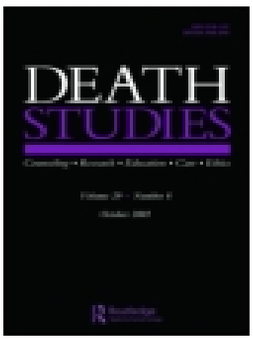

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Using Simulation as a Learning Experience in Clinical Teams to Learn about Palliative and End of Life Care: A Literature Review

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Abstract

Simulation has been shown to improve the preparedness of practitioners in acute care. In this review we evaluate using simulation to prepare practitioners to deliver palliative care in

multidisciplinary teams. The Joanna Briggs Institute approach was used and seventeen studies selected. The thematic analysis of the literature fitted well with Gabby et al pyramid approach to health improvement suggesting that simulation can be used in teams to learn technical, soft and learning skills of delivering palliative care. The analysis does not indicate how learning each of these skills interacts nor if simulations in teams should be repeated, or how often.

Keywords: death education, palliative care, simulation, terminal care

INTRODUCTION

The use of simulation has become an accepted learning method on university courses, clinical teaching and work based learning (Bradley & Postlethwaite, 2003). Simulation is now widely used in many high income countries in health and social care learning (Gillan, Jeong, & van der Riet, 2014; Jeffries, 2012). In the main these simulations scenarios feature acute care either in trauma or intensive care situations (Cant & Cooper, 2010; Stocker et al., 2012). In their review of the use of end of life simulation in undergraduate nursing programmes Gillan et al. (2014) point out that end of life scenarios only started to be used since 2009. The evaluations of simulation learning have shown that these opportunities are welcomed by students and that they increase their understanding of clinically important concepts (Cant & Cooper, 2010). Moreover, they provide the opportunity for students to examine values and analyse caring experiences which allows them to model behaviour useful in clinical situations such as decision making (Barnato et al., 2008). Clinical skills have been shown to improve when using simulation (Allinier, Hunt, Gordon, & Harwood, 2006) and student outcomes in terms of perceived confidence and competence following simulation training are comparable to experience gained from time spent in a clinical area (Baillie & Curzio, 2009). Moreover, the use of simulation in learning has been shown to have a positive

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impact on nurses' levels of confidence when dealing with death and dying (Kurz & Hayes, 2006; White, Coyne, & Patel, 2001).

Despite this evidence of the effectiveness of simulation in education programmes **c**urrent analysis indicates that where palliative and end of life care is included in undergraduate curricula it is delivered largely in theoretical form (Bassah, Seymour, & Cox, 2014). Educators cannot guarantee that students will experience palliative or end of life care in clinical practice, and when they do have exposure in practice it can be difficult to find time and skilled facilitation to ensure the maximum learning is achieved from the encounter. Given the mainly theoretical approach and lack of reflexive clinical exposure it is perhaps not surprising that health and social care practitioners feel ill prepared and ill equipped to deliver palliative and end of life care (Wessel & Rutledge, 2005). The studies referenced above relate to undergraduate learning, there does not appear to be any reviews of how teams delivering palliative care use simulation to learn together.

Palliative and end of life care is a relatively new medical subspecialty (only recognised in the UK in 1995 and in Australia/New Zealand in 1998 (Clark, 2007)). This emerging medical sub-specialty status perhaps in part explains the variations seen in palliative and end of life care attitudes, values and practices (Goel et al., 2014) and in the degree to which practitioners in different countries felt prepared, or not (Wessel & Rutledge, 2005) for aspects of delivering palliative care, such as breaking bad news (Goel et al., 2014). Services in palliative care also present a mixed picture with some populations having access to specialist services, and others accessing general health services supported by specialists, and some who have no access to palliative care expertise. Thus the teams delivering palliative and end of life care may be constituted very differently, be perceived as "generalist" or "specialist" and include many different disciplines and professional groups. In addition, the development of palliative services has been

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different for children with different teams emerging integrated across settings of home, hospice and hospital (Grinyer, 2012).

