Systematic review: kidney transplantation compared with dialysis in clinically relevant outcomes
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CRD summary
The review concluded that the findings validated current attempts to increase the number of people worldwide who benefit from kidney transplantation. The review had potential for a number of biases, which limits the reliability of the authors' conclusions. The authors' call for further research appears warranted.

Authors' objectives
To summarise the anticipated clinical benefit associated with kidney transplantation compared with dialysis and identify characteristics associated with degree of benefit.

Searching
MEDLINE and EMBASE were searched to February 2010. All evidence-based medicine reviews were searched to September 2007. Search strategies were provided in supplementary materia that appeared to be no-longer available.

Study selection
Studies of kidney transplantation and chronic dialysis were eligible for inclusion. Studies had to have a minimum sample size of 30 participants in each study group and report important clinical outcomes such as mortality, cardiovascular events, hospitalisation and quality of life. Studies in paediatric patients (<16 years) and those that included multi-organ transplantation were excluded. Crossover and case-control studies were excluded. Cross-sectional studies were excluded except when they reported quality of life.

The included studies evaluated various transplant and dialysis interventions. Mean age of transplant recipients ranged from 30 to 68 years. Study enrolment ranged from 1960 to 2006. Maximum follow-up ranged from six months to 19 years.

Two reviewers performed study selection. Disagreements were resolved by discussion or consultation with a third reviewer.

Assessment of study quality
Study quality was assessed using the Downs and Black checklist, which appraised selection of participants, allocation of participants, outcome definitions, calculation of sample size, adjustment for potential confounding and loss to follow up. Three additional quality items were assessed post hoc: selected time of origin, adjustment for prior time spent on renal replacement therapy and modelling time-dependency of modality.

Two reviewers independently performed quality assessment. Disagreements were resolved by discussion with a third reviewer.

Data extraction
Data were extracted on all-cause mortality, cardiac events, hospitalisation and quality of life. These were used to calculate odds ratios (OR), risk ratios (RR), mean differences and hazard ratios (HRs), each with 95% confidence intervals (CIs).

It appears that one reviewer extracted data and a second reviewers checked for accuracy.

Methods of synthesis
A narrative synthesis was undertaken using unpooled meta-graphs. Subgroup analysis was undertaken for evidence of effect modification on the association between transplantation and mortality for diabetic patients, elderly patients, patients with chronic infections and patients with cardiovascular disease. Multivariable meta-regression models were used to examine whether era, restricting analyses to dialysis patients who were active on the kidney transplantation
waiting list and elements of study design modified the relationship between unadjusted mortality and modality.

**Results of the review**

One hundred and ten cohort studies were included in the review (1,922,300 participants, range 39 to 468,681). Risk of bias was variable.

Seventy-six per cent of studies found a significantly lower risk of death with transplantation. Seven per cent of studies found a lower risk of death with dialysis. The magnitude of mortality benefit with transplantation tended to increase over time.

Most studies found that the risk of cardiovascular events was significantly reduced among transplant recipients. Risk of hospital-related infections appeared to be significantly reduced with transplant recipients but there was no clear difference in all-cause hospitalisations.

Quality of life was significantly and substantially better among transplant recipients (47% to 100% of cohort groups favoured transplantation).

Results of subgroup/moderator analysis were reported.

**Authors’ conclusions**

The findings validated attempts to increase the number of people worldwide who benefit from kidney transplantation.

**CRD commentary**

Inclusion criteria for the review were broadly defined and several relevant data sources were searched. Sixty-one articles were excluded on the basis of language, which may have introduced language bias. Publication bias was not assessed and could not be ruled out. Attempts were made to reduce reviewer error and bias throughout the review process. Quality assessment indicated that the risk of bias in the included studies was variable. The studies differed in terms of patient and study characteristics, so a narrative synthesis was presented.

The review had potential for a number of biases, which limits the reliability of the authors’ conclusions. The call for further research appears warranted.

**Implications of the review for practice and research**

**Practice:** The authors stated that there was an urgent need to increase living and deceased kidney donation.

**Research:** The authors stated that future studies should identify patient-level factors associated with the benefit of transplantation for outcomes other than mortality. For cardiovascular events and all-cause hospitalisation this could be achieved by patient-level meta-analysis. Other outcomes such as quality of life would need detailed prospective study. Statistical adjustment for potential confounders would be critical for the success of such initiatives and so there was a need for consensus on the best way to measure and adjust for comorbidity after wait-listing for transplantation.

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