Systematic review of clinical debriefing tools: attributes and evidence for use

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ABSTRACT

Background and objectives Clinical debriefing (CD) following a clinical event has been found to confer benefits for staff and has potential to improve patient outcomes. Use of a structured tool to facilitate CD may provide a more standardised approach and help overcome barriers to CD; however, we presently know little about the tools available. This systematic review aimed to identify tools for CD in order to explore their attributes and evidence for use.

Methods A systematic review was conducted in line with PRISMA standards. Five databases were searched. Data were extracted using an electronic form and analysed using critical qualitative synthesis. This was guided by two frameworks: the '5 Es' (defining attributes of CD: educated/experienced facilitator, environment, education, evaluation and emotions) and the modified Kirkpatrick's levels. Tool utility was determined by a scoring system based on these frameworks.

Results Twenty-one studies were included in the systematic review. All the tools were designed for use in an acute care setting. Criteria for debriefing were related to major or adverse clinical events or on staff request. Most tools contained guidance on facilitator role, physical environment and made suggestions relating to psychological safety. All tools addressed points for education and evaluation, although few described a process for implementing change. Staff emotions were variably addressed. Many tools reported evidence for use; however, this was generally low-level, with only one tool demonstrating improved patient outcomes.

Conclusion Recommendations for practice based on the findings are made. Future research should aim to further examine outcomes evidence of these tools in order to optimise the potential of CD tools for individuals, teams, healthcare systems and patients.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Clinical debriefing (CD) is an emerging practice, with potential benefits for both staff and patients.
⇒ Using a structured tool to facilitate CD may provide a more standardised approach; however, there is no current evidence to support one tool over another.

WHAT THIS STUDY ADDS

⇒ This systematic review has identified 21 tools for CD in acute care settings and has synthesised findings regarding their attributes and evidence for use.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Findings of the study have been used to make recommendations for clinicians wishing to implement CD and for educators and researchers developing or evaluating these tools.
⇒ Expanding knowledge in this area may enable wider and more confident implementation of CD tools, which may ultimately translate to improved patient outcomes.

BACKGROUND

Debriefing in healthcare has been described as 'the attempt to bridge the gap between experience of an event and making sense of it'.[1] It is conducted as a guided exploration and analysis with the aim of affecting future practice.[2] Debriefing is well established in simulation-based education and is a vital component for learning.[3] More recently, the practice of clinical debriefing (CD) has emerged. This can take place at any time following a clinical event; however, it most frequently refers to a 'hot debrief' which takes place immediately after the event.[4] Nomenclature regarding CD practice varies across the literature. Coggins *et al*[5] distinguish CD from other forms of debriefing such as 'critical incident stress debriefing' and 'after-action review' as it can be more applicable to everyday clinical events, although this type of debriefing is infrequent compared with debriefing following adverse events.

CD confers improved psychological outcomes for staff[6] and can increase knowledge, confidence and clinical skills,[7] although this is historically controversial.[8] Some studies have demonstrated improved patient outcomes as a result of CD, for example, Wolfe *et al*[9] found significant improvement in neurological outcomes and a trend towards increased survival post-cardiac arrest following implementation of a debriefing programme.

CD is an emerging practice in various clinical contexts; however, there is a lack of standardisation and widespread implementation.[6 10] This may be due to potential barriers such as time and resource constraints, lack of facilitators or lack of perceived usefulness. In addition, there is currently no accepted best process for CD.[11] Use of a tool to guide CD may provide a more standardised approach and has been recommended to provide structure and consistency.[4 5]

A recent systematic review[12] compared six CD tools for use in emergency settings and concluded that each tool had 'unique advantages' and that their use should be tailored to specific clinical contexts. This review was limited to a small number of tools and did not undertake a formal evaluation of outcomes. We currently know very little about the potential impact of CD tools, which may limit their implementation. In line with the 'problem gap hook' heuristic,[13] it is clear that there is real potential for improvements in healthcare resulting from CD; however, optimal implementation practices are presently unclear. It is critical to explore these questions to optimise the process of CD and to maximise the potential benefits for individual staff, teams, healthcare systems and patients.

This topic is relevant for all staff working in a healthcare context where adverse or significant clinical events may be encountered, as failure to implement learning following such events may lead to gaps in staff skillset, system failures and substandard care for future patients.

Objectives

The aim of this systematic review was to identify existing tools for facilitating CD, in order to explore their attributes and evidence for use. For the purposes of this study, attributes relate to the content of the tools and evidence for use relates to the data presented regarding outcomes of using the tools in practice.

METHODS

Search strategy

A search of five online databases was conducted on 16/10/2021 (by ECP): Medline, Embase, Cumulative Index to Nursing and Allied Health Literature, Education Resources Information Centre and PsycInfo. An experienced medical librarian was involved in the search process. Keywords and alternative terms were determined by screening of titles and abstracts from relevant studies. Search terms were refined through an iterative process in liaison with the librarian. Search terms are included in the online supplemental material. A manual search of the reference lists of studies from the background literature was also conducted. Following removal of duplicates, study selection was carried out in two stages by two independent researchers (ECP and VT). Stage one was a review of titles, abstracts and keywords. Relevant articles were included in a full text review at stage two. Disagreements were resolved through discussion and review by a third researcher (SES). Study selection was carried out using Mendeley Reference Management Software (V.1.19.8) and Microsoft Excel (V.17).

