Chapter XXV

Cost-effectiveness of rHu-EPO in oncology

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Introduction

Approximately 1.3 million Americans are diagnosed with cancer every year and the various therapies they receive are often as physically trying as the cancer itself [2, 26]. Pain, nausea, infection, and anemia are common and debilitating side effects experienced by many patients undergoing chemotherapy and radiotherapy. As attention has turned toward improving the quality of life for patients undergoing treatment, many advances have been made in managing these side effects [14, 27, 33]. However, a treatment for anemia beyond traditional blood transfusions remained elusive until the introduction of recombinant human erythropoietin “rHu-EPO (epoetin alfa)”, which made it possible to aggressively treat anemia [10, 13, 14, 18, 22–24, 31].

The ability to reduce anemia is important not only because it improves the quality of life for cancer patients, but it may also reduce overall disease-related costs. A study by Barnett et al. (2000) found that the costs for a cancer patient with anemia were $106,982 compared to $68,621 for a similar patient not suffering from anemia [3]. This study suggests that significant cost savings may be realized by reducing anemia in cancer patients.

Blood transfusions and rHu-EPO are two of the options currently available to treat the anemia associated with cancer and cancer chemotherapy. Typically, transfusion use has been limited to patients with symptomatic severe or life-threatening cases of anemia in an attempt to conserve the tight supply of blood and to reduce the risks associated with transfusions including spreading HIV, hepatitis C and other blood-borne diseases [10, 17, 23, 24]. Unfortunately, these limitations have meant that until recently, patients suffering from mild to moderate cases of anemia went untreated and endured the resulting fatigue, weakness, drowsiness, and impairment of mental functioning with little hope for relief [10].
rHu-EPO is a viable option for treating anemia and is free of the risks associated with transfusions. rHu-EPO, however, is not inexpensive and concerns about the cost of therapy have limited its use [10]. To determine whether these concerns are warranted, several studies have investigated the cost-effectiveness of rHu-EPO resulting in a variety of conclusions.

**Early studies of rHu-EPO in cancer patients**

In line with the literature on cost analysis at the time, the early literature on rHu-EPO focused on cost minimization with very crude measures of effectiveness. For example, a study by Sheffield et al. (1997) showed that the cost of rHu-EPO was three times higher than transfusions for treating chemotherapy-induced anemia [30]. In that study the authors judged success by an increase in hemoglobin level, but made no distinction between the magnitude of the increases across the two study groups. Similarly, the authors considered rHu-EPO treatment ineffective if it was accompanied by at least one transfusion, even if more transfusions would have been required in the absence of rHu-EPO. Furthermore, since transfusions always increased the patient’s hemoglobin level, transfusions were considered to be 100% effective. In contrast, rHu-EPO was only considered 64% effective, since 36% of the study patients required a transfusion. From their analysis, the authors concluded that rHu-EPO was not cost effective.

Fundamentally, the authors failed to correctly assess the effectiveness of rHu-EPO, thereby producing biased results. In particular, they did not recognize that rHu-EPO typically results in a higher hemoglobin level and better quality of life for the patient [1, 9, 15, 23, 24]. Since the Sheffield study did not take these effects into account, their findings significantly understate the cost-effectiveness of rHu-EPO.

Another study by Ortega et al. (1998) relied on consumer willingness to pay in order to estimate the cost-effectiveness of rHu-EPO [28]. Ortega et al. asked a random sample of the Canadian population and cancer patients who received rHu-EPO how much they would be willing to pay in taxes to receive rHu-EPO treatment in the event of cisplatin or non-cisplatin chemotherapy. The results were interpreted as the net benefit from rHu-EPO. Cancer patients surveyed were willing to pay about $600 for the use of rHu-EPO. Canadian consumers were willing to pay about $750. The net cost of rHu-EPO was estimated at about $2800. The authors concluded that due to the high cost of rHu-EPO, it was not a wise use of Canada’s limited health care resources.

This study, like the previous one, is biased and may be of limited applicability outside the Canadian market. The cost of blood used in the study was $274 for two units, which is less than half of recent cost estimates available in the literature [4, 13]. This significantly reduces the perceived high cost of rHu-EPO treatment since fewer transfusions are required. In addition, the study did not account for lost productivity or the cost of complications.