Learning through simulation would seem to be effective in helping people to learn about complex health and social care situations (Cant & Cooper, 2010; Gillan et al., 2014). The current mainly theoretical learning strategies for palliative and end of life care at undergraduate level do not seem to be preparing practitioner for delivering palliative and end of life care (Wessel & Rutledge, 2005). While clinical experience is invaluable, it does not always offer the reflexive environment in which encounters with palliative and end of life care can be explored and learning optimised. However, defining "simulation" is problematic in that the term is used to refer to a very wide range of learning methods. The term fidelity is often used in simulation and refers to the exactness of replication of an object or situation. Simulation can include low fidelity methods such as, staged multi-disciplinary team meetings, role playing, online scenarios presented via multimedia and other theatre based methods. High fidelity methods can be described as using manikins augmented with various technologies which attempt to more closely recreate the context of care (Gillan et al., 2014; Parker & Myrick, 2009). However, evaluation of the use of simulation in learning seem to indicate that the level of fidelity is less important as both low and high fidelity learning methods have demonstrated positive outcomes (Cant & Cooper, 2010). Thus the degree to which technology is used to recreate the context and experience of the clinical situation being simulated seems to be less important than the opportunity to explore clinical situations through realistic simulation.

Through our work teaching end of life care, including using simulation, and with clinical partners in the North West Children's Palliative Care Network, we became interested in how simulation might be used to help clinical teams to learn about palliative care. We teach across

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children's and adult nursing so we wanted to understand both children's and adult teams might learn using simulation. What we were interested in was whether there was evidence in the literature that teams delivering palliative care might be brought together using a simulation exercise to learn about palliative care. These interests and our reading gave rise to the following research questions.

Research Questions

- What indications are there in the current literature that educators or clinicians are providing learning experiences in clinical teams using simulation to facilitate learning about palliative and end of life care?
- What challenges and opportunities are discussed in the literature on the use of simulation in the design, implementation and evaluation programmes on palliative and end of life care in clinical teams?
- In the literature, how are issues of palliative and end of life care across the life span addressed in clinical team's learning using simulation?

METHOD

The authors undertook a systematic literature review using the Joanna Briggs Institute (2014, pg29) three phase approach and the principles of literature reviewing set out by Aveyard (2014). The research questions were devised and agreed by both first two authors (DR DG). In accordance with The Joanna Briggs Institute (2014) guidance on qualitative research we re - constructed the questions to aid clarity in our review using the Population, Phenomena of Interest, Context and Outcome (PiCO) format as follows

Population: healthcare professionals delivering palliative and end of life care

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Phenomena of interest: learning from simulation experiences about delivering palliative and end of life care across the life span

Context: Uni and multi professional learning in simulated learning environments

Outcome: Evaluations of learning from simulation learning experiences and application to clinical practice.

Phase One: Search Strategy

An initial search was undertaken to identify key words and words used in titles. In addition, the Medical Sub heading database (Pubmed) was searched and search terms revised to reflect MeSH terms. The following search terms constructed with Boolean operators were used

Keyword or Subheading Search Term

High fidelity simulation OR patient simulation OR computer simulation AND palliative OR terminal care AND education OR assessment educational needs OR continuing education OR competency based education

Title Word Search Term

High fidelity simulation OR simulation OR Short OR intense OR compact AND intervention OR programme OR opportunity OR experience AND learning OR education OR training OR skills acquisition AND palliative OR end of life OR supportive OR hospice OR death OR dying

Phase Two and Three: Database Searches and Selection of Studies

The following databases were searched Ovid MEDLINE(R) without revisions 1996-18/9/2014, PsycINFO 2002- September week 2 2014 and the AISSA database. These databases

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were used to ensure coverage of medical and of social aspects from a range of health and social care professional groups. Limits were applied in each database to exclude non-human studies, studies published prior to 2004 and those not published in English.

Selection of Studies

Each of the authors (DR, DG) independently reviewed the results of the keyword (subject heading) and title word search from each of the databases. The title and abstracts were read and the inclusion and exclusion criteria agreed by the authors were applied independently. The resulting lists of selected papers were reviewed by both authors and a final selection list agreed. Duplicates were removed. The end list of references from all the included papers were reviewed by both authors and inclusion exclusion criteria applied, the selection of additional papers by this snowballing method was agreed by both authors (DR, DG).

