

# A systematic mapping literature review of ethics in healthcare simulation and its feasibility

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This paper has been accepted for publication in Clinical Simulation in Nursing. Please refer to the published version where possible.

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## Abstract

Both the ethics of simulation and how it may be used to explore, train and assess ethical issues in a clinical context have received growing interest in recent years. As ethical considerations permeate almost every element of simulation and clinical practice, the emerging literature in this field remains relatively fragmented, lacking a common vocabulary or standardised practice and methodology. Given this, the primary aim of this paper was to systematically map the literature related to ethics in healthcare simulation, guided by the research question of ‘how is ethics in healthcare simulation recorded in current literature?’. Our secondary aim was to explore the feasibility of conducting a systematic mapping review. One hundred and four papers were included and analysed. Results suggest that this is relatively small, but rapidly growing field. Most research was carried out in the US and with variety of research methods employed. Research involving samples of nurses relied more heavily on qualitative methods and students in their samples than that of medical doctors or other professions. Keyword co-occurrence suggested that studies utilised simulation overwhelmingly in an educational context.

Key words: mapping review, systematic review, simulation, methodology

## Introduction

Simulation is now widely used in healthcare for pedagogical and practice-based objectives. Both the ethics of simulation and how it may be used to explore, train and assess ethical issues in a clinical context have received growing interest in recent years. The literature that considers the ethics of simulation discusses a range of issues, from the use of vulnerable standardised patients (Tsai, 2004), psychological safety of the simulation participants (Madireddy & Rufa, 2020) to debating the use of simulated death (Goldberg, Heller, Hochkeppel, Levine, & Demaria, 2017), and even the extent to which simulation should be used to train healthcare professionals to mitigate the risk to patients (Toale, Morris, & Kavanagh, 2022). There is now a code of ethics for simulation, which seeks to “promote, strengthen, and support an ethical culture among all individuals and organizations engaged in healthcare simulation” (Society for Simulation in Healthcare, 2018).

Beyond discussions about the ethics of the simulation activity itself, there is an emerging literature that outlines how simulation has been utilised to train and explore a range of ethical issues in healthcare. For healthcare professionals and those in training, knowledge of ethical concepts and how to apply these are essential to providing safe and competent care (Tønnessen, Scott, & Nortvedt, 2020). In the UK alone, there is a standard of conduct, performance and ethics code for nurses and midwives (Nursing and Midwifery Council, 2018), ethical guidance consisting of 32 pieces and 11 categories for medical doctors (General Medical Council, 2022), and a different standards of conduct, performance and ethics for allied healthcare professionals (HCPC, 2016). This is mirrored across other countries that have healthcare professional regulatory bodies (American Nurses Association, 2015; Nursing & Australia, 2018; Sasso, Stievano, González Jurado, & Rocco, 2008).

The literature suggests that ethics instruction varies, and there is little consensus on the best practice for achieving ethical awareness/competence amongst learners (Eckles,

Meslin, Gaffney, & Helft, 2005; Sokol, 2022). Beyond this, several concerns can be found throughout the literature related to the challenges of including ethics content into curriculums (Perkins, Hazuda, & Geppert, 2000), learner engagement (Lehmann, Kasoff, Koch, & Federman, 2004) and in assisting learners to translate ethical concepts into action in clinical situations (Stites, Clapp, Gallagher, & Fiester, 2018). Simulation has been proposed as a means to remedy some of these problems and as an aide to training and maintaining ethical competence for healthcare professionals. Simulation, as it has been used to teach other skills has been shown to improve knowledge, skills, confidence, critical thinking, competence, and well-being (Al Gharibi & Arulappan, 2020; Alanazi, Nicholson, & Thomas, 2017; Fuglsang, Bloch, & Selberg, 2022; Kiernan, 2018).

Ethical concerns permeate almost every element of simulation. That is, while simulation could, for example, focus specifically on ethical issues like beneficence or non-maleficence or explore specific ‘dilemma’ scenarios, the normative elements of simulation are far more expansive. Ethical issues arise in the design of simulated scenarios and within these scenarios, even if not explicitly exploring ethical issues like confidentiality or autonomy for example. Perhaps most fundamentally, every decision or event in simulation has a normative element where we can evaluate whether it was good or desirable, or bad or undesirable. Beyond these normative considerations, the design of simulated scenarios themselves also entail a range of ethical concerns, most notably on this point, there has been a growing literature of psychological safety (Kang & Min, 2019). At least partly for these reasons, this emerging field remains relatively fragmented, lacking a common vocabulary or standardised practice and methodology.

