Health economic modelling of the cost-effectiveness of microalbuminuria screening in Switzerland


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 microalbuminuria screening for chronic kidney disease, and subsequent treatment, in different populations. The authors concluded that screening could be cost-effective, starting at the age of 50 years, and repeating every two years for patients with diabetes, every five years, for patients with hypertension, and every 10 years, for the remaining population. There were some limitations to the methods and reporting of the study, so the authors’ conclusions should be considered with caution.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
To evaluate the cost-effectiveness of microalbuminuria screening for chronic kidney disease (CKD), and subsequent treatment, in different populations.

Interventions
Microalbuminuria screening, starting at age 50 years, and repeating every one, two, five or 10 years, was compared with no screening, and with usual care. Usual care was defined as some patients undergoing some screening and treatment in daily clinical practice. A positive screening result was followed by treatment with angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers.

Four groups of people were evaluated: all patients, patients with diabetes, non-diabetic patients with hypertension, and non-diabetic patients without hypertension.

Location/setting
Switzerland/primary and secondary care.

Methods
Analytical approach:
The analysis was based on a micro-simulation model, developed for the US population (Hoerger, et al. 2010 a and b, see Other Publications of Related Interest), which was adapted for Switzerland. The time horizon was lifetime. The model had seven health states: no CKD, CKD stages one to five (defined by the glomerular filtration rate, GFR, and kidney damage or albuminuria), and death. The authors stated that the perspective was that of the Swiss health care system.

Effectiveness data:
The effectiveness data were mainly from published epidemiological literature, clinical trials, a cost-effectiveness study, and the original model. The main measures of effectiveness were the annual screening rates, the probability of biopsy upon screening, treatment adherence, and the effects of treatment.

Monetary benefit and utility valuations:
The utility estimates were from the published literature. Different GFRs and CKD complications, such as myocardial infarction, non-myocardial infarction coronary heart disease, and stroke, were considered.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure, and they were discounted at an annual rate of 3%.

**Cost data:**
The direct costs included the annual expected medical costs for the CKD stages and for end-stage renal disease, the direct screening costs, and the related treatment costs, including complications. The costs were from several US sources and the Swiss health system. Where non-Swiss data were used, adjustments were applied to better represent the local cost structure. All costs were in Swiss francs (CHF), inflated to the year 2010, using an annual inflation rate of 3.1%. Future costs were discounted at a rate of 3% per year.

**Analysis of uncertainty:**
One-way sensitivity analyses were conducted to evaluate the impact, on the cost-effectiveness results, of varying the key parameters by ±25%. A limited probabilistic sensitivity analysis was undertaken by introducing second-order variability in the major parameters, including all medical costs, microalbuminuria incidence, and progression to macroalbuminuria. The results were presented in a tornado diagram and cost-effectiveness acceptability curves.

**Results**
All screening scenarios increased the costs and the QALYs for the total population.

Annual screening for all patients, had an incremental cost-effectiveness ratio (ICER) of CHF 83,000 per QALY gained, relative to usual care, and 66,000 CHF per QALY gained, relative to no screening. The ICERs improved (decreased) with less frequent screening. Screening every 10 years reduced the ICER to below CHF 30,000 per QALY gained, relative to no screening and to usual care.

For patients with diabetes, all screening scenarios had an ICER below CHF 50,000 per QALY gained, compared with usual care, and below CHF 30,000 per QALY gained, compared with no screening. For non-diabetic patients with hypertension, all screening scenarios had an ICER below CHF 50,000 per QALY gained, compared with usual care and no screening. For non-diabetic patients without hypertension, the ICERs were between CHF 34,000 and CHF 100,000 per QALY gained.

The deterministic and probabilistic sensitivity analyses showed that the results were robust, using the standard cost-effectiveness threshold, recommended by the World Health Organization (WHO), based on the per capita gross domestic product (GDP), of CHF 71,000 in 2008.

**Authors’ conclusions**
The authors concluded that microalbuminuria screening could be cost-effective, starting at the age of 50 years, and repeating every two years, for patients with diabetes, every five years, for patients with hypertension, and every 10 years, for the remaining population.

**CRD commentary**
**Interventions:**
No explicit justification was provided for the comparator, but it seems to have been the usual care in the authors’ setting. Many scenarios were considered, without an explanation of their importance.

**Effectiveness/benefits:**
The authors used their judgement to select the most appropriate estimates. No systematic review was reported, so it is unclear if the best available evidence was used. Some important parameters were from international studies (particularly US studies), which could bias the results. The authors justified the use of these sources, as there were no local (Swiss) sources. QALYs were an appropriate benefit measure, given the impact of kidney disease on quality of life and survival. The source for the utility values was the original model, and from the information given, the methods used to assess them and their quality cannot be assessed.

**Costs:**
All cost categories appear to have been relevant and consistent with the authors' stated perspective. Some unit costs were directly from the USA, which could cause important bias, and the methods used to adapt them were not clearly
All the cost results were presented in a table, with their sources and the availability of local (Swiss) information. The price year, adjustments, and discounting were reported.

Analysis and results:
The analytic approach and assumptions were generally well described, with a diagram of the screening and treatment model structure. The costs and benefits were appropriately synthesised, using an incremental approach, and the ICERs were calculated relative to usual care and to no screening. The findings were adequately presented and illustrated. Uncertainty was investigated in deterministic and probabilistic sensitivity analyses, for the full population and the subgroups. The authors stated the types of distributions used for each parameter, but the details were not reported. The authors discussed some limitations of their analysis, including the estimation of some model parameters, using US data, and the assumptions due to a lack of available Swiss data.

Concluding remarks:
There were some limitations to the methods and reporting of the study, so the authors’ conclusions should be considered with caution.

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