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**Can a board game be an effective method for palliative care education?
Introducing Bed Race, The End of Life Game.**

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Can a board game be an effective method for palliative care education? Introducing *Bed Race, The End of Life Game.*

ABSTRACT

INTRODUCTION.
Educational board games facilitate active learning to conceptualize knowledge, and, promote collaborative learning and team work. Despite increasing interest in them, use in palliative and end of life care has been very limited to date.

METHOD
In 'Bed race, The End of Life Game', participants are divided into four teams who move a model hospital bed around a board to collect items (syringe driver; Do Not Attempt Resuscitation form; oral hydration gel; a 'heart'; Just In Case medicines). To obtain items at themed 'checkpoints', each team needs to answer quiz questions, which require application of clinical knowledge and/or communication skills. Pre and post game quiz scores and feedback were collected from 12 game sessions involving 251 year 5 medical students.

RESULTS
169 (67%) of students completed pre and post game anonymous quiz questions and free text feedback. Post game quiz scores were higher for each topic, and the difference in the paired pre and post game questionnaires was statistically significant (p<0.05). Themes from the free text feedback included: 'engaging and fun'; 'relevant learning'; 'peer learning and team work'.

CONCLUSIONS
Educational board games are not a new panacea for education, but the concept can be successfully applied in palliative care.

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Key messages box

1. **What was already known?**
- Educational board games facilitate an active learning experience.
- Use in palliative care is under researched.

2. **What are the new findings?**
- Quantitatively, applied knowledge/understanding scores increased.
- Qualitatively, students found the learning relevant, collaborative and engaging.

3. **What is their significance?**
- The concept of a palliative care board game was deliverable.
- There are a number of potential further applications of the concept.

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INTRODUCTION

A newly qualified foundation year doctor will care for approximately 40 actively dying patients in their first year of work, and look after a further 120 patients who are in the last months of their life[1]. Palliative and end of life care is a core curriculum component in the training of *Tomorrows Doctors,* whom the General Medical Council (GMC) expects to '*make appropriate clinical judgements when considering or providing compassionate interventions or support for patients who are nearing or at the end of life*'[2].

A recent systematic review established that there are a variety of methods utilised in delivering this curriculum component across medical schools in the UK [3]. These include classroom based teaching, hospice or palliative care clinical placements and newer formats such as simulation [4]. All types of teaching intervention have been shown to improve palliative care knowledge in medical students, with no method appearing to be superior [3]. However, there are no published studies relating specifically to the use of educational board games in this speciality, despite an increasing interest in the use of this method in medical education [5–7].

We describe the development, and evaluation, of an educational board game for teaching palliative and end of life care: *Bed Race*, *The End of Life Game.*

BACKGROUND

Educational board games can be defined as 'an instructional method requiring the learner to participate in a competitive activity with pre-set rules' [8]. Use of games in education('gamification'), has been endorsed in educational theory as an active experience for the learner to conceptualize their knowledge beyond factual recall by application to clinical problem solving [5,8,9]. In addition, multiplayer games promote collaborative learning, team working and communication[9,10]. Concrete experience from game playing therefore provides a basis to enhance reflection and understanding in keeping with 'Experiential Learning Theory' [5,6].

Whilst there are numerous published examples of the use and evaluation of benefit of educational board games for medical and nursing education in areas such as infection control, anatomy, and pharmacology[8,10], there is an evidence gap for palliative and end of life care.

Whether the concept of an educational board game can be applied in palliative and end of life care, and, how learners may perceive being taught in this format is therefore a very current and appropriate question requiring exploration.

METHOD

Research evidence in medical education suggests that educational games should aim to: (a) ensure there is an active learning experience; (b) integrate fun and

excitement in the learning process; and (c) provide feedback [8]. The game was therefore designed to fulfil these recommended requirements.

