REVIEW

A Scoping Review of Peer-led Education in Patient Safety Training

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Objective. To examine the literature pertaining to the use of peer-led education in patient safety.

Findings. Four studies met the inclusion criteria: two were conducted in health care students and two in medical practitioners. Three studies used pre-post evaluation, with one containing a comparator group. One study a post-intervention evaluation only. All studies undertook Kirkpatrick Level 2 evaluations, showing significant improvements in attitudes and knowledge. One study undertook Level 3 and 4 evaluations, showing improvement in self-reported behaviors and engagement in quality improvement initiatives.

Summary. There are few studies evaluating peer-led education in patient safety and formal and high-quality evaluations are lacking.

Keywords: patient safety, health care, education, review, literature

INTRODUCTION

Since 2002, the World Health Organization has recognized improving patient safety as a key global health priority. As defined by Vincent, patient safety is the “avoidance, prevention and amelioration of adverse outcomes or injuries stemming from the process of health care.”1 Education has been considered a fundamental strategy in improving patient safety in the health care setting. Since the late 1990s, higher education institutions have attempted to implement specific patient safety and quality improvement education as part of their health professional training programs.2 However, making changes to established curricula can be challenging, especially when institutions lack resources and appropriate staff with experience or knowledge in patient safety science.3 To address this global issue, the World Health Organization developed the Patient Safety Curriculum Guide for Medical Schools in 2009, which was based on the Australian National Patient Safety Education Framework.2 Following testing, evaluation and adoption by medical schools globally, the curriculum guide was revised and re-released in 2011 as a multi-professional edition, in recognition of the important role of allied health disciplines in patient safety.4

To date, the delivery of patient safety education has centered on didactic methods of teaching,2 and although this method is useful in increasing knowledge, it appears to be less effective in changing the attitudes and practices of students and health care professionals. As more systems-based approaches to managing errors in care have been adopted, so have the pedagogical methods in teaching students, graduates and health care professionals about safety and quality improvement.5 Currently, a number of non-didactic pedagogical methods are beginning to be implemented in patient safety education in addition to more traditional didactic forms. Small group learning has been the most commonly used teaching model in patient safety education.2,6 This is most likely due to it being a less resource-intensive method, with patient safety workshops, tutorials or problem-based learning cases easily inserted into existing curricula. Although this method is quite effective for use in a single discipline, it has been shown that multi-disciplinary small group workshops that are implemented toward the end of a health care professional degree program can be of greater benefit, particularly enabling better teamwork and communication.7,8 However, implementing multi-disciplinary education, particularly at a senior student level, can be problematic due to the resource and logistic challenges it presents.9

Peer-led education is another non-didactic approach to learning that has been used in training health care professionals and students in a number of areas.10,11 This
approach has been both formally and informally adopted by many organizations as a method of teaching patient safety, overcoming the capacity, capability and resource issues that an institution may face in delivering patient safety specific education. Additionally, peer-led education programs have been shown to be beneficial in clinical education due to the peer environment providing a comfortable learning space, which can enhance the professional socialization of health care students.\(^{11-13}\)

Although a number of systematic reviews have been conducted that examine the use of peer-led education in health care student education, there has been no review to date that has specifically examined the use of peer-led education approaches in patient safety training.\(^ {11,14}\)

Therefore, the aim of this scoping review was to examine the literature pertaining to the use of peer-led education as a method of training health care professionals and students in patient safety, with the specific objectives of evaluating who is receiving peer-led patient safety education, what content is taught, and how the education programs have been evaluated.

**METHODS**

A scoping review is a literature review strategy that is used to identify and summarize the main concepts underpinning a research area in order to answer a specific question and identify gaps.\(^ {15}\) It has been widely used in evidence-based medicine research to examine emerging evidence and inform future study design, particularly when there is insufficient literature to conduct a systematic review.\(^ {16}\) Given the paucity of literature pertaining to peer-led patient safety education, a scoping review was deemed to be the most appropriate method for undertaking this review.

