

Health Technology Assessment: Continuous renal replacement therapy versus intermittent renal replacement therapy for acute kidney injury in adult patients

Schönfelder T, Chen X, Bleß HH

Background

Dialysis-dependent acute kidney injury can be treated using continuous (CRRT) or intermittent renal replacement therapies (IRRT). Some studies suggest that CRRT may have advantages over IRRT in some populations, particularly in hemodynamically unstable patients. Corresponding study results are inconsistent and neither modality has been found superior regarding patient-relevant endpoints. However, currently available systematic reviews and meta-analyses do not reflect the present state of research and, therefore, may not consider technical advancements adequately.

Research questions

The assessment investigates differences between CRRT and IRRT regarding the endpoints mortality, renal recovery, hemodynamic tolerance, fluid balance, length of stay, and health-related quality of life. Economical research questions address the cost-effectiveness of both modalities. Additionally, ethical aspects that are linked to renal replacement therapies in the intensive care setting are considered.

Methods

Systematic searches in MEDLINE, EMBASE and Cochrane Library and an additional manual search are performed (search date: December 2014). Randomized controlled trials (RCT), observational studies, and cost-effectiveness-studies are included. Studies are selected and their quality is assessed by means of fixed criteria by two reviewers independently. Results are pooled using a random effects-model.

Results and Discussion

Overall, 49 relevant studies were identified and analyzed. Conducted analyzes show significant differences between CRRT and IRRT regarding patient-relevant outcomes.

Pooled analyzes show a higher rate of renal recovery among survivors who initially received CRRT as compared with IRRT. This advantage applies to the analysis of all identified studies with different observation periods (Relative Risk (RR) 1,10; 95 %-Confidence Interval (CI) [1,05 1,16]) as well as to a selection of studies with observation periods until 90 days after initial treatment (RR 1,09; 95 %-CI [1,04 1,15]). As regards observation periods longer than three months there are no significant differences between renal replacement therapies when only two identified studies were analyzed (RR 0,97; 95 %-CI [0,43 2,18]). Differences between both renal replacement therapies regarding renal recovery primarily rely on observational studies (RR 1,17; 95 %-CI [1,09 1,24]). Separate analyzes of RCT only do not show an significant impact of dialysis modality (RR 1,01; 95 %-CI [0,95 1,07]). If differences in characteristics of patients receiving CRRT or IRRT due to the inclusion of observational studies effected findings could not be analyzed.

Patients initially receiving CRRT have higher mortality as compared to IRRT (RR 1,17; 95 %-CI [1,06 1,28]). This difference primarily is attributable to observational studies (RR 1,21; 95 %-CI [1,07 1,37]) and most likely is due to allocation bias, since seriously ill patients more often initially receive CRRT instead of IRRT. Separate analyzes of RCT do not show significant differences between both modalities (RR 1,03; 95 %-CI [0,94 1,14]).

CRRT do not differ from IRRT with respect to change of mean arterial pressure (Hedges' $g = -0,45$; 95 %-CI $[-0,89 \ 0,00]$, number of hypotensive episodes (RR 0,71; 95 %-CI $[0,39 \ 1,31]$), hemodynamic instability (RR 0,48; 95 %-CI $[0,10 \ 2,28]$), length of stay in hospital (Hedges' $g = 0,05$; 95 %-CI $[-0,09 \ 0,20]$), and number of days spent in intensive care unit (Hedges' $g = 0,11$; 95 %-CI $[-0,00 \ 0,22]$).

Data on cost-effectiveness is inconsistent. Recent analyzes indicate that initial CRRT is cost-effective compared to initial IRRT due to a reduction of the rate of long-term dialysis dependence. As regards a short time horizon this cost benefit has not been shown. However, applying these economic evaluations to the German health care system may be limited, since all identified studies analyze national cost data, which are not related to the German health care context.

Conclusion

Among survivors of acute kidney injury initial treatment with CRRT is associated with higher rates of renal recovery. Potential long-term effects on patient-relevant endpoints for more than three month could not be analyzed on the basis of currently available research and should be investigated in further studies. Transferability of the economic analyzes to the German health care system is limited. Therefore, conduction of economical analyzes using national cost data are necessary.

The full text is available

under

http://portal.dimdi.de/de/hta/hta_berichte/hta658_bericht_de.pdf