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Cost-Effectiveness Analysis of 18F-FDG PET/CT in Detecting Suspected Recurrence or Metastasis in Well-Differentiated Thyroid Carcinoma Patients with Negative Diagnostic Total Body Scan in Thailand: A Decision Analysis

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Abstract

Objective: To evaluate cost-effectiveness analysis of 18F-FDG PET/CT to detect tumor recurrence or metastasis in well-differentiated thyroid cancer patients with high Tg but negative TBS in Thailand.

Material and Method: A retrospective literature review of 55 studies published between 1978 and 2010 was done. Decision analysis by TreeAge program showed an evaluation of the most cost-effective treatment and 18F-FDG PET/CT scan in thyroid cancer patients with high Tg but negative TBS. The incremental cost and life years gained associated with seven strategies approached were analyzed by the decision tree model. The first strategy was treatment with empirical high dose 131I therapy. The second to the seventh strategies were using imaging investigations by CT scan of neck and chest, 99mTc MIBI scan, and 18F-FDG PET/CT scan to identify recurrent, persistent, and metastatic lesions before the specific treatment via curative surgery, external radiotherapy, and high dose 131I therapy. All strategies were adopted using hospital perspective and direct medical cost was estimated based on the reference price of Siriraj Hospital. Deterministic sensitivity analysis was conducted to investigate the effect of the cost of PET/CT scan.

Results: The strategy using 18F-FDG PET/CT scan to detect recurrence or metastasis and possible curative surgery in operable cases and high dose 131I therapy in inoperable cases gave the highest life years gained of 27.08 with cost of 90,227.61 Baht (2,926.24 US dollars) and acceptable incremental cost effectiveness ratio (ICER) of 6,936.88 Baht (224.98 US dollars) per life year gained when compared to the least costly strategy using 99mTc MIBI scan and additional 18F-FDG PET/CT scan in negative MIBI result. Other strategies were dominated by this PET/CT strategy. Deterministic sensitivity analysis (based on the willingness to pay (WTP) 360,000 Baht (11,675.42 US dollars) showed that the cost of PET/CT scan has no impact on the net health benefit.

Conclusion: Based on the hospital perspective, the cost-effectiveness of 18F-FDG PET/CT scan in detecting suspected recurrence or metastasis in thyroid carcinoma patients with negative diagnostic TBS but high Tg was first done using 18F-FDG PET/CT scan to identify disease, followed by curative surgery or high dose 131I therapy. Moreover, cost of PET/CT scan did not influence the net health benefit. This PET/CT benefit is helpful for considering the proper PET/CT use for thyroid cancer in Thailand.

Keywords: Cost-effectiveness, Thyroid cancer, PET/CT scan

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