Detection of polyomavirus BK reactivation after renal transplantation using an intensive decoy cell surveillance program is cost-effective

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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 assessed the clinical and economic impact of using urinary decoy cell detection instead of quantitative polymerase chain reaction (qPCR) for BK virus (a polyomavirus) surveillance after renal transplantation. The authors concluded that urine cytology screening was reliable and the restriction of qPCR testing to patients with sustained decoy cell positivity saved costs, making the strategy cost-effective. The study design had some limitations that might affect the validity of the authors’ conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study assessed the clinical and economic impact of using urinary decoy cell detection instead of quantitative polymerase chain reaction (qPCR) for BK virus (a polyomavirus) detection after renal transplantation.

Interventions
Early intensive decoy cell detection (urine cytology) screening was performed fortnightly from zero to three months after transplantation, monthly from three to six months, and every two months from six to 12 months. Patients with sustained decoy cell positivity (defined as two or more positive samples more than two weeks apart) progressed to qPCR. This was compared with conventional qPCR screening, which was performed monthly for the first three months and then every three months until one year after transplantation.

Location/setting
UK/hospital.

Methods
Analytical approach:
The analysis was based on one study and had a time horizon of two years. The authors did not explicitly state the perspective adopted.

Effectiveness data:
The clinical data were from a retrospective within-group comparison of patients at one institution. Over two years, there were 313 patients who were followed-up for at least one year; 211 had undergone kidney transplantations and 102 had undergone simultaneous kidney and pancreas transplantations. The data for 29 patients were incomplete, due to transfer to another unit, death, or graft failure. The results of decoy cell detection for all patients were compared with those of conventional qPCR. The rates of decoy cell positivity and sustained decoy cell positivity were the primary endpoints.

Monetary benefit and utility valuations:
Not considered.

Measure of benefit:
No summary benefit measure was used. The main outcome was the early detection of decoy cell positivity.

Cost data:
The economic analysis included the costs of processing samples. Full compliance with the screening tests and no additional testing were assumed. The quantities of resources and unit costs were from the authors' institution. The costs of qPCR were based on the protocol and the cost of the test from an external provider. All costs were in UK pounds sterling (£).

Analysis of uncertainty:
Not investigated.

Results
A positive decoy cell urine sample was found in 56 patients (17.9%) and sustained decoy cell positivity was found in 32 patients (10.2%). In the sustained positive group, 24 patients (75%) had viraemia proven by qPCR, four had a negative qPCR test, and four had no BK virus qPCR results. The median time after transplantation until decoy cell positivity was 78 days for the whole sample, 67 days for patients with sustained positivity, and 57 days for patients who developed polyomavirus nephropathy.

Over two years, the total costs for the 313 patients would have been £161,508 with qPCR screening or £26,508 with decoy cell screening (including the cost of qPCR for patients with sustained decoy cell positivity). This was a net saving of £135,000 with decoy cell detection.

Authors' conclusions
The authors concluded that urine cytology screening for BK virus was reliable, and the restriction of qPCR testing to patients with sustained decoy cell positivity saved costs, making the strategy cost-effective.

CRD commentary
Interventions:
The authors justified their selection of the comparators, which appear to have been appropriate and generalisable to other health care settings.

Effectiveness/benefits:
The clinical data were from a retrospective analysis of the screening protocol performed in the authors' institution. This was described in detail and the results of the early intensive decoy cell detection screening by urine cytology were presented appropriately. The analysis of the conventional qPCR protocol was unclear. Some data were incomplete and the method used to deal with these data was reported.

Costs:
Only the costs of the two surveillance strategies were analysed, suggesting that the perspective was that of the authors' institution. The resource use for decoy cell detection was based on its implementation in the authors' hospital, assuming complete adherence to the protocol. The unit costs were from the same institution. Estimates for the qPCR protocol were based on charges to the hospital for external testing and full compliance. The price year was not reported. Discounting was not reported, but the time horizon was two years.

Analysis and results:
The results were extensively presented. A synthesis of the costs and benefits was not performed and a cost-consequences analysis was reported. The uncertainty was not investigated. The authors acknowledged that a limitation of their analysis was the retrospective nature of the clinical study. The results should be considered to be specific to the authors' setting and might not be transferable to other institutions or settings.

Concluding remarks:
The study design had some limitations that might affect the validity of the authors' conclusions.

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