

# BMJ Open Early interventions for the prevention of post-traumatic stress symptoms in survivors of critical illness: protocol for a systematic review

Lindsey J Glaspey,<sup>1</sup> Michael B Roberts,<sup>2</sup> Anthony Mazzarelli,<sup>1</sup> Stephen Trzeciak,<sup>1,3</sup> Brian W Roberts<sup>1</sup>

**To cite:** Glaspey LJ, Roberts MB, Mazzarelli A, *et al.* Early interventions for the prevention of post-traumatic stress symptoms in survivors of critical illness: protocol for a systematic review. *BMJ Open* 2017;**7**:e018270. doi:10.1136/bmjopen-2017-018270

► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2017-018270>).

Received 15 June 2017  
Revised 2 August 2017  
Accepted 9 August 2017



CrossMark

<sup>1</sup>Department of Emergency Medicine, Cooper University Hospital, Cooper Medical School of Rowan University, Camden, New Jersey, USA

<sup>2</sup>Department of Psychiatry, Cooper University Hospital, Cooper Medical School of Rowan University, Camden, New Jersey, USA

<sup>3</sup>Department of Medicine, Division of Critical Care Medicine, Cooper University Hospital, Cooper Medical School of Rowan University, Camden, New Jersey, USA

## Correspondence to

Dr Brian W Roberts;  
[roberts-brian-w@cooperhealth.edu](mailto:roberts-brian-w@cooperhealth.edu)

## ABSTRACT

**Introduction** Post-traumatic stress disorder (PTSD) is being increasingly reported among survivors of critical illness and injury. Previous work has demonstrated that PTSD reduces patient quality of life and ability to return to work, as well as increases healthcare costs. As such, identifying interventions aimed at preventing the development of critical illness-related PTSD could have an important public health impact. The objective of this systematic review is to collate the world's literature on early interventions aimed at preventing PTSD among survivors of critical illness.

**Methods and analysis** We will perform a qualitative systematic review of human clinical trials of interventions aimed at preventing or reducing critical illness-related PTSD symptoms. We will methodically search CENTRAL, MEDLINE, Embase and CINAHL. We will also search websites containing details on clinical trials registration (National Library of Medicine's ClinicalTrials.gov and the WHO's International Clinical Trials Registry Platform), as well as screen reference lists of the articles we select for inclusion to identify additional studies for potential inclusion. Two authors will independently review all search results. After identification and inclusion of articles, we will use a standardised form for data extraction. We will use tables to describe the study type, populations, interventions tested and timing of interventions, outcome measures and effects of interventions on outcome measures compared with control groups. This review will be completed between 1 August 2017 and 31 August 2017.

**Ethics and dissemination** The proposed systematic review will not collect individual patient level data and does not require ethical approval. Results of this study will contribute to the understanding of critical illness-related PTSD and help prompt future research aimed at further developing interventions to prevent PTSD symptoms in survivors of critical illness.

**PROSPERO registration number** This systematic review is registered in the PROSPERO international prospective register of systematic reviews (registration number CRD42017069672).

## INTRODUCTION

Post-traumatic stress disorder (PTSD) is being increasingly reported among survivors of critical illness. It is currently estimated that 25%

## Strengths and limitations of this study

- This systematic review will be the first comprehensive search of the literature to identify and describe early interventions aimed at preventing intensive care unit-related (ICU) post-traumatic stress disorder.
- Experts in the field, including a clinical psychologist and intensivists, with experience performing systematic reviews, developed our search strategy.
- We plan to perform an exhaustive search of multiple databases (ie, CENTRAL, MEDLINE, Embase and CINAHL).
- It is highly likely that we will find a paucity of data on early interventions aimed at preventing ICU-related post-traumatic stress disorder.