'Bed Race, The End of Life Game' has been developed as a board game specific to palliative and end of life care (the game's mission statement is shown in table 1). The game was developed by palliative care clinicians, with peer feedback (both from other professionals in palliative care and colleagues in other specialties) through its initial development, and then piloted with a large cohort of medical students to evaluate it further.

The game design was not based on any pre-existing game template per se, but designed using a number of recommended variables incorporated into the design of other types of educational games e.g. working in teams; participation; dice; trivia questions to win game items; instant facilitator feedback [10,11].

To play the game participants are divided into four teams. Each team rolls a dice in turn to move a model 'hospital bed' around a board track which represents the end of life journey (figure 1). A facilitator oversees the teams as they move around the board. To win, a team needs to reach the 'finish', but also collect five miniature items to place in their hospital bed as they move round the game board: a DNAR (Do Not Attempt Resuscitation) form; oral hydration gel; a 'heart' (representing compassionate communication); and, a 'Just In Case' (anticipatory prescribing) medication bag (figure 2).

Each team can collect these items at the 'checkpoints' marked at stages around the board. On reaching any checkpoint the team are asked a quiz or, a communication skills question, which will 'earn' them an item for their bed if answered correctly. The miniature items and, checkpoint themes, were derived from key elements of end of life care which are commonly and consistently highlighted in published guidance ([12–14]): breaking bad news; symptom control; discussion of prognosis; family discussion; reversing the reversible; end of life prn prescribing and spiritual care.

The quiz questions are presented in 'best of 5' multiple choice format. The question content was based on the learning outcomes in the Association for Palliative Medicine (APM) curriculum for undergraduate medical education [1]. A 'best of 5' question format was chosen because this question style is commonly used by UK medical schools for assessment, and therefore familiar to medical students (see table 2 for example questions). The questions were written by one of the authors who is an experienced question writer (DH), and peer reviewed by two other palliative care clinicians. All of the quiz questions are based on interpretation of palliative care clinical vignettes and therefore require application of knowledge of understanding, rather than simply factual recall. Students in each team discuss and explore the question together, hence team work and collaboration are required to have a better chance to win.

In the middle of the game board is the 'heart' checkpoint where each team picks a 'conversation card'. The conversation cards describe a short clinical scenario with a question posed by a patient or relative, and the team are asked to provide a short explanation about how they would handle the conversation on the card (see table 2 for examples). The facilitator then determines if the answer given demonstrates a good enough example of communication for the 'heart' miniature to be awarded.

For all the question answers, the team get instant feedback from the facilitator. A facilitator's guide was provided to all the facilitators around a week before the sessions took place (supplementary file), and, immediately prior to each set of sessions there was a short facilitator briefing to calibrate. All facilitators were palliative care clinicians with prior teaching experience.

The game was initially piloted face to face with year 5 medical students as part of the 'preparing for practice' curriculum teaching days. These teaching days aim to consolidate learning from previous years. These students had been provided with symptom control lectures and up to one week of palliative care placement within the previous two years at medical school. In addition, prior to the game session they were asked to view a revision online lecture covering symptom control and prescribing (i.e. a flipped classroom approach). They played the game live in groups of up to 20 and playing in teams of 4-5.

In order to quantitatively evaluate the game, students were invited to complete an optional anonymous online questionnaire before and immediately after playing the game. The questionnaire consisted of 10 (best of 5) quiz questions which they were asked to answer immediately before and immediately after the game session. They were not given the correct answers to the pre-game quiz. This facilitated a comparison difference in overall scores quantitatively and any differences in scores would in theory reflect impact of the game, rather than the combination of the game and the online lecture. These questionnaire quiz questions were similar to some of those that the students would have answered in the game and covered a representative selection of different topics: spirituality; pharmacological symptom management of breathlessness; opioid conversion; do not attempt resuscitation decisions, and, management of nausea and vomiting.

The quantitative data therefore consisted of two matched samples (i.e., a pre- and post-game quiz score). The Wilcoxon signed-rank test was used to compare the overall total pre- and post-game score for each student (i.e., a non-parametric paired difference test). It was anticipated that the quiz scores would not form a normal distribution, and the Wilcoxon signed-rank test does not assume normality in the data.

