Cost-effectiveness of boceprevir add-on treatment of hepatitis C virus genotype 1 patients in Denmark
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Background

Approximately 170 million people globally are infected by hepatitis C virus (HCV). In 2013, 17,000 patients were estimated to be HCV infected in Denmark. Only half of them have been diagnosed (1). HCV may cause liver cirrhosis and other liver-related complications such as hepatocellular carcinoma (HCC), which is the leading cause of liver transplants in the United States (2, 3, 4, 5).

Of the six HCV genotypes, genotype 1 is the most common, but also the most difficult to eradicate by therapy (6, 7). In 2011, boceprevir (BOC), one of the first protease inhibitors, was approved for treatment of HCV genotype 1 infection in previously untreated and treated patients.

Objectives

The aim of this study was to evaluate the cost-effectiveness of boceprevir treatment in combination with pegylated interferon plus ribavirin (PEG+R), compared to PEG+R therapy alone, genotype 1 HCV patients, including treatment naïve as well as treatment experienced patients.

Methods

A Markov model simulating antiviral therapy and disease progression was developed to estimate lifetime healthcare costs and clinical outcomes of alternative treatment strategies. The model simulated the treatment regimens of dual therapy (PEG+R) and triple therapy (PEG+R+BOC), respectively, as recommended in the summary of product characteristics (SPC) and the Danish treatment guidelines. Data on clinical efficacy was taken from phase III clinical trials (SPRINT-2 and RESPOND-2). The model projected the expected lifetime healthcare costs and clinical outcomes in quality-adjusted life years (QALY). Costs were measured in 2012 Danish kroner (DKK) and clinical outcomes in QALY. Both costs and QALY were discounted at 3% per year.

Incremental cost-effectiveness ratios (ICER) were estimated for treatment naïve and experienced patients in comparison with PEG+R-based therapy. Deterministic and probabilistic sensitivity analyses (PSA) on clinical inputs, costs, health state utility values, and sustained virologic response (SVR) rates were performed to assess the overall decision uncertainty.

Figure 1. Boceprevir treatment duration and futility rules as recommended by SpC:

- Futility rules: discontinue all three treatments if patients have HCV_RNA >= 100 IU/ml at week 12 of detectable viral load week 24. Viral load test week 4
- Incremental probability of cost-effectiveness of PEG+R+BOC therapy compared to PEG+R of more than 65 % at a willingness-to-pay threshold of DKK 300,000 (approx. £30,000).

Results

The ICER for PEG+R+BOC therapy versus standard therapy with PEG+R was DKK 241,774 for treatment naïve HCV patients and DKK 96,371 for treatment experienced patients. PSA for treatment naïve patients showed a probability of cost-effectiveness of PEG+R+BOC therapy compared to PEG+R of more than 65 % at a willingness-to-pay threshold of DKK 300,000 (approx. £30,000).

Conclusions

From a Danish health economical perspective PEG+R+BOC therapy is cost effective in HCV genotype 1 patients to eradicate virus and to prevent development of late liver manifestations, such as cirrhosis and hepatocellular carcinoma (HCC) irrespective of previous treatment status. The result was robust to changes in the model as demonstrated by the sensitivity analyses.

References

2. The Nordic Liver Transplant Registry Annual report 2009