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Abstract

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Simulation for communication skills training in medical students: protocol for a systematic scoping review

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Abstract

Empirical research has produced inconclusive, and occasionally contradictory, evidence relating to the extent to which improvements in medical communication skills taught through simulation can be measured. This is further limited by the wide range of designs and outcome collection methods that studies employ and does not allow for data comparability or meta-analysis. The proposed scoping review aims to systematically map and comprehensively explore the extent, range and nature of research activity on the use of simulation for communication skills training in medical education. Comprehensive literature searches in MEDLINE, EMBASE, Scopus and Web of Science will be performed and data will be reported using quantitative (simple numeric counts) and qualitative (thematic synthesis) analyses.

Keywords: human-based simulation; computer-based simulation; communication skills; medical education

1. Introduction

1.1. Setting the context: Background

Advanced communication skills lie at the core of safe and effective clinical care (Kaplonyi et al., 2017). Good doctor-patient communication can improve patient outcomes (Silverman et al., 2013) and as such is essential for delivering care of high-quality (Blackmore et al., 2018). Communication therefore comprises an indispensable part of the undergraduate teaching curriculum in medical school across the globe. However, the extent to which advanced communication skills can be taught is still in question.

Over the years, various teaching approaches have been introduced to undergraduate medical degree programs to facilitate and enhance communication skills training. Programs that integrate more interactive (as opposed to more didactic) teaching approaches have been found to be more successful in helping students acquire and develop their communication skills (Aspegren, 1999). Empirical research, however, seems to suggest that doctors with little or no training in communication skills are highly unlikely to acquire such skills through years of clinical practice and that the training that medical students receive in important communication sub-skills, such as interviewing, giving information, and establishing patient rapport is somewhat insufficient (Aspegren & Lonberg-Madsen, 2005). The best approach to train future doctors in advanced professional communication skills is yet to be determined.

Simulation (or simulation-based education), introduced in the 50s (Bradley, 2006) as an effective tool for skills development in medical education (Kaplonyi et al., 2017), is currently integrated in medical school curricula all over the world (Motola et al., 2013). Simulation is a student-centred, educational strategy through which students are safely exposed to lifelike scenarios that resemble real clinical environments allowing them to develop their skills, learn from their mistakes and receive feedback on their professional practice (Kaplonyi et al., 2017). Besides manual and clinical skills, simulation, in its many guises (manikin-based simulation, human-based simulation, computer-based simulation) allows students to practise and develop non-technical skills such as that of communication (Anderson et al., 2014).

Simulation, as a novel teaching approach, appears to be popular with medical undergraduates worldwide (Anderson et al., 1994; Hargie et al., 1998). Research exploring the experience of students interacting with simulated patients indicates that this approach is frequently

perceived to be more beneficial compared to other teaching approaches such as lectures or reading, and that the constructive feedback provided following the interaction is important for students to develop their skills (Eagles et al., 2001; Koponen et al., 2011). In terms of communication skills training, the response of students to the use of simulation has been largely positive, whereas cases have also been recorded in which students felt that for learning purposes they preferred to interact with simulated rather that real patients (Rees et al., 2004).

1.2. Identifying the gap in the literature: Aims

While there is plenty of evidence pertaining to the use of manikin- and human- based simulation for manual and clinical skills training (Kaplonyi et al., 2017), little is known about the impact of simulation on non-technical skills and communication in particular (Blackmore et al., 2018). Only few systematic reviews have explored the use of simulation aimed at enhancing communication skills of health care professionals (Lane et al., 2007; Cook et al., 2011; Cook et al., 2012), summarising the outcomes of the use of simulation training in general and in skill acquisition including communication (Blackmore et al., 2018). Empirical research to date seems to have produced inconclusive, and occasionally contradictory, evidence relating to the extent to which improvements in communication skills taught through simulation can be measured (Kaplonyi et al., 2017). This evidence is further limited by the wide range of study designs and outcome collection methods that each study employs that do not allow for data comparability or meta-analysis (Kaplonyi et al., 2017; Blackmore et al., 2018).