Additionally, to qualitatively evaluate the game students were also asked to complete two free text open questions at the end of the session to explore any positive or negative perceptions from their experience of playing the game (supplementary file). Students were asked to describe anything they had found useful/that went well during the session and/or anything that could have been done differently/improved to support their learning and understanding.

The qualitative free text responses to these questions were analysed using thematic analysis, and initially analysed independently by both authors. An inductive thematic analysis was used with familiarisation, initial coding of each data item, theme development, defining themes, clustering/refining themes, and reporting [15]. Discussion of areas of agreement and disagreement was undertaken between both reviewers to achieve consensus in the overall themes.

RESULTS

Of a total of 251 students who played the game in its pilot form, 169 (67%) completed the anonymous pre- and post-game questionnaires. And of those 131 (78%) added responses to the free text qualitative questions.

Quantitative results
Graph 1 shows the proportion of students who answered the anonymous online questionnaire questions correctly for each topic category before and after playing the game. Of the 169 students who opted to complete the pre and post-game evaluation questionnaires, 129 (76%) correctly answered the pre question on spirituality versus 155 (92%) after; 86 (51%) correctly answered the nausea/vomiting question versus 125 (74%) after; 153 (91%) correctly answered the pre-game opioids question versus 160 (95%) after; 105 (62%) correctly answered the pre-game DNAR question versus 132 (78%) after; and, 81 (48%) correctly answered the breathlessness management question versus 116 (69%) afterwards.

It may be noted that: (a) the baseline (pre) scores are relatively high, which would be expected as the game was played with year 5 medical students as a consolidation/revision of their learning over previous years (b) the proportion of students getting the correct answer is higher for all of the topic categories in the post-game score.

The difference in overall total scores pre- and post-quiz scores was statistically significant (with a p value of 0.0038), using the Wilcoxon signed-rank test to compare matched paired pre and post total score results.

Qualitative results
The free text comments were subjected to a thematic analysis [15]. Students had been asked two free text open questions, the first asking about what they felt was useful or went well, and the second asking about what could be done differently and/or how the session could be improved.

There were 131 (78%) 'positive' free text comments and 100 (59%) comments which were 'negative' or suggested changes (students had been prompted to give both positives and negatives).

Positive comments related to three main themes: engaging and fun; relevant learning; and, peer learning and team work.

Theme: Engaging and fun
Overall, 68 of the free text comments related to the experience of playing the game being engaging and fun. Of those who gave free text responses, 16 spontaneously used the word "fun" in their comments, and 24 specifically used the word "interactive" or "engaging", for example:

"It was a fun way of learning key end of life care concepts!"
"Relaxed environment and I loved the effort that went into making the game!"
"It was interactive and at the same time very informative in a fun way."

Theme: Relevant learning
A significant number of the free text comments (69) related to the student's perceived relevance or appropriateness of the learning from the quiz questions, for example:

"A really good concept, questions were at the appropriate level and explanations were good"
"The questions were really relevant so it was interesting listening to all of the answers."
"Really well designed, useful practical learning points done in an engaging creative way"

Theme: Peer learning and team work
The third theme from the free text comments related to the team work and peer learning aspect of playing the game (25 comments), for example:

"*A lighthearted entertaining way of including everyone in competitive discussions, working together to find out the right answer.*"
"*Working in groups was good, and having multi choice answers*"
"*Great interaction in the group - really fun*"

100 students gave free text comments in relation to any negative aspects of playing the game or suggestions of how it could be improved. Of those, the major themes related to: the environment, and, game pace.