Given this, the primary aim of this paper was to systematically map the literature related to ethics in healthcare simulation, guided by the research question, ‘how is ethics in healthcare simulation recorded in current literature?’. This included studies that utilised or

discussed simulation in relation to clinical or practical ethical problems or papers that discussed the ethics of simulation itself. Both were included as it would be impossible to separate them at this stage due to the same terminology used. It was also anticipated that most papers referring to the ethics of simulation participants would use the term 'psychological safety'. However, this term wasn't included in the search as it is a specific field in its own right and this review was more interested in ethics and simulation more generally, and how it is being considered and incorporated into simulation activities. We were foremost interested in exploring the year and place published, the amount and type of papers that had been published and the samples/professions involved in the outputs, keyword co-occurrence and co-authorship. This would give us a broad sense of how and if ethics is considered through simulation, where and why, ultimately leading to a more focused and refined understanding post review.

Our secondary aim was to explore the feasibility of conducting a systematic mapping review within a diffuse field such as the healthcare simulation literature, as this would potentially generate a useful methodology for delineating many other areas of interest. To our knowledge, such a review has not been carried out in the simulation literature previously.

### **What is a systematic mapping review?**

A systematic mapping review provides a means to broadly map an area of research, focusing on the features of the literature search and allowing for a range of descriptive figures and tables to be produced in relation to the characteristics of the literature, such as the methods used, and temporal, spatial and thematic trends. The focus of a mapping review is thus far broader than traditional systematic and scoping reviews and may even be conducted prior to conducting a more focused search. How broad or focused a review is will at least partially depend on the literature available. A mapping review, in comparison to other forms

of systematic and scoping reviews, is far more flexible in its application, search, inclusion criteria and how data is analysed. Rather than analyse data contained in the full text of papers, systematic mapping reviews are generally concerned with bibliographic data, that is, years of publication, keywords, authors, journals, citations and countries in which the research was conducted. Mapping reviews may also draw on data contained in the abstract or full text of the paper; a number of reviewers 'code' elements of the paper (i.e. methodology, type of intervention) depending on their research questions (Soaita, Serin, and Preece, 2020).

Gough, Oliver, and Thomas (2013) identify three reasons for mapping a research field. Firstly, mapping can be useful in clarifying the type and nature of the research that has been undertaken to date. Secondly, mapping can be a useful precursor to more focused synthesis, that is, mapping may be useful in clarifying a research question and/or refining the scope of a more focused review. Thirdly, mapping can provide useful contextual information to inform future syntheses. Booth (2016) add that where there is an abundant but diverse area of research, mapping reviews are able to help create a visual synthesis of trends, patterns and themes in evidence.

The scope and research questions explored in mapping reviews are typically broader than those in traditional systematic or scoping reviews. Mapping reviews can contain anywhere from hundreds to thousands of included papers. In this case, after a series of preliminary searches and discussions amongst the authors, we concluded a mapping review was appropriate to map the healthcare simulation ethics literature, as it firstly brings two literatures (i.e. healthcare simulation and bioethics) together that are often disparate. Secondly, a mapping review provides a means to include papers (other than research) that would not be included in more focused systematic or scoping reviews, such as letters, opinions, analysis and normative articles (although these sometimes are included in scoping reviews). This was important, as we wanted a wider understanding of what is being practiced

as well as what is known. We therefore felt a mapping review would be appropriate to provide a broad overview of an emerging area in simulation and bioethics and identify gaps and direction for future research, practice and discussion.

## Methods

Systematic mapping reviews broadly follow the process of other systematic reviews, in that a search is conducted, papers are screened/reduced and then analysed. Each step however is somewhat different, perhaps most notable in how data is extracted from papers and how this is then analysed. Each stage such as sample reduction, coding to perform visualisations such as clustering and further analyses will be broadly outlined below. As systematic mapping reviews aim to map out (or visualise) the type and kind of the research that has been undertaken to date, but does not go into the detail of synthesising the content of the literature found - as it would with a focused systematic review or scoping review - the step of critical appraisal has been omitted.

### Research Question

How is ethics in healthcare simulation recorded in current literature?

### Literature search

A search was conducted on 08/19/21 using Scopus, Medline, CINAHL and PsycInfo. The search terms were broad and reflected key concepts related to our research question addressing simulation, ethics and healthcare. The search terms utilised were: simulat\* AND ethic\* AND doctor OR physician OR clinician OR "medical practitioner" OR nurs\* OR "health profession\*" OR healthcare OR "healthcare" OR pharmac\* OR dentist OR midwi\* OR dieti\* OR therap\* OR paramed\* OR physiotherap\* OR radiograph\* OR psycholog\* OR

"health worker" OR hospital. No date or language limitations were applied. Search results were transferred to Endnote; there were 1856 results after duplicates were removed.