Inclusion Criteria

	Rationale
Literature published between 2004-2014	Development of simulation facilities, staff and equipment have led to an increasing use of simulation in education over the last decade [5]
Empirical research from peer reviewed journals	To provide an evidence base for the development of simulation in palliative and end of life learning we wanted to use empirical research sources which had been peer reviewed
Relevant to the research questions	Literature related to interventions to aid the learning

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	of health and social care workers on palliative and end of life care

Exclusion Criteria

	Rationale
Literature in languages other than English	The research team does not have access to the cultural experience nor the language skills to interpret literature written in other languages
Reports of non-scenario based learning experiences which do not use peer learning and have no skill to be practiced (skills include communication etc) Reports of text based only learning experiences	Such approaches do not reflect simulation which is immersive, scenario based and uses peer learning to explore the way skills are enacted in simulated clinical contexts
Literature on use of simulation in learning not related to palliative or end of life care i.e. trauma or intensive care settings	Our concern is with palliative and end of life care across the life span, not with management of acute illness

Analysis

All of the selected papers were analysed by the authors independently reading and re reading the papers and using inductive reasoning to generate thematic codes which were then discussed and agreed between the authors. A data abstraction table, **Table 1** was used as recommended by Aveyard (2014). The thematic open codes shown in **Table 1** (e.g. Students

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understanding improved) were discussed by both authors and organised into the axial coding (e.g. Technical Skills) presented in this paper. The first author (DR) analysed the quality of the selected papers using Pluye et al. (2009) method. The quality of studies was not used as an exclusion criterion as there is no evidence that a score below a certain level on Pluye, Gagnon, Griffiths, and Johnson-Lafleur (2009) scoring is indicative of the inferences from such studies being unsound. Instead the data quality table (**Table 2**) is provided so that the reader may judge for themselves the degree to which they wish rely on the inferences from the research. For example a score of 33.3% would indicate that only 1/3 of the quality measures are present in the research report and the reader may wish to consider how reliable and valid the paper's findings are if 2/3rds of the quality measures for the type of research are not reported.

FINDINGS

The citations retrieved from each of the databases are set out in **Table 3** both for the keyword of subject heading search strategy and for the title word search. In the MEDLINE(R) and PsycINFO keyword search the term "assessment educational needs" was omitted as using this term reduced the citations to zero. The string "palliative OR end of life OR supportive OR hospice OR death OR dying" was also omitted in the title word search in these databases as again using this string in the search strategy reduced the citations to zero. In the AISSA database the title word string was replaced with "High fidelity simulation OR simulation OR Short OR intense OR compact AND palliative OR end of life OR supportive OR hospice OR death OR dying" to yield more than one citation.

From these citations seventeen papers were selected for review using the inclusion /exclusion criteria. No new papers were identified from the search of the selected papers reference

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lists. See **Figure 1** a PRISMA chart detailing the identification and selection process as suggested by Moher, Liberati, Tetzlaff, Altman, and the PRISMA group (2009).

Of the seventeen papers selected, four were purely qualitative in methodology, four were quantitative quasi experimental and nine used mixed methods. Although many of the mixed methods studies did not identify this as the methodology being employed, nor gave a rationale for using mixed methods. The majority of papers describe participants who are students on various courses, rather than practitioners in palliative care teams. We refer in this paper to students but recognise this will include pre and post qualification practitioners who may go on to work, or are working in palliative and end of life care teams.

Quality Appraisal

Appraising the quality of papers was often challenging because the reports were sometimes more focused on evaluations of the methods used in the simulation (understanding if the simulation worked as a simulation exercise) rather than evaluations of students learning from the simulation i.e understanding if simulation helped students understand about palliative and end of life care. This meant the reporting of evaluation of learning was sometimes very limited, making it difficult to appraise the quality of the study. However, the qualitative papers seemed the best in terms of quality (mean 62.49 out of 100) with three studies scoring 66.66*. The quantitative quasi experimental papers scored much lower, however this may be because they were pilot studies for larger studies which might explain a weaker method as teams trialed various methods in the early stages of a project. The mean score was 33.33*. The mixed methods studies present a range of quality scores from 33.33* to 66.66*.Many of these studies were scored by the reviewers as mixed methods studies because they use both qualitative and quantitative methods even though the

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authors of the papers have not identified the work as mixed methods. This lack of recognition of methodologies being employed may explain the wide variation in quality (mean 44.44*). The full quality appraisal scoring is reported in **Table 2** (online supplementary file)

