FDG PET scan strategies and long-term outcomes after first-line therapy in Hodgkin's disease

Poulou LS, Karianakis G, Ziakas PD

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
The objective was to evaluate the long-term effectiveness and costs of follow-up strategies, using fluorodeoxyglucose (FDG) positron emission tomography (PET), with or without computed tomography (CT), for patients with Hodgkin's disease, after first-line chemotherapy or chemoradiotherapy. CT restaging, followed by a FDG PET scan for those with a residual mass on the CT, was the preferred strategy. The key methods were poorly reported, which casts doubt on the validity of the results, and the conclusions should be considered with caution.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to evaluate the long-term effectiveness and costs of follow-up strategies, using fluorodeoxyglucose (FDG) positron emission tomography (PET) restaging with or without computed tomography (CT), for patients with Hodgkin's disease, after first-line chemotherapy or chemoradiotherapy.

Interventions
After first-line therapy, CT restaging was performed, followed by FDG PET, when residual mass was detected, with biopsy for positive findings from the FDG PET. This was compared with FDG PET alone, with biopsy for positive findings.

Location/setting
Greece/out-patient.

Methods
Analytical approach:
A decision-tree model was used, with a five-year time horizon and a hypothetical cohort of patients, who had received curative chemotherapy or chemoradiotherapy. Patients whose histologies were positively staged (relapsed or refractory disease) were given autologous stem cell transplantation, while all other patients were considered to be in complete remission. The authors did not explicitly state the perspective of their analysis.

Effectiveness data:
The clinical evidence came from seven studies published between 2000 and 2005. These studies had to prospectively enrol patients with newly diagnosed Hodgkin's disease, who had received first-line therapy with adriamycin, bleomycin, vinblastine, dacarbazine (ABVD), or hybrid regimens. They also had to include radiotherapy as an adjuvant option and report the complete response rates and five-year progression-free survival (PFS). The positive and negative predictive values for FDG PET were from a published meta-analysis, while those for CT were from a study of 193 patients. The main measure of effectiveness was the five-year PFS and these data were from a prospective report of patients, with biopsy-confirmed refractory Hodgkin's disease, who received autologous stem cell transplantation. The prevalence of positive FDG PET results after first-line therapy and identification of residual mass on CT, and the prevalence with no mass detected, were pooled data from six small studies published between 2001 and 2006.

Monetary benefit and utility valuations:
Not relevant.
Measure of benefit:
The measure of benefit was the percentage of patients with expected improvement in five-year PFS.

Cost data:
The direct medical costs of diagnosis and treatment were analysed and included CT scan, FDG PET scan, biopsy, and autologous stem cell transplantation. The costs were expressed in Euros (EUR) and were from local sources.

Analysis of uncertainty:
One-way and two-way sensitivity analyses were performed to assess the impact of variations in the key model parameters on the study results. Threshold analysis was performed on each variable to determine the point at which the decision altered, if it did within the specified range of values.

Results
The expected mean costs per patient were EUR 2,470 with CT before FDG PET, and EUR 4,333 with FDG PET alone, yielding a cost saving with the CT strategy of EUR 1,863. The expected five-year PFS was 83.6% with CT and 81.6% with FDG PET alone, yielding an additional improvement of 2.0% with CT. The CT strategy resulted in a cost-saving of EUR 932 per unit of improvement in PFS per patient.

One-way sensitivity analysis showed that CT before FDG PET was always the dominant (less costly and more effective) strategy for initial restaging, except when the prevalence of a positive FDG PET scan was lower than 6% or when the prevalence of a positive FDG PET scan, when a residual mass was found on CT, exceeded 40%.

Two-way sensitivity analyses on the probabilities of a residual mass and a positive FDG PET scan showed that, with a probability of a positive FDG PET scan of over 3%, CT before FDG PET was always the favoured strategy.

Authors' conclusions
The authors concluded that CT restaging after first-line therapy, with a FDG PET scan for those with a residual mass on the CT, was the preferred strategy for patients with Hodgkin’s disease. It had a maximum diagnostic yield and reduced the costs.

CRD commentary
Interventions:
The selection of the interventions was appropriate for the patient population and they were generally well described. There might have been other relevant interventions that were not considered.

Effectiveness/benefits:
The effectiveness data were from several published studies, identified by a search of the literature from 2000 to 2007, but the methods of a systematic review were not reported. It was not clear if all the best available evidence was used. For example, the trials had to report PFS data at five years, but there might have been relevant trials reporting data beyond five years. Given the impact of the interventions on long-term survival and quality of life, these limitations make it difficult to objectively judge the internal validity of the data. The benefit measure was disease specific and will be difficult to compare with the benefits of interventions for other diseases. Discounting was relevant, but was not reported.

Costs:
The authors did not clearly state the perspective and the sources of the cost estimates were not reported and no references were provided. The resource use was not presented separately from the costs and only aggregated costs were given for each of the four procedures. The price year and discounting of future costs were not reported. The reporting of the cost data was poor and this lack of detail greatly limits the generalisability of the findings.

Analysis and results:
The analytic approach was generally well described and a diagram of the model and the probabilities used were presented. Given that it was not clear how the input estimates were derived nor which sources were used, the validity of the analysis is questionable. The one- and two-way sensitivity analyses assessed some, but not all of the parameter
uncertainty; no probabilistic sensitivity analysis was conducted. The authors highlighted the key limitations and assumptions of their study, such as the development of better first-line regimens than ABVD.

Concluding remarks:
The poor reporting of the key methods of the analysis makes the validity of the results highly questionable. Due to the limitations highlighted the conclusions should be considered with caution.

Funding
Not stated.

Bibliographic details

PubMedID
18342471

DOI
10.1016/j.ejrad.2008.01.043

Original Paper URL
http://www.ejradiology.com/article/S0720-048X(08)00069-7/abstract

Indexing Status
Subject indexing assigned by NLM

MeSH
Fluorodeoxyglucose F18; Hodgkin Disease /mortality /radionuclide imaging /therapy; Humans; Longitudinal Studies; Positron-Emission Tomography /statistics & numerical data; Prevalence; Prognosis; Radiopharmaceuticals; Reproducibility of Results; Sensitivity and Specificity; Survival Analysis; Survival Rate; Treatment Outcome

AccessionNumber
22009102124

Date bibliographic record published
20/01/2010

Date abstract record published
09/03/2011