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Effectiveness of online communication skills training for cancer and palliative care health professionals: A systematic review

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Abstract

Objective: To determine the reported effect of online communication skills training (CST) on health professional (HP) communication skills and patient care outcomes in cancer and palliative care.

Methods: Primary research published in English between January 2003 and April 2019 was identified in bibliographic databases including Medline, Embase and Proquest (Prospero: CRD42018088681). An integrated mixed-method approach included studies describing a CST intervention and its effect, for cancer or palliative care HPs, delivered online or blended with an online component. Included studies' outcomes were categorised then findings were stratified by an evaluation framework and synthesised in an effect direction plot. Risk of bias was assessed using Joanna Briggs Institute's tools.

Results: Nineteen included studies (5 randomised controlled trials, 11 pre-post, 2 post-test and 1 qualitative study) evaluated a CST intervention (median duration=3.75 hours; range 0.66-96 hours) involving 1116 HPs, 422 students and 732 patients. Most interventions taught communication skills for specific scenarios and approximately half were delivered solely online and did not involve role plays. Online CST improved HPs' self-assessed communication skills (3 studies, 215 participants), confidence (4 studies, 533 participants), and objective knowledge (5 studies, 753 participants). While few studies evaluated patient outcomes, CST may benefit observed communication skills in care settings (2 studies, 595 participants).

Conclusions: Online CST benefits oncology HPs' subjectively-reported communication skills and confidence, and objective knowledge. Translation to patient outcomes requires further investigation. The quality of research varied and few studies had a control group. We recommend improvements to study design, evaluation and implementation.

Introduction

Communication skills are considered a core clinical ability and training programs have been developed for health professionals (HPs) working in oncology and palliative care to improve their ability to effectively communicate with patients throughout their cancer care experience. Ineffective communication between HPs and patients, and failing to provide psychosocial support may lead to increased patient anxiety, reduced trust in HPs, reduced sense of patient control, and patient non-adherence to recommended treatment.[1] Communication breakdown (24%) and inexperience/lack of technical competence (41%) were the leading healthcare system factors behind surgical error which led to malpractice claims between 1986 and 2004 from four liability insurers.[2]

Communication skills training (CST) programs improve HPs' competency in psychological assessment, interviewing, understanding and confidence in HP-patient communications.[3-6] In a 2018 Cochrane review, Moore and collegues found that HPs who participated in CST were more likely to use open questions and express patient empathy, and were less likely to use a didactic approach.[7] CST, which targets responding to patients' emotions and needs, improves communication quality and may improve patient outcomes.[3] CST can also be used to remind HPs about minimising medical jargon and to spend time checking and improving patient understanding .[8]

Research suggests that optimal CST should be face-to-face, at least one day in length, and include presentations on effective communication techniques, experiential role-play with feedback, and small group discussions.[9] Historically, HPs have had limited access to CST due to the delayed incorporation of CST into the medical curriculum,[10] expectations that some oncology disciplines, such as nursing, learn communication skills on the job,[11] limited availability of training, accessibility of face-to-face training, the time required and costs involved. Improvements in access to CST requires consideration of availability, delivery modality, scheduling which is amenable to busy HPs, and departmental support.[12] Face-to-face training is more expensive compared to web-based training and requires a greater number of participants for education providers to recuperate costs.[13]

Online or blended education consisting of online training and web-based face-to-face workshops is likely to address these issues and allow for more HPs to participate. Online training is appealing, practical, sustainable, flexible, accessible, low cost and provides an opportunity to educate more people, with broad reach and acceptability.[13-16] Within the healthcare setting, previous research found that completion of education modules was six times higher by clinicians randomised to online versus face-to-face education, with participants reporting higher knowledge and confidence.[17] Web-based training has also been shown to improve HP's knowledge, skills, learner behaviours and effects on patients (such as medical errors, screening rates) when compared with providing no training.[16] Furthermore, there is an increased need and likely acceptance for online delivery of CST due to the current Covid-19 pandemic.[18,19] Limitations of online CST; however, include a sense of learner isolation, reduced interaction with instructors and between learners, asynchronous feedback or limited support and difficulties with suitable assessment design.[20] Blended learning, which is a combination of face-to-face and online approaches,[21] allows for the inclusion of interactive multi-discliplinary learning with expert facilitation.

In their systematic review, Moore et al.[7] reported that limited studies had been conducted using online or blended learning and highlighted the need for further research exploring the role of e-learning for HPs. To date, the effect of online/blended CST provided to health professionals in oncology and palliative care has not been explored systematically. The overall aim of this systematic review was to determine the reported effect of CST, delivered partially or completely online, on HP communication skills and patient care outcomes in cancer and palliative care (Prospero:

CRD42018088681). The specific aims comprised: 1) What online/blended interventions are available for delivering CST for cancer and palliative care professionals?; 2) What online/blended CST interventions are effective for delivering communication skills to HPs?; 3) What are the HPs' perspectives on, and experiences of online/blended training?; and 4) What are the implications of questions (1), (2) and (3) on HP's practice and patient care outcomes?

Methodology of the review

A mixed-method approach identified, mapped, assessed and synthesised information from a diverse range of studies.[22] Figure 1 summarises the review stages. The review methods were made explicit,[23,24] and the protocol was subjected to a peer-review process and is publically available (Prospero: CRD42018088681).

Searching strategy and mapping

To minimise bias and error in the review process, the reviewers undertook a wide ranging search of databases encompassing the relevant research. A search strategy was developed and tested to source articles published in English from 12 databases – Informit, EMBASE, ProQuest, Medline, EBSCOhost-CINAHL, Cochrane Reviews and Trials, Scopus, JBI Connect, PsychINFO, PubMed Clinical Queries site and Campbell Collaboration. The search strategy was initially developed for Medline and was then adapted for other databases using terms in four categories combined as follows: communication AND online learning AND (profession AND (cancer OR Palliative care)). Supplement 1 depicts the conceptual table of search terms. Initial searches were completed by 5 April 2018, for articles published from 1 January 2003 to 5 April 2018. An updated search using the same method was completed on 9 April 2019 to account for relevant studies which had been published in the year.

Study selection

Titles (*n*=7602) were independently reviewed by two reviewers (MB, IN), as were abstracts (original search LG and MS; updated MB and IN). A third reviewer (GH) resolved any discrepancies if they occurred. Full texts were assessed independently by two reviewers (GH, MB) using the inclusion criteria: 1) primary research article; 2) research assessed online training or blended training with an online component; 3) intervention delivered CST for HPs working in cancer or palliative care; 4) studies sufficiently described the interventions and methods of evaluation; and 5) training effects on HPs communication skills and/or patient care outcomes were reported. Of 63 full text articles screened, 19 were included and 44 excluded for reasons as follows: participants were not HPs caring for cancer and palliative patients (*n*=5); not CST/not delivered over the internet/insufficiently described (*n*=7), and article was not a research article (*n*=32). The updated search results underwent the same review process described. For clear presentation,[25] results from each search were combined in the PRISMA flow diagram (Figure 2).

Quality assessment

Studies (randomised, non-randomised and qualitative studies) were independently assessed for quality by pairs of reviewers (described below) using the JBI Critical Appraisal Checklists for Randomised Controlled Trials (RCTs),[26] Quasi-Experimental Studies (non-randomised experimental studies)[27] and Qualitative Studies.[28]

Data extraction and synthesis

Both quantitative and qualitative data were deemed similar enough to be combined into a single synthesis.[29] Articles were randomly allocated to three pairs of reviewers (GH, IN; LG, MS; ZB, MB). Each reviewer independently extracted data from articles using a standardised extraction tool then reached consensus with their partner. A third reviewer resolved discrepancies (GH/MB). The following information was extracted (when available) and tabulated for narrative synthesis: aims/background; study design and methods; training delivery method, duration and timing; participant descriptors; training contents; use of role-play or standardised patients; learner interactions; and evaluation outcomes (Supplement 2).

Outcomes were categorised, following constructs in a systematic review of outcomes measured in evaluations of oncology CST[30], into twenty-one categories. Kirkpatrick's levels of evaluation for educational interventions further guided the stratification of study findings for narrative and graphical presentation and aided objective assessment of their significance depending upon measurement type (e.g. subjective or objective) and source (e.g. HPs, patients, independent observers).[31] The levels are defined as follows: learner's reaction (level 1); self-assessed (level 2A) or observed (level 2B) change in learner's knowledge, attitude or skill; observed HP behaviour in the patient care setting (level 3) and patient care outcomes or results (level 4).[31]

The narrative synthesis presents findings for outcome constructs within each Kirkpatrick level, ordered by the number of studies which measured the outcome at the level (most studies to least). Within each outcome construct, individual study findings are ordered by the level of evidence of studies, (i.e. RCT, then pre-post, post-test, and finally qualitative) and then findings from studies with similar designs, were ordered from low to high assessed risk of bias. Outcomes which were evaluated by two or more studies, or two separate measures, across all Kirkpatrick levels were included in the narrative synthesis and presented in an effect direction plot.[32] The plot synthesised and tabulated study findings by coded outcome constructs and Kirkpatrick level (Supplement 3). Findings from nine outcomes with only one measure from a single study[33-36] across all Kirkpatrick levels were separately summarised (Supplement 4).