### Sample reduction

In a mapping review, sample reduction (or a first screen) involves cleaning up the data, generally scanning titles and abstracts. This step can apply broad criteria, simply just removing clearly irrelevant results or a more stricter eligibility criteria. Two authors <redacted> carried out this screen and excluded irrelevant papers. A broad inclusion and exclusion criteria guided this process. Papers were included if they had a substantive focus on ethics or an ethical issue either related to simulated clinical/medical ethics or the ethics of simulation. Papers were only excluded where ethics was not a substantive focus of the paper, where simulation was used in a treatment or therapeutic context, or where the paper was not available in English. After sample reduction, 104 papers were left.

#### Inclusion criteria

- Papers that had a substantive focus on ethics or an ethical issue either related to clinical/medical ethics or the ethics of simulation
- Papers that utilised or discussed simulation
- Papers with a focus on health or healthcare training or education
- Empirical research, theoretical papers, commentaries and editorials

#### Exclusion criteria

- Simulation when used in a treatment context
- Papers where the focus on ethics was incidental or not a main outcome



## Coding

Coding is also a common step in mapping reviews and allows for analysis that would otherwise not be possible on information contained in the abstract and bibliographic information alone. Seven authors <redacted> coded the papers (n = 104) which were subsequently checked by <redacted>. Papers were coded on several variables:

- 1) whether the focus of the paper was on the ethics of simulation or simulation to explore/assess or train ethical issues as applied to healthcare;
- 2) whether the paper was empirical research (or not), that is where it had a sample and reported data from the sample (for example, many studies reported a simulation implementation/process/innovation and reported that this simulation had been validated, however provided no data on this).

If the paper was empirical research, further variables were coded:

- 3) the methodology employed by the study;
- 4) whether the sample included students and;
- 5) the profession of the sample, for example nurses, doctors of an interdisciplinary sample.

## Analysis

Several analyses were carried out to map the literature. Specifically, 1) the year and country of publication, 2) the nature and type of research, this included analysing how many studies were empirical research, the methodology they employed and their sample characteristics, and 3) co-occurrence analysis of keywords and co-authorship analysis. Data was explored and analysed in Excel, SPSS (IBM Corp, 2020) and VOSviewer (Van Eck & Waltman, 2013). VOSviewer is a programme designed for visualising bibliometric networks and can map bibliometric data such as co-authorship and co-occurrence of keywords.

## Results

### Year and country of publication

The majority of studies included in the analysis were published after the year 2000. Since 2010 there has been a notable increase in publications, peaking in 2017 with 15 publications (figure 1). These results also suggest that the studies included are geographically concentrated. The overwhelming majority of studies came from North America, with the United States and Canada accounting for 64 and 10 papers respectively. The remaining 30 papers either came from authors in Europe, Israel, Hong Kong or Australia.

### Output type on simulation and ethics

Of the papers included in this review, 26 (25%) focused on the ethics of simulation. 76 (73%) of the studies focused on simulation as a means to explore/assess or train ethical issues related to healthcare. One paper focused on both issues. Just over half of the papers ( $n = 56$ ; 54%) were coded as being empirical research. When only looking at empirical research, the majority of papers focused on simulation as a means to explore/assess or train ethical issues ( $n = 49$ ; 87.5%) as opposed to the ethics of simulation ( $n = 7$ ; 12.5%).

### Profession approach and student involvement

Of the empirical papers included, medical doctors took more of a quantitative/mixed methods approach and nurses more of a qualitative approach (figure 2), revealing further difficulties in methodological alignment of studies but the potential for more interdisciplinary high quality mixed-methods approaches. Nurses were also more likely to involve students in the studies compared to medical doctors and other disciplines (figure 3).

## Existing literature reviews

Despite being a relatively small literature base, five literature reviews were found while coding our data. These were subsequently coded. While not commonly done in systematic mapping reviews, given that we hope this review serves as a reference point for future research and reviews, these are worth briefly mentioning. The reviews range from systematic and scoping to summarising papers (see table 1). All but one (Calleja, Soubllette Sánchez, & Radedek Soto, 2020) had a specific professional or clinical focus. Calleja et al. (2020) had a broader remit but was concerned with a primary outcome of the identification, resolution or reflection on ethical problems and therefore included papers according to these criteria. In summary, the papers concluded (in relation to their specified focus) that the integration of ethics into simulated scenarios has the potential to positively promote nursing students' ability to develop knowledge of and skills in ethical practice (Sedgwick, Yanicki, Harder, & Scott, 2021). However, little is known about the what, why and how of ethics in simulation, and there are 'few studies with very low quality of evidence that evaluate the effectiveness of clinical simulation in teaching clinical ethics' (Calleja et al., 2020). More specifically, Rubeis and Steger (2018) concluded that the use of simulation for live tissue training in place of animals is a credible and more ethical alternative. Similarly, Tsai (2004) and Gamble, Bearman, and Nestel (2016) both concluded that the use of children in simulated scenarios was valuable and feasible, however, there was potential for harm to younger children and therefore their involvement should be avoided.