The present systematic scoping review, a novel review approach used to cover a vast volume of literature on a broad topic (Arksey & O' Malley, 2005), is therefore proposed as the most practical method to examine the extent, range and nature of research activity, by synthesising research that has used a wide range of methodological approaches and identifying gaps in the evidence base where no research has been conducted. Considering the rapid rate of growth in the evidence produced on the field of simulation-based education and the multi-disciplinary nature of the topic under question (simulation, communication and medical education), providing a visual map of the evidence available is therefore essential. To the best of our knowledge, no study to date has attempted to systematically map and comprehensively explore the existing literature for evidence pertaining to the use of

simulation for communication skills training in medical education and this is an important gap that the present systematic scoping review has been designed to fill in.

This scoping review comprises the first step in a major empiric research project aimed to explore the extent to which technology extended learning (computer simulation) can be used to facilitate and enhance communication skills training in medical education.

2. Methods

2.1. Study design

To decide on the best method to explore the existing literature pertaining to the use of simulation for communication skills training in medical students, various approaches available for reviewing published literature were considered (Grant & Booth, 2009). The scoping review was selected as the best method for charting, collating, summarising and reporting on existing research evidence due to the breath of the objectives underpinning the present exploration. This type of review aims at mapping 'key concepts, types of evidence, and gaps in the research related to a defined area or field by systematically searching, selecting and synthesising existing knowledge' (Colquhoun et al., 2014: 1294) and has been described as extremely popular over the last decade (Levac et al., 2010; Daudt et al., 2013).

The present scoping review will adopt the model introduced by Arksey and O' Malley, comprising a five-stage iterative process including: identifying the research question, identifying relevant studies (designing the search), study selection, charting the data (data extraction), and collating, summarising and reporting the results (Arksey & O' Malley, 2005), supplemented by recent publications offering guidance on how to conduct and report on systematic scoping reviews (Pham et al., 2014; Peters et al., 2015; Trico et al., 2016).

2.2. Stage I: Identifying the research question

The primary aim of scoping reviews is to comprehensively address and systematically explore broad research questions (Davis et al., 2009). To formulate the question of the present scoping review, the PICO (Patient or Population or Problem, Intervention or Exposure, Comparison, Outcome) model was employed (Stone, 2002). PICO introduces a structured format for framing and answering medical/clinical or health care related questions that has been extensively used to improve the scientific rigor of systematic reviews. All concepts that

the present systematic scoping review seeks to map were classified under the relevant PICO components. Hence the primary question to be addressed and explored in this review will be:

- ***What is the current state of knowledge about the use of simulation*** *(intervention)* ***to enhance communication skills*** *(outcome)* ***in medical students*** *(population)?*

This section of the review will attempt to map and explore the extent, range and nature of research activity pertaining to the use of simulation for communication skills training in medical education employing bibliometric techniques to identify and report on the distribution of a series of pre-determined indicators, detailed in *2.5*.

The review will then go further to explore the Strengths, Weaknesses, Opportunities and Threats (SWOT) of simulation used to enhance communication skills of medical students as identified and recorded in eligible studies. SWOT analysis is a simple but effective framework for the analysis of data and information that can be used to identify and maximise strengths, overcome or minimise weaknesses, exploit opportunities and counter threats of a plan, project or situation (Gurel & Tat, 2007). This framework has been extensively applied to several industries (for instance, strategic management, marketing, business, education) but has not been so widely used in healthcare (Kahveci & Meads, 2008). For the purpose of this review, the SWOT framework has been selected and will be applied to identify strengths, weaknesses, opportunities and threats of an intervention (i.e. simulation) to assess its use as a tool to enhance communication skills training in medical education.

In this respect, a set of secondary questions were developed, as follows:

- ***What are the strengths or benefits of the use of simulation for communication skills training in medical students?***
- ***What are the weaknesses, limitations or drawbacks of the use of simulation for communication skills training in medical students?***
- ***What are the opportunities of the use of simulation for communication skills training in medical students?***
- ***What are the threats of the use of simulation for communication skills training in medical students?***

It is worthwhile mentioning that the 'comparison' component of the PICO, though not directly addressed in the present review as part of the primary question, will be explored in the synthesis of results with the different forms simulation identified being compared in terms of strengths, weakness, opportunities and threats in the second section of the scoping review that is the SWOT analysis.