Inclusion and exclusion criteria

Selection criteria were applied to ensure accurate focus on relevant studies in order to produce meaningful results. We included studies that reported development and/or use of a structured tool to facilitate CD for discrete, unplanned clinical events occurring within a hospital setting. We excluded studies which were exclusively related to simulation debriefing tools. Only primary empirical research studies which had been published in a peer-reviewed journal were included. The search was restricted to studies published within the last 15 years, as there was minimal published literature on the subject of CD identified prior to 2006 in the background literature search, and given the pace at which educational and clinical practice evolve, studies conducted prior to 2006 may have less clinical relevance today.

Data extraction and analysis

A data extraction form was designed de-novo in Microsoft Excel (V.17) and was piloted on three studies. Data extraction was conducted by two independent researchers (ECP and SES). Details of data extracted are included in the online supplemental material. Disagreements were discussed until agreement was reached. It is not uncommon for there to be missing items when conducting a review of educational interventions due to heterogeneity in methodology,[14] therefore studies with missing data were not excluded due to the risk of losing vital data.

Attributes of the tools were analysed using the '5 Es' framework.[11] This outlines five key features that should be addressed during CD: educated/experienced facilitator (an educated and experienced facilitator should be designated to lead the debrief), environment (there should be a physically appropriate environment and a psychologically safe atmosphere), education (debriefs should enhance performance, skills and knowledge), evaluation (debriefs should identify areas for improvement, set goals and lead to implementation) and emotions (the psychological well-being of staff should be addressed and followed-up). This framework was selected due to its contemporary and comprehensive

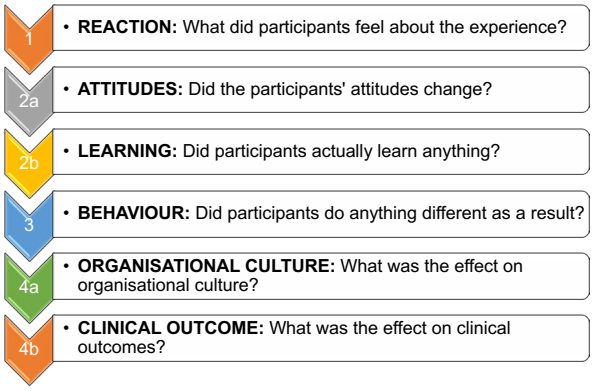

Figure 1 Kirkpatrick's modified levels of evaluation.

nature, although it is acknowledged that it has not yet been validated.

Outcomes of the tools were analysed using the modified Kirkpatrick model,[15] which categorises effectiveness of educational interventions in a hierarchical fashion. This is shown in figure 1. This framework was selected due to its familiarity, as it is well established in the literature.

Data were extracted from the studies according to these frameworks and synthesised using critical qualitative synthesis with intention to both integrate and interpret the findings[16] (by ECP) using Microsoft Excel (V.17). While one author integrated and interpreted the findings, these were discussed with the whole study team, with other members of the team regularly checking the contextual validity of the assertion made and conclusions drawn with reference to the included studies. No statistical meta-analysis was undertaken.

We devised a scoring system for combining information about attributes and evidence for use in order to increase the utility of our review. This scoring system allows ranking of the tools according to their intended clinical context. For each element of the '5 Es' framework, a score of 0 (not addressed), 1 (partially addressed) or 2 (fully addressed) was given. For environment, 1 point was given if one of physical/psychological environment was addressed, and 2 points if both were addressed. For scoring evidence for use, a score of 0–6 was given according to the maximum Kirkpatrick level evidence for the tools (no evaluation=0; Level 1=1; Level 2A=2; Level 2B=3; Level 3=4; Level 4A=5; Level 4B=6). These numbers were combined to give a total score (with a maximum of 16 points possible). Tools receiving a score of 10 or more are discussed in more detail.

Principles adhered to during this study include informed subjectivity and reflexivity, where the authors acknowledge their potential impact on the results given their contextual positioning and transparency.[17]

Quality assessment

The quality of each study was assessed using the Medical Education Research Study Quality Instrument (MERSQI) tool, which has evidence for usefulness, reliability and predictive validity.[18] Although this tool has been developed primarily for the appraisal of medical education research, it was deemed to be appropriate for this study due to the educational lens applied. Tools for CD are generally developed to enhance learning from clinical events, and we were interested in the educational implications of the tools included in the review. The MERSQI contains 10 items evaluating six domains, with the overall score ranging from 5 to 18. All contributions were considered important and therefore MERSQI score was not used as a criterion for inclusion.

RESULTS

Results of search

The initial search retrieved 1243 articles. Twelve articles were identified from citation searching. Figure 2 details the results of article screening. Twenty-one studies were included in the final review, each which was based on a different tool.

Study and tool characteristics

Eight tools originated from the USA,[19–26] five from the UK,[27–31] four from Australia[32–35] and one from each of Ireland,[36] Canada[37] and Italy.[38] One was multinational.[39] The intended clinical contexts were acute care areas. These included emergency departments (ED),[21 23 24 26 30–33 35–37] intensive care units (ICU)[22 27 34] and cardiac arrests across the hospital.[29 39] Eight tools were for use specifically in a neonatal or paediatric setting.[21–23 26 27 32 34 39] DISCOVER-Tool is for debriefing cases relating to care of patients with COVID-19.[25] The TALK tool is for use across a wide range of clinical environments.[28] Three tools did not define the context in which they should be used.[19 20 38]

All but one tool[26] outlined criteria for initiating a debrief. The majority of these related to major clinical events (eg, cardiac arrest, emergency intubation, major trauma) or adverse outcomes (eg, unexpected death); however, some stated that any clinical event (ie, both routine and non-routine) could trigger a debrief.[19–21 25 28] Six tools stated that 'staff request' was an acceptable criterion.[27 28 30 31 36 37]

MERSQI scores ranged from 6 to 12.5. It was not possible to calculate a score for six studies,[20 21 24 25 28 35] as these lacked the minimum required data for calculation. Table 1 displays the study characteristics.

