passive and active exercises here can be demonstrated with Miller's Pyramid⁴ (Fig. 2). Observation of MDTs may only satisfy the lower 'Knows' or 'Knows How' levels of the pyramid, whereas participation in this simulation demonstrates the higher 'Shows How' stage of applying knowledge and skills to a situation. The theory in this context was supported by a study of surgical trainees' participation in MDTs, in which passive observation of meetings was considered to be the least valuable level of participation compared to discussion, case presentation and/or case preparation.⁵ Simulation exercises have been successfully piloted in other interprofessional clinical contexts, including the in-hours ward-based care and out-of-hours on-call environments.^{6,7}

The purpose of this exercise is to improve the familiarity of third-year medical students with the MDT process. Expectation of participants to be able to participate in a formal MDT after this exercise would obviously be unrealistic as the exercise cannot replace the experience, knowledge and judgement acquired over years of training which are required to fulfil this role. For the purpose of focusing on the communication, teamwork and shared decision-making components of MDTs, this exercise has been

designed to mitigate some of the learning challenges that a formal MDT poses for medical student teaching. For example, students were given written information on potential treatment options to aid decision making and were encouraged to ask the teaching facilitator for advice if required. Students were also allocated a greater period of time to consider each case than a formal MDT typically permits; with debrief included, each vignette took approximately 20–30 min to conclude. Though in this respect the exercise is not representative of a formal MDT, the authors consider this to be permissible at this stage of training as this approach allowed an improved focus on demonstrating the importance of interdisciplinary working in MDTs.

We are aware of one other instance of a similar concept in the literature. Fukuchi *et al.*⁸ described the development of an oncology-themed computer-assisted board game which aimed to increase understanding of oncologic principles, biomedical features of cancer and appreciation for the multidisciplinary nature of cancer management for third-year medical students. Investigators found a statistically significant improvement in the correct number of questions answered between the pre- and post-test questionnaires, and students also felt that their understanding of oncologic principles, their biomedical knowledge of cancer and their appreciation for the multidisciplinary nature of cancer management also improved. The investigators conclude that the game can improve students' factual knowledge about cancer

and can also effectively teach students about the multidisciplinary nature of cancer treatment.

There are multiple potential areas of bias within this study. Both simulation and observation MDT teaching sessions were non-compulsory and a register of attendance was not kept. The total number of attendees is therefore not known; however, we estimate approximately 120 students participated in these sessions. This represents a loss to follow-up as not all students will have submitted feedback on the exercise. There is also a risk of recall bias inherent in this study design as feedback was generally submitted up to a week after the exercise took place. Students were also given written resources (for example, a histopathology report) during the simulated MDT, which were not available for the observed MDT; this is a potential confounder in interpreting the difference in perceived quality of the exercise.

This study has examined data from an appropriate sample of medical students to demonstrate that our simulation exercise aids self-reported understanding of MDTs and is perceived to be a high-quality teaching method. We hope to further develop our simulation by implementing pre- and post-session assessment to evaluate acquisition of learning outcomes. We will also consider the use of anonymised data of real patients, which would allow us to introduce additional learning outcomes including histology and radiography interpretation, as well as creating more authentic case histories.

Conclusion

This study demonstrates that, for delivery of learning objectives on the multidisciplinary care of gastrointestinal cancer, active participation within a simulation is perceived to be of higher quality than passive observation of formal MDTs. Students report that their understanding of MDTs is improved by participation in a simulated MDT. The learning effects demonstrated in this study with medical students may be applicable to training junior doctors as well as to other fields in which multidisciplinary care is used.

Supplementary material

Supplementary file 1. Case 1: information for teaching facilitator, is available at <https://doi.org/10.5281/zenodo.10027026>.

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Conflict of interest

None declared.

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