A systematic search strategy was used as part of this review. Five databases were searched for peer-reviewed studies relating to peer-led education in patient safety training: MEDLINE via Ovid (1946-July 2016), Embase via Ovid (1974-July 2016), CINAHL via EBSCO (1982-July 2016) and Scopus (1995-July 2016). The initial search strategy used search terms mapped to Medical Subject Headings (MeSH), however, due to the limitations of this strategy, primarily as there is no MeSH term related to peer education and that the term “patient safety” was only adopted by MeSH in 2012, a combined search term and abstract text word strategy was applied. Therefore, the search strategy consisted of the following terms: “patient safety” AND (“education” OR “education, pharmacy” OR “education, nursing” OR “education, medical” OR “vocational education” OR “education, continuing” OR “curriculum” OR “training”) AND (“peer education” OR “peer assisted training” OR “peer assisted programs” OR “peer led education” or “peer-led education”). The search was limited to primary research articles published in English until July 2016.

The screening process was based on both the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for conducting systematic reviews\(^ {17}\) and The Joanna Briggs Institute methodology for scoping review guidelines.\(^ {16}\) Citations that were generated as part of the search strategy were screened for relevance by all authors. The full text of each article was reviewed to determine whether it satisfied the study’s inclusion criteria by two authors with discussions conducted by all authors to achieve consensus regarding article exclusion (Figure 1).

As this review investigated the use of peer-led education as a method for teaching patient safety concepts, the inclusion criteria were generally broad. Suitable studies could include participants from any health profession at any stage of their professional development. Studies were included if they were original research articles or short reports and discussed peer-led education related to a single or multiple patient safety topics, as outlined in the WHO’s *Patient Safety Curriculum Guide*\(^ {3}\). Studies that contained peer group learning or simulation were excluded if it could not be determined that they were led by a peer leader (ie, someone of the same educational level) or near peer leader or instructor (ie, someone at a similar educational level).\(^ {18}\) Additionally, citations that related to systematic reviews, opinion pieces, letters or
The published abstracts were excluded. The context of the review was not restricted to any setting or country of origin.

The study origin, population characteristics, description of the educational intervention, outcomes measured and the results, were extracted by two members of the research team with a consensus sought for any disagreements. The Kirkpatrick four level model of evaluating educational interventions was used to determine the level of evaluation used by each study. This is an internationally accepted standard for evaluating education. The four levels of evaluation are described in Table 1. The educational content of each of the studies was mapped against the WHO Patient Safety Curriculum Guide topics in order to compare the content covered in each of the educational interventions. The Newcastle-Ottawa Scale was used as a guide to assess study quality.

RESULTS

A total of 255 articles generated from the search: 53 from MEDLINE, 135 from EMBASE, 10 from CINAHL and 57 from Scopus. Following the removal of duplicates and the application of inclusion and exclusion criteria, six papers from four studies met the criteria for inclusion in the review (Figure 1; Table 2).

Of the four studies reviewed, three studies used a pre-post intervention evaluation study design, with only one of these studies containing a comparator group. One study evaluated post-intervention measures only.

Three of the studies were targeted toward the medical profession, with one study targeted toward the pharmacy profession. Two studies were conducted among students at the start of their professional degree programs. The other two studies were conducted among medical professionals, with one study conducted with junior practitioners within their first two years of clinical practice in hospital, and the other with medical educators who were either hospital- or university-based.

The amount and type of patient safety education varied among the studies. The two interventions that were conducted using university students were of short duration, ranging between two and four hours of teaching time. The two studies that were in medical professionals were longer in duration, ranging from a three-day intensive program to a six-month program consisting of five 60-minute monthly training sessions.