Attributes

Many tools did not contain one or more of the elements in the '5 Es' framework, and methods of addressing the elements were highly variable. These findings are summarised in online supplemental table 2 and should be referred to alongside the summary below.

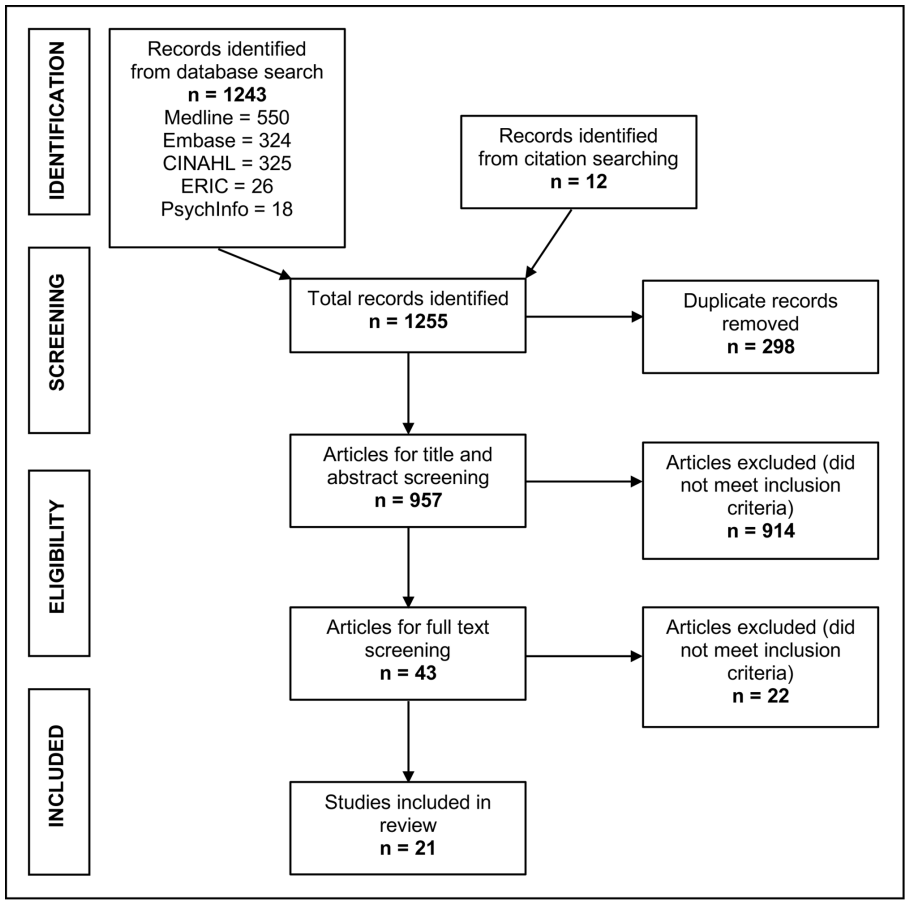

Figure 2 PRISMA flowchart of article search and screening.

Educated/experienced facilitator

Thirteen tools specified a recommended facilitator: a doctor (Emergency airway management, Postevent debriefing study tool, Self-reflection module, PICU cardiac arrest debriefing tool, Neonatal unit debriefing tool, DISCERN, AIR and REFLECT),[22 23 26 32–35 38] nurse (Emergency airway management, Postevent debriefing study tool, Self-reflection module, Neonatal unit debriefing tool, AIR and INFO),[32–35 37 38] clinical psychologist (neonatal intensive care unit (NICU) debrief protocol),[27] social worker (Postevent debriefing study tool and AIR)[33 35] or 'any team member' (TALK and STOP5).[28 31] No tool stated a minimum recommended level of debriefer clinical experience. Few mentioned a prerequisite of debriefing experience. Exceptions to this were TALK[28] in the context of emotionally complex situations, when an experienced debriefer should be used, and INFO[37] which is suitable for novice debriefers. Duration of recommended training in using the tools ranged from 15 min to 4 hours. Methods of delivering this training included interactive workshops[26 37] and simulation scenarios.[22 34]

Environment: physical

Twelve tools detailed where the debrief should take place: a private/quiet/isolated environment (Self-reflection module, TALK, DISCERN, AIR and DISCOVER-TooL),[23 25 28 35 38] an area physically distant from the clinical event (NICU debrief protocol and TAKE STOCK),[27 30] inside the resuscitation room (Emergency airway management and STOP5),[31 32] non-clinical work rooms (PICU cardiac arrest debriefing tool and Neonatal unit debriefing tool)[22 34] or 'anywhere' (Postevent debriefing study tool).[33]

