To stimulate or withdraw? A cost-utility analysis of recombinant human thyrotropin versus thyroxine withdrawal for radioiodine ablation in patients with low-risk differentiated thyroid cancer in the United States
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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 determined the cost-utility of recombinant human thyroid-stimulating hormone (rhTSH) compared with thyroid hormone withdrawal, before radioactive iodine remnant ablation, in patients with low-risk differentiated thyroid cancer. The authors concluded that the cost-effectiveness of rhTSH was highly dependent on variations in the cost of rhTSH, the rates of remnant ablation, time off work, and quality of life. The methods appear to have been appropriate and were well reported. The conclusions reached by the authors appear to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to determine the cost-utility of recombinant human thyroid-stimulating hormone (rhTSH) compared with thyroid hormone withdrawal before radioactive iodine remnant ablation in patients with low-risk differentiated thyroid cancer.

Interventions
The new rhTSH intervention was compared with the usual treatment of thyroid hormone withdrawal.

Location/setting
USA/secondary care.

Methods
Analytical approach:
A Markov decision model was constructed to combine the data from published studies, to determine the cost-utility of the interventions. The Markov model cycles were one week in length and a lifetime horizon was adopted, with patients continuing in the model until death or until the model reached a steady state. The authors reported that the analysis was carried out from a societal perspective.

Effectiveness data:
The effectiveness data were identified by a systematic review in the PubMed database. This review was conducted by three authors independently and studies were chosen based on their design and if their results were robust. The main measures of effectiveness were the rate of remnant ablation and thyroid cancer recurrence.

Monetary benefit and utility valuations:
Health-related quality of life data were derived from published literature. The quality of life estimates for pre-ablation, ablation, and post-ablation states were based on published data from the Medical Outcome Study, Short Form (SF) 36 Health Survey. These data were transformed using the SF-6D Health Survey to produce the utility weights.

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

Cost data:
The direct costs included physician office visits, tests, and surgery, and they were from the Medicare reimbursement schedule. The productivity costs, arising from the loss of working days, were from the US Bureau of Labor Statistics. The price year was 2009. The costs were in US dollars ($) and they were discounted at an annual rate of 3%.

Analysis of uncertainty:
A one-way sensitivity analysis was performed on all the variables that differed between the two interventions. All the inputs of the model were varied by reasonable ranges from the literature. If no range was found in the literature review, the inputs were varied by ±5 to 10% of their base-case estimate. A 95% confidence interval for the inputs was calculated using Monte Carlo simulations. The results were presented in a tornado diagram and in line graphs.

Results
The rhTSH intervention resulted in 4.777 QALYs, while thyroid hormone withdrawal provided 4.751 QALYs. The cost per patient for rhTSH was $15,994, while the cost per patient for withdrawal was $14,629. The incremental cost per QALY gained with rhTSH compared with withdrawal was $52,554.

The sensitivity analysis showed that the results were sensitive to the amount of time taken off work by patients before ablation in the rhTSH arm, the cost of the rhTSH, the patient utility in the well state and in the first 12 weeks after thyroidectomy, and the differences in the rate of remnant ablation between the two arms. Varying the time off work resulted in cost utility ratios that ranging from $39,979 per QALY gained with no time off to $86,087 per QALY gained with 11 days off.

Authors' conclusions
The authors concluded that the cost-effectiveness of rhTSH for ablation in patients with low-risk differentiated thyroid cancer in the USA was dependent on variations in the cost of rhTSH, rates of remnant ablation, time off work, and quality of life.

CRD commentary
Interventions:
The interventions were clearly reported and appear to have been the relevant strategies in the authors' setting and the population was described.

Effectiveness/benefits:
The effectiveness data were identified by a systematic review of the literature, which should ensure that the most recent and relevant data were used. The authors reported that the study design and whether its results were robust were taken into account when selecting the effectiveness estimates, but no details of these assessments were reported. QALYs were appropriate as the main outcome measure as they capture the impact of the intervention on both length and quality of life. Some details of the method used to elicit the quality weights were given.

Costs:
The perspective was clearly reported and it appears that all the relevant costs were included. Most of the unit costs were reported, which facilitates the replication of the analysis for other settings. Other details, such as the price year and discounting, were stated.

Analysis and results:
The authors completed an appropriate incremental analysis and the full results were presented. An extensive one-way sensitivity analysis was performed, but a more complete analysis would have investigated the impact of uncertainty in two or more variables simultaneously. The authors noted some limitations to their analysis.

Concluding remarks:
The methods used throughout the evaluation appear to have been appropriate and were quite well reported. The conclusions reached by the authors appear to be valid.

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