Table 3 summarizes the content taught in the educational interventions against the WHO Patient Safety Curriculum Guide topics. All studies covered introductory patient safety knowledge, systems theory, teamwork and communication skills, learning from error and understanding and managing clinical risk. Only the two studies in medical professionals covered methods of undertaking quality improvement interventions. It was unclear in the studies of medical professionals whether the participants received any specific training in infection control, surgical safety and medication safety. It was also unclear in the three medical student and professional studies whether training was also provided in skills relating to involving patients and careers.

The methods used to evaluate the outcomes of each study are summarized in Table 2, based on the Kirkpatrick model of evaluating educational interventions. All studies used surveys to evaluate self-reported satisfaction, knowledge, attitudes and behaviors related to patient safety. Three studies used surveys to evaluate satisfaction (Kirkpatrick Level 1 evaluation), with all of the studies showing positive results. All four of the studies evaluated knowledge and self-reported attitudes (Kirkpatrick Level 2 evaluation).
| Authors and Origin | Study Design          | Participants and Setting | Content                                                                 | Intervention                                                                 | Outcome Measuresa | Study Results                                                                 |
|-------------------|-----------------------|--------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------|--------------------------------------------------------------------------------|
| Ahmed et al, 2013-14 | Pre-post study design | Junior doctors in first two years of clinical practice within hospitals (n=1076) | Understanding patient safety incidents: types of incidents, contributing factors, analytical methods and subsequent improvement strategies | “Lessons Learnt” Patient safety training program implemented within the Foundation Training. Consisted of 5 times of monthly 60-min training sessions during which a junior doctor (foundation trainee) would lead a peer-group discussion and analysis of a patient safety incident under the supervision of an expert trained senior doctor. | L1: Participant satisfaction evaluated with a short satisfaction questionnaire. | L1: Participants reported high levels of satisfaction with the program. |
| Myers et al, 2014 | Post-intervention evaluation study | Medical educators (n=90) | General patient safety and quality improvement knowledge; patient safety curriculum development and assessment; change management; and professional development in medical education | “Quality and Safety Educators Academy” 3-day intensive program consisting of 2 plenary lectures, 6 topic sessions with small group activities and 3 interactive workshops. Course directors and faculty were patient safety/quality improvement teachers at their respective institutions. | L1 & 2: 39-item post-intervention evaluation survey assessing satisfaction and self-perceived confidence in patient safety, quality improvement, curricular development, assessment and change management. | L1 & 2: Participants highly rated the content and faculty teaching the workshop. Participants also reported that the program improved their skills in the 4 areas that were measured. |
| United Kingdom |                        |                          |                                                                        |                                                                                |                   |                                                                                 |

(Continued)
Table 2. (Continued)

| Authors and Origin | Study Design | Participants and Setting | Content | Intervention | Outcome Measures<sup>a</sup> | Study Results |
|--------------------|--------------|--------------------------|---------|--------------|----------------------------|---------------|
| Hayes et al., 2014<sup>22</sup> | Pre-post study design | Preclinical (first- or second-year) medical students at university (n=86) | Knowledge and skills in: preparing for surgery, patient handover, clinical error, escalation management skills (MEWS assessment & SBAR Communication strategy) | “Clinical Hazards in Patient Safety” Seminar | L1: Satisfaction assessed using 11-item post-intervention questionnaire. | L1: Positive scores for all items except sufficient time to cover material. |
| United Kingdom | | | 2-hour seminar consisting of a 30-min introductory lecture followed by a series of 15-min small group sessions lead by medical students in their clinical years. | | L2: Patient safety attitudes and self-efficacy in the skills taught were assessed with an 8-item survey before, after and 6-8 months post-intervention. | L2: All 4 self-efficacy items and 2 of 4 measured patient safety attitudes sustained improvements 6-8 months following intervention. |
| Walpola et al., 2015-2016<sup>21,25</sup> | Pre-post study design with comparator group (second-year pharmacy students) | First-year pharmacy students at university (n=175) | Program covered introductory patient safety topics focusing on teamwork, communication skills, systems thinking and open disclosure | Two 1-hour lectures delivered by a senior academic; and a 2-hour workshop delivered by trained final-year pharmacy students. | L2: Patient safety attitudes evaluated using a 23-item modified version of Patient Safety/Medical Fallibility Curriculum Survey previously validated in pharmacy students. | L2: First-year students’ attitudes significantly improved as a result of the intervention, particularly in relation to internalizing errors (p=.010), questioning behaviors (p<.001) and open disclosure (p=.008). |