In most cases, recommended timing was immediately after the clinical event, in keeping with the concept of a 'hot' debrief.[24 26 31–34 36–38] Debrief was recommended to take place within a short period of time after the event by the remaining tools, for example, within hours[21 35 39] or within the same nursing shift.[22 23 25] For some tools, the timing of the debrief was decided as agreed by the clinical team (NICU debrief protocol)[27] or variable depending on circumstances (TALK).[28]

Most tools recommended the debrief be completed in less than 10 min.[24–26 28 31–36] The range was 1.5–2 min for the Proposed TeamSTEPPs tool,[20] to 1 hour for the NICU debrief protocol.[27] Duration was described as 'flexible' for using the PEARLS approach tool[21] and determined by local practice for using the Hot debrief tool.[39]

Table 1 Characteristics of included studies

Article	Name of tool	Country of study	Clinical context	Debriefing criteria	Who debrief is for	MERSQI score
Archibald and O'Curry (2020)[27]	NICU debrief protocol	UK	Neonatal intensive care unit	Staff request	Neonatal intensive care teams	6
Bentley *et al* (2021)[19]	Safety-II	USA	Not stated	Any clinical event	Not stated	7
Cincotta *et al* (2021)[32]	Emergency airway management	Australia	Paediatric emergency department	Paediatric emergency intubations	All staff involved	10
Clapper (2016)[20]	Proposed TeamSTEPPS	USA	Not stated	Any clinical event	Not stated	N/A
Coggins *et al* (2020)[33]	Postevent debriefing study tool	Australia	Emergency department	Any critical incident	Interdisciplinary teams	12
Conoscenti *et al* (2021)[38]	Self-reflection module	Italy	Not stated	Major critical incidents	Not stated	7
Diaz-Navarro *et al* (2021)[28]	TALK	UK	Range of clinical settings	Initiated by any team member	Healthcare teams	N/A
Eppich *et al* (2016)[21]	PEARLS approach to clinical debriefing	USA	Paediatric emergency department	Any clinical event	Not stated	N/A
Gillen *et al* (2019)[22]	PICU cardiac arrest debriefing tool	USA	Paediatric intensive care unit	Paediatric cardiac arrest	All team members	8.5
Gilmartin *et al* (2020)[36]	Cardiac arrests in emergency department	Ireland	Emergency department	Cardiac arrest, death in resus, staff request	Not stated	10
Gougoulis *et al* (2020)[34]	Neonatal unit debriefing tool	Australia	Neonatal intensive care unit	Major clinical events	All team members	12.5
Khpal and Coxwell Matthewman (2016)[29]	Cardiac arrest debriefing tool	UK	Cardiac arrest across hospital	Cardiac arrest	Cardiac arrest teams	6
Mullan *et al* (2013)[23]	DISCERN	USA	Paediatric emergency department	Cardiac arrest, intubation, major trauma	Multidisciplinary	10.5
Pallas (2020)[35]	AIR	Australia	Emergency department	Acute incidents	Emergency department staff	N/A
Rose and Cheng (2018)[37]	INFO	Canada	Emergency department	Cardiac arrest, intubation, trauma, staff request	Not stated	10.5
Sugarman *et al* (2021)[30]	TAKE STOCK	UK	Emergency department	Unexpected death, distressing event, staff request	Not stated	6
Sweberg *et al* (2018)[39]	Hot debrief tool	Multi-national	Paediatric cardiac arrests across hospital	Paediatric cardiac arrest	Not stated	10.5
Turner (2012)[24]	TeamSTEPPS	USA	Emergency department	Resource-intensive event, end of busy shift	Not stated	N/A
Walker *et al* (2020)[31]	STOP5	UK	Emergency department	Major trauma, death in resus, prehospital call-out, staff request	Emergency department teams	9
Welch-Horan *et al* (2021)[25]	DISCOVER-TooL	USA	COVID-19 cases	Care of patient with COVID-19	Not stated	N/A
Zinns *et al* (2020)[26]	REFLECT	USA	Paediatric emergency department	Not stated	Resuscitation teams	8.5

Environment: psychological

A common technique for psychological safety was to include a statement in the introduction relating to a 'blame free' environment. This was used by the following tools: PICU cardiac arrest debriefing tool, Cardiac arrests in emergency department, TAKE STOCK, Hot debrief tool and STOP5.[22 30 31 36 39] The 'basic assumption', which states that 'we believe everyone participating in patient care is intelligent, capable, cares about doing their best and wants to improve',[40] was referred to by INFO[37] and the Postevent debriefing study tool.[33] Techniques were used in other tools to establish a psychologically safe learning environment, such as encouraging respectful listening (NICU debrief protocol, DISCOVER-TooL and REFLECT),[26–28] creating a non-judgmental atmosphere (Self-reflection module),[38] clarifying purposes of the debrief (PEARLS approach to CD),[21] removing the focus from individuals (Neonatal unit debriefing tool)[34] and emphasising voluntary participation (AIR).[35]

Only six tools included explicit efforts for confidentiality: PEARLS approach to CD, Cardiac arrests in emergency department, Neonatal unit debriefing tool, DISCERN, AIR and STOP5.[21 23 31 34–36] Participation was mandatory or preferable when using TeamSTEPPS and TALK.[24 28] Voluntary participation was emphasised by seven tools: Emergency airway management, Postevent debriefing study tool, Cardiac arrests in emergency department, DISCERN, AIR, STOP5 and DISCOVER-TooL.[23 25 31–33 35 36]