Results

Nineteen studies which evaluated an online CST intervention were identified.[33-51] Extracted data are presented in Supplement 2.

Description of included studies

Total sample sizes ranged from *n*=8[37] to *n*=406,[43] and comprised of one or two participant types: HPs (*n*=8[37] to *n*=233[49]); students (*n*=28[41] to *n*=145[44]); and patients (*n*=137[38] to *n*=385[43]). Five studies had a comparison group, e.g. RCTs or a cluster RCT.[34,38,39,41,46] Most RCTs included two equivalently sized groups. One RCT had three groups.[39] Comparison groups either: received the training after study completion;[38,41,46] completed a written curriculum of the same material;[39] or could choose to undertake traditional training.[34] The remaining fourteen studies had no comparison group and were either: a pre-test post-test design,[33,35,36,43-45,47-51] single group study with post-testing,[37,42] or a qualitative study.[40] Studies were conducted in the United States of America,[35,37,39-41,47-51] Canada,[42,45] Netherlands,[43,46] Australia,[36] Germany,[38] Japan,[33] Spain[34] and the United Kingdom.[44]

Participants

Most studies included qualified HPs[33,34,36,38,40,42,43,45-47,49,50] or trainees,[35,37,48] or both HPs and students.[41] HP participants were from the medical[34,35,37,38,41,43,48] or nursing discipline,[33,36,46,49] or were multi-disciplinary.[40,42,45,47,50] Trained medical HP participants were from mixed sub-disclipines which included oncology[38,43] or family medicine.[34,41] The average age of HPs ranged from 28 to 48 years. Three studies included students only,[39,44,51] and one had both student and professional participants.[41] Student participants were from the nursing[44,51] or medical discipline,[41] or were a multi-disciplinary cohort.[39] The average age of students, reported in two studies, ranged from 24 to 27 years.[41,51] One study reported a student age range of 18 to 45 years[44] and one study did not report age.[39] Only three studies presented data from patient participants (average age 51 to 72 years)[38,43,46] and one used patient interviews (*n*=112) to inform module content.[41] The cancer types of patient participants were breast,[38] mixed[46] or were not specified.[43]

Interventions

The objectives of CST interventions varied. About one quarter aimed to teach general communication skills to HPs providing care to cancer [35,43] or palliative or end-of-life patients.[42,47,50] Four interventions focussed on delivering bad news[34,37,41,44] and two studies each focussed on cross-cultural competence,[36,40] responding to distress,[33,45] and code status (resuscitation) discussions.[39,48] The remaining interventions aimed to improve communication in cancer care for the following topics and/or groups: complementary therapies;[38] family caregivers;[51] pre-chemotherapy treatment;[46] and reproductive health issues for adolescent and young adult (AYA) cancer patients.[49] Some interventions taught knowledge of the topic (e.g. palliative care, culture) in addition to communication skills.[34-38,40-43,46,47,49-51]

Intervention structure and content varied across studies, with their development informed by: professional bodies' competencies;[34,42,45] guidelines or recommendations;[33,38] World Health Organisation core competencies and design recommendations;[50] the SPIKES model for delivering bad news (setting; perception; invitation; knowledge; emotions; summary);[37,41] COMFORT communication curriculum from professional body guidelines;[47,51] education curriculum;[35,44] or were grounded in cultural congruence theory[40] or adult learning theory.[49] The content of remaining interventions was guided by previous research.[36,39,43,46,48]

Training interventions were either delivered solely online[34-37,40,41,43-45,47,51] or as blended online and face-to-face content,[33,38,39,42,46,48-50] and the majority were delivered over multiple sessions.[33,34,36,38-50] The time required for training varied across studies; the median duration to complete all intervention components was approximately 3.75 hours (range 40 minutes[35] to 96 hours[34]) and 2.0 hours (range 30 minutes[33] to 96 hours[34]) to complete the online component of training for blended or solely online training.

Approximately half of interventions did not involve interaction with other HP participants.[35-37,40,41,43-45,47,51] Participant interactions, when included, were in person[33,38,39,42,46,48] or online.[34,49,50] Almost half of the interventions did not involve role plays.[34,36,40,42-45,47,51] When included, role plays were either conducted with standardised patients via an online platform[35,37] or face-to-face[39,41]; or face-to-face with peers.[33,48,49] Two interventions included face-to-face role-play exercises with both standardised patients and with peers.[38,50] One intervention included face-to-face role play with peers and a reflective practice involving participants self-assessing a recording of their real-life patient consultation.[46] Online case studies were presented in most interventions through video,[36,39-41,43-45,51] video and written modalities[38] or an undescribed medium.[34,49] Three studies presented case studies in didactic sessions.[33,42,47]

Interventions for medical participants[34,35,37,38,41,43,48] predominantly aimed to teach general communication skills[35,43] or delivering bad news,[34,37,41] were solely online,[34,35,37,41,43] and included role plays with standardised patients or peers.[35,37,38,41,48] Interventions for nursing discipline participants[33,36,44,46,49,51] generally were for communication related to specific treatments and/or care recipients[36,46,49,51] and when included, role play was was conducted face-to-face with peers.[33,46,49] Of interventions for multi-disciplinary participants,[39,40,42,45,47,50] half addressed general communication skills[42,47,50] and many did not include role-play.[40,42,45,47]

Outcomes

The average number of separate outcomes in each study was 3.5 (SD=2.12, range 1-10). Most studies (*n*=12, 63%) reported outcomes from one source, i.e. training participants, patients or observers, with the remainder reporting outcomes from two (*n*=6, 32%) or three (*n*=1, 5%) sources. Most studies had pre-intervention baseline measures.[33-35,37,41,43-46,48-51] Approximately half of studies measured outcomes immediately after implementation of the intervention; this was either explicity stated in studies,[35,37,38,49,51] or was assumed, due to the study design.[33,42,45,47,50] The remaining studies conducted post-intervention measurements at: one to three weeks;[39-41] one to five months;[48] multiple times over 6 months[38] or 12-18 months;[46] or two times, either 0-6 weeks then 6-12 weeks[43] or two weeks then three months.[36] Several studies did not explicitly describe a study assessment timeline.[33,34,42,44,50]

The majority of studies included data reported from training participants (*n*=17, 90%), although few used a validated or previously utilised measure (*n*=6, 35%).[33,35-37,42,48] Data was collected for the following training participant constructs: training evaluation;[33-36,39,40,45,47-50] knowledge;[33,34,47,49] implementation into practice;[43,45,48-50] communication confidence,[33,44,45] skills,[49-51] attitude,[35] and self-effectiveness;[36,48,50] empathy;[35,37] presence in virtual environments,[35,37] satisfaction with consultation given;[38] acceptability and feasibility;[42] attitudes towards palliative care;[34] practices and attitudes while interacting with people with limited English;[36] relative responsibility of HPs and hospitals to adapt to needs of people from minority backgrounds;[36] and attitudes towards caring.[33]

Some studies included independent assessors' or standardised patients' ratings of observed simulated (*n*=5, 26%) or real (*n*=2, 10%) communication encounters.[35,37,39,41,43,46,48] All included previously utilised or validated measure/s for: participants' communications skills;[35,37,39,41,43,46,48]

interview content;[39,46,48] or behaviour related to shared decision-making, informed consent, and medical error disclosure.[35] The few studies that assessed patient-reported outcomes (*n*=3, 16%) all used previously utilised or validated patient measure/s and included additional sources of reporting (e.g. training participants or independent observers).[38,43,46] Patient constructs included: consultation satisfaction,[43] perceived empathy, satisfaction and information,[38] or recall of treatment recommendations.[46]

Risk of bias

Figure 3 (RCTs) and Figure 4 (quasi-experimental) present the critical appraisal of included studies. The single qualitative study was assessed as having met all criteria except the influence of the researcher (item 7) which was rated as 'unclear'.[40]

The assessed risk of bias in RCTs varied and two studies, due to the nature of reporting, had a large proportion of 'unclear' items.[39,41] All RCTs were deemed to have similarly assessed groups' outcomes (item 10) and had an appropriate trial design (item 13). No RCTs blinded participants (item 4) and only one blinded intervention personnel (item 5), though these items would have been difficult to implement given the nature of online training interventions.