<sup>a</sup>Based on the Kirkpatrick framework for evaluating educational interventions. L1: Level 1 Reaction; L2: Level 2 Learning; L3: Level 3 Behavior; L4: Level 4 Results

<sup>b</sup>Patey R, Flin R, Cuthbertson BH, et al. Patient safety: helping medical students understand error in healthcare. *Qual Saf Health Care* 2007;16: 256-259

<sup>c</sup>Walpola RL, Feis, RA, McLachlan AJ, Chen TF. Validation of a survey tool to assess the patient safety attitudes of pharmacy students. *BMJ Open*. 2015;5: e008442
Level 2 evaluation), with all studies showing a significant improvement in knowledge, skills and most attitudes as a result of the educational intervention.\textsuperscript{21-24} One study also evaluated self-reported behaviors (reported as Kirkpatrick Level 3 evaluation), and showed an improvement in this endpoint as a result of the intervention.\textsuperscript{22} One study also undertook a Level 4 evaluation, which involved examining how the skills from the workshop had been implemented into practice through evaluating practitioner-driven quality improvement projects.\textsuperscript{22}

Using the Newcastle-Ottawa Quality Assessment Scale\textsuperscript{20} as a guide, the quality of each study’s design was assessed according to three criteria: participant selection, comparability, and outcome. The first criterion evaluated how well a study’s sample represented the population of interest. Although the studies reviewed did not give a clear indication of the degree of representativeness of the participant samples, it could be ascertained that they were “somewhat representative” and hence, satisfied this criterion. The second criterion assessed the comparability of studies in terms of the use of study controls. Only one study\textsuperscript{21} was identified to contain a comparator group, and therefore, the other three studies\textsuperscript{22-24} failed this criterion. The final criterion evaluated the assessment of study outcomes. Three of the studies\textsuperscript{21-24} analyzed matched participant data to enable a better assessment of the changes in patient safety knowledge/attitudes/behaviors over time. However, all four studies performed poorly regarding the duration of study follow-up. The total duration of follow-up across the four studies was eight months or less, which is unlikely to be sufficient to evaluate whether the outcomes of the interventions were sustained.

**DISCUSSION**

Although there have been studies evaluating the use of peer education models in health professional training,\textsuperscript{11,14} this is the first review focusing on the use of peer-led education models in patient safety education. This is particularly important given that there is a lack of patient safety training provided across all levels of health care professionals on a global scale.\textsuperscript{26} With education being acknowledged by the WHO as a key element in improving safety,\textsuperscript{4} it is likely that more peer-led education programs in patient safety will be developed and implemented alongside traditional educational programs and traditional educational methods.
interventions. Hence, an evaluation of the currency and effectiveness of these peer-led interventions is needed.

In this scoping review, the use of peer-led education models in patient safety training and the methods used to evaluate these programs were examined. Two important findings about peer-led education were identified. Firstly, it was often provided early in the training of health care professionals or at entry level into the profession and secondly, that it was often voluntary. Specifically, patient safety training methods were evaluated for medical and pharmacy junior level students in the first or second year of their professional degree program\textsuperscript{21,23} while training for practitioners was evaluated in the first or second year following their graduation.\textsuperscript{22} There was one notable exception, which was a study in practitioners involved in health care professional education who had limited patient safety expertise.\textsuperscript{24} It is noteworthy that peer-led interventions have been used in both voluntary and compulsory patient safety courses. Both of these findings are reflective of other peer-led education studies in other health care professional education topics such as clinical skills, diagnostics and physiology.\textsuperscript{11}