Thematic Analysis

After completing the open coding (**Table 1** online supplementary file) the authors considered whether these codes or themes could be organised using Gabby, Le May, Connell, and Klein (2014) concepts of a pyramid approach to health improvement, given that the aim here was to improve how clinical teams provide palliative and end of life care. The structure of technical, soft and learning skills (set out in **Table 4**) seemed to fit well with the open coding and to address the research questions. The health improvement pyramid conception was based on empirical work Gabby et al. (2014) undertook for the Health Foundation. Their thesis is that to improve services one has to build the three sides of the pyramid set on a strong organisational foundation. The three side concepts are technical skills, such as compiling a run chart to show improvement over time, soft skills, including understanding cultural and local contexts, and learning skills which allow people to learn together as part of a community. Gabby et al. (2014) contention is that one side cannot be successfully built without the other two elements, as without the development of the other aspects the pyramid will collapse, whereas if all three aspects are attended to equally a successful pyramid can be constructed to reach its summit. Understanding the technical skills of how to improve health is only useful if combined with understanding how to implement change in a local culture and if one has the skills to facilitate other learning about health improvement.

Obviously the concept requires some adaptation. Instead of a strong organisation foundation we might consider that students have experience of death and dying from their own

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lives and communities, which they bring to their learning. We suggest that students might need a solid foundation of understanding their own beliefs and conceptions of death and dying upon which to base their learning about palliative and end of life care. Students who have recent experience, or are experiencing, a threat to the life of a close relative, or friend, or who are caring for someone who is dying, may find their core beliefs and conceptions of death and dying being challenged. They may find it more difficult to learn, to build a stable pyramid because for them the foundations are being shaken. This "base of the pyramid" phenomenon is only obliquely referred to in the papers in this review. Much as in Gabby et al. (2014) study the organisational base is assumed (Gabby et al studied organisations with a good track record for health improvement) here too there is in some papers an assumption that students may have experience of death, dying and loss (Fabro, Schaffer, & Scharton, 2014; Gilliland, Frei, McNeill, & Stovall, 2012; Pullen et al., 2012; Tuxbury, McCauley, & Lement, 2012).

The other three side concepts from Gabby et al. (2014) pyramid would seem to provide a useful way of understanding the students' learning from simulation about palliative and end of life care. Technical skills relate to students understanding of the technical aspects of delivering palliative and end of life care, such as nursing practices and understanding decision making in end of life care. The soft skills relate to multi professional and interdisciplinary understanding, how the student understands care through cultural and spiritual lens, by observing others and from reflexion on service user insights. Lastly the learning skills are evident in the acceptability of simulation as a learning experience, how the experience affects students' confidence in their ability to deliver care and reflect on their learning from the simulation.

Technical Skills

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Although only three studies measured improvements in students understanding about palliative and end of life care (Fluharty et al., 2012; Moreland, Lemieuxy, & Myers, 2012; Rodriguez, Johnson, Culbertson, & Grant, 2011) there appeared to be no difference between students who took a more active role (role playing a nurse delivering care) and those who purely observed and participated in debriefing. These studies also used high and low fidelity. Twigg and Lynn (2012) were unable to demonstrate a significant improvement in students understanding from participating in simulation.

More studies addressed whether students had learnt about nursing practices through their participation in the simulation (Ellman et al., 2012; Gillan, Parmenter, van der Riet, & Jeong, 2013; Leavy, Vanderhoffy, & Ravert, 2011; Smith, Witt, Klaassen, Zimmerman, & Cheng, 2012). However, studies that included other professions did not report participants recognising the role of nurses (Ellman et al., 2012). Again these studies used a variety of simulation scenarios both low and high fidelity. Only one study Barnato et al. (2008) looked at decision making in end of life care, the participant were all medical practitioners from one institution.

Soft Skills

Inter professional collaboration was discussed in only four studies which in all but one case these were multi professional studies. Gilliland et al. (2012) study only involved pharmacy students but was the only single professional study to recognise the interdisciplinary aspects of palliative and end of life care. The three studies which report participants gaining insight into service user views were all nursing studies (Eaton, Floyd, & Brooks, 2012; Fabro et al., 2014; Leighton & Dubas, 2009). Seven studies found that simulation allows students to gain insights into how they personally might feel when caring for a dying person. These insights are perhaps linked

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to the way simulation allowed students to observe how other healthcare workers deal with delivering palliative care with the potential to model the behaviour of others in the simulation. There was a good deal of variation in the studies, which reported how students use their simulation learning to frame or re-frame death and dying, and understand cultural or spiritual aspects of palliative and end of life care. Some report both the students' personal reflection, on death and dying in communities using cultural and spiritual lenses, but other studies suggest personal reflection on death, but not cultural aspects of palliative care (Fabro et al., 2014). Some reported reflection on dying without either the student's understanding of cultural or spiritual aspects being recognised (Gilliland et al., 2012; Ladd, Grimley, Hickman, & Touhy, 2013).

