

Study protocol for systematic review

Acute kidney injury in trauma patients admitted to the ICU: A systematic review and meta-analysis

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Abstract

This is a protocol for a review, and there is no abstract. The objectives of the study are as follows:

- To assess acute kidney injury (AKI) in trauma patients admitted to the intensive care unit (ICU)
- To describe AKI in critically ill trauma patients with focus on incidence, risk factors and outcome.

Background

Severely injured trauma patients are admitted to an intensive care unit (ICU) to observe and treat organ failures. These patients may develop acute kidney injury (AKI) characterized by fluid overload and increased blood concentrations of creatinine and urea. Research on AKI has been hampered by the lack of uniform definitions of AKI, therefore definitions are developed since 2004 such as the RIFLE (Risk, injury, failure, loss and end-stage renal disease), AKIN (Acute kidney injury network) and KDIGO (Kidney disease improving global outcome) criteria. Although a lot of research has lately been done regarding AKI development in trauma patients, a systematic review of the recent medical knowledge seems to be lacking.

The aim of this study was to assess AKI in trauma patients, focusing upon incidence, risk factors and mortality. The hypothesis was that development of AKI was common in trauma patients and associated with increased mortality.

Objectives

The aim of the study is to explore the development of AKI in major trauma patients, the research question may be specified using a diagram presented in Figure 1:

Population	Exposure	Comparison	Outcome	
			Descriptive	Comparative
Trauma patients admitted to intensive care unit (ICU) irrespective of the trauma mechanism	Acute kidney injury (AKI) according to the RIFLE (Risk, injury, failure, loss and end-stage renal disease), AKIN (Acute kidney injury network) and/or KDIGO (Kidney disease improving global outcome) criteria	No AKI according to the RIFLE (Risk, injury, failure, loss and end-stage renal disease), AKIN (Acute kidney injury network) and/or KDIGO (Kidney disease improving global outcome) criteria	Time from trauma to AKI Incidence rate of mild, moderate or severe AKI Diagnosis (RIFLE, AKIN or KDIGO) Renal replacement therapy (outlined in data extraction form) Renal recovery	Risk factors (outlined in data extraction form) Physiological parameters (outlined in data extraction form) Biochemical parameters (outlined in data extraction form) Mortality Length of stay

Figure 1: Diagram of the study question.

Methods

Search strategy

The search will include screening for publications in UpToDate, The Cochrane Library, PubMed and PROSPERO. An experienced librarian will perform the search supervised by a consultant intensive care clinician. There will be limitations on time period (databases from 2004) and language (English or Scandinavian). The search was focused on the study population irrespective of the intervention, comparison and outcome. A detailed search strategy is attached in Appendix 1.

Study selection

Two collaborators will independently examine titles, abstracts, and keywords of citations from electronic databases for eligibility. We will obtain the full text of all potentially relevant records and two authors will independently assess whether each meet the pre-defined inclusion criteria presented in Appendix 2. We plan to resolve any disagreement through discussion with a third author. If there is ambiguous or missing information, the authors will contact investigators of the study to clarify study eligibility.

Data extraction

Two authors will extract data independently, using a standardized data extraction form presented in Appendix 3. We will attempt to contact the study authors for missing information.

Quality assessment

Two authors will assess the risk of bias of each included study; the method used will depend upon study design. Due to the wide scope it is difficult to know what tools we need, but to be more concrete, we can state that our risk of bias assessment will be based on this collection of checklists: <http://www.cebm.net/critical-appraisal/>. We will complete risk of bias tables based on specific criteria, any disagreement will be resolved by consulting a third author.

Data synthesis

We will use ordinary statistical methods in the data synthesis. As the scope of the review is rather wide, it is difficult to predict all relevant methods, but we will probably use meta-analysis of differences between groups and meta-analysis of proportions. Estimates will be presented with 95% confidence intervals, and when combining studies in a meta-analysis we will prefer the use of a random effect model.

Whenever applicable, we will perform subgroup analyses covering the following topics:

- Risk factors present in patients with and without AKI (penetrating or not, burn injuries or not, rhabdomyolysis or not, oliguria or not, effect of age and sex)
- Comparing different severities of AKI (according to RIFLE, AKIN and KDIGO criteria)
- Comparing different treatments of AKI (with renal replacement therapy (RRT) or not, early or late RRT)

If there are many publications including subgroups of trauma patients (for instance burn injuries or children), we might handle them in a separate review and meta-analysis.

History

The protocol will be published in PROSPERO.

Declaration of interests

The authors have no conflicts of interests.

Appendices

- Appendix 1: Search strategy
- Appendix 2: Study selection form
- Appendix 3: Data extraction form