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Protocollo di revisione sistematica

The effectiveness of strategies to minimize or prevent hemolysis during blood sampling in the emergency department: a systematic review.

Relazione di Fine Master
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Abstract

Il seguente protocollo di revisione sistematica ha come focus il fenomeno dell'emolisi del campione ematico nei prelievi eseguiti in pronto soccorso; nello specifico, si intende revisionare in modo sistematico la letteratura al fine di evidenziare l'efficacia dei possibili interventi che possono essere adottati per minimizzare o prevenire tale criticità.
Nei dipartimenti di emergenza/urgenza si assiste ad un'alta percentuale di prelievi di sangue eseguiti a fini diagnostici che devono essere ripetuti causa emolisi degli stessi, con conseguente inattendibilità da un punto di vista clinico; la letteratura conferma un'incidenza maggiore di questi episodi nei suddetti setting piuttosto che in altri come ad esempio un centro prelievi territoriale o un reparto ospedaliero a carattere internistico.
Numerosi sono gli studi effettuati al fine di individuare le cause che portano a tale esito, ma nessuna revisione sistematica è stata individuata nelle più comuni banche dati specifiche nella fase preparatoria del presente protocollo.
Il protocollo di studio (e la conseguente revisione sistematica) è stato redatto con la suite di software Sumari® del Joanna Briggs Institute di Adelaide; la scelta della lingua inglese è stata resa necessaria dal momento che alcune parti pre-compilate del software Crems® sono in tale idioma.
Il protocollo di revisione prevede l'utilizzo di due revisori, un primario (autore del presente lavoro) ed un secondario, entrambi provenienti dallo stesso percorso formativo.

Background

Blood sampling in emergency department is often associated with high rates of hemolysis rather than other settings; hemolysis is defined as a rupture of red blood cells with release of haemoglobin into the plasma, with consequent altered values in the result of the test, like values of potassium.
Due to unreliability of these results, a new sample of blood has to be retaken, with consequences in terms of time and resources: delay of length of stay in emergency department, delay of a certain diagnosis, further use of equipments, overload of work for health professionals, and at last but not least discomfort for patients who must undergo a new venipuncture.
Literature has tried to investigate and explain this difference of rates of hemolysis between emergency department and other units; one of the most important difference between these settings is that in the first one there is the usage to withdraw blood from venous catheter just inserted; in fact, as a patience arrives in an emergency room, there is often the need to find a venous access, in order to have a ready access to administer drugs or liquids. Nurses use to take blood after entering the new venous catheter and this happens for more reasons: less discomfort for patients, as they suffer only a venipuncture instead of two; reduction of workload for nurses and faster procedures.
But, literature has also shown that a blood sample collected through a peripheral venous catheter has high risks of hemolysis, primarily due to the gauge of the device, in the sense that smaller is the gauge, higher is the risk of hemolysis.
Other causes affecting hemolysis may be, according to literature:
- pulling a syringe plunger back too fast and/or forcefully
- forcefully expelling the blood from a syringe into the blood tube
- variability in competency level
- increased tourniquet time.

Various studies have been conducted to show which are factors that cause hemolysis with more frequency than others; the aim of this review is to assess the effectiveness of strategies that nurses can undertake to avoid or at least reduce the number of specimens haemolysed; in other words, this review aspire to establish which are the best practices in relation to the types of intervention, policies, and professional roles that prevent or minimize the hemolysis of blood specimens collected in emergency departments.
Reviewers will search on databases and will accept only studies conducted in this setting, excluding all studies conducted in other settings and all studies conducted both in emergency departments and other units since literature suggest that the phenomenon of hemolysis is specific of this environment.
Research on database will also concern studies about patients over 18 years old that enter emergency room and who require a blood specimen collection; from this review, will be excluded studies which have inside patients with known coagulopathies or other known blood diseases, as literature suggest that this kind of patients may have a greater incidence of problem during blood analysis, such as hemolysis.

No other inclusion/exclusion criteria will be adopted, as most of all literature and daily practice do not suggest other factors that may influence the focus.

Inclusion criteria

Types of participants

This review will consider studies that include blood samples withdrawn in emergency departments from patients over 18 years old.
Reviewers will exclude studies that have inside patients with known coagulopathies or other blood pathologies.

Types of intervention(s)/phenomena of interest

This review will consider studies that analyze factors that may cause hemolysis of blood samples taken in emergency departments, such as the use of intravenous catheter rather than straight needle, or such aspirating blood by Vacutainer® system versus the use of a syringe, in order to identify best practices to adopt for minimizing or avoiding hemolysis of the specimen; if there are studies that investigate multiple factors or types of interventions, for example catheters versus straight needle, Vacutainer versus syringe, nurse versus other healt professionals, these will be grouped in the development of this review.

Types of outcomes

This review will consider studies that include the following outcome measures: differences of hemolysis rates between the various ways of sampling blood. Other possible secondary outcomes may be, if mentioned in studies, satisfaction of patience or of nurses regarding various methods, equipments or procedures.

Types of studies

This review will consider both experimental and epidemiological study designs including randomised controlled trials, non-randomised controlled trials, quasi-experimental, before and after studies, prospective cohort studies, case control studies and analytical cross sectional studies for inclusion.

This review will also consider descriptive epidemiological study designs including case series, individual case reports and descriptive cross sectional studies for inclusion.

Search strategy

The search strategy aims to find both published and unpublished studies. A three-step search strategy will be utilised in this review. An initial limited search of MEDLINE and CINAHL will be undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe article. A second search using all identified keywords and index terms will then be undertaken across all included databases. Thirdly, the reference list of all identified reports and articles will be searched for additional studies. Studies published in english only will be considered for inclusion in this review. Studies published in the last 10 years only will be considered for inclusion in this review. The databases to be searched include: Medline, Cinhal, Trip Metadatabase, Cochrane Register of Controlled Trials.
The search for unpublished studies will include:
Current Controlled Trials meta-Register of Controlled Trials (www. controlled - trials.com/mrct).
Initial keywords to be used will be:
hemolysis, blood sample, blood specimen collection, emergency department; these words are used both in UK english that in the USA one.

Assessment of methodological quality

Papers selected for retrieval will be assessed by two independent reviewers for methodological validity prior to inclusion in the review using standardised critical appraisal instruments from the Joanna Briggs Institute Meta Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI®). Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer.

Data collection

Quantitative data will, where possible be pooled in statistical meta-analysis using JBI-MAStARI®. All results will be subject to double data entry. Effect

sizes expressed as odds ratio (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis. Heterogeneity will be assessed statistically using the standard Chi-square and also explored using subgroup analyses based on the different study designs included in this review.
Where statistical pooling is not possible the findings will be presented in narrative form including tables and figures to aid in data presentation where appropriate.

Conflicts of interest

The author declares the complete absence of conflicts of interest in this review.

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