Learning Skills

Only two studies reported none of the aspects of student learning (Barnato et al., 2008; Pullen et al., 2012). The other reviewed studies identified that students recognised simulation as an acceptable and suitable learning experience. All the studies suggest students were satisfied with their learning experience and feel the simulation learning experience is both valid and reliable. All the studies also reported that simulation experience increased students' confidence in delivering care. However, despite debriefing being an integral part of simulation scenarios (Jeffries, 2012) only five studies commented on the learning from debriefing.

DISCUSSION

The literature reviewed here indicates that in answer to our first research question there are learning experiences using simulation that address palliative and end of life care issues which are being used with clinical practitioners from various professions and disciplines that work in palliative and end of life care teams. However, none of these studies describe the use of simulation

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in clinical care teams who deliver services together to a cohort of people. The design, structure and evaluation of these learning opportunities are variable. This means that important aspects are sometimes omitted such as cultural aspects of end of life care or evaluating debriefing opportunities. None of the studies report the use of simulation in case reviews to explore recent team performance in specified cases or circumstances. However, the challenges of delivering simulation learning outside longer credit bearing programmes receives little attention in the literature. This makes it difficult to evaluate the potential cost or benefits of establishing and delivering palliative and end of life care simulation in clinical teams. Although, the lack of evidence that the fidelity of the simulation is important may indicate that low fidelity simulation could be used, which requires little technical equipment.

In answering our second research question the opportunities and especially the benefits in student confidence and competence are given much more attention in the studies. While it is encouraging to reflect that all these studies showed improvement in students understanding and confidence in delivering palliative and end of life care none of these studies looked at dose effect. These improvements may fade over time and the activity need to be repeated to maintain understanding and behaviours. It is also not been shown whether the changes in confidence and understanding affected delivery of care. We do not know from these studies if the confidence and understanding is permanent, or if repeated exposure to simulation learning is required. If so what is the dose, and how often does it need to be applied? This raises questions as to whether there is an initial dosage, perhaps an extended simulation experience followed by shorter reminder or maintenance doses of simulation. In this study we excluded online or virtual simulations, based on the fact that they do not allow for skill demonstration or peer learning through observation.

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However, as immersive technologies advance simulations online might become useful if not for an initial dose then for maintenance.

What is also unclear is the interaction of theoretical content and simulation. This will be a particular challenge for simulation learning in clinical teams where team members may have very different levels of understanding prior to the simulation. A majority of papers mention some other learning activities delivered either prior or alongside the simulation. However, it is not clear how the effect of simulation is being measured controlling for the effects of other learning opportunities, even in those studies that measure understanding (Fluharty et al., 2012; Moreland et al., 2012; Twigg & Lynn, 2012).Nor is there evidence of an underpinning pedagogy of simulated learning which might support Parker and Myrick's (2009) critique that simulation has developed with technical advances without full consideration of how people use such technologies to learn.

Aspects of palliative and end of life care across the life span seem to be missing from the literature, there is only one study which included a paediatric scenario but the differences between adult and child simulated scenario is not analysed (Leavy et al., 2011). Thus our third research question remains unanswered which is perhaps indicative of how children's palliative care services have developed differently from adult services. Children's palliative and end of life care requires the technical, soft and learning skills described in the studies for adults to be applied in a context of children living childhoods (Randall, 2016). For example, interprofessional collaboration is different for children's nurses as they need to work with social care, and education professionals as well as parents and the child's other carers.

