Clinical and Economic Evaluation of an Evidence-Based Institutional Epoetin-Utilization Management Program

Mitchell S. Buckley, PharmD, BCPS[1]; Sandra L. Kane-Gill, PharmD[2]; and Shardool A. Patel, PharmD[3]

[1]Department of Pharmacy, Banner Good Samaritan Medical Center, Phoenix, Arizona; [2]Department of Pharmacy and Therapeutics, and the Center for Pharmacoinformatics and Outcomes Research, School of Pharmacy, University of Pittsburgh, Pittsburgh, Pennsylvania; and [3]Department of Pharmacy, Banner Del E. Webb Medical Center, Sun City West, Arizona

ABSTRACT

Background: Anemia is common in several patient populations, including those with chronic kidney disease, cancer, and HIV/AIDS, and may require treatment with erythropoietin-stimulating agents (ESAs). Given the potential risks of the ESA, epoetin, and the significant costs associated with this agent, a large teaching medical institution developed a the drug-utilization management program using evidence-based guidelines on appropriate use.

Objective: This study was designed to determine the clinical and financial impact of the drug-utilization management program.

Methods: This retrospective cohort study was conducted at the medical institution that implemented the program using clinical pharmacists. Patients were included if epoetin was administered during their hospital stay (evaluation period, December 1, 2010, to December 31, 2011). The rate of inappropriate epoetin prescribing and the economic impact of guideline implementation were evaluated using comparisons of data from cohorts prescribed epoetin before and after guideline implementation.

Results: Data from 796 patients were included in the analyses (pre-implementation, 496; post-implementation, 300). The proportion of patients prescribed epoetin was significantly smaller after guideline implementation (2.4% vs 1.6%; $P < 0.001$). The reduction in the total number of epoetin units administered was 45%. The significant reduction (25%) in inappropriate prescribing after guideline implementation was primarily attributed to a 17% decrease in epoetin use in nonspecific anemia. The reduction in inappropriate epoetin prescribing translated into a 23.8% reduction in costs ($P < 0.001$) associated with inappropriate epoetin use. The estimated annual cost-savings of this program was $198,352 ($16,529/mo).

Conclusion: The implementation of a drug-utilization management program using clinical pharmacists who evaluated epoetin was associated with a decrease in inappropriate epoetin prescribing and with significant cost-savings. (*Clin Ther.* 2013;35:294–302)

Key words: cost, clinical pharmacy, drug-utilization evaluation, epoetin, erythropoietin-stimulating agent.

INTRODUCTION

Anemia is a common occurrence in patients with chronic kidney disease (CKD), cancer, or HIV/AIDS.[1,2] The World Health Organization defines *anemia* as a serum hemoglobin (Hb) concentration <13 g/dL in men and <12 g/dL in women.[1] Although the pathogenesis is often multifaceted, 2 etiologies often contributing to anemia include: (1) impairment in the production of erythropoietin and (2) depletion of hematopoietic stem cells as a result of disease or drug therapy.[1,2] Clinical consequences of anemia include fatigue, decreased quality of life, lowered exercise capacity, impaired cognition, and reduced immune response.[3,4] Cardiovascular complications are manifested through worsening heart failure, left ventricular hypertrophy, and angina.[5] The management of anemia with epoetin has beneficial effects in anemic patient populations. Epoetin use has been reported to increase serum Hb concentrations, improve quality of life, and reduce transfusion requirements.[6–8] A survival benefit has been observed with

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epoetin in both CKD and cancer patients, although these findings have not been corroborated in randomized clinical trials.[9–11]

Despite the potential benefits of epoetin use in the treatment of anemia, concerns have been raised in recent years over the safety of this medication. Treatment with epoetin targeting higher Hb levels (ie, >13 g/dL) in CKD and cancer-related anemia has been associated with increased risks for death, venous thromboembolism, and stroke.[8,12–14] Other complications observed with elevated epoetin-induced Hb targets in CKD patients are an increased risk for hospitalization and worsening hypertension and renal function.[8,13] Tumor progression has been linked with high Hb levels in cancer patients.[12]

Epoetin has several potential uses in the hospital setting. The US Food and Drug Administration (FDA)-approved indications for epoetin include: (1) treatment of anemia in patients with chronic renal failure; (2) treatment of anemia in patients with cancer receiving chemotherapy; (3) treatment of anemia in HIV-infected patients on zidovudine; and (4) reduction of allogeneic blood transfusion requirements in patients undergoing surgery.[15–18] The acute management of anemia and/or bleeding in patients who are Jehovah's Witnesses represents a challenge because, due to these patients' beliefs, they do not accept blood products or transfusions.[19] In conditions in which blood-conservation techniques (eg, minimizing phlebotomy) are the mainstay of acute management, epoetin may be an alternative to blood transfusions. However, such FDA-approved indications for epoetin are lacking, and because published data on epoetin are limited to case reports and case series, the optimal epoetin regimen remains unknown.[19] Epoetin use in Jehovah's Witnesses with severe anemia or acute bleeding (eg, gastrointestinal hemorrhage, trauma, surgery) may be considered due to a lack of effective alternative treatment options.

Epoetin has beneficial effects in anemia in acute-care populations with specific indications.[15] Appropriate criteria for use in patient populations supported by the published literature should be promoted given the significant risks for adverse outcomes and costs associated with this agent. Epoetin is a common and costly medication in both an inpatient and outpatient setting.[20]

To establish objective, appropriate, evidence-based criteria for epoetin use with an opportunity for cost-savings, a drug-utilization management program was developed by a multidisciplinary task force at a large teaching medical institution (Banner Good Samaritan Medical Center, Phoenix, Arizona; a 668-bed quaternary care medical center). The task force consisted of clinical pharmacists, physicians, nurses, and hospital administrators. A thorough literature search on appropriate epoetin indications applicable to an acute care setting was performed. Team members reached a consensus on the institutional guidelines based on the evidence found in the literature search. Various medical and surgical staff committees provided input as well. The approved institutional guidelines for appropriate epoetin use were as follows: (1) anemia in CKD (dialysis or non dialysis dependent); (2) zidovudine-induced anemia in patients receiving zidovudine ≤4200 mg/wk; (3) chemotherapy-related anemia in patients currently receiving chemotherapy; (4) Jehovah's Witnesses with anemia; and (5) reduction of allogeneic blood transfusion requirements in patients scheduled to undergo elective surgery within ≥2 weeks. Despite a lack of published data, the task force determined that the use of epoetin in patients who are Jehovah's Witnesses was an appropriate indication given the limited alternative options. The indication of reduction of allogeneic blood transfusion requirements in elective surgery was also based on a task-force consensus. Although the use of epoetin for this indication may be more applicable in the outpatient setting, it was determined acceptable to start epoetin in the inpatient setting to help facilitate red blood cell production before the scheduled procedure. After approval from the pharmacy & therapeutics, and medical executive committees, these evidence-based institutional guidelines were implemented on May 31, 2011.

The institutional guidelines for epoetin use were enforced by the clinical pharmacists at Banner Good Samaritan Medical Center as a permanent clinical pharmacy target-drug program. All of the clinical pharmacists completed education and competency testing regarding appropriate-use criteria before the implementation date. They generated a daily report consisting of all active epoetin prescriptions in the hospital, together with dose, frequency, and prescription provider. It was also the clinical pharmacists' daily responsibility to evaluate the epoetin prescription for compliance with the approved institutional criteria of use in their respective patient-care areas. The pharmacist would document appropriateness of use in the