

Pulmonary artery catheters and central venous catheters did not differ for mortality in acute lung injury

Wheeler AP, Bernard GR, Thompson BT, Schoenfeld D, Wiedemann HP. Pulmonary-artery versus central venous catheter to guide treatment of acute lung injury. *N Engl J Med.* 2006;354:2213-24.

Clinical impact ratings: Emergency Med ★★★★★☆☆ Hospitalists ★★★★★☆☆ Critical Care ★★★★★☆☆ Pulmonology ★★★★★☆☆

QUESTION

In patients with acute lung injury, how does a pulmonary artery catheter (PAC) compare with a central venous catheter (CVC) for guiding treatment?

METHODS

Design: Randomized controlled 2x2 factorial design trial (Fluid and Catheter Treatment Trial [FACTT]).

Allocation: Concealed.*

Blinding: Unblinded.*

Follow-up period: 60 days.

Setting: 36 centers in the United States and 2 in Canada.

Patients: 1001 patients ≥ 13 years of age (mean age 50 y, 53% men) who had acute lung injury for ≤ 48 hours; were receiving positive-pressure ventilation by endotracheal tube; and had a ratio of PaO₂ to FIO₂ < 300, bilateral infiltrates on chest radiography consistent with pulmonary edema, and no evidence of left atrial hypertension. Exclusion criteria included any use of a PAC between injury onset and enrollment; physician refusal; and chronic or terminal conditions that could affect survival, impair weaning, or compromise compliance.

Intervention: Patients were allocated, after stratification by hospital and type of fluid

therapy (liberal or conservative use), to a PAC (*n* = 513) or a CVC (*n* = 488). For each group, catheter measurements were then used to guide management according to an explicit hemodynamic protocol begun within 2 hours of catheter placement.

Outcomes: All-cause mortality. Secondary outcomes were ventilator-free days, intensive care unit (ICU)-free days, organ failure-free days, and adverse effects. The study had 90% power to detect a 10% difference in mortality at 60 days.

Patient follow-up: 99.9% (intention-to-treat analysis).

MAIN RESULTS

PAC and CVC groups did not differ for all-cause mortality at 60 days (Table). Groups also had similar numbers of ventilator-free days (13.2 vs 13.5 d, *P* = 0.58), ICU-free

days (12.0 vs 12.5 d, *P* = 0.40), and organ-failure-free days in the first 28 days. PAC and CVC groups had similar rates of complications (0.08 vs 0.06 per catheter inserted, *P* = 0.35), although twice as many catheters were inserted per patient in the PAC group as in the CVC group (2.47 vs 1.64, *P* < 0.001), resulting in a higher number of complications.

CONCLUSION

In patients with acute lung injury, use of a pulmonary artery catheter did not confer more benefit than use of a central venous catheter for guiding treatment.

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*See Glossary.

Pulmonary artery catheter (PAC) vs central venous catheter (CVC) for guiding treatment in acute lung injury at 60 days†

Outcome	PAC	CVC	ARI (95% CI)	NNH
All-cause mortality	27.4%	26.3%	1.1% (-4.4 to 6.6)	Not significant

†Abbreviations defined in Glossary.

COMMENTARY

The large, well-done multicenter clinical trial by Wheeler and colleagues addressed the effect of using a PAC for management of acute lung injury following a strictly defined hemodynamic protocol. It nicely complements the study by Richard and colleagues (1), which addressed a similar question but without any hemodynamic protocol. Both studies found that systematic use of a PAC does not modify length of stay or mortality in acute lung injury or the acute respiratory distress syndrome (ARDS).

The study does not directly address the specific usefulness of a PAC for managing shock or identifying side effects of treatment. Slightly more patients in the PAC group had shock and received vasopressors. In acute lung injury or ARDS, these 2 factors, especially vasopressor use, are the most powerful predictors of mortality (2). However, the imbalance was small and of borderline significance (*P* = 0.05). Of note, the subgroup of patients in shock did not seem to benefit from a PAC using a specific protocol.

Strikingly, the main reason for exclusion in the study was a PAC already in place (2186 patients, compared with 501 enrolled and receiving a PAC). If enrollment was confounded by the clinical indication for

PAC use, the study cohort might not represent typical patients with acute lung injury or ARDS. Another limitation is that CVCs could have been inserted before the study, and therefore complications might not have been recorded. The finding that the incidence of complications depends on the number of catheter insertions thus deserves particular emphasis.

A PAC is not justified for routine management of acute lung injury or ARDS and has rarely been recommended for such use. Therefore, the results of this study should not alter usual management of acute lung injury or ARDS in most ICUs.

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References

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