In considering the utility and validity of the Gabby et al. (2014) pyramid approach, six of the studies do not include all three elements, although some of these studies have a limited report of the evaluation of the simulation learning (Fluharty et al., 2012; Gilliland et al., 2012; Leighton

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& Dubas, 2009; Pullen et al., 2012; Swenty & Eggleston, 2011; Tuxbury et al., 2012). The remaining eleven studies include elements of all three skills factors (technical, soft and learning) which may support the view that Gabby et al.'s (2014) concept is a good fit as a frame for analysis. However, none of these studies test the interdependence of the skills. All three might be present (in the majority of studies) but not dependent on each other as suggested by Gabby et al. (2014) pyramid concept. Further research would be required to test the hypothesis that these factors work in concert. In designing such further research, it would be helpful to explore the base of the pyramid that is the students understanding and experiences of death and dying. The assumption made above that the three factors require a solid base needs to be verified. In addition, further discussion and thought might be required to explore the ethical, moral and practical issues of learning about death and dying. Currently there would seem to be informal and often variable approaches to dealing with a student who is experiencing personal or professional difficulties surrounding death and dying at the time of study. While we might all agree that one should not, and perhaps could not, force someone to learn about palliative and end of life care, the dilemma remains that communities expect health and social care workers to be able to help them with dying and death.

Based on our work in this study we recommend that simulation can be used with multi professional clinical palliative and end of life care teams. The evidence suggests that low or high fidelity simulation can be used to improve understanding and confidence in delivering care. While not conclusive, we would suggest there is enough evidence to warrant adopting a pyramid approach to simulation in clinical teams where technical, soft and learning skills are all addressed in the design of both the simulation and the debrief exercises.

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We would urge further consideration to be given to the design, structure and content of theoretical resources used alongside simulation learning. Further research to evaluate the dose effect of simulation experiences and to evaluate if the pyramid factors work in concert, are interdependent, or not, and to verify if learning is affected by the students current understanding and experience of death and dying. Finally, further research is required to evaluate the use of simulation in teams that deliver palliative and end of life care to neonates, children and young people as well as to other underserved groups.

For many clinical practitioners simulation courses may be the only opportunity to develop and explore their practice. While it cannot replace reflective clinical experience it does offer a systematic way to learn how to deliver better palliative care.

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Table 1. Data abstraction

Author(s)(year of publication) and study location	Population Characteristics	Data Collection method/Details of Study	Technical Skills			Soft Skills							Learning Skills		
			Students understanding improved	PEoLC Nursing practices	Decision making in PEoLC	Inter professional collaboration	Insights into service user views	Emotional preparedness	Modelling	(re)Framing death and dying	Cultural safety	Spirituality	Acceptability to students and learning	Student satisfaction and confidence	Debriefing
Barnato et al. (2008) USA	27 doctors (Physicians) from one institution	Qualitative data on decision making and demographic statistics. Observation of simulation			✓	✓		✓	✓						✓

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Eaton et al. (2012) USA	30 undergraduate baccalaureate nursing students	Qualitative study hospice based simulation using open questions written responses immediately after simulation and after clinical placement		✓			✓				✓		✓	✓	✓
Ellman et al. (2012) USA	Students from medicine, nursing,	Qualitative analysis of 217 students free text responses		✓		✓					✓	✓	✓	✓	

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	chaplaincy and social work	and quantitative analysis of 309 post session questionnaires from 10-14 cycles of the programme (self report only) Online case and low fidelity case conference													

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Fabro et al. (2014) USA	21 students on an elective (option) module on end of life care in a baccalaureate undergraduate nursing programme	4 students in a pilot study Education Practices Questionnaire and Student Satisfaction and Self Confidence in Learning Tool administered after the simulation session Qualitative analysis of		✓			✓			✓		✓	✓	✓	

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		reflection essay													
Author(s)(year of publication) and study location	**Population Characteristics**	**Data Collection method/ Details of Study**	**Technical Skills**			**Soft Skills**							**Learning Skills**		
			Students understanding improved	PEoLC Nursing practices	Decision making in PEoLC	Inter professional collaboration	Insights into service user views	Emotional preparedness	Modelling	(re)Framing death and dying	Cultural safety	Spirituality	Acceptability to students and learning	Student satisfaction and confidence	***Debriefing***
Fluhart y et al. (2012) USA	370 undergr aduate nursing student s from 4 nursing depart ments doing medica	As study specific knowledg e, communi cation and satisfactio n measures, an adaptatio	✓										✓	✓	

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	l/surgical module	n of a 30 item confidence measure													
Gillan et al. (2013) Australia	120 3rd year undergraduate nursing students	Study specific evaluation questionnaire with Likert 10 point scales and open questions		✓				✓					✓	✓	✓
Gilliland et al. (2012) USA	30 pharmacy students	Mixed methods pre/post test attitudes toward death and competen				✓				✓				✓	