Education

All tools identified areas for enhancing performance. The 'plus/delta' method was the most commonly used structure for achieving this, which was used by Emergency airway management, Postevent debriefing study tool, Self-reflection module, PEARLS approach to CD, Cardiac arrests in emergency department, Neonatal unit debriefing tool, DISCERN, AIR, INFO, TAKE STOCK, Hot debrief tool, TeamSTEPPS, STOP5 and Discover-TooL.[21 23–25 30–39] This divides the debrief into two key sections: 'what went well' and 'what could be done better'. Other methods used included facilitated discussion/analysis (NICU debrief protocol, Safety-II, Proposed TeamSTEPPS and Cardiac arrest debriefing tool),[19 20 27 29] and use of structured headings or mnemonics (TALK, PICU cardiac arrest debriefing tool and REFLECT).[22 26 28]

Evaluation

All tools included a way of identifying required changes based on the debrief discussion. Only five tools described a process for implementing these changes, such as identifying named debrief participants to address each action point (TALK, PEARLS approach to CD, Cardiac arrests in emergency department and STOP5)[21 28 31 36] or handing this responsibility to the quality improvement lead (TAKE STOCK).[30]

Emotions

Nine tools included specific efforts for addressing well-being and emotions, most commonly via an open question placed at or near the start of the debrief, for example, 'Is everyone ok?' (Cardiac arrests in emergency department, TAKE STOCK and STOP5),[30 31 36] 'How did that feel?' (Emergency airway management)[32] and 'Any initial reactions?' (PEARLS approach to CD).[21] Alternative methods included an active acknowledgement of feelings and emotions of participants (Postevent debriefing study tool)[33] and requesting discussion from participants about their emotions (AIR and DISCOVER-TooL).[25 35]

A strategy for follow-up of well-being issues was described in eight tools.[23 25 27 32–35 37] These included documenting contact numbers for counselling/support services on the debriefing form which was included in Postevent debriefing study tool, INFO and DISCOVER tool[25 33 37] and having a step within the debrief where those requiring further support are identified by the debriefer which was implemented by Emergency airway management, Postevent debriefing study tool, Neonatal unit debriefing tool, DISCERN, AIR and INFO.[22 31–34 36]

Of the tools which were designed specifically for adverse events, over half did not address emotional response to the adverse event (Self-reflection module, PICU cardiac arrest debriefing tool, Neonatal unit debriefing tool, Cardiac arrest debriefing tool, DISCERN, INFO, Hot debrief tool);[22 23 29 34 37–39] however, both the Neonatal unit debriefing tool and INFO did state a follow-up strategy for well-being issues.

Evidence for use

Table 2 displays which tools have demonstrated each Kirkpatrick level of evidence for use alongside their methods of doing so. Level 1 evidence was demonstrated by 10 tools (NICU debriefing protocol, SAFETY-II, Postevent debriefing study tool, Self-reflection module, Cardiac arrests in emergency department tool, Neonatal unit debriefing tool, Cardiac arrest debriefing tool, TAKE STOCK, STOP5 and REFLECT)[19 26 27 29–31 33 34 36 38] through surveys of participants or facilitators. The number completing these surveys ranged from 9 to 148. Positive outcomes were reported for all these tools, but there was marked diversity in the questions asked.

The PICU cardiac arrest debriefing tool[22] demonstrated a Level 2A outcome (change in attitude). Participants demonstrated increased belief that CD should be standard practice, and 61% were more likely to request CD in the future. No tool demonstrated Level 2B outcomes.

