Scoping review protocol:

The ABCDE approach in critically ill or injured patients: a scoping review of quantitative and qualitative evidence

Authors: M. Linders¹, L. Bruinink¹, W. de Boode¹, C. Fluit², M. Hogeveen¹

¹Department of Paediatrics, Division of Neonatology, Amalia Children's Hospital, Radboud University Medical Centre, Radboud Institute for Health Sciences, Nijmegen, The Netherlands

²Radboud Health Academy, Radboud University Medical Centre, Nijmegen, The Netherlands

Corresponding author: M. Hogeveen, Department of Paediatrics, Division of Neonatology, Radboud University Medical Centre Amalia Children's Hospital, Radboud Institute for Health Sciences, Internal postal code 804, Geert Grooteplein Zuid 10, 6525GA, Nijmegen, the Netherlands
Email: marije.hogeveen@radboudumc.nl, Telephone: +31 24 361 4430

Introduction

The Airway, Breathing, Circulation, Disability and Exposure (ABCDE) approach is a systematic approach for the primary assessment and emergency treatment of all critically ill or injured patients. It is an internationally accepted approach and the mnemonic ABCDE is the cornerstone of the primary survey in the worldwide used Advanced Trauma Life Support (ATLS).¹ The ABCDE approach enables healthcare professionals to systematically assess a patient following the principle 'treat first what kills first' and aims to "break down a complex clinical situation into more manageable parts" as stated by *Thim et al.*² Although the approach was initially developed to improve trauma care, it is nowadays used in all medical emergencies and applicable to patients of all age categories, both adults and children.³

The ABCDE approach is recommended in an abundant amount of (inter)national life support courses and guidelines.^{1,4,5,6} Although the majority of healthcare professionals treating critically ill or injured patients are ABCDE trained, adherence towards the approach seems to be suboptimal.⁷ Several studies performed in the Radboud University Medical Centre (Radboudumc, Amalia Children's hospital, Nijmegen, the Netherlands) underscored the suboptimal adherence and identified possible factors influencing this adherence.^{8,9,10} Since we noticed literature about the ABCDE approach was scarce and solid evidence of the benefits of the approach seemed to be lacking, we wanted to explore the reported evidence with regards to the ABCDE approach.

To confirm this observation, a preliminary search was performed in PubMed, Cochrane database and the JBI Database of Systematic Reviews and Implementation Reports to identify existing reviews. No reviews on the ABCDE approach in particular were found. Solely reviews about the use of the ATLS course were identified.^{11,12} Although the ABCDE approach is included in the primary survey of the ATLS, none of these reviews presented results about the ABCDE approach in particular. The identified reviews concluded there was insufficient evidence that the ATLS impacted patient outcomes such as

mortality or morbidity. However, it showed that ATLS significantly improved healthcare professionals' knowledge and clinical skills and led to better organization and priority approach. In our review, we are interested in all outcomes related to application or teaching of the ABCDE approach by healthcare professionals in the context of patient care or life support courses in a hospital setting.

Objectives and research question

Objectives

It is remarkable no reviews could be found about something so commonly instructed and (inter)nationally adopted as the ABCDE approach.¹³ Therefore, the objective of this scoping review is to provide a wide overview of all relevant literature about the use and teaching of the ABCDE approach in critically ill or injured patients.

Research question

This scoping review aims to find an answer to the following question:

What are the reported outcomes related to application or teaching of the ABCDE approach by healthcare professionals in a hospital setting?

Methods

Our review will follow the guidelines of the Joanna Briggs Institute (JBI) manual and this review protocol will be registered within the Open Science Framework database. We will perform the scoping review according to the PRISMA-ScR checklist for scoping reviews.^{14,15} Before study commencement research objectives, inclusion and exclusion criteria and methodological strategies are defined.

Inclusion and exclusion criteria

The following inclusion criteria will be applied:

Study selection: All type of studies (quantitative, qualitative, mixed-method or existing reviews) will be considered eligible if they describe any outcome related to application or teaching of the ABCDE approach. The search strategy will not be limited by year of publication. Languages will be restricted to English, Dutch, German, French and Spanish.

Population: Healthcare professionals (medical students, nurses, nurse practitioners, physician assistants, residents, specialists) applying the ABCDE approach in daily clinical practice or as participants in life support courses.

Concept: The key concept of this review is the ABCDE approach and includes application of the approach in medical emergencies or the ABCDE approach in the context of education.