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		cy surveys 30 minute (15 pre 15 post mortem) high fidelity simulation. Reflective journal and course evaluation													
Ladd et al. (2013) USA	35 undergraduate nursing students	Pre and post group interviews/ survey with observati		✓				✓	✓	✓				✓	

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		on and note taking (interviews were not recorded)														
Leavy et al. (2011) USA	149 undergraduate nursing students	Study specific questionnaire with some scoring elements and focus groups post simulation		✓				✓					✓	✓	✓
Author(s)(ye	**Population**	**Data Collectio**	**Technical Skills**			**Soft Skills**							**Learning Skills**		

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ar of publication) and study location	Characteristics	n method/ Details of Study	*Students understanding improved*	PEoLC Nursing practices	Decision making in PEoLC	Inter professional collaboration	Insights into service user views	Emotional preparedness	Modelling	(re)Framing death and dying	Cultural safety	Spirituality	Acceptability to students and	Student satisfaction and confidence	*Debriefing*
Leighton and Dubas (2009) USA	16 undergraduate nursing students	Course evaluations over 4 semesters					✓	✓					✓	✓	
Moreland et al. (2012) USA	14 Undergraduate nursing students 11 traditional 3 accelerated	Mixed methods quasi experimental of effect of 15 minute high fidelity simulatio	✓	✓				✓						✓	

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	programmes	n (Laerdal human patient) A pre/post test knowledge and self efficacy measure developed for the study and group interviews													
Pullen et al. (2012) USA	Hospice staff and nursing students (70-100)	4 day programme including high fidelity simulatio		✓		✓				✓					

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		n student satisfaction on study specific scoring 1-5 Likert scale and student comments													
Rodriguez et al. (2011) USA	31 clergy	Pre and post questionnaire low fidelity simulation	✓									✓		✓	
Author(s)(ye	**Population**	**Data Collectio**	**Technical Skills**			**Soft Skills**							**Learning Skills**		

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ar of publication) and study location	Characteristics	n method/ Details of Study	*Students understanding improved*	PEoLC Nursing practices	Decision making in PEoLC	Inter professional collaboration	Insights into service user views	Emotional preparedness	Modelling	(re)Framing death and dying	Cultural safety	Spirituality	Acceptability to students and	Student satisfaction and confidence	*Debriefing*
Smith et al. (2012) USA	60 undergraduate nursing students on a legal and ethical module	Post experience questionnaire comparison of 3 groups, in person, online and high fidelity Included student evaluation (High		✓							✓		✓		

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		fidelity rated highest by students($p < 0.05$)													
Swenty and Egglest on (2011) USA	79 3rd year undergr aduate nursing student s	Comparis on of simulatio n experienc es including a patient death scaled measures of education al practice, simulatio n design,											✓	✓	

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		student satisfaction and self confidence using 0-5 point Likert scales Includes power analysis (0.79-0.95)													
Tuxbury et al. (2012) USA	Undergraduate nursing and theatre students	35min Live actor simulation (not manikin) using Forum Theatre methods (includes							✓	✓			✓	✓	

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		replaying scenes or moments) .Qualitative and quantitative immediate evaluation of simulation. A follow up reflection journal entry one week post simulation													
Twigg and Lynn	16 3rd year undergr	Knowledge pre/post	✓	✓				✓	✓				✓		✓

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(2012) USA	aduate nursing students	test and Concerns About Dying Scale and group interview 1 week post simulation (Qualitative data not reported)														

Notes: Palliative and End of Life Care PEoLC

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Table 2. Quality appraisal using Pluye et al. (2009) scoring system

Author(s)(year of publication) and study location	Methodology	Qualitative objective or	Appropriate qualitative	Description of the context	Description of participants	Description of qualitative data	Discussion of researchers'	Number of factors presence in reports divided by the number
Qualitative QUAL								
Eaton et al. (2012)	QUAL	1	1	1	0	1	0	4/6 100 = 66.6* %
[α]Gillan et al. (2013)	QUAL	1	1	1	0	1	0	4/6 100 = 66.6* %
Ladd et al. (2013)	QUAL	1	1	1	0	1	0	4/6 100 =

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								66.6* %
Leighton and Dubas (2009)	QUAL	1	1	1	0	0	0	3/6 100 = 50%