The majority of quasi-experimental studies clearly identified cause and effect variables (item 1) and similarly measured outcomes comparing participants (item 7). No quasi-experimental studies included a control group (item 4). When applicable, almost all studies had similar participants for comparisons (item 2)[33,35-37,43,48-51] and all treated participants similarly, apart from the intervention (item 3).[33,35-37,43,47,48,50,51] Aside from two studies,[37,42] most included pre- and post-intervention measurements.[33,35,36,43-45,47-51] However, of these studies, only three[43-45] performed multiple measures at both pre- and post-intervention timepoints (item 5).

Effects of interventions

Almost all studies (*n*=18) measured outcomes at either Kirkpatrick's level one or two, ten studies measured outcomes at both level one and two, and few studies evaluated outcomes at level three (*n*=2) or four (*n*=3).

LEVEL 1 LEARNER'S REACTION

Level one of Kirkpatrick's hierarchy evaluates training participants' reactions to the training method and content.[31] Participants' reactions to training interventions were predominantly positive in many studies (*n*=12); however, it should be noted that no findings at this level were compared to a baseline or comparison group.

Training evaluation

Ten studies reported participant training evaluations.[33-36,40,45,47-50] In one RCT, the majority of participants positively evaluated technical aspects of the intervention and described their satisfaction across a number of items, only noting dissatisfaction with the level of difficulty.[34] In eight studies using a pre-post design, a large proportion (80-100%) of participants rated the training positively[33,36,48,49] or mean scores were at the positive end of the scale.[35,45,47,50] One study used focus groups to gather in-depth participant feedback and found that the training was perceived to be helpful overall with few problems related to technical functionality. Participants suggested that the training content be developed in areas such as increased complexity in the case studies and examples of communication mistakes and how to recover from them.[40]

Specific experiences

Two studies evaluated specific aspects of training participants' experiences. In avatar consultations conducted in a virtual world, participants' subjective experience of being in a virtual environment was measured; mean scores of almost all items were on the positive side of the scale.[35,37] In addition, participants in one of these studies rated the level of realism (co-presence) moderately positively.[35]

Acceptability and feasibility

Acceptability and feasibility of the educational intervention was established in only one study (*n*=27 participants) by analysis of quantitative (78%-100% participants rated training as 'useful') and focus group data.[42] Content analysis of feasibility indicators revealed ready availability of technological materials and facilitated group activities, and convenience of available times however, the time commitment was a possible barrier to participation and fidelity.[42] Content analysis using acceptability indicators found the following beneficial aspects of the training: motivation to improve communication, knowledge consolidation activities, self-reflection and self-evaluation, assessment tools, promotion of inter-professional teamwork, and convenience and flexibility of the online format.[42] HPs suggested more cases studies set in the intensive care setting and inter-disciplinary participants noted that assessing patient decision-making capacity was outside their scope of practice.[42]

LEVEL 2 LEARNING

Level two of Kirkpatrick's hierarchy evaluates training participant's learning.[31] Level two has two sub-levels;[52,53] self-assessed changes in attitudes, knowledge or skills (level 2A) and assessment of knowledge and skills by others (level 2B).

LEVEL 2A SELF-ASSESSED CHANGE IN ATTITUDE, KNOWLEDGE OR SKILLS

Thirteen studies evaluated learner's self-assessed change in attitude, knowledge or skills at Kirkpatrick's evaluation level 2A across twelve categories of outcomes.

Implementation

Five studies explored participants' implementation of CST training elements into practice.[43,45,48-50] One study compared a sub-group's (*n*=63) self-reported implementation into practice from pre-training to six months post-training, and found a significant increase in the self-reported frequency of implementation into practice in all seven criteria measured.[49] In three studies, the proportion of participants who self-reported implementing training into practice ranged from 38%,[43] approximately half or more at 0.5-2.5 years post training,[49] or 69% for online training content and 78%-85% for other components of training.[48] In two studies participants' open-ended responses indicated intentions to make changes to their practice[45] and provided examples of application of skills into practice.[50]

HPs' communication confidence, skills and self-effectiveness

Four studies evaluated communication confidence,[33,34,44,45] and three studies each evaluated communication skills[49-51] and communication self-effectiveness[35,36,48] at Kirkpatrick level 2A. Communication confidence significantly improved after the intervention;[33,34,44,45] in an RCT,[34] for all relevant scales in two pre-post studies[33,45] and for scales related to breaking bad news in a pre-post study of nursing students.[44] Two of three studies which compared participants' self-reported pre- and post-intervention communication skills, found statistically significant improvements for nursing students[51] and qualified HPs.[49] The remaining study compared participants' self-assessed retrospective pre-test (then-test) communication skills with post intervention responses and found a significantly greater proportion of participants rated their skill as strongly confident or highly

competent across assessed domains.[50] Two pre-post studies reported participant communication self-effectiveness however, pre-post changes were not statistically compared.[36,48] Another pre-post study measured communication self-effectiveness in four virtual simulated consultation scenarios at post-intervention only, and found a large proportion of participants (42-67%) scored below the established benchmark for competency for the measurement instrument used.[35] We noted this intervention only had 40 minutes of training,[35] compared to 2 hours[36] or more.[48]

Satisfaction and knowledge

In one RCT, researchers asked physicians to self-assess their performance after each patient consultation. It was concluded that physicians in both the trained and untrained groups perceived the consultation positively, although no statistical comparisons were made for this measure.[38] Participants who self-reported knowledge gain was relatively high (94%) after an intervention about timely communication of reproductive health issues for AYA patients and survivors.[49]

LEVEL 2B CHANGE IN KNOWLEDGE OR SKILLS

Ten studies included measures of participants' knowledge and skills assessed by others, through written exams or observed simulated patient encounters, which represented Kirkpatrick's level 2B evaluation.[31] However, six studies[35,37,39,47,48,51] had no baseline comparison for at least one outcome; only four included both pre and post measures[33,34,41,49] enabling a trustworthy assessment of the change in knowledge.[31] Two studies compared repeated measurements which were not directly comparable due to the different methods used at each measurement timepoint. One study compared communication self-efficacy which was self-rated at pre-intervention to ratings by faculty at post-intervention[37] and the other study compared observed communication skills in simulated consultations with other residents immediately after the intervention to skills demonstrated in consultations with standardised patients conducted up to 5 months post-intervention .[48]

Communication skills and self-effectiveness

Mixed findings were observed in three studies which measured communication skills in simulated patient encounters using different instruments.[39,41,48] In simulated patient encounters, the results of one RCT indicated that resident participants (p=0.001), but not students (colon cancer scenario p= 0.123; breast cancer scenario p=0.057), improved their global interview performance change scores.[41] Another study which compared written curriculum to online training with or without multimedia elements found no difference in the average communication checklist score between the three groups of inter-disciplinary students.[39] Finally, one small single group study (n=10) found training participants' total communication skills score (average percentage of total skills completed) in a simulated consultation did not change over time however, the numbers of doctors who discussed the use of CPR increased (p=0.006) and the number of doctors who asked patients to articulate their goals decreased (p=0.025).[48] Two studies assessed communication self-effectiveness in online virtual simulated patient encounters using the same instrument.[35,37] After completion of the training in one study, 25%-33% of participants had total scores less than the established benchmark for competency for the measurement instrument used.[35] In the other study, communication self-efficacy significantly improved after the intervention. However, as explained above, baseline measures were not directly comparable.[37]

Specific communication skills

Three studies evaluated communication skills specific to breaking bad news using simulated patient encounters.[35,37,41] One RCT found both the students and residents intervention groups demonstrated significantly higher mean change scores than the control groups on some breaking bad news sub-scales (total sub-scales=5) in the colon cancer scenario (students=2; residents=3) and the breast cancer scenario (students=3; residents not tested).[41] Two single group studies did not include pre-

intervention measures for observed communication skills involved in breaking bad news during online virtual simulated patient encounters.[35,37] In one study, more than half of participants had average to high scores across all scales[35] and it was not possible to interpret findings in the other study due to data reporting.[37]

Objective Knowledge

Five studies evaluated participant learning through knowledge tests.[33,34,47,49,51] One RCT found the intervention group had significantly greater improvement in palliative care knowledge change scores compared with the control group.[34] A single group study which tested an intervention for nurses to improve responses to patients experiencing psychological distress found knowledge scores significantly improved.[33] Similarly, total knowledge scores significantly increased after an intervention for timely communication of reproductive health issues for AYA patients and survivors.[49] Two single group studies tested knowledge only after the intervention.[47,51] One study found that most nursing students (77-82%) correctly identified family communication patterns presented in case studies and students' descriptions of their planned responses indicated 40-56% had mastered content.[51] The other found participants' average percent correct was relatively high (68%-92%) across the four modules and participant groups after palliative care CST.[47]