Table 1. Literature reviews included in this study

Authors	Aims	Studies included	Outcomes
Calleja, Soubllette Sánchez, and Radedek Soto (2020)	To identify and synthesize the available evidence on the effectiveness of teaching clinical ethics using simulation as a learning tool.	N = 15	This review found that there were few studies that evaluated the effectiveness of clinical simulation in teaching clinical ethics. The available evidence suggested that simulation allowed participants to identify, solve or reflect on ethical problems.
Gamble et al. (2016)	A systematic review, using a narrative summary with thematic synthesis, aiming to report findings related to children/adolescents as simulated patients in health professions education (undergraduate or post-graduate).	N = 15	This review found that the involvement of children and adolescents in simulation for education and assessment purposes is valuable and feasible. The review identified the potential for harm to children/adolescents; however concluded that rigorous selection, training and support strategies could mitigate this risk.
Rubeis and Steger (2018)	To identify what methods of trauma training are currently available, and determine the educational benefits of live tissue training.	N = 31	This review found that live tissue trauma training is not superior to simulation, because of this the authors argue that live tissue training is unjustified.
Sedgwick et al. (2021)	To systematically assemble, examine and map the extant literature pertaining to the integration of ethics education in high-fidelity simulation-based learning experiences in nursing undergraduate programmes.	N = 8	This review found that the integration of ethics education into simulation had the potential to promote knowledge and skills related to ethical practice, however there was a need for a greater evidence base to add more certainty to these findings.
Tsai (2004)	To summarise the current state of the use of child SPs, and to highlight the difficulties inherent in the use of children for this purpose.	N = 9	This review found that child simulated patients were able to portray a range of roles in simulation and were able to provide reliable feedback. The review also found that experiences may differ between older and younger children and for that reason, the authors caution against using younger simulated patients.

### Co-occurrence analysis of keywords

A co-occurrence analysis of 751 keywords was carried out. The minimum occurrence of a keyword was set to three, which left 122 words that met the threshold. In this analysis we manually excluded keywords that were too general: “human, humans, male, female, article, adult, young adult, child, data analysis software, priority journal, standard, utilization and United States”. The method of normalization was association strength. In relation to clustering the resolution was set at 10 and the minimum cluster size to 10. In total, six clusters with 1934 links and 3422 total link strength were identified. The six clusters are best represented by the most important keywords, clusters were: ethics/education, patient simulation, simulation, medical ethics, teaching and methodology. Figure 4 shows the network visualisation map. The volume of the circle and the size of the label depend on the item’s importance. Thus, if an item is more important, its label and circle are bigger. The colour of the circle is related to the cluster assigned to a group of items.

### Co-authorship analysis

A co-authorship analysis of 341 authors was carried out. The minimum number of documents per author was set to one, which included all 341 authors. The method of normalization was association strength. In relation to clustering the resolution was set at 10 and the minimum cluster size to 10. In total, 92 clusters with 649 links and 680 total link strength. The 92 clusters suggest that across this literature, there has been little collaboration and co-authorship. Figure 5 shows the network visualisation map. Like the previous analysis the volume of the circle and the size of the label depend on the item’s importance. Thus, if an item is more important, its label and circle are bigger. The colour of the circle is related to the

cluster assigned to a group of items. As can be seen, there are few connects that can be visualised.

## Summary of findings

This study sought to map the literature related to ethics in healthcare simulation and to explore the feasibility of a systematic mapping review as applied to simulation and ethics. In relation to our first aim, there are several notable findings. The above literature is a relatively small, but rapidly growing field. The majority of publications included here were published after 2010 and prior to 2000 there were few studies that discussed ethics in simulation. While this increase may of course be reflective of the increasing volume of simulation research more generally it may also reflect a growing interest in ethics and simulation. Prior to 2011 there were limited standards. Cumin, Merry and Weller (2008) highlighted the need to develop standards to help simulation reach its full potential. In 2011 the International Nursing Association for Clinical Simulation and Learning (INACSL) set their first standards which were revised in 2016 (Sittner 2016) and again in 2022. Also in 2016, the Association for Simulated Practice in Healthcare (ASPiH) standards were published (ASPiH 2016).

The literature was also geographically concentrated, with the overwhelming majority of papers coming from the US. This analysis also suggests limited co-authorship in the papers included. While these could be seen as shortcomings, they are also likely attributable to the fact that this field is in its infancy.

