An economic evaluation of early versus late referral of patients with progressive renal insufficiency

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
This study evaluated the cost-effectiveness of early versus late referral to nephrologists, for patients with progressive renal insufficiency. The authors concluded that their analysis strongly suggested that early referral was cost-effective. The reporting was generally clear, and the results were robust to the broad sensitivity analyses. The authors’ conclusions were appropriate, but the results should be considered to be uncertain.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study evaluated the cost-effectiveness of early versus late referral to nephrologists, for patients with progressive renal insufficiency.

Interventions
Early referral was at a creatinine clearance of 20mL per minute. This was compared with late referral, when patients were uraemic and required renal replacement therapy. All patients were referred to a multi-disciplinary team comprising a nephrologist, nurse, dietitian, social worker and a pharmacist.

Location/setting
Canada/secondary care.

Methods
Analytical approach:
A Markov model was developed to simulate the clinical progression of a patient with progressive renal insufficiency. The data were from published studies, and a prospectively maintained regional database. The model simulated two cohorts of 1,000 patients with an estimated initial mean creatinine clearance of 20mL per min. The time horizon was five years, and cycles were one month. The authors stated that they took a health care provider perspective.

Effectiveness data:
The key effectiveness data were the rates of renal function loss, and the probabilities of transition between states in the model. Most rates were from published studies in Canada or the USA. The rate of loss of renal function was from a 1993 study of patients receiving standard care. Mortality from progressive renal insufficiency, and the preemptive transplant rate, for early and late referrals, were from the Southern Alberta Renal Program (SARP) database. The key transitions were from referral to progressive renal insufficiency clinic, clinic to dialysis, dialysis to transplant, and all states to death. Hospitalisation rates were included. The model assumed constant rates for all transitions.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
Three outcome measures were presented: patient life-years, patient life-years free from renal replacement therapy, and hospital in-patient days. Only life-years were combined with costs. The benefits were discounted at 5% annually.
Cost data:
The costs included out-patient care, progressive renal insufficiency clinic care, and in-patient care. Out-patient costs were from two published Canadian studies. The cost of progressive renal insufficiency care was from the SARP database, and included staff, support services, supplies, operational costs, and erythropoietin (4,000 units per week). In-patient costs were estimated using data from the Foothills hospital. All costs were inflated to 1999 Canadian dollars (CAD), using the Consumer Price Index for Canada. They were discounted at 5% annually.

Analysis of uncertainty:
One-way sensitivity analyses, for all model parameters, were undertaken. The parameter values were varied to their 95% confidence interval, where available, or otherwise, to ±25% of the mean. Scenarios were evaluated, wherein the renal deterioration rates were equal, and early referral rates were 50% or 75%.

Results
The mean total cost per patient was CAD 130,912 for early referral, compared with CAD 164,262 for late referral. The mean number of life-years saved was 3.52 with early referral, compared with 3.36 with late referral. Early referral dominated late referral, as it produced more benefits at a lower cost.

Early referral produced better results for the other two outcomes; life-years free from renal replacement therapy (early 2.18 versus late 1.76), and total hospital in-patient days (early 25 versus late 41).

The results were robust across the ranges in the sensitivity analysis and in the scenario analyses.

Authors' conclusions
The authors concluded that their analysis strongly suggested that early referral was cost-effective.

CRD commentary
Interventions:
The interventions were described and appear to have been appropriate. In addition to the main analysis, in which all patients were referred early or all were referred late, a range of referral rates was assessed, including the actual rates in North America.

Effectiveness/benefits:
The effectiveness data were from sources that seem to have been appropriate, but the methods of identifying, selecting and combining data from these sources were unclear. The mean values could have been distorted, and uncertainty could have been underestimated. A number of limitations were highlighted and fully discussed, including the constant-rate assumptions and the assumption of no survival benefit with early referral. The impact of these assumptions remains unclear.

Costs:
The costs appear to have been from appropriate sources, but the methods of identifying and selecting these data were unclear. The analysis focused on the costs of progressive renal insufficiency and did not appear to take into account the costs of any comorbidities; this could underestimate the costs. The authors indicated that more research was needed into the cost-effectiveness of screening in at-risk populations. It was unclear if the five-year time horizon was sufficient to capture all the downstream costs and benefits.

Analysis and results:
The analysis was clearly presented, and the conclusions were appropriate. As with all modelling studies, there were some simplifying assumptions, some of which could not be tested, due to a lack of data or the complexity of the task; these uncertainties remain. Extensive sensitivity analysis on the parameters that could be tested, suggested that the results were robust. To fully capture the uncertainty in these parameters, probabilistic analysis would have been more appropriate; this might not have changed the results, but the uncertainty would have been better assessed. A full discussion of the modelling assumptions, potential subgroups, study limitations, and the need for future research on screening of high-risk groups, was presented.

Concluding remarks:
The reporting was generally clear, and the results were robust to the broad sensitivity analyses. The authors’ conclusions were appropriate, but the results should be considered to be uncertain.

**Funding**
Support received from the Kidney Foundation of Canada.

**Bibliographic details**

**PubMedID**
11684571

**DOI**
10.1053/ajkd.2001.28619

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Cost-Benefit Analysis; Humans; Kidney Failure, Chronic /economics /therapy; Markov Chains; Referral and Consultation; Renal Replacement Therapy /economics; Survival Analysis; Time Factors

**AccessionNumber**
22001002095

**Date bibliographic record published**
10/12/2001

**Date abstract record published**
14/11/2013