Information

One RCT evaluated the information provided during simulated patient encounters, although it did not conduct pre-intervention measures for this outcome. Differences between student participants who received online training and paper based training were not significant.[39]

LEVEL 3 LEARNER'S BEHAVIOUR CHANGE IN PATIENT CARE

Three studies included a HP behaviour change measure/s in communication skills, interview content or empathy evaluated in the patient care context by independent assessors, or by patients themselves, which constituted evaluation at Kirkpatrick's level three.[31]

Communication skills

Two studies assessed observed communication skills.[43,46] During one RCT, pre-chemotherapy nurse consultations with older cancer patients were rated and it was found that the intervention group's pre-post change scores were significantly better for discussion of realistic expectations and scores for rehabilitation information were significantly reduced. This was consistent with the pre-specified training objectives to reduce expansive information and instead provide information tailored to patients' individual situations and needs.[46] Of five remaining scales, the intervention group's pre-post change scores were significantly improved in three scales, however, between-group differences were not significant.[46] In a pre-test post-test study, multi-level analysis found significant post training improvements in observed quantity, quality and overall communication behaviour in all physicians.[43] A further model found significant interaction effects for quantity, quality and nonverbal communication quality for self-reported training implementers who had higher weighted mean scores post training compared with non-implementers.

Information

Content analysis of videotaped pre-chemotherapy nurse consultations with older cancer patients (approximately one hour per patient) found that after training nurses provided patients with significantly less total information (history taking and possible side effects) and fewer recommendations. This was consistent with pre-specified training objectives to provide tailored information for patients' individual situations and needs.[46] However, in another RCT, patient evaluations of the comprehensibility and relevance of information provided by HPs in consultations

(mean difference adjusted for physician age, experience and position) were not statistically compared between groups.[38]

Empathy

One RCT which tested training for communication on evidence-based complementary therapies in cancer care, compared intervention and control group patients' ratings of HPs empathic behaviours (mean difference adjusted for physician age, experience and position; two validated measures) however, no statistical comparison was reported.[38]

LEVEL 4 PATIENT CARE OUTCOMES

Only three studies measured change in patient care outcomes which is level four of Kirkpatrick's hierarchy.[31] Only one found a statistically significant difference between comparison groups (information - number of patient questions).[46]

Satisfaction

Patient satisfaction with consultations was measured in one RCT and one pre-post study.[38,43] A RCT which tested training for communication about evidence-based complementary therapies in cancer care, measured satisfaction with inpatient clinical care (mean difference adjusted for physician age, experience and position) however, no statistical comparison was reported.[38] Average patient consultation satisfaction was reported after an intervention for general communication skills in a pre-post study however, multi-level analysis was not significant in any model.[43]

Information

One RCT found no significant difference between groups in pre-post change scores for patients recall of provided recommendations (assessed by independent observers).[46] This study also reported a separate outcome of observed patient and carer dyad questioning behaviour in pre-chemotherapy nurse consultations during the post-test. It found that intervention dyads, compared to controls, asked significantly more questions from the question prompt list about treatment-related topics and asked significantly more questions in total.[46]

Synthesis of effects

An effect direction plot[32] (Supplement 4) synthesised and tabulated study findings by Kirkpatrick level and outcomes constructs. We considered outcomes synthesised in the plot and made the following observations in relation to the question "what is the reported effect of online CST on HP communication skills and patient care outcomes in cancer and palliative care?". Online CST improved self-assessed (level 2A) communication skills and confidence in communication. There were mixed effects of online CST on observed communications skills (level 2B) however, observed measures of knowledge (level 2B) appear to be improved. While there were only two studies, online CST seemed to improve HPs' observed communication skills in the patient context (level 3). Three RCTs assessed information provided during consultations and there appeared to be a benefit of online CST for patient information recall and type of questioning (level 4). We were unable to derive further answers to our review question due to the paucity of evidence or our concerns with its quality.

Discussion

This systematic review included studies published in the last 16 years that assessed the efficacy of online or blended CST for HPs providing care for patients receiving cancer or palliative care treatment. The integrated mixed-method approach included 5 RCTs, 11 pre-post studies, 2 single group post-test studies and a qualitative study. Study findings were mixed for outcomes measured at higher levels of Kirkpatrick's evaluation (level 2B-4) which was likely due to the reduced proportion of studies which evaluated outcomes at higher levels; less than half had level 2B outcomes and only three measured observed changes in HP behaviour in the patient care setting (level 3)[38,43,46] or measured patient care outcomes (level 4).[38,43,46]

The interventions were designed to teach general communication skills, delivering bad news, or communication skills for particular scenarios, topics, or patient groups. Approximately half of the studies were delivered solely online and the rest used blended content. In general, the online training component could be completed in approximately nine hours or less with an average duration of three hours. Approximately half of the interventions did not require interaction between participants. About half involved role plays which were conducted: with standardised patients, online, face-to-face, or face-to-face with peers. Role play practice and feedback on communication skills from facilitators and participants have been established as an important CST element for sustained behaviour change in clinical settings.[9,54]

Improvement in patient care is the ultimate goal of CST for HPs, yet only two patient-reported outcomes (level 4, satisfaction and consultation information) were reported and only one study demonstrated a statistically significant effect (consultation information).[46] It appears to be challenging to establish benefits of online CST through more distal patient-reported outcome measures. We observed variable time intervals (0-18 months) from the intervention to measurement of patient-reported outcomes. If this impacted on findings, it highlights the importance of selecting valid and standardised time intervals for outcome measurement in future studies, while considering each source and level of outcome. Our review question was focussed on online CST and we therefore excluded studies of computer-based interventions if they were not delivered via the internet. One RCT found by our searches utilised a blended CD-ROM based intervention which included tailored feedback on audio-recorded exemplars from oncologists' own patient encounters.[55] This RCT found intervention oncologists' empathic responses to patients' negative emotions were significantly increased post-intervention and moreover, patients of intervention oncologists reported significantly higher trust in their physicians. We note that the intervention has recently transitioned to the online environment[56] and other computer based interventions may also transition to the online environment for evaluation in the future.

While there were only two studies of mixed quality, online training seemed to improve HPs' observed communication skills in the patient context (level 3). One study used patient observations of HP behaviour during consultations in several level 3 outcomes.[38] Research shows there may be limits to the capacity of patients to rate quality of communication. A study which compared patients' opinions of consultations with trained raters found only two of five communication domains correlated.[57] In another study, patient ratings of GP communication in consultations were positively skewed. Furthermore, when trained raters assessed communication was poor, patient assessments ranged widely.[58]

The majority of studies (*n*=16) reported change in knowledge, attitude or skill (level 2) and around half (*n*=9) reported observed, rather than self-reported, measures of these changes (level 2B). However, a number of studies had change scores with questionable reliability due to differences in

the pre- and post-intervention method of measurement[37,48] or had no pre-intervention measure for comparison.[35,39,47] To confirm an observed change in learners' knowledge or skills (level 2B), post-intervention scores must be compared with an equivalent pre-training measurement.[31] Therefore, we assessed that stand-alone post-intervention knowledge or skill scores provided no reliable evidence for the impact of the CST, particularly when raw scores were presented with no benchmark criterion to enable its interpretation. Studies which included student participants[37,39,41,44,51] only measured outcomes at Level 2A or 2B. For generic or specific communication skills, compared with qualified or trainees HPs, it appeared that findings related to student participants were equally or more likely to be positive, but were less likely to be statistically significant finding.

It is evident from this systematic review that measures of learner's reaction to CST (level 1) are common. Learner's reaction was utilised to assess participants' evaluation of training components, including technical aspects, and learner's perceptions of remote learning. Two of the nineteen included studies only had level 1 measures[40,42] and a further 12 (1 RCT, 10 pre-post, 1 qualitative) measured learners' reactions, predominantly as training evaluations (*n*=10 studies), in addition to other outcome levels. Quantitative evaluation surveys of workplace training can be convenient and provide useful feedback to training providers and employers,[59] while qualitative exploration can help refine training.[40] However, consistent with our observations in this review, the reliability and validity of training evaluations are often not established and instruments are often purpose built and used in only one study.[60] We observed that quantitative training evaluations findings were ubiquitously positive, did not involve between groups statistical analysis, and generally measured CST evaluation surveys or subjective HP satisfaction. Consequently, we were unable to synthesise the effect of any level 1 outcome, despite the number of studies which reported them.

