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Cost-effectiveness of peginterferon alfa-2a (40 kDa) plus ribavirin in patients with HIV and hepatitis C virus co-infection

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Abstract

Background: A multinational trial (APRICOT) showed that peginterferon alfa-2a (40 kDa) plus ribavirin is efficacious for treatment of HIV–HCV co-infection. The cost-effectiveness of treating these patients with peginterferon alfa-2a/ribavirin has yet to be explored from a US societal perspective.
Objective: To predict the cost-effectiveness of peginterferon alfa-2a/ribavirin with interferon/ribavirin (IFN/RBV) or no treatment in HIV–HCV co-infected patients.
Study design: A Markov model was constructed with liver progression estimates based on published literature. Sustained virological response and baseline characteristics of the reference case were based on APRICOT. Quality of life and costs in 2004 US dollars (US$) were based on literature estimates and discounted at 3%.
Results: Peginterferon alfa-2a/ribavirin compared with IFN/RBV or no treatment is predicted to increase quality-adjusted life-years (QALYs) by 0.73 and 0.94 years, respectively, in HCV-genotype-1 patients. The incremental cost-effectiveness ratio of peginterferon alfa-2a/ribavirin compared with IFN/RBV and no treatment for all patients is respectively US$ 2082 and 5187/QALY gained.
Conclusions: Anti-HCV treatment is predicted to decrease the risk of cirrhosis and increase quality-adjusted survival of HIV–HCV co-infected patients compared with IFN/RBV and no treatment. Peginterferon alfa-2a/ribavirin's cost per QALY gained relative to these options falls within the cost-effectiveness level of many health technologies commonly adopted in the US.

Keywords: HIV; Economics; Costs; Cost-effectiveness; Interferon; Peginterferon alfa-2a; Ribavirin

Abbreviations: AASLD, American Association for the Study of Liver Disease; APRICOT, AIDS Pegasys Ribavirin International Co-infection Trial; CHC, chronic hepatitis C; DC, decompensated cirrhosis; EVR, early virological response; HCV, hepatitis C virus; HCC, primary hepatocellular carcinoma; HIV, human immunodeficiency virus; ICER, incremental cost-effectiveness ratio; IFN/RBV, interferon/ribavirin; LY, life-year; NIH, National Institutes of Health; QALY, quality-adjusted life-years; SVR, sustained virological response

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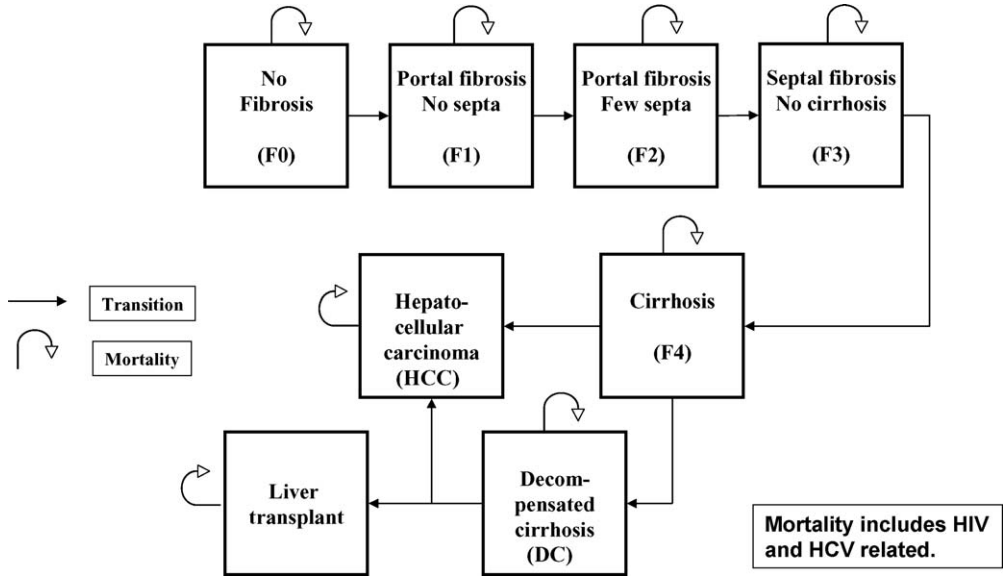

Fig. 1. Diagram of the model. Adapted from Salomon et al. (2002, 2003). Death represents the ninth state of the Markov model. The model was programmed in Microsoft® Office Excel 2003.

1. Introduction

The prognosis of HIV infection has improved dramatically since the availability of potent antiretroviral regimens (Detels et al., 1998; Marschner et al., 1998; Palella et al., 1998; Murphy et al., 2001). Consequently, patients co-infected with HIV–HCV may be at increased risk of succumbing to complications of HCV-related liver disease (Bica et al., 2001; Sulkowski and Thomas, 2003; Powderly, 2004). Indeed, observational studies suggest higher mortality in HIV–HCV co-infected patients than HIV mono-infected patients, despite appropriate antiretroviral treatment (Tedaldi et al., 2003; Backus et al., 2004). Co-infected patients also have a two- to six-fold higher rate of progression to cirrhosis than HCV mono-infected patients (Graham et al., 2001). Moreover, choosing and managing antiretroviral agents, many of which carry risks of liver toxicity, is more complicated in HCV infection.

In large, randomized, multicenter trials in patients with HCV mono-infection, sustained virological response (SVR) rates of up to 63% were achieved with peginterferon alfa-2a (40 kDa) plus ribavirin (Fried et al., 2002; Hadziyannis et al., 2004; Zeuzem et al., 2004). Also, in 2004, a multinational, randomized, placebo-controlled trial (AIDS PEGASYS Ribavirin International Co-infection Trial: APRICOT) demonstrated that SVR rates were significantly ($p < 0.001$) higher in HIV–HCV co-infected patients treated with peginterferon alfa-2a (40 kDa) plus ribavirin (40%) than patients treated with peginterferon alfa-2a (40 kDa) monotherapy (20%) and interferon alfa-2a plus ribavirin (IFN/RBV; 12%) (Torriani et al., 2004). This led to approval of peginterferon alfa-2a (40 kDa) plus ribavirin in the US and Europe for use in HIV–HCV co-infection.

Although pegylated interferon treatment represents a significant advance for HIV–HCV co-infected patients, it is more expensive than non-pegylated interferon treatment. Experts are thus advocating greater use of cost-effectiveness as a policy variable in setting funding and coverage policies (Ubel et al., 2003; Garber, 2004; Neumann et al., 2005). This study therefore aimed to contribute to these discussions by estimating incremental cost-effectiveness of peginterferon alfa-2a (40 kDa) plus ribavirin compared with either IFN/RBV or no treatment in HIV–HCV co-infected patients.

2. Methods

2.1. Design

We adapted a published Markov model of chronic hepatitis C (CHC) mono-infection to simulate disease progression in patients with HIV–HCV co-infection (see Fig. 1) (Salomon et al., 2002, 2003). Stages of liver disease were classified using the METAVIR scoring system. The model contains nine health states, following a representative patient with characteristics identical to patients eligible for treatment in APRICOT (Torriani et al., 2004). In this cost-utility analysis (Sonnenberg and Beck, 1993), we estimated the incremental cost per quality-adjusted life-year (QALY) gained from a US societal perspective.

2.2. Treatments

The model was designed to mimic the use of peginterferon alfa-2a (40 kDa) (180 μg/week) plus ribavirin (400 mg bid)