Table 2 Evidence for use of the CD tools

Debriefing tool	Outcome evidence
NICU debrief protocol[27]	*Level 1*: Survey of participants n=23, Response Rate (RR) =12%, most agreed debrief met expectations
Safety-II[19]	*Level 1*: Survey of facilitators after simulation scenario and debrief n=10, RR=100%, high levels of usability and utility of tool *Level 3*: Change in debriefing behaviour Number of topics discussed examined using video recordings of debriefs—increased from 14 to 21 after introduction of the tool
Emergency airway management[32]	*Level 4B*: Change in outcomes related to intubation Increased first-pass success rate without hypoxia or hypotension increased from 48% to 78%
Proposed TeamSTEPPS[20]	*N/A*: No evaluation done
Postevent debriefing study tool[33]	*Level 1*: Analysis of participant reactions (recorded on behalf of team, not individuals) n=71, RR not reported, 52% found clinical debrief useful *Level 4A*: Organisational changes Reporting led to practice changes, for example, CO_2 monitors added to transport packs, blood availability prepatient arrival, visible laminated guidelines
Self-reflection module[38]	*Level 1*: Survey of participants n=148, RR=25%, 55% felt guidelines were correctly applied, 85% felt debriefing was useful and relevant
TALK[28]	*N/A*: No evaluation done
PEARLS approach to clinical debriefing[21]	*N/A*: No evaluation done
PICU cardiac arrest debriefing tool[22]	*Level 2A*: Survey of participants Preintervention: n=129, RR=55%; postintervention: n=96, RR=41% Significant increase in satisfaction with debriefing, increased belief that debriefs should be standard practice, 61% more likely to request debrief after cardiac arrest
Cardiac arrests in emergency department[36]	*Level 1*: Survey of participants n and RR not reported, 100% felt their practice improved, 90% felt their well-being improved *Level 4A*: Organisational changes Monthly audit and Plan-Do-Study-Act (PDSA) cycles identified issues which led to changes in organisational structure, for example, changes to equipment, repair of faulty monitoring, restructure of departmental education
Neonatal unit debriefing tool[34]	*Level 1*: Survey of participants Preintervention: n=48, RR not reported; postintervention: n=28, RR not reported All respondents wanted unit to continue using tool, felt tool improved safety, communication and provided opportunities to identify issues *Level 4A*: Organisational changes for example, who attends emergency calls, location of emergency equipment, armbands for emergency team to aid identification
Cardiac arrest debriefing tool[29]	*Level 1*: Survey of participants n=100, RR=100%, 93% found tool useful and would like to use it in future
DISCERN[23]	*N/A*: No evaluation done Comments on form explored using thematic analysis but no actual evaluation of impact
AIR[35]	*N/A*: No evaluation done Participants comments presented in table but not analysed
INFO[37]	*Level 4A*: Organisational changes Changes to practice implemented from suggestions from debriefs, for example, new triage checklist, name tags, changes to handover processes
TAKE STOCK[30]	*Level 1*: Survey of participants n=15, RR not reported, felt that debrief tool helped with identification of equipment issues, promoting teamwork culture, well-being and education
Hot debrief tool[39]	*N/A*: No evaluation done Content analysis of comments on debrief tool but no actual evaluation of impact
TeamSTEPPS[24]	*Level 4A*: Organisational changes Forms used to identify opportunities for education or systems change Single example only given: incompatible intravenous tubing reported and changed
STOP5[31]	*Level 1*: Survey or participants 6-month postintervention: n=30, RR not reported, 90% rated usefulness good to excellent 18-month postintervention: n=41, RR not reported, all debriefs rated good to excellent *Level 4A*: Organisational changes Resuscitation log kept to document process changes as result of debrief, for example, changes to checklists, change in stock drugs, machine faults repaired
DISCOVER-TooL[25]	*N/A*: No evaluation done
REFLECT[26]	*Level 1*: Survey of participants and debriefers n=9, RR not reported, significant improvement in overall use of tool, but no significant improvements in individual components

CD, clinical debriefing; NICU, neonatal intensive care unit.

Table 3 Tool ranking according to clinical context

Debriefing tool	Five Es score (max 10)	Kirkpatrick level score (max 6)	Total score (max 16)
Emergency departments			
Emergency airway management[32]	9	6	15
Postevent debriefing study tool[33]	9	5	14
INFO[37]	8	5	13
STOP5[31]	8	5	13
Cardiac arrests in emergency department[36]	7	5	12
TeamSTEPPS[24]	6	5	11
AIR[35]	9	0	9
DISCERN[23]	8	0	8
TAKE STOCK[30]	7	1	8
REFLECT[26]	7	1	8
PEARLS approach to clinical debriefing[21]	7	0	7
Intensive care units			
Neonatal unit debriefing tool[34]	8	5	13
NICU debrief protocol[27]	8	1	9
PICU cardiac arrest debriefing tool[22]	7	2	9
Cardiac arrests			
Hot debrief tool[39]	6	0	6
Cardiac arrest debriefing tool[29]	3	1	4
Other or not specified			
Self-reflection module[38]	7	1	8
TALK[28]	8	0	8
Safety-II[19]	3	4	7
DISCOVER-TooL[25]	7	0	7
Proposed TeamSTEPPS[20]	4	0	4

Safety-II[19] was associated with a Level 3 outcome (behavioural change), detailed further below.

Six tools demonstrated Level 4A outcomes (organisational change): Postevent debriefing study tool, Cardiac arrests in emergency department, Neonatal unit debriefing tool, INFO, TeamSTEPPS, STOP5.[24 31 33 34 36 37] Changes to practice were suggested from the debriefs or review of debrief forms.

One tool, Emergency airway management,[32] demonstrated a Level 4B outcome (change in clinical outcome), detailed further below. Seven tools did not report any formal outcome evidence: Proposed TeamSTEPPS, TALK, PEARLS approach to CD, DISCERN, AIR, Hot debrief tool and DISCOVER-TooL.[20 21 23 25 28 35 39]

Ranking of tools according to clinical context

Table 3 presents the ranking of tools according to clinical context using scores that combine attributes and evidence for use. The highest scoring tools overall were intended for use in EDs. The highest scoring tool was the Emergency airway management tool[32] (score of 15). This was the only tool which achieved Level 4B outcome evidence. Following implementation of this tool, the success rate of first-pass intubation without hypoxia or hypotension increased from 48% to 78%. However, this may have been influenced by other measures, as tool implementation was part of a wider quality improvement project. This tool fully addressed all elements of the five Es with the exception of evaluation (as it did not identify how to implement change). Tool specifics include: debrief to be conducted by a doctor or nurse in the resuscitation room immediately after the clinical event and should last 5–10 min. Participants are not required to attend and are contacted by email if did not attend. Education points are summarised using the 'plus/delta' system and evaluation points summarised using 'take home messages'. Emotions are handled by asking participants how the situation felt and by making follow-up referrals if required.