The PICO model was also used for planning and developing the search strategy and setting the criteria for studies to be eligible for inclusion in the review, outlined in *2.3.*

2.3. Stage II: Identifying relevant studies (designing the search)

2.3.1. Search strategy

A search strategy was developed with the help of an experienced information specialist, part of the Research Support Team at the University of Leeds. Certain parameters were applied to searches. Only studies available in English and studies published in peer-reviewed journals were considered. Books, books chapters, conference proceedings and grey literature were not considered. A mixture of keywords and Medical Subject Headings (MeSH terms) were used to guide searches joined together by the Boolean operators (AND, OR). Such mixture comprised combinations and synonyms of the key concepts: simulation, communication and medical students, as identified in the PICO model. Appropriate wildcards were applied to account for plurals and variations in spelling. A draft of the main search strategy (for MEDLINE Complete) can be found in *Table 1*.

2.3.2. Information sources

The main search strategy will be systematically applied to the following electronic collections and databases: MEDLINE Complete (OVID interface, 1946 onwards), EMBASE Excerpta Medica (OVID interface, 1947 onwards), Scopus (1966 onwards) and Web of Science (1900 onwards). Scopus and Web of Science will be included in the information sources to account for studies published in peer-reviewed journals whose scope lies in scientific fields other than medicine, health and related subjects. Preliminary searches will be restricted to titles, abstracts and keywords and will not include full papers. Reference lists from retrieved papers (past reviews in particular) will be also hand searched and relevant papers will be added to data sources.

2.3.3. Eligibility criteria

Considering the breadth of search terms outlined above, it is anticipated that searches will result in a broad range of studies. To narrow this down but also ensure that the right sample of studies to address the primary question of this scoping review is captured, a set of eligibility criteria (based on PICO) were developed as follows:

In terms of population, only studies that refer to the use of simulation for communication skills training in the context of medical education (the focus being primarily on undergraduate medical students) will be included in the review. Studies that describe or explore the use of simulation for communication skills training in other educational (e.g. secondary education, military education) or postgraduate health related (e.g. primary care, hospital care, palliative care) contexts will not be included. Studies that describe or explore interprofessional communication in medical contexts will also be excluded.

In terms of intervention, only studies that refer to simulation (of any form) as the main (or one of the teaching approaches) used for communication skills training in medical students will be included in the review. Studies that describe or explore other teaching approaches for communication skills training (simulation not being one of them) will not be included.

In terms of comparison, any comparator is relevant for inclusion. This means that any studies that compare simulation with other teaching approaches (e.g. role playing, didactic teaching, theatre in education) used for communication skills training in medical students will be included in the review.

Finally, in terms of outcome, only studies that refer to the use of simulation for communication skills training will be included in the review. Studies that describe or explore the use of simulation for training of other skills such as clinical skills or manual skills will not be included.

Considering the nature and the purpose of the current review, no critical appraisal of the content of the studies included was deemed necessary.

2.4. Stage III: Study selection

Once searches are complete, all studies retrieved will be imported into EndNote and a duplicate analysis will be conducted for any duplicates to be identified and removed. Two

investigators (one of which not related to the TELECOMS project) will then review the remaining titles and abstracts to determine their relevance and ensure that the final set of data sources included in the scoping review meets the eligibility criteria set for inclusion. The screening process will be performed independently and once completed the investigators will confer to discuss and agree upon their selections. In cases where agreement cannot be reached on whether a certain study should be included in the final set of data sources or not, a third party (the principal investigator of TELECOMS, or deputy) will arbitrate.

No quality appraisal of eligible studies (as would be required if a systematic review was performed) will be required for selection, as the methodology proposed by Arksey and O' Malley (on which this scoping review was designed) intentionally omits this step. While this could be perceived as a possible methodological limitation of the present review (Levac et al., 2010), it is not deemed necessary because the primary aim of this work is to map the existing literature on the field of simulation for communication skills training in medical education, and it would narrow down the amount of research evidence to be reported.

2.5. Stage IV: Charting the data

A data charting framework will be used for data extraction. An initial framework including a detailed list of the information that should be charted from each study was developed and pilot tested (using an Excel Spreadsheet) on two relevant, recently published, papers identified through a Google Scholar search. Results of the pilot testing discussed with the team members, and the initial framework was refined through discussion and consensus. The refined data charting framework will comprise information, as follows:

In terms of Bibliometrics:

- authorship;
- year of publication;
- type of published output;
- journal of publication;
- country of research activity and country of publication;
- form of simulation used;
- definition (if provided)
- simulation characteristics
- study characteristics (e.g. study design, study setting, study population, focus of assessment and methods of analysis);

- communication skills and communication tasks;
- impact of simulation on communication skills
- modes of communication explored (if any reference)
- consultation models (if any reference)
- evaluation (if any reference)

In terms of SWOT Analysis:

- strengths;
- weaknesses;
- opportunities;
- threats

Two investigators will independently read each study and apply the data charting framework to extract the relevant information. The framework will be first applied to a small sample of studies randomly selected from the full set of eligible studies and adjusted if necessary. This will ensure that the list of information to be charted is comprehensive and accurate.