Theme: Environment
Some students had difficulty hearing some of the discussions (26 comments) and commented on lack of chairs and the room being cold (13 comments). For example:

"Difficult to hear. It would have been possible to move teams closer to the board & maintain social distancing"
"Was hard to hear sometimes and sitting on the floor wasn't very comfortable"

These comments therefore seemed to relate to the environment within which the game was played rather than the game per se. This is likely to relate to the game being played socially distanced using a field hospital space. The original intention being this would have been played around a board table in small groups in seminar rooms, but arrangements had to be changed to accommodate social distancing in light of the COVID 19 pandemic. These factors should be easily correctable.

Theme: game pace
In addition, 28 students gave feedback comments suggesting the game could be made slightly quicker, but making some constructive suggestions of how this could be accomplished e.g. making the question stems slightly shorter and/or allowing teams slightly less time to discuss between themselves before presenting their answer to the facilitator. For example:

"Slightly slow bc [because] we had to play it socially distanced"
"Time limit on answering"
"Less time on each question so we could cover more although they were important discussions"

Ten students felt the game was too long whereas six felt it was too short. Five students also suggested that a handout or online supplement could be given at the end to summarise some of the key learning points.

DISCUSSION

As a concept, the use of an educational board game to deliver teaching around palliative and end of life care was shown to be achievable and effective

The evaluations provided some positive evidence of improvement in applied knowledge and understanding of key palliative and end of life care concepts by showing higher post-, versus, pre- game scores. The qualitative free text comments suggest that the students found the game an acceptable mode of teaching delivery which was fun and interactive, whilst also testing and exploring applied knowledge and understanding at an appropriate learning level for them. Playing as a team, appeared to increase their positive experience. Negative comments are also important in terms of informing future modification of the game, but related primarily to the environment within which the game was played, rather than the game itself, the setting having been adjusted to enable socially distancing during the COVID19 pandemic.

These results are consistent with other studies which have evaluated other types of educational board game (i.e. improved knowledge, and, satisfaction with board games as a teaching modality) [5,6,8–10]. Peer learning and team work is not something that has been strongly demonstrated previously in other types of board game evaluation.

There are some important limitations of the game and its evaluation. One of the difficulties in measuring the effect of medical education interventions is demonstrating how they affect clinical practice in the workplace, and it is recognised that most evaluations tend to measure evidence of improvement in applied knowledge and understanding and/or confidence in the topic area [3]. This is partly because performance in the clinical workplace will have been influenced by a wide range of learning experiences. These could include clinical placements, different types of teaching, as well as personal and life experiences. It is therefore difficult to pinpoint the direct effect of any single intervention on its own. Retained applied knowledge could also be tested at a later time, perhaps by re-sending the same questionnaire to students after 6 months. But, in doing so also acknowledging that other teaching and learning experiences that occur in the meantime may also influence future questionnaire scores, rather than just from playing the game per se.

Furthermore, it would also be possible to generate much longer pre and post evaluation questionnaires, or even to ask students to complete a 'mock exam' pre and post session. We were however concerned that the response rate may significantly drop if a longer evaluation was required from the students. We also wanted to encourage free text responses in this initial evaluation to identify areas for further improvement and development of this teaching method.

On the basis of the comments from this evaluation, a further evaluation could randomise students to a game-based session or lecture style session, and compare knowledge scores and confidence as well as their perception of fun, interactivity, collaboration and team work. This would require ethical approval and potentially re-running one of the sessions if it proved (statistically) significantly better than the other to not disadvantage students randomised to the other arm. Moreover, previous randomised controlled trials, although not in palliative care, have already shown that gamification of a session is overall superior to a traditional lecture format in terms of applied knowledge gained [9].

In its current format the content of the quiz cards has been tailored to undergraduate medical students. The topic content and level (of difficulty) could be easily changed for other professional groups whilst keeping the concept of how the game plays the same. Equally, in the piloted form, the game was used as a revision tool to consolidate learning on areas related to palliative and end of life care but by changing the question set, the game could be adapted to cover/introduce a single topic area for the first time (rather than revision and consolidation).