When looking more closely at the type of research conducted, qualitative, mixed methods and quantitative methodologies were utilised, across studies that included doctors (or medical students), nurses (or nursing students) and interdisciplinary samples. Notably there were few studies that included other allied health professionals found in this review. This could be for a range of reasons, but may at least partially be due to the fact that many

allied health professionals have more traditionally acted on referrals rather than being a ‘first-contact’ group (Crouch & Brown, 2018; Greenhalgh, Selfe & Yeowell, 2020). There are likely several other reasons, but regardless there appears to be substantial opportunity to expand research into his area.

Research involving samples of nurses relied more heavily on qualitative methods and students in their samples than that of medical doctors or other professions. More generally almost double the number of studies included students in their sample, as opposed to qualified healthcare professionals. Keyword co-occurrence suggests that studies utilised simulation overwhelmingly in an educational context, with keywords such as teaching, education, medical education and curriculum heavily weighted in these analyses.. In this respect there is the potential for significant growth in this area; future studies should consider research with more diverse allied health professionals (and students) and look to sample outside of North America. There also appears to be the potential for substantially more collaboration.

While we are aware of no other mapping reviews as they relate to the healthcare simulation literature, it is worth offering some reflections on our findings in light of the broader literature on simulation.. We found a range of papers that examined the ethics of simulation itself. Clearly there is a need for more focused reviews and attempts to organise and categorise this literature to better identify common issues, approaches and more generally, the intersections of ethics and simulation. On this, there appears to be a case for greater standardisation across the literature and a broader focus on research questions related to ‘ethics’. One example relates to the training of healthcare professionals in relation to ethics and ethical decision making (Sedgwick, Yanicki, Harder, & Scott, 2021) .

Simulation appears to have enormous potential when compared to traditional approaches that rely on didactic learning. In the broader bioethics literature for example,

codes of ethics and other ethical guidance has been long disputed, an alternative that has proposed is a more reflexive approach, that is, training healthcare workers to respond as ethically as possible to unforeseen situations, rather than simply being knowledgeable in ethical principles which may not help in such a situation (Dawson, 1994). Simulation in this sense has the advantage that it can simulate conflicts and issues not otherwise found in codes of ethics, helping learners to resolve conflicts in an applied, rather than abstract fashion. In saying this, pragmatic limitations mean that simulation could not possibly recreate the spectrum of ethical issues faced by healthcare professionals throughout their careers, so a question that naturally follows relates to how might we utilise simulation to its potential to train healthcare professionals to be ethical decision makers? Such a research focus will require collaboration across disciplines, discussions about effective methods or means and it will also raise fundamental questions about what we are trying to achieve if exploring ethics within simulation. In short, while focused questions about specific ethical dilemmas are warranted, if we are to realise the potential of simulation in this domain we will also need a broader focus with questions in mind about what simulation and ethics can bring to one another.

On this final point, the relationship between simulation and ethics should not be seen as unidirectional, there is clearly scope for greater theoretical work in this area that examines the contribution that each could make in informing the other, in comparison to the vast literature on clinical/medical and nursing ethics (in the context of clinical practice) for example and the vast literature that critiques the normative aspects of research methodologies, this review found a relatively small number of papers that discussed the ethics of simulation itself.

Our second aim was to explore the feasibility of a mapping review as applied to ethics in healthcare simulation. To our knowledge, this form of review has not yet been carried out



in this area of interest. While it could be applied to a larger body of literature, we felt in this case it would be appropriate to apply this method to an emerging literature, such as the one included in this paper. While such an approach comes at the cost of more specific details that would otherwise be seen in more traditional systematic and scoping reviews, this review allowed us to apply a broader lens to the literature, noting its broad strengths and limitations, among other things. We feel that such reviews have merit for further application in simulation and ethics research and could be applied to better understand the literature in these areas. Furthermore, we also feel that such reviews could provide valuable direction for more focused scoping and systematic reviews in this area.

### Limitations

One limitation of this review relates to the nature of the concept of ethics itself, that is, it is a concept with relatively diffuse boundaries which often makes it difficult to study in a systematic fashion; this has been well documented in methodological papers related to literature reviews in the bioethics literature for example (McDougall, 2015). In practicality this means that when it comes to simulation and clinical practice more generally, there is no clear line where 'ethics' starts and ends. For this reason there may be a number of other studies not included here that are relevant. Additionally, although no language restrictions were placed on the search, language barriers may mean we don't have a full picture of what is being done globally. The other major issue raised by this review, already alluded to above was that the focus of review was relatively broad, this was not a limitation in itself as we sought to map the literature, it does however mean we can only say so much about certain things, like the types of research questions asked in empirical studies or the major arguments made in the theoretical literature.