of critical illness survivors suffer from PTSD,<sup>1</sup> with the incidence among certain populations approaching 65%.<sup>2</sup> PTSD is defined as the development of mental health concerns in someone who is directly or indirectly exposed to a traumatic event. More specifically, trauma is operationalised as someone who is exposed to death, threatened death, actual or threatened serious injury, or actual or threatened sexual violence. Subsequently, the individual develops symptoms from each of four symptom clusters: intrusive thoughts or memories, avoidance of trauma-related stimuli, negative alterations in cognitions and mood and alterations in arousal and reactivity.<sup>3</sup> Critical illness is by definition a life-threatening experience, which predisposes many patients to these chronic psychological symptoms. Previous work has demonstrated that patients suffering from PTSD are more likely to have poor physical health-related quality of life with higher frequency and severity of general health symptoms and conditions, such as musculoskeletal pain, cardiorespiratory symptoms and gastrointestinal symptoms.<sup>4</sup> Furthermore, PTSD is independently

associated with the inability to return to work 12 months after intensive care unit (ICU) discharge,<sup>5</sup> as well as increased healthcare costs.<sup>6</sup> As such, preventing the development of PTSD could have an enormous influence on long-term patient outcomes as well as public health.

The development of critical illness-related PTSD has been linked to patient experience during medical care. Specifically, frightening experiences<sup>7</sup> and acute psychological stress during resuscitation care are strongly associated with the development of PTSD.<sup>8</sup> A central mechanism to the development of PTSD is the process by which traumatic memories are formed.<sup>9</sup> For many patients, frightening experiences result in peritraumatic dissociation, defined as an alteration in time or place with reported feelings of depersonalisation, altered perceptions of pain, feeling disconnected or tunnel vision.<sup>10</sup> This dissociation has been demonstrated to increase the risk for developing PTSD,<sup>10</sup> likely by causing traumatic information to be encoded in somatosensory, affective, non-linguistic and relatively uncontrolled fragmented memories.<sup>11</sup> Our overarching hypothesis is that interventions, which focus on decreasing the degree of acute stress (ie, frightening experiences) and dissociation during the traumatic event in the hospital, will shift traumatic information processing from developing uncontrollable fragmented memory to a more controllable and cognitive memory process, and thus prevent or reduce PTSD severity in survivors of critical illness.

The first step towards testing this hypothesis is to collate the world's literature on interventions aimed at preventing or reducing PTSD symptoms in patients who survive medical emergencies. We hypothesise that there are currently few or no interventions aimed at reducing the degree of acute stress and dissociation, during the traumatic event in the hospital, in order to prevent chronic PTSD in this population.

## METHODS AND ANALYSIS

### Protocol and registration

This systematic review protocol is prepared in accordance with the Cochrane handbook for systematic reviews of interventions<sup>12</sup> and the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) Protocols statement.<sup>13</sup> The final results will be reported according to PRISMA and the Meta-analysis of Observational Studies in Epidemiology guidelines.<sup>14 15</sup> This systematic review has been registered in the PROSPERO international prospective register of systematic reviews (registration number CRD42017069672).

### Search for and identification of studies

An electronic search will include the following databases: CENTRAL, MEDLINE, Embase and CINAHL. The search terms include the concepts of post-traumatic stress, critical care and prevention. These strategies were developed by a group of experts, including a clinical psychologist and intensivists with experience performing systematic

reviews. We used a combination of standardised terms and keywords and modelled the search after a previously published systematic review examining the prevalence of ICU-related PTSD.<sup>2</sup> The fully reproducible search strategy is provided in the online supplementary. In order to identify potentially unpublished data from clinical trials, we will search websites containing details on clinical trials registration (National Library of Medicine's ClinicalTrials.gov and the WHO's International Clinical Trials Registry Platform). Registered but unpublished trials will be considered eligible for inclusion if the registration website indicates that enrolment in the clinical trial had been completed. We will also screen reference lists of the articles we select for inclusion to identify additional studies for potential inclusion.