Oncology HPs' satisfaction of online CST does not clearly translate to a measurable benefit for cancer patients in care settings.[61,62] If CST provides no or few benefits to patients then its value is limited. Therefore, it is imperative that future studies targeting CST for cancer HPs are extended beyond HP-reported outcomes and measure outcomes at several higher levels of Kirkpatrick's evaluation framework (2B to 4),[31] with measurement of patient outcomes (Level 4) being the highest priority.

Clinical implications

Online communication skills are particularly relevant during the current COVID-19 pandemic for students' and HPs' continuation of training including feedback. An example for clinical practice includes the development of online training and resources to support nonpalliative care clinicians delivering primary palliative care to the overwhelming number of critically ill and dying patients diagnosed with COVID-19.[63]

We found learners perceived that online CST was acceptable, including technical and remote aspects, and we found evidence that self-assessed communication confidence and observed knowledge improved due to training. Learner's outcomes from online CST may translate into the patient care setting; however, this is less certain due to the small number of studies reporting outcomes measured in simulated or real practice settings or from patients themselves. Whether CST translates to the patient care setting and, most importantly, benefits cancer or palliative patient outcomes is still yet to be established. Furthermore, additional studies found by our search update (additional twelve months) indicate online CST is a rapidly emerging field. Public health interventions associated with the pandemic have placed limits on face-to-face gatherings, which will further extend the interest in and a need for online training. Additionally, the use of telemedicine has increased during the pandemic and health professionals are likely to benefit from training for communication skills specific to telehealth.[64]

Research implications

This review highlights that research has suffered due to limitations related to low levels of evaluation (levels 1 and 2A), important methodological problems with measures, and the small proportion of studies with a control group. This may be due to the time required to develop an online intervention for specific training participants, health settings or the technology platform. However, this approach leads to duplication of effort and could counteract the proposed benefits of online training such as being practical, sustainable, low cost, and widely available.[14,15] Future studies in this area should: 1) be rigorously-designed and executed controlled trials; 2) measure outcomes using robust/standardised instruments, methodologies and assessment timelines at several levels of evaluation,[31] and as a priority 3) establish whether any improvement in oncology HPs' communication skills translates to improved patient outcomes (level 4) or implementation in the patient care setting (level 3). A thorough and convincing evaluation of an online CST intervention could enable transfer of findings to other professions, health domains and countries. We suggest future research in this area would benefit from: establishing standardised reporting for content and structure of CST interventions, development of, if possible, reliable and valid instruments for common outcomes at each level of evaluation, and clarifying any associations between different levels of measurement for commonly measured outcomes.

Study Limitations

We acknowledge this review was limited by the focus on English articles and the omission of unpublished data. Therefore findings may reflect a publication bias. Studies of blended learning were included in addition to purely online interventions. Although this strategy included more studies, blended learning is a common model in the real world. Pairs of reviewers screened the results of an exhaustive search which found a reasonable number of studies. Although only five of 19 included studies were RCTs, an integrated mixed methods approach provided structure for inclusion of lower levels of evidence and allowed us to establish the current evidence.

Conclusion

This mixed methods systematic review found 19 studies which evaluated online CST for oncology HPs. Strengths of this review include the categorisation of outcomes by published constructs,[30] stratification of findings within an established framework of evaluation for educational interventions,[31] and synthesis of outcomes into an effect direction plot.[32] Generally, learner-reported outcomes proposed face validity for online CST for oncology and palliative care professionals. Tentatively, improvements in observed HP communication behaviour after training appear to translate to the patient care setting and potentially to patient care outcomes, although only very few studies investigated these outcomes. We have recommended improvements to research design, evaluation and implementation, with a focus on implementing online communication skills into practice and evaluating patient outcomes.

Figure legends

Figure 1 Stages of the review (Figure adapted from: Harden and Thomas 2010 [22] pp. 276).

Figure 2 Flow chart of the included studies screening process reported using PRISMA guidelines.The original search was for studies published in the ten year period ending 5 Apr 2018, and the search update was completed 9 April 2019.

Figure 3 Assessed risk of bias included studies with a randomised controlled trial design. Legend: Black triangle – the criterion was assessed as being met; inversed grey triangle – the criterion was not met; grey dash - it was unclear whether or not this criterion was met; n/a – not applicable.

Figure 4: Assessed risk of bias of included studies with a quasi-experimental design. Legend: Black triangle – the criterion was assessed as being met; inversed grey triangle – the criterion was not met; grey dash - it was unclear whether or not this criterion was met; n/a – not applicable.

