Cost-effectiveness of cancer screening in end-stage renal disease
Chertow G M, Paltiel A D, Owen W F, Lazarus J M

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.

Health technology
Cancer diagnostic tests (mammography, papanicolaou, flexible sigmoidoscopy and prostate-specific antigen) for End Stage Renal Disease (ESRD) patients.

Type of intervention
Screening and treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Hypothetical cohort of patients with ESRD aged 30-85 and the general population with respect to four cancer types and four ethnic gender categories:

- breast cancer (white females, black females),
- cervical cancer (white females, black females),
- colorectal cancer (white females, white males, black females, black males) and
- prostate cancer (white males and black males).

Setting
Hospital. The economic study was carried out in the USA.

Dates to which data relate
The dates of resource data and prices were not stated.

Source of effectiveness data
Based on opinions.

Modelling
Expected net benefits and costs were obtained from a model.

Methods used to derive estimates of effectiveness
Authors’ assumptions.
Estimates of effectiveness and key assumptions
All cancer screening tests were assumed to be perfectly sensitive and specific. In the base- and best-case scenarios, all detected cancers were assumed to be instantaneously treated, and neither the knowledge of the diagnosis of cancer nor the effects of treatment resulted in any decrement in quality of life.

Measure of benefits used in the economic analysis
Life-years gained.

Direct costs
Costs and quantities were not reported separately. Screening costs included: mammography, papanicolaou test, flexible sigmoidoscopy, prostate-specific antigen. Treatment costs included: mastectomy, major large-bowel procedure, major male pelvic procedures, uterine procedure for non-ovarian malignancy. Costs of complications were included. Screening costs were obtained from a representative area hospital in Boston, USA. Treatment costs were obtained from the DRG reimbursement rates. Price years were not stated.

Currency
US dollars ($).

Sensitivity analysis
Analysis of extremes was carried out on key variables; cancer incidence, cost of screening, complication rate and efficacy to produce the base-, best- and plausible-case scenarios between the ESRD-specific and general populations. Threshold analysis was also carried out to determine the percentage of reduction in mortality rates for patients with ESRD that would be required to match the gain accrued by a typical cancer screening programme.

Estimated benefits used in the economic analysis
Under base-case conditions, life-years gained varied between 0.14 and 0.86 days (ESRD patients) and 0.91-2.36 (non-ESRD patients).

Under best-case scenario (cancer incidence 1:1.1 (ESRD-general population)), life-years gained varied between 0.28 and 1.73 (ESRD) and 0.91 and 2.36 (non-ESRD patients).

Under plausible-case scenario (cancer incidence 1.1:1.0 (ESRD: general population), cost of screening 1.1:1.0 (ESRD: general population), complication rate 1.2:1.1 (ESRD: GENERAL population) and efficacy 0.75:1.0 (ESRD: general population)) life-years gained varied between 0.08 and 0.43 (ESRD) and 0.61 and 1.38 (non-ESRD).

Cost results
For the base-case solution the costs for four categories of patient (a 50-year-old African American man with colorectal cancer, a 60-year-old African American woman with cervical cancer, a 65-year-old white woman with breast cancer and a 55-year-old white man with prostate cancer) within an assumed perfect screening programme were: $226, $19, $153 and $77 for both the ESRD and non-ESRD patients. In the best and plausible-case solutions these figures altered in the ESRD patients but remained constant for non-ESRD patients.

Synthesis of costs and benefits
For the base-case solution the associated cost per life-year gained for four categories of patient was $95,714, $26,880, $116,478 and $200,585 for the ESRD patients and $35,028, $5029, $8095 and $30,975 for categories of non-ESRD patients respectively. This comparison was also completed for best-case and plausible-case scenarios.
Authors' conclusions
Routine cancer screening in the population with ESRD is a relatively inefficient allocation of financial resources. Direction of funds toward improving the quality of dialysis could attain such an objective at substantially lower cost.

CRD Commentary
1. While the authors did not advocate abandoning cancer screening programmes for those patients at increased risk, such as those with a family history of breast cancer or occult gastrointestinal bleeding, the results suggested that routine cancer screening among patients with ESRD should not be instituted.

2. The authors acknowledged that many unrealistic assumptions and over-simplifications were introduced into their model to facilitate a comparison between ESRD patients and the general population. These included the assumption that screening tests for cancer have sensitivities and specificities of 100%, that all cancers are instantaneously detected and cured, and that reductions in quality of life do not occur as a result of diagnosis or treatment. More detailed costings for false positive and false negative results of screening would need to be undertaken to achieve a more realistic outcome.

3. In the best- and plausible-base solutions changes were made to key variables in order to assess the cost-effectiveness of screening ESRD patients under the most favourable assumptions. The inefficiency of this programme under these conditions shows that the conclusions are likely to be robust.

4. The study was acknowledged by the authors as being incapable of achieving predictive precision (ie the dollar estimate of cost per life-year gained), but was aimed at providing qualitative insights that might improve clinical decision and policy making.

Implications of the study
Further research is required to assess the qualitative improvements in the care of ESRD patients which will result in reductions in morbidity and mortality in the coming years.

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