### Eligibility criteria

We will include all human prospective interventional trials to prevent PTSD in the critically ill and injured. In order to be included, all studies must contain<sup>1</sup> adult patients diagnosed with a critical illness or injury<sup>2</sup>; patients treated in an emergency department or ICU setting<sup>3</sup>; an intervention arm in which subjects clearly underwent an intervention aimed at preventing or reducing PTSD symptoms, as the single experimental intervention<sup>4</sup>; a clearly defined control arm in which subjects received placebo or standard of care therapy;<sup>5</sup> and an outcome measure assessing development of acute stress or PTSD symptoms. We will consider studies eligible for review regardless of language or publication type. We will exclude studies that are secondary reports of previously published trials. We also will exclude papers that are reviews, correspondence or editorials; however, we will screen the reference lists of review articles to identify further studies for inclusion.

### Study selection and data abstraction

Two independent reviewers will screen the titles and abstracts of identified studies for potential eligibility. After the relevance screen, the two reviewers will compare their exclusion logs to determine whether there is disagreement and use the Kappa statistic to quantify the interobserver agreement. In cases of disagreement, the full text will be reviewed for inclusion. All studies deemed potentially relevant will be obtained, and the full manuscripts will be reviewed for inclusion. Two reviewers will independently abstract data on study types, patient populations, interventions and timing of interventions, outcome measures, adverse events and results using a standardised data collection form. This review will be completed between 1 August 2017 and 31 August 2017.

### Assessment of study bias

For each randomised clinical trial, we will assess the quality of the studies selected for inclusion using the Cochrane Collaboration's tool for assessing the risk of bias in clinical trials evaluating six domains (selection, performance, detection, attrition, reporting and other biases).<sup>12</sup> For each non-randomised clinical trial, we will

assess the quality of the studies selected using the Newcastle-Ottawa Quality Assessment Scale, as recommended in the Cochrane Handbook.<sup>12</sup>

### Analysis

We will perform a primarily qualitative analysis of the data in accordance with the recommended methodology for qualitative reviews published in the Cochrane Handbook.<sup>12</sup> We will collate and summarise clinical trials in table format, stratified by individual publication. We will include in the table<sup>1</sup>: study type,<sup>2</sup> population sampled (eg, motor vehicle crash and patients with sepsis),<sup>3</sup> description of intervention performed,<sup>4</sup> timing of intervention,<sup>5</sup> outcome measures, including primary and all secondary outcomes,<sup>6</sup> and effect of intervention on outcome measures compared with control groups.

Given the likely heterogeneity in both interventions and outcome measures, it is unlikely that it will be possible to pool data. However, if after conducting the systematic review it is determined data can be pooled, we will perform meta-analyses using random effects models to calculate overall effect sizes and 95% CIs between intervention and control groups. For binary data, such as development of PTSD (yes/no), ORs will be calculated, and for continuous outcomes, mean differences will be reported. A p value of <0.05 will be considered statistically significant. Finally, the  $I^2$  statistic will be used to assess heterogeneity between studies. We will consider the following thresholds for the  $I^2$  statistic: low (25%–49%), moderate (50%–74%) and high ( $\geq 75\%$ ) values.<sup>16</sup>

### Protocol amendments

If an amendment to this protocol is required, the date of each amendment will be accompanied by a description of the change along with the rationale.

### Ethics and dissemination

No ethical approval will be required for this systematic review of completed studies. Results from this systematic review will be submitted to peer-reviewed journals for publication and to national meetings in presentation form. We anticipate that this study will identify a need for further research aimed at developing early interventions to prevent or reduce PTSD symptoms in survivors of critical illness.

### DISCUSSION

There has been an increasing understanding that emotional trauma in the form of PTSD is common among patients who experience serious health emergencies and survive critical illness. PTSD has been shown to have long-lasting effects on physical and emotional well-being,<sup>4</sup> along with increasing healthcare costs.<sup>6</sup> However, it is currently unclear if early interventions can prevent or reduce emotional trauma in patients suffering from health emergencies.