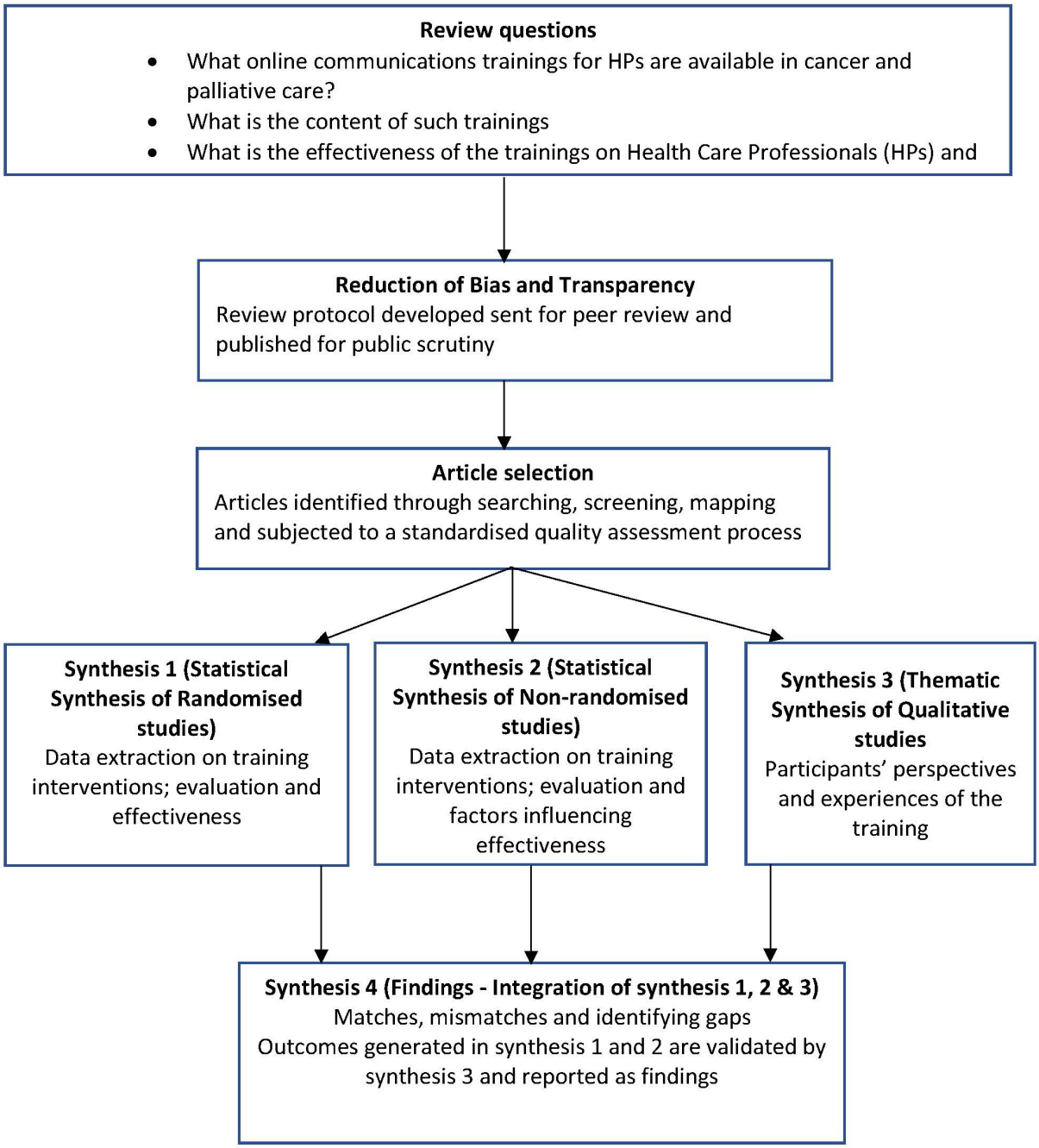
References

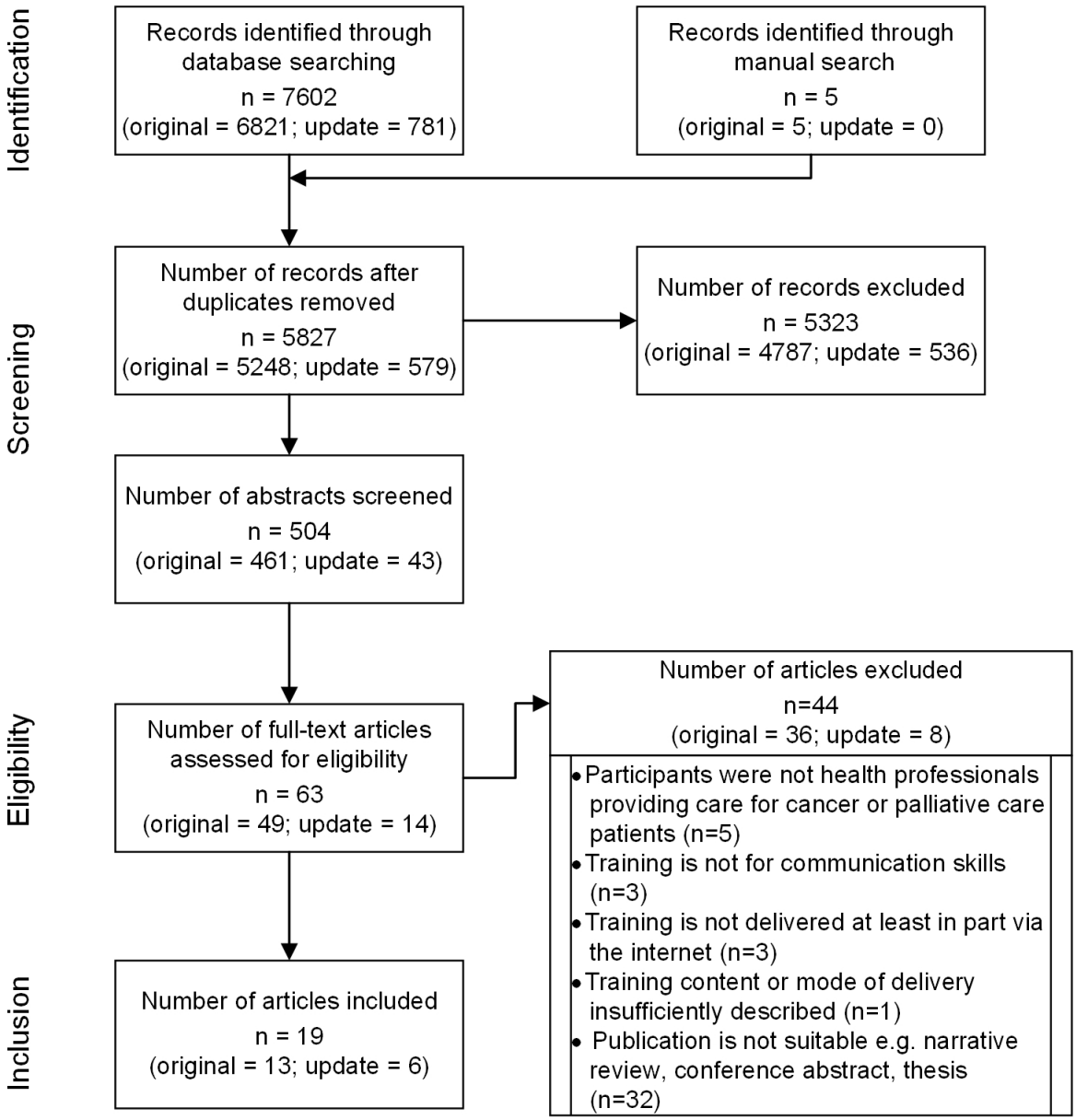
1. Waller A, Forshaw K, Bryant J, et al. Interventions for preparing patients for chemotherapy and radiotherapy: a systematic review. *Support Care Cancer* 2014; 22: 2297-2308. 2014/06/08. DOI: 10.1007/s00520-014-2303-3.
2. Rogers SO, Gawande AA, Kwaan M, et al. Analysis of surgical errors in closed malpractice claims at 4 liability insurers. *Surgery* 2006; 140: 25-33. DOI: https://doi.org/10.1016/j.surg.2006.01.008.
3. Moore P, Rivera Mercado S, Grez Artigues M, et al. Communication skills training for healthcare professionals working with people who have cancer. *Cochrane Database Syst Rev* 2013; 3: CD003751. DOI: 10.1002/14651858.CD003751.pub3.
4. Butow P, Cockburn J, Girgis A, et al. Increasing oncologists' skills in eliciting and responding to emotional cues: evaluation of a communication skills training program. *Psychooncology* 2008; 17: 209-218.
5. National Breast Cancer Centre. *Elciting and responding to emotional cues. Evidence from the literature and recommended steps*. Camperdown, NSW: National Breast Cancer Centre, 2007.
6. Kissane DW, Bylund CL, Banerjee SC, et al. Communication skills training for oncology professionals. *J Clin Oncol* 2012; 30: 1242-1247. DOI: 10.1200/JCO.2011.39.6184.
7. Moore PM, Rivera S, Bravo-Soto GA, et al. Communication skills training for healthcare professionals working with people who have cancer. *Cochrane Database of Systematic Reviews* 2018. DOI: 10.1002/14651858.CD003751.pub4.
8. Schnitzler L, Smith SK, Shepherd HL, et al. Communication during radiation therapy education sessions: The role of medical jargon and emotional support in clarifying patient confusion. *Patient Educ Couns* 2017; 100: 112-120. DOI: 10.1016/j.pec.2016.08.006.
9. Berkhof M, van Rijssen HJ, Schellart AJ, et al. Effective training strategies for teaching communication skills to physicians: an overview of systematic reviews. *Patient Educ Couns* 2011; 84: 152-162. DOI: 10.1016/j.pec.2010.06.010.
10. Lipkin M. The history of communication skills knowledge and training. *Handbook of Communication in Oncology and Palliative Care*. Oxford: Oxford University Press, 2010.
11. Winterburn S and Wilkinson S. The challenges and rewards of communication skills training for oncology and palliative care nurses in the United Kingdom. *Handbook of Communication in Oncology and Palliative Care*. Oxford: Oxford University Press, 2010.
12. van Beusekom MM, Cameron J, Bedi C, et al. Communication skills training for the radiotherapy team to manage cancer patients' emotional concerns: a systematic review. *BMJ Open* 2019; 9: e025420. DOI: 10.1136/bmjopen-2018-025420.
13. Maloney S, Haas R, Keating JL, et al. Breakeven, Cost Benefit, Cost Effectiveness, and Willingness to Pay for Web-Based Versus Face-to-Face Education Delivery for Health Professionals. *J Med Internet Res* 2012; 14: e47. DOI: 10.2196/jmir.2040.
14. Thepwongsa I, Kirby CN, Schattner P, et al. Online continuing medical education (CME) for GPs: does it work? A systematic review. *Aust Fam Physician* 2014; 43: 717-721.
15. Wittenberg-Lyles E, Goldsmith J, Ferrell B, et al. Assessment of an interprofessional online curriculum for palliative care communication training. *J Palliat Med* 2014; 17: 400-406. DOI: 10.1089/jpm.2013.0270.
16. Cook DA, Levinson AJ, Garside S, et al. Internet-based learning in the health professions: a meta-analysis. *JAMA* 2008; 300: 1181-1196. DOI: 10.1001/jama.300.10.1181.
17. Pelayo-Alvarez M, Perez-Hoyos S and Agra-Varela Y. Clinical effectiveness of online training... *J Palliat Med* 2013; 16: 1188-1196. DOI: 10.1089/jpm.2013.0005.
18. Junod Perron N, Dominicé Dao M, Rieder A, et al. Online Synchronous Clinical Communication Training During the Covid-19 Pandemic. *Advances in medical education and practice* 2020; 11: 1029-1036. 2021/01/01. DOI: 10.2147/amep.s286552.
19. Fischbeck S, Hardt J, Malkewitz C, et al. Evaluation of a digitized physician-patient-communication course evaluated by preclinical medical students: a replacement for classroom education? *GMS journal for medical education* 2020; 37: Doc85. 2020/12/29. DOI: 10.3205/zma001378.
20. Waterhouse H, Burton M and Neal J. E- learning as a medium for communication skills training. In: Kissane DW, Bultz BD, Butow PN, et al. (eds) *Oxford Textbook of Communication in Oncology and Palliative Care*. Oxford, UNITED KINGDOM: Oxford University Press, 2017, pp.200-206.
21. Littlejohn A. *Preparing for blended e-learning / Allison Littlejohn and Chris Pegler*. London: London : Routledge, 2007.