An interesting aspect that was identified in this review is the model of peer-led education used. Peer-to-peer and near-peer education are two terms commonly used to describe peer education models. Peer-to-peer education can be defined as peer driven education where the person who delivers the education is at the same level as the person receiving the education.\textsuperscript{27} Near-peer education is where the person delivering the education is at a similar level to the person receiving it, such as when a final year student teaches a first year student.\textsuperscript{27} In the studies reviewed, both of the studies conducted in students used near-peer models\textsuperscript{21,23} and both the studies conducted in registered health professionals used peer-to-peer education models.\textsuperscript{22,24} One of the major criticisms in health professional education is the disparity between the material taught and actual clinical practice.\textsuperscript{28} From a resilience engineering perspective, Hollnagel has described this as “work as done” vs “work as imagined,” whereby the greater the difference between the two, the less effective the educational intervention.\textsuperscript{29} One of the major reasons why peer education is used as an education model is to foster good practices, encourage role modeling and enhance professional socialization.\textsuperscript{12,18,17} The findings of this review demonstrate that both near-peer models in students and peer-to-peer models in professionals are effective peer-led education models in patient safety training.

The effectiveness of peer-to-peer models in students could not be determined in this review as only near-peer methods were examined in the student studies. However, forms of peer-to-peer learning are present in a number of simulation-based and inter-professional patient safety education programs for health care students, many of which have demonstrated improvements to patient safety knowledge, attitudes and skills.\textsuperscript{5} It is also noteworthy that a top-down approach to the education delivery was observed in all of the four studies, meaning that the education was delivered by peers either with more experience in patient safety, or support was provided by a senior peer to the junior peer driving the education. This approach could be seen as an artifact of using a more formal teaching structure. There are instances where peer-led education has existed in a bottom-up approach in skill-related education, such as in the implementation of the surgical checklist by medical students\textsuperscript{30,31} and the improved use of salbutamol-metered dose inhalers driven by pharmacy interns.\textsuperscript{32} However, in both examples, training was provided within a practice setting and on a more personal basis.

To compare the content of the interventions, standardization of concepts taught was performed by mapping intervention content to the WHO Patient Safety Curriculum Guide topics.\textsuperscript{4} Both of the student studies did not cover content related to “using quality improvement methods to improve care.” This topic in the WHO curriculum relates to change management and how to drive improvement. Considering that both student intervention studies were conducted in junior students in the first or second year of their professional degree programs, teaching students this topic in their professional infancy may be premature. Although several topics could be identified in some of the interventions,\textsuperscript{22,24} based on the information available, the complete range of topics covered could not be determined. Furthermore, it was also unclear in these studies whether patient-centered approaches to teaching patient safety were used. One of the reasons peer education models are used is to enhance professional socialization and promote a positive culture in the area being taught.\textsuperscript{12,13,33} However, there is the potential that using peer education models may lead to the propagation of the biomedical model of health care, particularly in programs that involve more senior practitioners. As more patient safety education programs become patient centered, it is important that peer-led patient safety education also adopt this approach.

A key objective of the review was to understand how peer-led patient safety education interventions were evaluated. The Kirkpatrick model for evaluating educational interventions was chosen due to its use in the medical education literature. Overall, most studies focused on evaluating perceptions and behavioral intentions rather than the effect on actual practice. Specifically, while all the studies undertook a Kirkpatrick Level 2 evaluation as
a minimum, evaluating knowledge, attitudes and skills, only one study in junior doctors performed Level 3 and 4 evaluations,25 evaluating behaviors and the greater impact on the practice environment. Although the authors of this study undertook a higher-level evaluation (Level 3: behaviors), there are some limitations to their evaluation method. In particular, the authors used a survey to evaluate self-reported behaviors specifically exploring trainees’ awareness, reflection, reporting and disclosure of patient safety incidents six months prior to, and six months post-intervention. This method of evaluation is more likely to measure “work as imagined” by the individual rather than “work as done.”29 Kirkpatrick suggests that the best way to evaluate behaviors is by undertaking observational studies by trained individuals, a process which is both costly and time consuming. While it is not ideal to measure self-reported and actual behaviors are subject to bias, either reporting bias or the Hawthorne effect (where those being observed change their behaviors based on whether they are being observed or not). Furthermore, Biggs and Tang argue that it is important for the evaluation strategy to be determined by the desired outcomes of the intervention.34 As both the student studies were conducted in “pre-clinical” students, it is justified to only measure knowledge and attitudes, whereas in practicing professionals, it would be more appropriate to conduct higher level evaluations.