This systematic review will collate the world's literature of early interventions aimed at preventing the development of PTSD in survivors of critical illness. We expect to find that there are currently few or no interventions aimed at reducing the degree of acute stress and dissociation, during the traumatic event in the hospital, in order to prevent chronic PTSD in this population. Specifically, we will identify important knowledge gaps in the literature.

The results of this study will contribute to the understanding of critical illness-related PTSD and help prompt future research aimed at further developing interventions to prevent PTSD symptoms in survivors of critical illness.

**Contributors** All authors have made substantial contributions to this paper. BWR supervised all aspects of the study design and takes responsibility for the paper as a whole. All authors contributed to the development of the selection criteria, the risk of bias assessment strategy and data extraction criteria. MBR, ST and BWR developed the search strategy. BWR provided statistical expertise. LJG and BWR drafted the manuscript. All authors read and contributed substantially to revision of the final manuscript and approved the manuscript in its final form.

**Funding** This research received no specific grant from any funding agency in the public, commercial or not-for-profit sector.

**Competing interests** None declared.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Open Access** This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

© Article author(s) (or their employer(s) unless otherwise stated in the text of the article) 2017. All rights reserved. No commercial use is permitted unless otherwise expressly granted.

### REFERENCES

1. Wade D, Hardy R, Howell D, *et al.* Identifying clinical and acute psychological risk factors for PTSD after critical care: a systematic review. *Minerva Anestesiol* 2013;79:944–63.
2. Griffiths J, Fortune G, Barber V, *et al.* The prevalence of post traumatic stress disorder in survivors of ICU treatment: a systematic review. *Intensive Care Med* 2007;33:1506–18.
3. American Psychiatric Association. *Diagnostic and statistical manual*. 5th ed (DMS-5). Washington, D.C: American Psychiatric Association, 2013.
4. Pacella ML, Hruska B, Delahanty DL. The physical health consequences of PTSD and PTSD symptoms: a meta-analytic review. *J Anxiety Disord* 2013;27:33–46.
5. Zatzick D, Jurkovich GJ, Rivara FP, *et al.* A national US study of posttraumatic stress disorder, depression, and work and functional outcomes after hospitalization for traumatic injury. *Ann Surg* 2008;248:79–87.
6. Walker EA, Katon W, Russo J, *et al.* Health care costs associated with posttraumatic stress disorder symptoms in women. *Arch Gen Psychiatry* 2003;60:369–74.
7. Elliott R, McKinley S, Fien M, *et al.* Posttraumatic stress symptoms in intensive care patients: an exploration of associated factors. *Rehabil Psychol* 2016;61:141–50.
8. Davydow DS, Zatzick D, Hough CL, *et al.* A longitudinal investigation of posttraumatic stress and depressive symptoms over the course of the year following medical-surgical intensive care unit admission. *Gen Hosp Psychiatry* 2013;35:226–32.
9. van der Kolk BA, Fislis R. Dissociation and the fragmentary nature of traumatic memories: overview and exploratory study. *J Trauma Stress* 1995;8:505–25.
10. McCanlies EC, Sarkisian K, Andrew ME, *et al.* Association of peritraumatic dissociation with symptoms of depression and posttraumatic stress disorder. *Psychol Trauma* 2017;9:479–84.



11. Gidron Y, Gal R, Freedman S, *et al.* Translating research findings to PTSD prevention: results of a randomized-controlled pilot study. *J Trauma Stress* 2001;14:773–80.
12. Higgins JPT, Green S. Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0. The Cochrane Collaboration. 2011. <http://www.cochrane-handbook.org>
13. Shamseer L, Moher D, Clarke M, *et al.* Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ* 2015;349:g7647.
14. Foy R. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of Internal Medicine* 2010;151:264–9.
15. Stroup D, Berlin J, Morton S, *et al.* Meta-analysis of observational studies in epidemiology: a proposal for reporting. *JAMA* 2000;283:2010–2.
16. Higgins JP, Thompson SG. Quantifying heterogeneity in a meta-analysis. *Stat Med* 2002;21:1539–58.