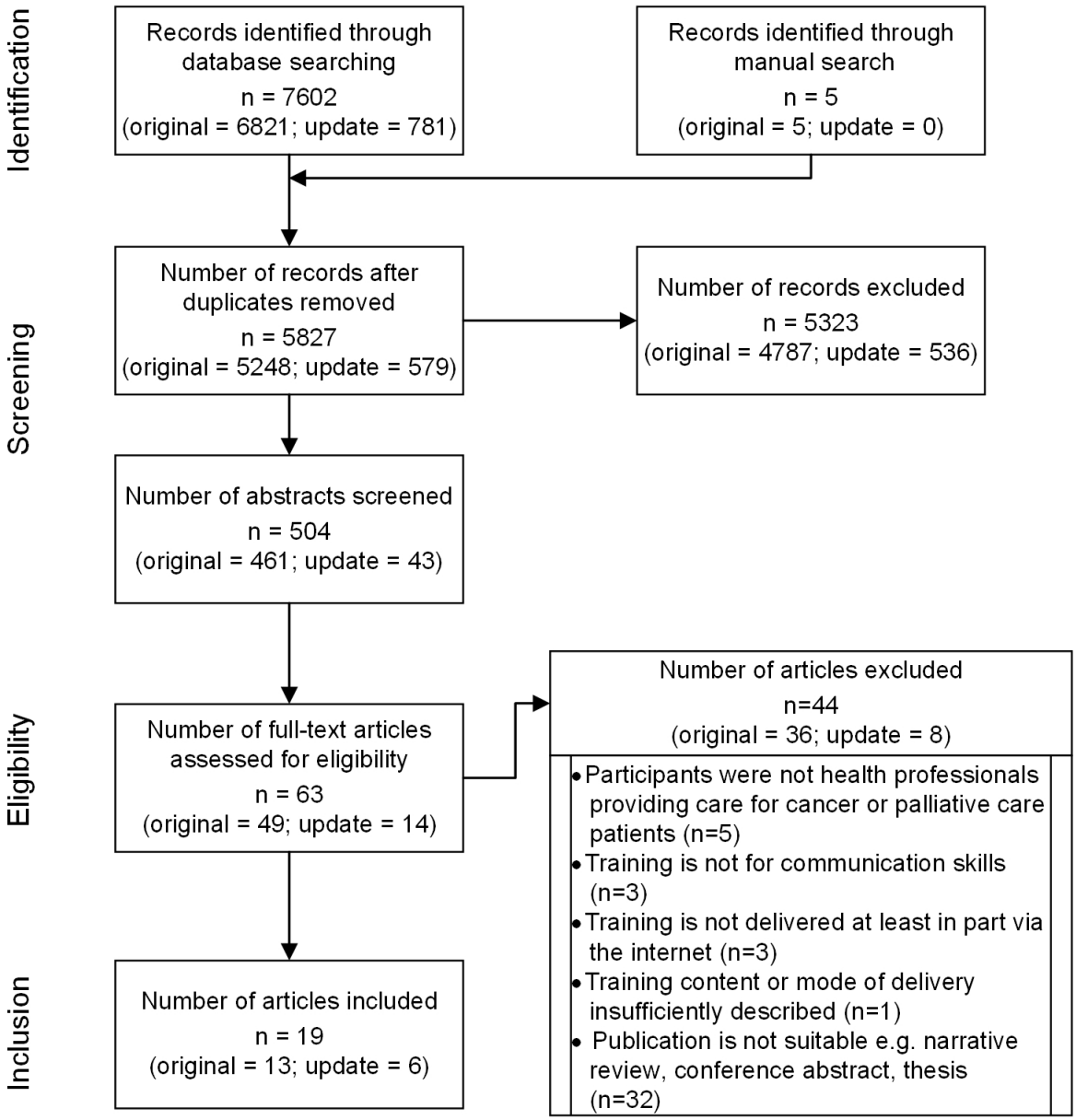
22. Harden A and Thomas J. Using Mixed Methods Research Synthesis for Literature Reviews. In: C TAT, (ed.). *Handbook of Mixed Methods in Social & Behavioral Research*. Thousand Oaks, California: SAGE Publications, Inc., 2010, p. pages 265-292.
23. Booth A, Sutton A and Papaioannou D. *Systematic approaches to a successful literature review*. Sage, 2016.
24. Moher D, Shamseer L, Clarke M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic reviews* 2015; 4: 1.
25. Stovold E, Beecher D, Foxlee R, et al. Study flow diagrams in Cochrane systematic review updates: An adapted PRISMA flow diagram. *Systematic Reviews* 2014; 3. Note. DOI: 10.1186/2046-4053-3-54.
26. Tufanaru C MZ, Aromataris E, Campbell J, Hopp L. Checklist for Randomized Controlled Trials. *Chapter 3: Systematic reviews of effectiveness*, https://reviewersmanual.joannabriggs.org/ (2017).
27. Tufanaru C MZ, Aromataris E, Campbell J, Hopp L. Quasi-Experimental Studies (non-randomized experimental studies) *Chapter 3: Systematic reviews of effectiveness*, https://reviewersmanual.joannabriggs.org/ (2017).
28. Lockwood C, Munn Z and Porritt K. Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. *International journal of evidence-based healthcare* 2015; 13: 179-187.
29. Heyvaert M, Hannes K and Onghena P. Reporting MMRS literature reviews. In: Heyvaert M, Hannes K and Onghena P, (eds.). *Using Mixed Methods Research Synthesis for Literature Reviews*. Thousand Oaks, California: Sage, 2017, p. 265-292.
30. Fischer F, Helmer S, Rogge A, et al. Outcomes and outcome measures used in evaluation of communication training in oncology - a systematic literature review, an expert workshop, and recommendations for future research. *BMC Cancer* 2019; 19: 808. DOI: 10.1186/s12885-019-6022-5.
31. Konopasek L, Rosenbaum M, Encandela J, et al. Evaluating communication skills training courses. In: Kissane DW, Bultz BD, Butow PN, et al., (eds.). *Oxford Textbook of Communication in Oncology and Palliative Care*. Oxford, UNITED KINGDOM: Oxford University Press, Incorporated, 2017, p. 399-404.
32. Thomson HJ and Thomas S. The effect direction plot: visual display of non-standardised effects across multiple outcome domains. *Res Synth Methods* 2013; 4: 95-101. DOI: 10.1002/jrsm.1060.
33. Kubota Y, Akechi T and Okuyama T. Effectiveness of a brief psycho-oncology training program for general nurses: A preliminary study. *Japanese Journal of Clinical Oncology* 2018; 48: 594-597. DOI: http://dx.doi.org/10.1093/jjco/hyy059.
34. Pelayo M, Cebrian D, Areosa A, et al. Effects of online palliative care training on knowledge, attitude and satisfaction of primary care physicians. *BMC family practice* 2011; 12: 37. 2011/05/25. DOI: 10.1186/1471-2296-12-37.
35. Kava BR, Andrade AD, Marcovich R, et al. Communication Skills Assessment Using Human Avatars: Piloting a Virtual World Objective Structured Clinical Examination. *Urology Practice* 2017; 4: 76-84. DOI: 10.1016/j.urpr.2016.01.006.
36. Kaur R, Meiser B, Zilliacus E, et al. Evaluation of an online communication skills training programme for oncology nurses working with patients from minority backgrounds. *Supportive Care in Cancer* 2018. In Press. DOI: http://dx.doi.org/10.1007/s00520-018-4507-4.
37. Andrade AD, Bagri A, Zaw K, et al. Avatar-mediated training in the delivery of bad news in a virtual world. *J Palliat Med* 2010; 13: 1415-1419. DOI: https://dx.doi.org/10.1089/jpm.2010.0108.
38. Blodt S, Mittring N, Schutzler L, et al. A consultation training program for physicians for communication about complementary medicine with breast cancer patients: a prospective, multi-center, cluster-randomized, mixed-method pilot study. *BMC Cancer* 2016; 16: 843.
39. Chittenden EH, Anderson WG, Lai CJ, et al. An evaluation of interactive web-based curricula for teaching code status discussions. *Journal of palliative medicine* 2013; 16: 1070-1073. 2013/08/14. DOI: 10.1089/jpm.2012.0611.
40. Doorenbos AZ, Lindhorst T, Schim SM, et al. Development of a web-based educational intervention to improve cross-cultural communication among hospice providers. *Journal of Social Work in End-of-Life & Palliative Care* 2010; 6: 236-255. DOI: 10.1080/15524256.2010.529022.
41. Gorniewicz J, Floyd M, Krishnan K, et al. Breaking bad news to patients with cancer: A randomized control trial of a brief communication skills training module incorporating the stories and preferences of actual patients. *Patient Educ Couns* 2017; 100: 655-666. DOI: https://dx.doi.org/10.1016/j.pec.2016.11.008.
42. Graham R, Lepage C, Boitor M, et al. Acceptability and feasibility of an interprofessional end-of-life/palliative care educational intervention in the intensive care unit: A mixed-methods study. *Intensive & critical care nursing* 2018 2018/06/26. DOI: 10.1016/j.iccn.2018.04.011.