Five other tools for use in the ED achieved Level 4A evidence (Postevent debriefing study tool, INFO, STOP5, Cardiac arrests in emergency department and TeamSTEPPS).[24 31 33 36 37] These were all in the form of organisational change as a result of debriefing, such as new monitoring, repairs to faulty equipment, implementation of checklists and handover processes and steps to aid staff identification. These tools had generally good coverage of the '5 Es' (scores 6–9). The Postevent debriefing study tool was similar to the Emergency airway management tool in that the only element not fully addressed was how to implement change. Similarly, INFO did not address this, and although it does not screen for initial emotions, it does aim to identify those who may benefit from counselling. STOP5 fully or partially addressed each element of the '5 Es', with the only missing aspects being no follow-up for emotional issues and no specification for facilitator training. Emotional follow-up and information on the facilitator was not detailed by the Cardiac arrests in emergency department tool. Of all the tools with Level 4A evidence, TeamSTEPPS had the least coverage of the '5 Es', scoring only 6 points for this domain. This lower score is due to a paucity of efforts for psychological safety and addressing emotions. Participation in debriefs using this tool is compulsory. The lower scoring tools for use in the ED either had no outcome evidence reported or achieved only Level 1 evidence.

All three tools designed for ICU use were specifically for neonatal or paediatric contexts.[22 27 34] The Neonatal unit debriefing tool[34] received the highest score of 13. Similar to the high scoring tools for ED use, this tool demonstrated Level 4A outcome evidence by organisational change. This tool had clear recommendations for the facilitator (neonatal consultant or nurse coordinator) and their training (education sessions including simulation) and physical environment (ward workroom, with debriefing taking place at the earliest opportunity following the event

and lasting up to 10 min). Confidentiality was covered in the training sessions—which was not described by any other tool. It lacked a follow-up system for implementing change and an initial screen for emotional sequelae, although identifies those needing further psychological debriefing.

No tools intended for use following cardiac arrests or general/unspecified contexts received a score of 10 or more. This was generally due to an absence of evidence for use or low-level evidence (Cardiac arrest debriefing tool[29] and Self-reflection module[38] both used participant surveys to demonstrate Level 1 evidence). However, Safety-II[19] was the only tool in the review which demonstrated Level 3 evidence (behavioural change). The average number of debrief topics discussed increased from 14 to 21 following tool introduction, demonstrated by examining recordings of debriefs following simulations.

DISCUSSION

This systematic review aimed to identify CD tools and explore their attributes and evidence for use. Twenty-one tools were identified, all of which were designed for use in acute care areas. A detailed synthesis of the tools has been presented which is of potential use for future clinicians and educators who wish to implement CD in their own context.

Attributes of the CD tools were explored using the '5 Es' framework, providing an in-depth appreciation of what is addressed in the tools and methods for doing so. This analysis highlighted several interesting concepts relevant to the practice of CD.

The facilitator is critical to the success of CD, as poor leadership carries the risk of potential harm to participants. Facilitation can be challenging and should be viewed as a skill that needs to be learnt and developed. However, with the exception of TALK,[28] which recommends that the debrief should be led by a 'debriefing expert' for complex cases, none of the tools stated a prerequisite for debriefing experience. This may have been an oversight or may have been intentionally pragmatic due to the potential challenges of only using experienced facilitators, who may be in short supply. INFO was designed specifically for use by novice debriefers, which implies that the designers were aware of this challenge.[37] It has been suggested that use of a structured tool may be advantageous for novice debriefers,[4] which may mean that it is acceptable to use facilitators with less experience or who have undergone shorter training, although evidence to support this is lacking. This may be of particular use for teams debriefing out-of-hours where an experienced facilitator is not available. The training in using the CD tools was generally short (range 15 min to 4 hours), and evaluation of this training in developing competent facilitators would be a useful next step. CD is most commonly led by those in authority, for example, senior doctors or nurses;[4] however, there is no clear evidence to suggest which discipline is best for facilitating CD.[11]

A further interesting point raised is that of implementation of change. The concept of learning points or 'take home messages' is common to both simulation and CD.[41]

An important difference for CD, however, is that it must be ensured that these identified changes are actually implemented.[21] Although each tool included a way of documenting required changes or learning points from the CD, less than a quarter described a follow-up process for implementation. Interestingly, neither the Emergency airway management[32] nor the Neonatal unit debriefing tool,[34] which were the top scoring tools for ED and ICU use, respectively, included a follow-up process, therefore adding this step in would further enhance these tools.

The '5 Es' framework describes 'emotions' as a core component of CD, stating that the psychological well-being of staff should be addressed and followed up.[11] It is clear from the review of the 21 tools that psychological well-being is not always considered in a clinical debrief. Emotions were addressed in only nine tools, with a follow-up strategy in place in eight tools. The NICU debrief protocol[27] and AIR[35] notably prioritised well-being within the tools and contained clear strategies within the debrief to explore emotions. Kessler *et al*[4] distinguish debriefing from 'defusing', which has the purpose of venting emotions. Although it is evident that many tools do address both technical and emotional aspects during their debrief, it is perhaps the case that this creates tension regarding focus in the debrief or introduces too much subject material to discuss. Time is likely to be a major limitation to fully exploring emotions within a clinical debrief (as most tools recommended debrief duration of <10 min). Although previous work has suggested that debriefing may increase the risk of developing post-traumatic stress disorder following traumatic events,[8] contemporary evidence indicates improved outcomes. Potential issues of not addressing emotions in CD are that effective debriefing is unlikely to take place if unprocessed emotions are not acknowledged, and this may lead to poor staff psychological outcomes, often referred to as the 'second victim' effect.[42] It therefore seems reasonable to suggest that emotions are at least briefly acknowledged even if they do not form the main focus of discussion, and importantly that there should be a follow-up process in place for staff who require it.