Context: The context of this review will be acute care situations in a hospital setting. This can be any department in a hospital (e.g. emergency department) and any learning or simulation situation where healthcare professionals learn or apply the ABCDE approach, whether the course is about the ABCDE approach solely or the ABCDE approach as part of a life support course. Studies from both low, middle and high income countries will be included.

The following exclusion criteria will be applied:

- Studies performed in a pre-hospital setting.
- Conference abstracts
- Other languages than English, Dutch, German, French and Spanish.

Search strategy for identification of studies

A three step search strategy will be performed as recommended by Briggs.¹⁴ First, an initial limited search was performed, followed by an analysis of relevant text words used in titles and abstracts, and of the index terms (MeSH terms, keywords) used to describe the articles. As a second step, a complete and thorough search strategy was constructed with the help of experienced librarians, that will be performed across all databases chosen. Thirdly, reference lists of all included full text articles will be searched for additional studies (backward reference searching). If relevant, authors will be contacted for further information.

The systematic literature search will be conducted in databases PubMed (MEDLINE), Embase, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and the Cochrane Library.

Search strategy

The following search strategy is suitable for PubMed and will be adjusted for Embase, CINAHL and the Cochrane Library.

PubMed (MEDLINE)

ABCDE[tiab] OR airway breathing circulation disability exposure [tiab] OR airway breathing circulation disability environment [tiab]

OR

((Airway[tiab] OR airway management[mesh] OR airway obstruction[mesh] OR Breathing[tiab] OR dyspnea[mesh] OR dyspnea[tiab] OR dyspnoea[tiab] OR respiratory insufficiency[mesh] OR respiratory insufficien*[tiab] OR respiratory rate[mesh] OR respiratory rate[tiab] OR oxygen saturation[tiab]))

AND

(Circulation[Text Word] OR flow, regional blood[mesh] OR blood pressure[mesh] OR blood pressure[tiab] OR heart rate[mesh] OR heart rate[tiab] OR capillary refill[tiab])

AND

(Disability[tiab] OR neurological examination[mesh] OR neurological examination[tiab] OR neurologic examination[tiab] OR glasgow coma scale[tiab] OR GCS[tiab] OR AVPU[tiab] OR alert verbal pain unresponsive OR blood glucose[mesh] OR glucose[tiab])

AND

(Exposure[tiab] OR environment[tiab] OR body temperature[mesh] or temperature[tiab]))

OR

(Primary survey[tiab] OR primary assessment[tiab] OR initial assessment[tiab]) AND (Care, Life support[mesh] OR life support[tiab] OR Resuscitation[mesh] OR resuscitation[tiab] OR care, critical[mesh] OR critical care[tiab] OR critical illness[mesh] OR critical illness OR emergency treatment[mesh] OR emergency medicine[mesh] OR emergency hospital[mesh] OR emergency medical service[mesh] OR emergency[tiab] OR emergencies[tiab])

Source of evidence selection

After the electronic search for eligible articles, the list of references will be downloaded, imported and deduplicated in Endnote. One researcher (LB) will screen titles and abstracts for relevance and will classify the articles into two categories: “clearly not eligible” and “potentially eligible 1” using Rayyan (<https://rayyan.qcri.org>). After this first selection, all articles in the category “potentially eligible 1” will be screened on title and abstract by two researchers (ML and LB) and classified into “not eligible” and “potentially eligible 2”. In Rayyan, labels will be used to clarify the reason for exclusion. Full text reviews will be performed on all articles in the “potentially eligible 2” category by two authors independently (LB and ML). A third reviewer (MH) will be available to solve disagreement through discussion in all stages.

The PRISMA Extension for Scoping Reviews (PRISMA-ScR) checklist will be used to document the selection process.¹⁵ A flowchart will be used, together with a narrative description of the search decision process, which is suggested in the Guidance for conducting systematic scoping reviews.¹⁶

Data extraction and synthesis

Data extraction

All outcome data (both study characteristics and outcomes) from the full-text articles will be extracted, assessed and coded by two reviewers (LB and ML), using a specifically designed spreadsheet, adapted from the JBI Manual for evidence synthesis.¹⁷ Study characteristics will include title, first author, year of publication, study design and population. The spreadsheet will be piloted before use.

Synthesis of the results

Data will be summarized in tabular form and described narratively as suggested in the Guidance for conducting systematic scoping reviews.¹⁸

Outcomes will be divided into at least these categories:

- Patient outcomes (e.g. (hospital) mortality, morbidity, time to diagnosis, time to correct treatment, in-hospital stay);
- Professional outcomes (e.g. knowledge, (clinical) skills, clinical competence, confidence, satisfaction, self-efficacy, scenario performance, retention, adherence);
- Team outcomes (e.g. teamwork, collaboration, efficiency, communication, team performance).
- Educational process of teaching the ABCDE approach, including details of the use of simulation situations and which manual or algorithm was used.