Considering there are no previous published evaluations of educational games in this subject area, we believe we have demonstrated that educational board games can be used successfully as another tool in the palliative care educator's armoury. This teaching method seems to be acceptable, fun and of educational value for medical students.

CONCLUSION

'*Bed race, the end of life game'* is a novel approach to teaching palliative and end of life care. Whilst board games may not be a panacea for all palliative care and end of life education, they do appear to have a potentially valuable role particularly in the areas of application and consolidation of knowledge. This is likely to be particularly valuable as a tool in the preparation of new doctors for the real work setting and using their knowledge when they face dying patients in their day-to-day practice, as well as for doctors in the first years of their working life.

Based on the student comments, a number of modifications are now being made to how the game is played, whilst still keeping the original concept of the game the same. Further potential adaptations and wider applications of the game are also being developed e.g. a model ambulance for paramedic trainees to move round the game board with questions tailored to their curriculum; questions adapted for nursing teams, multidisciplinary teams, Foundation level doctors and a more difficult version for Palliative Medicine speciality trainees. Development of an online version within a virtual facilitated tutorial and a live game board on shared screen, as well as a game app are also being explored.

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Table 1. 'Bed race, the end of life game' mission statement

Your mission is to achieve good end of life care by moving your team's bed around the game board to collect key aspects of end of life care. Timely end of life care is important and this is a race.

There are five things your team needs to collect in total:
1. 'Just In Case' medicine bag (anticipatory prescribing)
2. A DNAR form
3. A heart (compassion)
4. A syringe driver
5. Oral balance gel

You can collect these items when you land on certain squares on the board "Checkpoint squares". BUT, your team will need to correctly answer a question to collect the item when you arrive at a checkpoint, and you will also need to handle a tricky conversation with one patient/family as you go round the board. All the quiz questions are based on the GMC 'Outcomes for graduates' and are similar to the GMC undergraduate exam questions for palliative/end of life care in the Medical Schools Council national question bank … good luck.

Table 2: Example checkpoint and conversation card questions

Example checkpoint questions:	Example conversation cards:
Mr Law is a 70 year old man with advanced COPD. He has recently been referred to palliative care as his GP has noticed a progressive deterioration over recent months, despite maximal inhaler therapy. He is breathless on minimal exertion, and has been for some time. On examination his chest is clear with reduced air entry bilaterally and hyper expansion, RR 19, 02 sats 94% (air). His HADS (Hospital Anxiety and Depression) score is 5. What drug would be most appropriate to trial for symptomatic relief of his breathlessness? a) Amoxicillin b) Lorazepam c) Morphine d) Oxygen e) Prednisolone	Mr Harry is an 80 year old man with end stage COPD, he is approaching the end of life. He has no cognitive impairment. *His family are adamant that 'under no circumstances' should he be told he is dying, or that a Do Not Resuscitate form be put in place, and have asked to speak to you to ensure that is the case.* *How will you talk with this family?*
Mr Kettle is a 58 year old man with severe heart failure. He is dying (last hours to days of life) at home, as has been his wish. He has an Implantable Cardioverter Defibrillator (ICD) in situ which the district nurse has just noticed. It is 3am on a Sunday. How could the device be deactivated to avoid it firing when he dies naturally? a) Position a mobile phone behind the patient and keep it continuously on in an audio call b) Position the patient near a microwave and turn the microwave on for 30 seconds c) Secure a phone on vibrate mode over the device with tape d) Tape a magnet to the skin over the device e) Use local anaesthetic, make a small incision over the device, and pull the device out through the skin	Mrs Friggle is an 80 year old lady with metastatic breast cancer and is now dying. She is no longer conscious and appears comfortable. Her relatives are very anxious about the '*loud chesty secretion sounds from her throat and lungs*' *They are worried she is 'drowning in them', and whether anything can be done about them? How would you discuss their concerns?*

Figure 1 Bed Race, The End of Life Game: game board

Figure 2 Bed Race, The End of Life Game: miniature board items

Figure 3 Comparison of student pre and post quiz scores