The scoring system applied to each tool to rank their coverage of the '5Es' and their outcome evidence demonstrated that the tool with highest utility in an ED setting is the Emergency airway management tool,[32] and in an ICU setting, it is the Neonatal unit debriefing tool.[34] The application of this latter tool may be limited due to its design for a neonatal context. Implementation of the Emergency airway management tool led to improved patient outcomes related

to intubation.[32] These results should be interpreted with caution as other interventions were introduced at the same time as the tool (such as checklists and standardised equipment). Few other studies have demonstrated such high-level outcomes from CD. One example is Wolfe *et al*'s study of cardiac arrest outcomes,[9] but of note, this was not a team debrief using a CD tool, but a quantitative debrief reviewing resuscitation data.

While several other tools for use in the ED did demonstrate Level 4A outcome evidence, the majority of tools demonstrated either low-level evidence or did not evaluate outcomes of debriefing. Ten tools demonstrated Kirkpatrick Level 1 outcome evidence by favourable reactions of participants and facilitators. Although these are 'low-level' outcomes, they are useful in demonstrating that the tools are acceptable to those who are going to be using them. However, response rate was frequently low or unreported, which introduces the risk of sampling bias. Moreover, no study described the development or validation process of their questionnaire, so it is difficult to judge if these were well designed to capture the required data.

In the study evaluating the Postevent debriefing study tool,[33] reports of harm as a result of debriefing were sought from managers and the incident reporting system, and none were found. However, robust assessments of actual or potential harm caused by implementation of the debriefing tools included in the review was lacking. There is currently limited evidence regarding the potential harm of CD.[35] Kirkpatrick's levels are widely used for measuring outcomes of educational interventions. However, it has been suggested that they are not the most useful method for assessing an educational intervention, and that broad judgements may be superior.[43] Therefore, when interpreting these findings, incorporating sensible assumptions regarding the quality of the evidence is also pertinent.

Medicolegal concerns as a result of debriefs were only addressed in one tool—AIR,[35] in which debriefs were not documented as a method to ensure participant confidentiality. There were no reports of medicolegal issues by any of the included studies; however, it is unknown whether these were investigated for. This systematic review focused on tools designed for use within a hospital setting; however, it is noted that there is presently a lack of tools developed or adapted for outpatient care in the literature.

The MERSQI scores of the included studies were low, as previous studies have used a cut-off of 13.5 or higher to define high quality. This may limit conclusions drawn in terms of evidence for us; however, all contributions in terms of the tools innovations should be considered important.

Strengths and limitations

Two researchers performed article screening and data extraction to reduce the risk of bias. We recognise the potential for introduction of bias during data synthesis due to influence by the researchers' clinical and educational backgrounds. Five databases were searched as well as citation searching; however, some relevant articles or those in the grey literature may not have been identified. It has been a year since the initial literature search was conducted and therefore new tools may now be available; however, a Medline search conducted on 16/11/22 found no additional studies meeting the inclusion criteria. Frameworks were used for analysis to provide structure, transparency and reproducibility, but may have failed to capture data which were out-with their scope. Lack of standardisation in the studies' methodologies have limited direct comparison between them. It is acknowledged that this study and those included in the systematic review are of a western anglophone perspective and that this may not be generalisable to all countries.

Box 1 Recommendations for practice

Recommendations for clinicians

- ⇒ A tool or framework should be used for conducting CD.
- ⇒ This tool should be selected based on the specific clinical context.
- ⇒ Consider using a tool with good coverage of the '5Es' and with high level evidence for use as outlined in table 3.
- ⇒ Tool selection should also consider what the overall aims of the debrief are
  - ⇒For addressing emotional responses, consider using the NICU debrief protocol,[27] the Emergency airway management tool,[32] Postevent debriefing study tool,[33] PEARLS approach to clinical debriefing tool,[21] Cardiac arrests in emergency department tool,[36] AIR,[35] TAKE STOCK,[30] STOP5[31] or DISCOVER-TooL.[25]
- ⇒ Where possible, use a facilitator with debriefing experience, especially for complex cases.
- ⇒ Implement a system to ensure learning points from the debrief result in the necessary changes.

Recommendations for educators and researchers

- ⇒ If adapting an existing tool, consider using one which already has evidence for use and addresses all elements of the '5 Es' framework.
- ⇒ If developing a new tool, consider addressing all elements of the '5 Es' framework.
- ⇒ Further research should focus on investigation of positive outcomes and potential harm of using CD tools.

Future work and recommendations for practice

Findings from this systematic review may be used to inform future researchers aiming to develop or implement CD tools in their own workplace. The key translatable findings have been summarised in box 1 as

recommendations for practice. Evidence regarding outcomes of tools (both positive and potential harm) for both staff and patients remains underinvestigated. This needs to be studied further in order to avoid wasting time and resources, ensure stakeholder buy-in and increase the chances of success and sustainability of a debriefing programme.

CONCLUSION

CD is an emerging practice and it is likely that using a tool to facilitate this can provide structure and efficiency. Of the 21 tools identified by this systematic review, all addressed education and evaluation, but fewer than half addressed emotions. Many tools reported evidence for their use; however, improved patient outcomes from using a CD tool are yet to be convincingly demonstrated. Recommendations for practice have been made based on these findings, with the hope that these may lead to improved outcomes for individuals, teams, healthcare systems and ultimately patients.

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