Author(s)(year of publication) and study location	**Methodology**	**Appropriate sequence generation**	**Allocation concealment and/or blinding**	**Complete outcome data and/or low**	**Number of factors presence in reports divided by the number of relevant**
Quantitative Experimental QUAN (EXP)					
Fluharty et al. (2012)	QUAN(EXP)	0	0	1	1/3X100 = 33.3*%
Rodriguez et al. (2011)	QUAN (EXP)	0	0	1	1/3X100 = 33.3*%
Swenty and Eggleston (2011)	QUAN (EXP)	0	0	1	1/3X100 = 33.3*%
Twigg and Lynn (2012)	QUAN (EXP)	0	0	1	1/3X100 = 33.3*%

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Author(s)(year of publication) and study location	Methodology	Justification of the mixed methods design	Combination of qualitative and quantitative data collection-analysis techniques	Integration of qualitative and quantitative data or results	Number of factors presence in reports divided by the number of relevant criteria X 100
Mixed Methods					
Barnato et al. (2008)	Mixed Methods	1	1	0	2/3X100 = 66.6*%
Ellman et al. (2012)	Mixed Methods	0	1	0	1/3X100 = 33.3*%
Fabro et al. (2014)	Mixed Methods	0	1	0	1/3X100 = 33.3*%
Gilliland et al. (2012)	Mixed Methods	1	1	0	2/3X100 = 66.6*%
Leavy et al. (2011)	Mixed Methods	0	1	0	1/3X100 = 33.3*%
Moreland et al. (2012)	Mixed Methods	1	1	0	2/3X100 = 66.6*%

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Pullen et al. (2012)	Mixed Methods	0	1	0	1/3X100 = 33.3*%
Smith et al. (2012)	Mixed Methods	0	1	0	1/3X100 = 33.3*%
Tuxbury et al. (2012)	Mixed Methods	0	1	0	1/3100 = 33.3*%

Notes: α Gillan et al., 2013 arguably a mixed methods design but only qualitative data were reported * = recurring

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Table 3. Findings of the electronic search strategy

Database	Keyword	Title
Ovid MEDLINE(R) without revisions 1996-18/9/2014 PsycINFO 2002- September week 2 2014	21	49
AISSA	461	19

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Table 4. Axial coding after Gabby et al. (2014) pyramid approach to health improvement

Technical skills	Soft skills	Learning skills
Students understanding improved	Inter professional collaboration	Acceptability to students as a learning experience
PEoLC Nursing practices	Insights into service user views	Student satisfaction and confidence
Decision making in PEoLC	Emotional preparedness	Debriefing
	Modelling	
	(re)Framing death and dying	
	Cultural safety	
	Spirituality	

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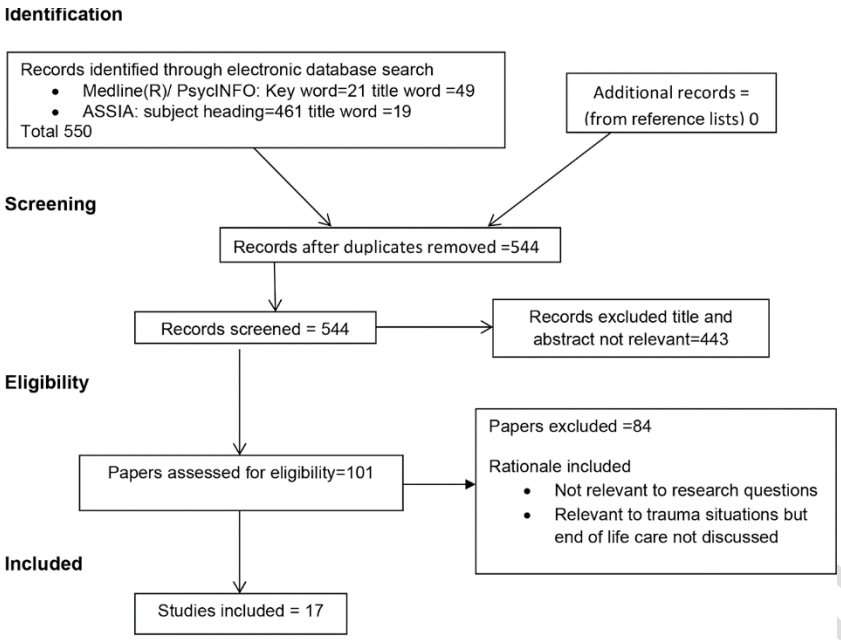
Figure 1. PRISMA Chart



Adapted from Moher et al 2009

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