## Recommendations for future practice and studies

This review identifies several key directions and opportunities for practice and future research. Firstly, there were relatively few papers that included healthcare professionals and few studies that utilised interdisciplinary participants outside of nursing and medicine, therefore more studies and practice incorporating multi/interdisciplinary teams should be conducted. Secondly, the methodology employed by studies appeared to largely correlate with the participant population, for example studies with nurse participants relied more heavily on qualitative methods. While we can only speculate why this is the case, this may be due to differences in research approaches across disciplines (i.e. medicine and nursing), there is therefore an opportunity for greater methodological diversity. Thirdly, there also appears to be scope to utilise simulation more broadly (in clinical practice), and not just educational contexts to explore ethical issues more generally. Finally, and more generally there was very little collaboration in this area. Again, this may be because this is a generally emerging area of scholarship, it is however something to keep in mind in future studies.

## Conclusion

This study has not only mapped the current global literature base in relation to ethics and healthcare simulation, but has also generated an example-led methodological process that could be of value to many subject areas within the field of healthcare simulation. The mapping has provided an overview of the where, how and why and provides an important first step in delineating what is already published to generate fertile ground for more detailed exploration and understanding.

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Table 1. Literature reviews included in this study

Authors	Aims	Studies included	Outcomes
Calleja, Soubllette Sánchez, and Radedek Soto (2020)	To identify and synthesize the available evidence on the effectiveness of teaching clinical ethics using simulation as a learning tool.	N = 15	This review found that there were few studies that evaluated the effectiveness of clinical simulation in teaching clinical ethics. The available evidence suggested that simulation allowed participants to identify, solve or reflect on ethical problems.
Gamble et al. (2016)	A systematic review, using a narrative summary with thematic synthesis, aiming to report findings related to children/adolescents as simulated patients in health professions education (undergraduate or post-graduate).	N = 15	This review found that the involvement of children and adolescents in simulation for education and assessment purposes is valuable and feasible. The review identified the potential for harm to children/adolescents; however concluded that rigorous selection, training and support strategies could mitigate this risk.
Rubeis and Steger (2018)	To identify what methods of trauma training are currently available, and determine the educational benefits of live tissue training.	N = 31	This review found that live tissue trauma training is not superior to simulation, because of this the authors argue that live tissue training is unjustified.
Sedgwick et al. (2021)	To systematically assemble, examine and map the extant literature pertaining to the integration of ethics education in high-fidelity simulation-based learning experiences in nursing undergraduate programmes.	N = 8	This review found that the integration of ethics education into simulation had the potential to promote knowledge and skills related to ethical practice, however there was a need for a greater evidence base to add more certainty to these findings.
Tsai (2004)	To summarise the current state of the use of child SPs, and to highlight the difficulties inherent in the use of children for this purpose.	N = 9	This review found that child simulated patients were able to portray a range of roles in simulation and were able to provide reliable feedback. The review also found that experiences may differ between older and younger children and for that reason, the authors caution against using younger simulated patients.

