The incidence of major morbidity in critically ill patients managed with pulmonary artery catheters: a meta-analysis

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Authors' objectives
To perform a meta-analysis on morbidity as an outcome end point related to the use of pulmonary artery (PA) catheters.

Searching
MEDLINE was searched from 1970 to 1996 using the headings 'pulmonary artery catheterization', 'Swan-Ganz catheterization' and 'right heart catheterization', and restricting the results to 'effectiveness' and 'usefulness.' Other experts were consulted regarding published RCTs.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs).

Specific interventions included in the review
Pulmonary artery catheters. The comparison groups used no pulmonary artery catheter, or supranormal.

Participants included in the review
Medical and surgical patients.

Outcomes assessed in the review
Major morbidity, defined as organ failures as per the American College of Chest Physicians/Society of Critical Care Medicine Consensus Conference criteria. Outcomes included pulmonary system dysfunction, cardiovascular system dysfunction, renal system dysfunction, hepatic system dysfunction, haematologic system dysfunction, gastrointestinal system dysfunction, neurological system dysfunction, and sepsis.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
The validity was assessed using a method described by Chalmers et al (see Other Publications of Related Interest no. 1). Points were awarded for different aspects of study design, including randomisation, blinding, control regimens, data collection, and statistical analysis. Quality scores for each study were assessed by two independent reviewers.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction. Data were extracted on number of patients, mortality, acuity (low, moderate or high), type of intensive care unit (surgical or medical), comparison group, total morbidity, and major morbidity.

Methods of synthesis
How were the studies combined?
Relative risks were calculated, and the overall log relative risk (RR) was calculated using a random-effects model, and a two-tailed test, at the alpha = 0.05 level.

How were differences between studies investigated?
The effects of possible covariates (acuity of illness, quality score of trials, year of publication, type of PA catheter-guided treatment used (PA catheter vs. no PA catheter, or PA catheter vs. PA catheter for supranormal hemodynamic values), and surgical or mixed patient population) were compared in multivariate random-effects models.

**Results of the review**
Twelve RCTs with a total of 1,610 patients were included.

Morbidity events were observed in 62.77% of the PA catheter treatment group, and in 74.34% of the control group. A relative risk ratio of 0.78 was obtained, (95% CI: 0.6459, 0.94374) and a corresponding p of 0.017, a lower morbidity in the PA catheter treatment group. Those with PA catheter-guided treatment had a mean protective effect of 21.9% for risk of morbidity. Other important covariates such as acuity of illness, quality score of trials, year of publication, type of PA catheter-guided treatment used (PA catheter vs. no PA catheter, or PA catheter vs. PA catheter for supranormal hemodynamic values), and surgical or mixed patient population, all increased variability and were not statistically significant predictors for risk ratio of morbidity.

**Authors' conclusions**
Meta-analysis of RCTs included in this study shows that there is a statistically significant reduction in morbidity using PA catheter-guided strategies.

**CRD commentary**
This is a reasonably well-written review. However, the objectives of the review are not clearly stated and the search strategy is poor, with only one electronic database being searched. Thus both published and unpublished trials may have been missed. The authors do assess the trials for validity, but this is not reported in the results of the review. However, it is one of the covariates used to assess the variability of the results. Only limited details of the included studies are provided. The conclusions and results should be viewed with caution given the above limitations.

**Implications of the review for practice and research**
Practice: The authors do not state any implications for practice.

Research: The authors state that better-designed future trials are need to support the findings of the review.

**Bibliographic details**

**PubMedID**
10752803

**Other publications of related interest**

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Catheterization, Swan-Ganz /adverse effects; Critical Illness /therapy; Humans; Morbidity; Risk; Treatment Outcome

**AccessionNumber**
Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.