Discussion

The aim of this review is to identify all relevant studies published about the ABCDE approach and to create an overview of all outcomes related to the ABCDE approach. With the use of a systematic and thorough search strategy, we intent to find all relevant literature.

One of the strengths of this scoping review is that every step of the process will be reported, which results in a transparent, reproducible study. Other strengths are the presence of two reviewers (LB, ML) for the selection of articles and independent extraction of data, and the presence of a third reviewer (MH) for discussing the disagreements.

Our ultimate goal is to improve the application of the ABCDE approach and its related outcomes. This review will contribute to this goal by identifying what is already known about the ABCDE approach and by determining the knowledge gaps wherefore further investigation is needed. By publishing the results, we want to share our acquired knowledge with a wider audience, because this topic is relevant for all healthcare professionals in all medical emergencies at all departments.

References

- ¹ American College of Surgeons Committee on Trauma. About Advanced Trauma Life Support. <https://www.facs.org/quality-programs/trauma/atls/about>. Accessed June 1, 2021.
- ² Thim T, Krarup NH, Grove EL, Rohde CV, Lofgren B. Initial assessment and treatment with the Airway, Breathing, Circulation, Disability, Exposure (ABCDE) approach. *Int. J. Gen. Med.* 2012;5:117-121.
- ³ Styner JK. The birth of Advanced Trauma Life Support (ATLS). *Surgeon.* 2006;4(3):163-165.
- ⁴ Resuscitation Council (United Kingdom). Guidelines and guidance: The ABCDE approach. 2021; <https://www.resus.org.uk/resuscitation-guidelines/abcde-approach/>. Accessed June 1, 2021.
- ⁵ Turner N. *Advanced Paediatric Life Support*. Bohn Stafleu van Loghum; 2017.
- ⁶ American College of Surgeons. *Advanced Trauma Life Support® (ATLS®) Student Course Manual* Chicago 2018.
- ⁷ Olgers TJ, Dijkstra RS, Drost-de Klerck AM, Ter Maaten JC. The ABCDE primary assessment in the emergency department in medically ill patients: an observational pilot study. *Neth. J. Med.* 2017;75(3):106-111.
- ⁸ Linders M, Binkhorst M, Draaisma J, van Heijst A, Hogeveen M. Adherence to the ABCDE approach in relation to the method of instruction: a randomized controlled simulation study. *Manuscript under review 2021*.
- ⁹ Linders M, Schoeber N, Binkhorst M, Fluit L, Hogeveen M. Factors influencing adherence to the systematic ABCDE approach to critically ill patients. *Manuscript in preparation 2021*.
- ¹⁰ Schoeber N, Linders M, Binkhorst M, Hogeveen M. Healthcare professional's knowledge of the systematic ABCDE approach for critically ill patients. *Manuscript submitted 2021*.
- ¹¹ Jayaraman S, Sethi D. Advanced trauma life support training for hospital staff. *Cochrane Database Syst. Rev.* 2009(2):CD004173.
- ¹² Mohammad A, Branicki F, Abu-Zidan FM. Educational and clinical impact of Advanced Trauma Life Support (ATLS) courses: a systematic review. *World J. Surg.* 2014;38(2):322-329.
- ¹³ Schipper IB, Schep N. ATLS - a pioneer in trauma education; history and effects. *Ned. Tijdschr. Geneesk.* 2017;161:D1569.
- ¹⁴ Aromataris E, Munn Z. JBI Manual for Evidence Synthesis. JBI, 2020.
Available from: <https://synthesismanual.jbi.global>. <https://doi.org/10.46658/JBIMES-20-01>. Chapter 11: Scoping Reviews
- ¹⁵ Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Annals of Internal Medicine.* 2018;169:467-473. DOI: 10.7326/M18-0850
- ¹⁶ Peters, MDJ, Godfrey CM, Khalil H, McInerney P, Parker D, Baldini Soares C. Guidance for conducting systematic scoping reviews. Methodology Paper. *International Journal of Evidence-Based Healthcare* 2015;13(3):141-146. DOI: 10.1097/XEB.0000000000000050
- ¹⁷ Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis. JBI, 2020.
Available from <https://synthesismanual.jbi.global>. <https://doi.org/10.46658/JBIMES-20-01>. Appendix 11.1 JBI template study details, characteristics and results extraction instrument.