Figure 1. Year of publication of included papers

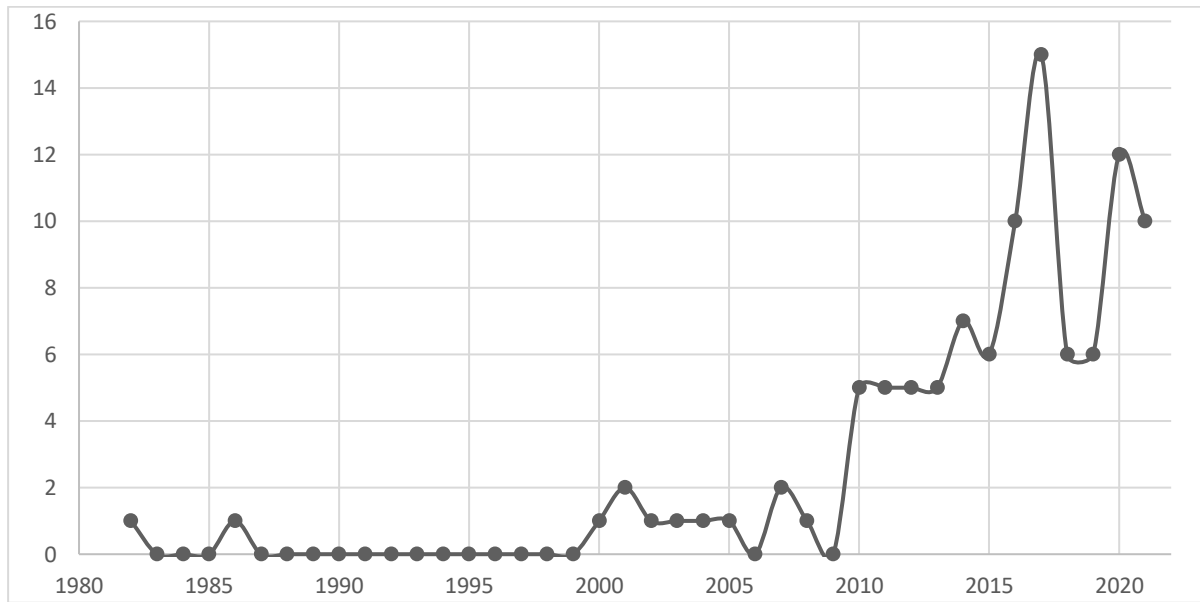




Figure 2. Methodology employed by included empirical studies

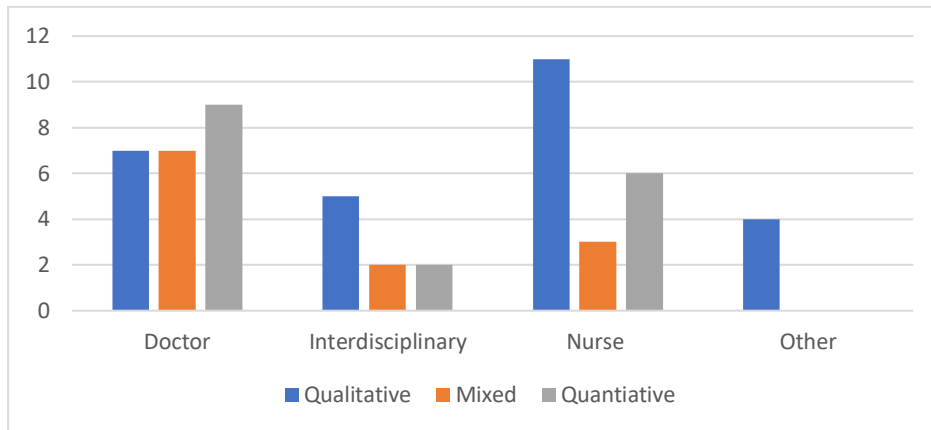


Figure 3. Students involved in research samples

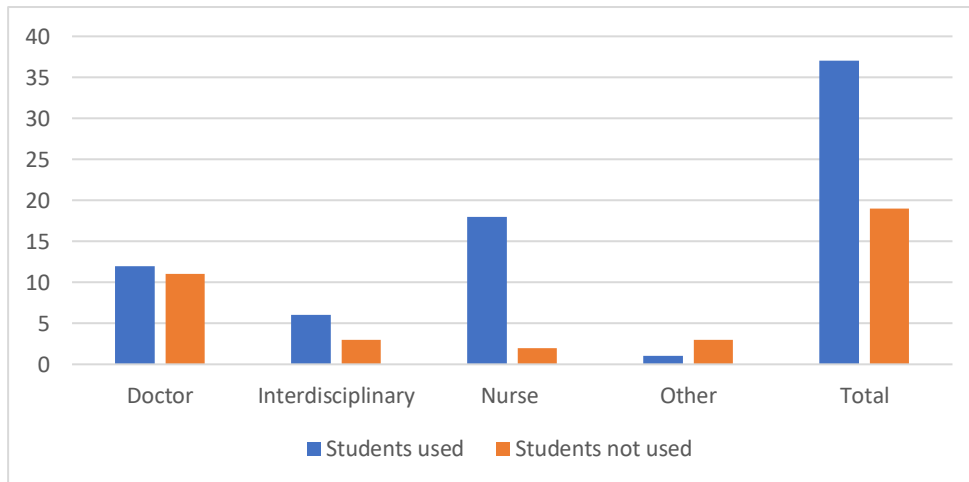
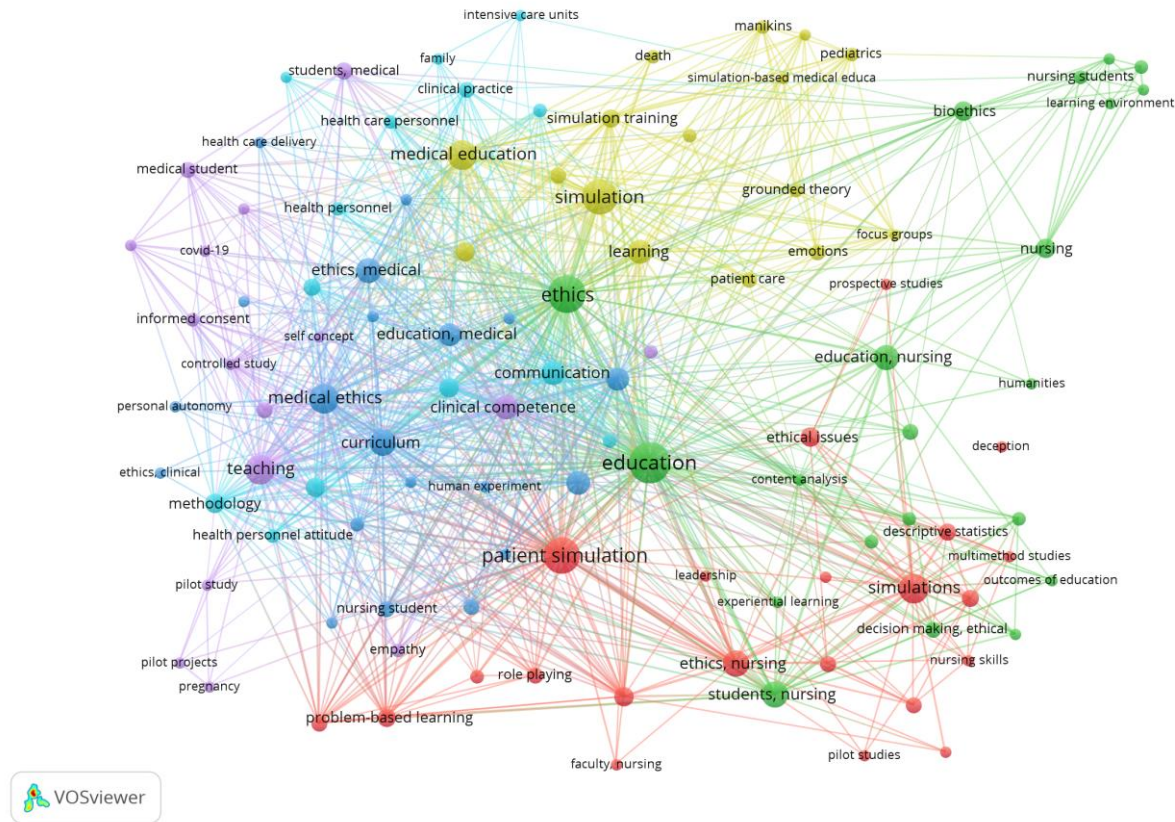
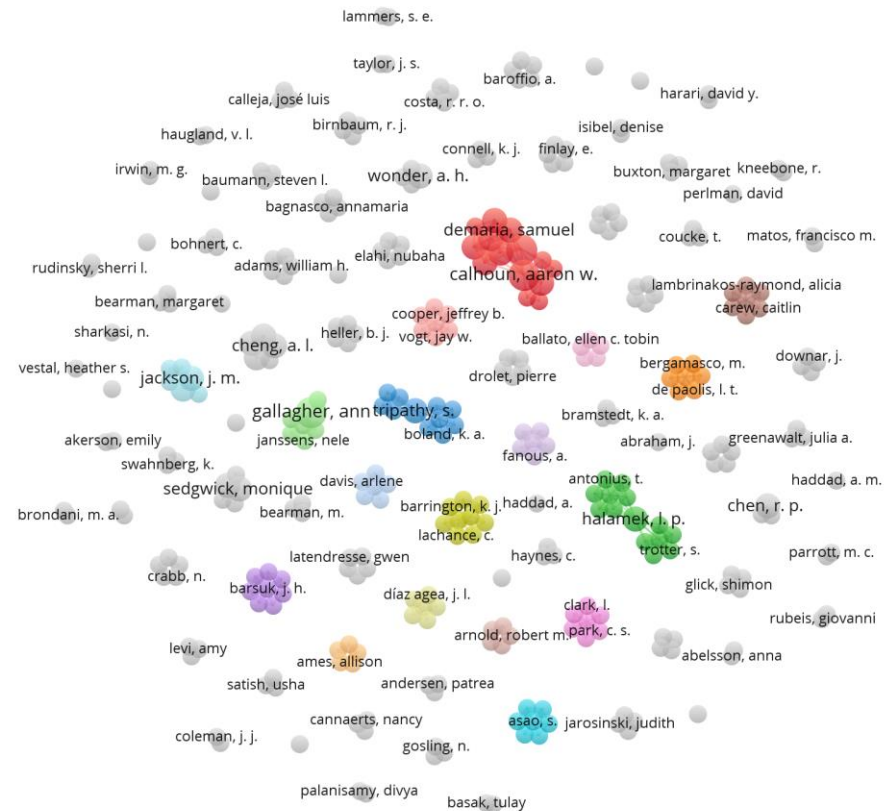


Figure 4. Co-occurrence analysis of keywords



Note: This figure shows six clusters of the most important keywords found in bibliometric data of the included papers: ethics/education, patient simulation, simulation, medical ethics, teaching and methodology. The volume of the circle and the size of the label represent the item's importance, with bigger circles representing more important key words. The colour of the circle is related to the cluster assigned to a group of items.

Figure 5. Co-authorship analysis



Note: This figure shows links between co-authors. The volume of the circle and the size of the label represent the item's importance, with bigger circles representing more important key words. The colour of the circle is related to the cluster assigned to a group of items.