Effectiveness and safety of different hemodialysis modalities: a review

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CRD summary
Conclusions as to which haemodialysis modality is the most beneficial for patients with end-stage renal disease could not be drawn, owing to the poor quality of the studies and short-term follow-up. The authors' cautious conclusions seem appropriate given several concerns about the included studies (such as the differences between them) and the limitations of the review itself (e.g. limited data synthesis and potential bias).

Authors' objectives
To compare the safety and efficacy of different haemodialysis (HD) modalities in patients with end-stage renal disease.

Searching
MEDLINE, EMBASE, the Cochrane Library, Centre for Reviews and Dissemination databases, IBECS, IME, LILACS, ISI Web of Knowledge and other electronic databases were searched from January 1990 to December 2005 for publications in English, Spanish, French, Italian and Portuguese; the search terms were reported. In addition, the references of selected publications were checked.

Study selection
Systematic reviews, meta-analyses, clinical trials and cohort studies comparing two or more HD modalities (conventional, high-flux, high-efficiency and various other types of haemodiafiltration) in at least 20 adults with end-stage renal disease, for at least 2 months' follow-up, were eligible for inclusion. Eligible studies also had to report morbidity, mortality and/or quality of life, and assess directly related acute and chronic complications of HD or physiologic parameters as the outcomes. Studies of acute renal failure, multiorgan failure, sepsis or intoxications were excluded, as were studies of paediatric patients, studies reporting peritoneal dialysis or haemofiltration as the sole comparison modality, comparisons of two types of specific membranes, and comparisons of high- or low-flux without specifying the dialysis modality. The included studies were of patients with or without anaemia. Some studies included controls, and some used HD modalities with cuprophane or polysulfone. Treatment durations varied in those studies reporting such data.

Two reviewers independently screened papers for relevance, and any disagreements were resolved through consensus.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
Data on differences in outcomes between comparison treatments were presented as a narrative synthesis and in tables, grouped by treatment comparisons and outcome measures.

Results of the review
Thirty-six studies (n approximately 6,821; the sample size for one study was not recorded) were included in the review: 13 randomised controlled trials (RCTs; three referred to the same study), 2 partial RCTs, 2 non-RCTs, 9 crossover trials, 1 non-randomised crossover trial, 5 cohort studies, 3 pre-test post-test studies (two referred to the same study) and 1 non-randomised pre-test post-test study. There was a slight discrepancy in the number of studies reported in the abstract and the number of studies presented in the tables and narrative synthesis. The sample sizes ranged from 20 to 1,846 patients. Reported follow-up durations ranged from 2 months to 6 years.
High-flux versus conventional (low-flux) HD: 2 out of 5 studies (3 RCTs referred to the same study) reported significant reductions in mortality for the high-flux versus low-flux groups; 66% (p=0.012) versus 76%, although one was only significant when diabetic patients were excluded. No significant differences were reported for quality of life and clinical tolerance (1 study).

High-efficiency versus conventional HD: the sole study on this topic found mortality was reduced in patients receiving high-efficiency HD, although it is unclear whether the improvement was significant or which study this actually related to.

Conventional haemodiafiltration versus HD (conventional and high-flux): 3 studies found that mortality and morbidity rates did not differ significantly between the two groups.

Results were not reported for the remaining treatment comparisons, or findings were conflicting for mortality, morbidity and quality of life. Other outcomes were reported in the review.

Authors’ conclusions
Definitive conclusions cannot be drawn as to which HD modality is the most beneficial in terms of mortality, morbidity and the patients’ quality of life, owing to the poor quality of the studies and short-term follow-up.

CRD commentary
The review question was clear and was supported by appropriate inclusion criteria. The literature search was comprehensive but restricted by language, which means that language bias might have been introduced. This, together with the fact that there was no apparent attempt to locate unpublished articles, means that relevant papers could have been missed. Publication bias was not assessed. The authors mentioned that the quality of the included studies was low, but no data were presented and the authors did not state whether they conducted a formal validity assessment. In addition, the data extraction process was unclear, which means that reviewer error and bias cannot be ruled out. The authors mentioned clinical and methodological heterogeneity amongst the studies; the narrative synthesis was therefore appropriate, although the data presented were limited. Given several considerations about the included studies, some of which the authors acknowledged, and the limitations of the review (e.g. limited data synthesis and potential bias), the authors’ cautious conclusions appear appropriate.

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

Research: Good-quality, long-term studies are needed to further investigate which HD modalities are beneficial for different patient populations.

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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.