Prognosis After Resuscitation Score: Literature Search and Summary

Question

Is there any literature about validating the prognosis after resuscitation score?

Background

Cardiopulmonary resuscitation (CPR) was introduced in 1960 and since then it has become the regular treatment for in-hospital cardiac arrest (IHCA)[1]. CPR is not always successful and unsuccessful CPR can be distressing for patients, relatives and care staff[2]. In some cases CPR is not appropriate and 'do not resuscitate' (DNR) orders have been introduced for some patients that do not wish to be resuscitated if they have a cardiac arrest. There are a number of factors that influence the success of CPR and there have been a number of tools developed to try to determine in advance someone's prognosis if they were to suffer a cardiac arrest. One such tool is the prognosis after resuscitation (PAR) score.

This publication is a brief summary of the literature about the PAR score and whether it has been validated.

Methodology

A systematic search of the literature was carried out on the 8th and 9th of December 2017 to identify publications about the PAR score. Cinahl, Embase, and Medline databases were searched using the following term: "prognosis after resuscitation". Limits were not applied to the searches because of the small number of results returned. Key websites were also searched for guidelines, policy documents, clinical summaries, and other grey literature on the PAR score.

Results

The search identified a small number of publications on the PAR score. Cinahl, Embase and Medline returned four, 21 and 17 results respectively. Three additional publications were identified from the grey literature search. Using the article abstract the results were sifted for relevance and de-duplicated to leave 12 articles[1-12]. Four articles were removed, two because they were conference abstracts[4, 10] and two more[5, 6] because the full-text article could not be obtained. The full text of the eight remaining articles were read by a single summarizer. One article (Fendler et al, 2015)[7] was removed because it only mentions PAR score once in passing. The remaining seven articles[1-3, 8, 9, 11, 12] are included in the summary below.

Summary

The articles

- O'Keeffe and Ebell (1994) is the oldest article included in this summary. This was a retrospective study in an Irish hospital over a two year period in patients who underwent CPR. They compared the PAR score with another morbidity score, the PAM index, as tools to predict failure to survive following CPR.
- Bowker and Stewart (1999) compared the PAR score with two other morbidity scores in a retrospective study of patients that received CPR in an English hospital. They concluded that the three morbidity scores would need refined to be a useful tool for predicting success from CPR.
- Calam and Andrew (2000) conducted a retrospective review to examine whether a discussion had taken place and been recorded in patients records and whether there was an association between PAR score

and patient outcome. They found that a PAR score taken during the first week of admission could assist physicians in discussing end-of-life care with patients.

- A 2007 article by Sandroni *et* al looked at incidence, prognosis and measures to improve survival of IHCA. The PAR score is not the focus of the article, it is only mentioned briefly on page 239.
- Ebell and Afonso (2011) conducted a meta-analysis on predictors of non-survival following IHCA. They looked at different scores as well as other factors and found that elevated PAR scores were associated with a poor outcome.
- A 2012 article by Temple and Porter was about predicting neurological outcomes and survival following a cardiac arrest. This article focused on out-of-hospital cardiac arrests (OHCA). It only mentioned the PAR score, it is not a focus of the article.
- The most recent article is an evaluation of the PAR score in a Swedish hospital by Ohlsson *et al* in 2014. They conducted a retrospective study that looked at whether the PAR score, another score (the pre-arrest morbidity score), or other factors could are associated with survival after IHCA.

About the PAR score

According to Ohlsson *et al*[8] the PAR score was developed by Ebell and published in his 1992 meta-analysis of 14 post-CPR studies. The full text of Ebell (1992) was unavailable however other articles[2, 8, 11, 12] describe the PAR score. The PAR score was developed retrospectively using data from IHCA. It includes only 7 variables (table 1) and the score varies from -2 to 31.

Validation of PAR score

It does not appear that the PAR score has been prospectively validated[11, 12]. According to Sandroni *et al* this is because it would require a very large population to validate it.

Table 1

PAR Score	
Variable	**Score**
Metastatic cancer	10
Non-metastatic cancer	3
Sepsis (on admission)	5
Homebound	5
Pneumonia (on admission)	3
Creatinine over 130mmol/l	3
Age >70	2
Acute MI	-2

There are however articles that have retrospectively validated the PAR score[1, 2, 9]. Two studies were able to use the PAR score to predict non-survival following cardiac arrest with 100% specificity. O'Keeffe and Ebell found in their study that a score >5 predicted non-survival 100% of the time while in their study, Bowker and Stewart, found it was a score >7. When used retrospectively the PAR score has high specificity but it has low sensitivity[2, 8, 9].

The most recent article on the PAR score, Ohlsson *et al*, suggests the PAR score is not sufficient as the sole predictive instruments for estimation of survival and non-survival in IHCA and their main caveat is low sensitivity[8]. Bowker and Stewart suggest the score be evaluated locally before being adopted[2].

References

1. Ebell MH, Afonso AM. Pre-arrest predictors of failure to survive after in-hospital cardiopulmonary resuscitation: a meta-analysis. Family Practice. 2011;28:505-15.
2. Bowker L, Stewart K. Predicting unsuccessful cardiopulmonary resuscitation (CPR): a comparison of three morbidity scores. Resuscitation. 1999;40(2):89-95.
3. Calam B, Andrew R. CPR or DNR? End-of-life decision making on a family practice teaching ward. Canadian family physician Medecin de famille canadien. 2000;46:340-6.
4. Davies H, Loosely A, Dolling S, Eve R. Predicting survival in patients admitted to intensive care following out-of-hospital cardiac arrest using the Prognosis After Resuscitation score. Critical Care. 2014;18:S178.
5. Ebell MH. Prearrest predictors of survival following in-hospital cardiopulmonary resuscitation: A meta-analysis. Journal of Family Practice. 1992;34(5):551-8.
6. Ebell MH, Kruse JA, Smith M, Novak J, Drader-Wilcox J. Failure of three decision rules to predict the outcome of in-hospital cardiopulmonary resuscitation. Medical Decision Making. 1997;17(2):171-7.
7. Fendler TJ, Spertus JA, Kennedy KF, et al. Alignment of do-not-resuscitate status with patients' likelihood of favorable neurological survival after in-hospital cardiac arrest. JAMA. 2015;314(12):1264-71.
8. Ohlsson MA, Kennedy LM, Juhlin T, Melander O. Evaluation of pre-arrest morbidity score and prognosis after resuscitation score and other clinical variables associated with in-hospital cardiac arrest in southern Sweden. Resuscitation. 2014;85(10):1370-4.

9.   O'Keeffe S, Ebell MH. Prediction of failure to survive following in-hospital cardiopulmonary resuscitation: comparison of two predictive instruments. Resuscitation. 1994;28(1):21-5.

10.   Porter R, Goodhart I, Temple A. Predicting survival in cardiac arrest patients admitted to intensive care using the Prognosis after Resuscitation score. Critical Care. 2011;15:S107.

11.   Sandroni C, Nolan J, Cavallaro F, Antonelli M. In-hospital cardiac arrest: incidence, prognosis and possible measures to improve survival. Intensive Care Med. 2007;33(2):237-45.

12.   Temple A, Porter R. Predicting neurological outcome and survival after cardiac arrest. Continuing Education in Anaesthesia, Critical Care & Pain. 2012;12(6):283-7.