43. Hulsman RL, Ros WJ, Winnubst JA, et al. The effectiveness of a computer-assisted instruction programme on communication skills of medical specialists in oncology. *Med Educ* 2002; 36: 125-134.
44. McConville SA and Lane AM. Using on-line video clips to enhance self-efficacy toward dealing with difficult situations among nursing students. *Nurse education today* 2006; 26: 200-208.
45. McLeod DL, Morck AC and Curran JA. A pan-Canadian web-based education program to support screening for distress: evaluation of outcomes. *Palliat Support Care* 2014; 12: 15-23. DOI: 10.1017/S1478951513000072.
46. van Weert JC, Jansen J, Spreeuwenberg PM, et al. Effects of communication skills training and a Question Prompt Sheet to improve communication with older cancer patients: a randomized controlled trial. *Crit Rev Oncol Hematol* 2011; 80: 145-159. DOI: https://dx.doi.org/10.1016/j.critrevonc.2010.10.010.
47. Wittenberg-Lyles E, Goldsmith J, Ferrell B, et al. Assessment of an interprofessional online curriculum for palliative care communication training. *J Palliat Med* 2014; 17: 400-406. DOI: https://dx.doi.org/10.1089/jpm.2013.0270.
48. Margolis B, Blinderman C, de Meritens AB, et al. Educational Intervention to Improve Code Status Discussion Proficiency Among Obstetrics and Gynecology Residents. *Am J Hosp Palliat Care* 2018; 35: 724-730. DOI: https://dx.doi.org/10.1177/1049909117733436.
49. Quinn GP, Bowman Curci M, Reich RR, et al. Impact of a Web-Based Reproductive Health Training Program: ENRICH (Educating Nurses about Reproductive Issues in Cancer Healthcare). *Psycho oncology* 2019; 18. DOI: http://dx.doi.org/10.1002/pon.5063.
50. Starks H, Coats H, Paganelli T, et al. Pilot Study of an Interprofessional Palliative Care Curriculum: Course Content and Participant-Reported Learning Gains. *The American journal of hospice & palliative care* 2018; 35: 390-397. DOI: http://dx.doi.org/10.1177/1049909117725042.
51. Wittenberg E, Goldsmith JV, Y'Esha W, et al. Caring for Family Caregivers: a Pilot Test of an Online COMFORT™ SM Communication Training Module for Undergraduate Nursing Students. *Journal of Cancer Education* 2018: 1-6. DOI: http://dx.doi.org/10.1007/s13187-018-1452-3.
52. Freeth D, Hammick M, Koppel I, et al. *A Critical Review of Evaluations of Interprofessional Education*. 2002. London: Higher Education Academy Learning and Teaching Support Network for Health Sciences and Practice.
53. Steinert Y, Mann K, Centeno A, et al. A systematic review of faculty development initiatives designed to improve teaching effectiveness in medical education: BEME Guide No. 8. *Medical Teacher* 2006; 28: 497-526. DOI: 10.1080/01421590600902976.
54. Manna R, Bylund CL, Brown RF, et al. Facilitating communication role play sessions: Essential elements and training facilitators. In: Kissane DW, Bultz BD, Butow PN, et al., (eds.). *Oxford Textbook of Communication in Oncology and Palliative Care*. Oxford, UNITED KINGDOM: Oxford University Press, Incorporated, 2017, p. 351-436.
55. Tulsky JA, Arnold RM, Alexander SC, et al. Enhancing communication between oncologists and patients with a computer-based training program: a randomized trial. *Ann Intern Med* 2011; 155: 593-601. DOI: 10.7326/0003-4819-155-9-201111010-00007.
56. Tulsky JA, Brannen E, Goldman J, et al. *Comparing Communication Training Programs for Cancer Doctors*. 2020 Washington DC, USA: Patient-Centered Outcomes Research Institute (PCORI).
57. Wouda JC and van de Wiel HBM. The effects of self-assessment and supervisor feedback on residents' patient-education competency using videoed outpatient consultations. *Patient Education and Counseling* 2014; 97: 59-66. Article. DOI: 10.1016/j.pec.2014.05.023.
58. Burt J, Abel G, Elmore N, et al. Rating Communication in GP Consultations: The Association Between Ratings Made by Patients and Trained Clinical Raters. *Medical Care Research and Review* 2018; 75: 201-218. DOI: 10.1177/1077558716671217.
59. Ford JK and Sinha R. Advances in Training Evaluation Research. In: Cartwright S and Cooper CL (eds) *The Oxford Handbook of Personnel Psychology*. New York: Oxford University Press, 2009.
60. Gillan C, Lovrics E, Halpern E, et al. The evaluation of learner outcomes in interprofessional continuing education: A literature review and an analysis of survey instruments. *Medical Teacher* 2011; 33: e461-e470. DOI: 10.3109/0142159X.2011.587915.
61. McLinden D and Boone WJ. More than smile sheets: Rasch analysis of training reactions in a medical center. *Performance Improvement Quarterly* 2009; 22: 7-21. DOI: 10.1002/piq.20042.
62. Warr P, Allan C and Birdi K. Predicting three levels of training outcome. *Journal of Occupational and Organizational Psychology* 1999; 72: 351-375. Review. DOI: 10.1348/096317999166725.

63. deLima Thomas J, Leiter RE, Abrahm JL, et al. Development of a Palliative Care Toolkit for the COVID-19 Pandemic. *J Pain Symptom Manage* 2020; 60: e22-e25. 2020/05/27. DOI: 10.1016/j.jpainsymman.2020.05.021.
64. Smith AC, Thomas E, Snoswell CL, et al. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). *Journal of telemedicine and telecare* 2020; 26: 309-313. 2020/03/21. DOI: 10.1177/1357633x20916567.







	1. Random sequence generation	2. Allocation concealment	3. Groups similar at baseline	4. Blinding of participants	5. Blinding of treatment personnel	6. Blinding of outcome assessment	7. Groups treated identically other than named intervention	8. Follow up completed	9. Participants analysed in allocated groups	10. Outcomes measured in the same way for all groups	11. Outcomes measured reliably	12. Appropriate statistical analysis used	13. Appropriate trial design
Blodt et al., 2016	▲	▲	▼	—	n/a	—	▲	—	▲	▲	▲	▲	▲
Chittenden et al., 2013	—	—	—	—	—	—	▲	▼	▲	▲	▼	—	▲
Gorniewicz et al., 2017	—	—	—	—	n/a	▲	▼	—	—	▲	▲	▲	▲
Pelayo et al., 2011	▲	—	▲	—	▲	▲	▲	▲	▲	▲	▲	▲	▲
van Weert et al., 2011	▲	▲	▲	▼	n/a	▲	▲	▼	▲	▲	—	▲	▲

	1. Clear cause and effect	2. Compared participants similar	3. Participants treated similarly other than named intervention	4. Control group	5. Muliple pre- and post- intervention outcome measurements	6. Follow up completed	7. Outcomes measured in the same way for all groups	8. Outcomes measured reliably	9. Appropriate statistical analysis used
Andrade et al., 2010	▲	▲	▲	▼	▼	—	▲	—	▼
Graham et al., 2018	▲	n/a	n/a	▼	▼	▲	n/a	▼	▲
Hulsman et al., 2002	▲	▲	▲	▼	▲	▲	▲	▲	▲
Kaur et al., 2018	▲	▲	▲	▼	▼	▲	▲	▲	▲
Kava et al., 2017	▲	▲	▲	▼	▼	▲	▲	▲	—
Kubota et al., 2018	▲	▲	▲	▼	—	▲	▲	—	▲
Margolis et al., 2018	—	▲	▲	▼	▼	▼	▲	▼	—
McConville et al., 2006	▲	n/a	n/a	▼	▲	▲	n/a	▼	▲
McLeod et al., 2014	▲	n/a	n/a	▼	▲	▲	▲	▼	▲
Quinn et al., 2019	▲	▲	—	▼	▼	▼	▲	▲	—
Starks et al., 2018	▲	▲	▲	▼	▼	—	▼	▲	—
Wittenberg et al., 2014	▲	▼	▲	▼	▼	—	▲	▲	▲
Wittenberg et al., 2018	▲	▲	▲	▼	▼	—	▲	—	▼