Charting, nonetheless, will be an iterative process which means that the data charting framework can be adapted and updated at any stage during the data extraction process with information being added, revised or removed accordingly, in consultation with members of the team.

2.6. Stage V: Collating, summarising and reporting the results

Data will be collated and summarised using both quantitative and qualitative analyses. Quantitative analysis (using simple numeric counts) will be performed for the bibliometrics component of the scoping review whereas qualitative analysis (drawing on thematic synthesis) will be performed for the SWOT analysis component of the review for which data, as identified in eligible studies, will be collated and summarised following the SWOT methodology. For this component, thematic content analysis will be employed and data will be analysed on the basis of a set of pre-determined and emerging themes that will also be used for data synthesis and reporting. Qualitative analysis will be performed using Nvivo software (Nvivo v.12, Australia: QSR International, 2017). To ensure accuracy of reporting, the PRISMA reporting guidelines for systematic reviews (Moher et al., 2009) will be used.

3. Discussion

This systematic scoping review comprises the first step in a major empiric research project aimed at using technology extended learning (computer simulation) to enhance communication skills in medical students. This review will examine the extent, range and nature of research activity, identify gaps in the evidence base where no research has been conducted, pointing at areas for which full systematic review might be required.

3.1. Ethical considerations

Considering that this scoping review operates with secondary findings from primary research, with all its data being obtained from sources freely available / openly accessible in the public domain, no formal ethical approval or consent will be required.

3.2. Dissemination plan

Various activities serving the dissemination and exploitation of research findings will be performed comprising publications in open-access, peer-reviewed journals and presentations at relevant national and international conferences and other events. A series of dissemination meetings will also be held with key stakeholders including but not limited to researchers, clinicians, communication leaders, information specialists, experts in simulation and funders.

3.3. Strengths and Limitations

- This is the first scoping review to systematically map and comprehensively explore evidence pertaining to the use of simulation for communication skills training in medical education.
- The proposed review adopts a well-established methodology for conducting scoping reviews based on which a systematic (replicable, transparent and rigorous) search strategy, study selection and data extraction process has been developed.
- An effective plan comprising several strategies for dissemination of results is presented.
- Data will be limited to peer-reviewed published work and will include only studies published in English.
- Given the broad scope of the topic and the heterogeneity of the studies included, the data charting framework will remain liable to adaptation, modification and up-date throughout the entire review process.

4. Timeline and author contribution

It is anticipated that this scoping review will be completed within 9 months. A proposed work plan including stage, task, time and author involvement is outlined in *Table 2*.

Conflicts of interests

None declared

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Table 1: A draft of the main search strategy (for MEDLINE Complete)

	Search string	**Key concept**
1	exp patient simulation/	simulation
2	(simulat* adj2 patient*).tw.	
3	((computer* or virtual* or realit*) adj2 patient*).tw.	
4	((computer* or virtual* or patient*) adj2 simulat*).tw.	
5	or/1-4	
6	exp communication/	communication
7	communication*.tw.	
8	or/6-7	
9	exp students, medical/	medical students
10	education, medical/ or education, medical, undergraduate/	
11	(student* adj2 medic*).tw.	
12	(undergrad* adj2 medic*).tw.	
13	(school* adj2 medic*).tw.	
14	or/9-13	
15	5 and 8 and 14	

Table 2: Proposed work plan for scoping review completion

Stage	Task	Time	Author involvement
1	Identifying the research question and writing the protocol	Months 1-2	AB, JD, VD, TR
2	Identifying relevant studies	Month 3	AB*
3	Study selection	Month 4	AB, JD
4	Charting the data	Months 5-6	AB**, JD
5	Collating, summarising, and reporting the results	Months 7-9	AB, JD, VD, TR

*in consultation with an IT Specialist (member of the Research Support Team at the University of Leeds)
**the person to act as the second independent reviewer, not related to TELECOMS, is to be determined