Although the studies included in this review addressed a need for patient safety training in health care professionals and students, a few issues regarding the quality of the studies and their reporting have been identified using the Newcastle-Ottawa Scale.20 Firstly, only two of the studies clearly described the training that was undertaken by peer educators prior to the delivery of the educational intervention.21,22 Knowledge of the training delivered is important in order to enable the programs and potentially the results, to be reproduced. Secondly, there is a potential for the results of two of the studies to have a positive bias due to their sample consisting only of volunteers. Thirdly, there are issues with the evaluation methods that were employed in the studies. While all the studies used surveys as their primary form of evaluation of the interventions, only one study had validated the survey tool in the population of interest.21

All of these studies conducted post-intervention evaluations between 0-8 months after the completion of the interventions. Although this identifies the benefits of the interventions in the short term, it does not allow for the evaluation of the long-term effects. Furthermore, no study compared the use of peer-led education to traditional education models, although, one study did contain a comparator group of students who did not receive the education.21 Finally, as no information was provided in any of the studies about whether the interventions had been repeated, it was difficult to evaluate sustainability of the interventions used. Therefore, there is a need for future work in this area, particularly in the validation of the tools used to evaluate the interventions and also to evaluate sustainability of the programs and reproducibility of results.

This scoping review applied a robust method to evaluate the different studies, based on the Joanna Briggs Institute guidelines.16 Additionally, the use of the WHO Patient Safety Curriculum Guide3 allowed the content of the interventions to be mapped to international guidelines and the Newcastle-Ottawa Scale20 allowed for the quality of the studies to be assessed. However, some of the key words available to conduct the search, such as “patient safety,” were only recently added to the MeSH terms, which may have influenced the number of studies identified. Although strategies were adopted to overcome this issue (ie, using a combined search term and abstract text word strategy), only a limited number of studies were identified. However, a number of published conference abstracts and letters were also generated from the search,35-37 suggesting that peer-led education is becoming a method of training that is being adopted more widely in teaching patient safety concepts to students and practitioners.

Based on the studies identified in this review, students generally responded well to forms of peer-led teaching in patient safety education and engaged in the material being taught. In addition to improving knowledge of patient safety principles, their attitudes toward patient safety also improved. Given the challenges associated with changing established curricula,23 and capacity and capability issues that institutions may face,3 this method of teaching presents a practical solution that can aid in the implementation of patient safety education within the formal curriculum or as extra-curricular education. Yet despite these benefits, it is unclear as to how well these programs may influence future safe practices. Therefore, future research is required to evaluate the sustainability of the programs and ensure that validated tools are used to evaluate the long term effects of peer education against traditional models of education.

CONCLUSION

Peer-led education is a novel method of improving both health care professionals’ and students’ patient safety knowledge, attitudes and practices. Although this model of education is growing in popularity, this review has shown that few studies evaluating peer-led education
in patient safety have been conducted. Furthermore, formal and high-quality evaluations of peer-led patient safety education were also found to be lacking. In addition, there is a lack of studies comparing peer-led and traditional education models in patient safety. Future work is needed to evaluate whether peer-led education models are a superior or complementary method of teaching patient safety.

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