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PRACTICE REPORT

Appropriateness of anemia management in hemodialysis patients

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Iron status

Abstract The anemia of end stage renal disease (ESRD) is common and often severe complication that can be managed successfully by erythropoiesis-stimulating agents (ESA) administration.

Aims: To investigate current practice of anemia management in hemodialysis patients and to assess the appropriateness of anemia management by comparing observed practice to the Kidney Disease Outcomes Quality Initiative (KDOQI) guideline recommendations.

Settings and design: The study was conducted at two hemodialysis centers in Riyadh, Saudi Arabia. Data on anemia parameters, comorbidities, ESA dosing and iron supplementation were collected. The data were collected for 7 months retrospectively from April to the end of May 2008 and prospectively from June to October 2008. Patients who were over 18 years of age with ESRD undergoing hemodialysis were included. Patients were excluded if they have cancer or receiving chemotherapy or radiotherapy.

Results: Data were collected from 87 patients. Mean Hgb value for those patients was 11.16 ± 0.97 g/dL. Thirty-nine patients (45%) had mean Hgb values between 11.0 and 12.0 g/dL

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the target range recommended by KDOQI guideline. The mean weekly prescribed dose of erythropoietin was 8099 ± 5946 IU/Week (135 ± 99 IU/kg/Week). Information on ferritin concentrations was available for 48 (55%) patients. The mean serum ferritin concentration for those patients was 693 ± 420.5 ng/mL. Fifty-two patients had transferrin saturation (TSAT) values recorded. The mean TSAT value was 38.5 ± 19.7%. *Conclusions*: There is an opportunity to improve anemia management in hemodialysis patients particularly thorough evaluation of causes of inadequate response rate and better monitoring and management of iron status.

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1. Introduction

The anemia of end stage renal disease (ESRD) is a common and often severe complication that can be managed successfully by erythropoiesis-stimulating agents (ESA) administration (Schmid et al., 2010; Dowling, 2007; Lefebvre et al., 2006; Leaf and Goldfarb, 2009).

A study screened 480 ESRD patients from six Arabian Gulf countries including Saudi Arabia (Alsuwaida et al., 2007) and found that one-third of the surveyed patients had suboptimal hemoglobin (Hgb) levels and iron stores. The limitations of this study were that it was a one day cross sectional study and the data were limited to the available information without accessing historical notes. The purpose of our study was to determine the current practice of anemia management in hemodialysis patients over seven months. Furthermore, we assessed the appropriateness of anemia management by comparing observed practice to an evidence based clinical guidelines, the Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines and practice recommendations (National Kidney Foundation, 2007).

2. Patients and methodology

The study was conducted at two hemodialysis centers. The first is the hemodialysis center at the King Khalid University Hospital (KKUH) and the second is the Ministry of Health Centre, Prince Salman Centre for Kidney Disease (PSC), both in Riyadh, Saudi Arabia. All patients who were over 18 years of age with ESRD undergoing hemodialysis were included. Patients were excluded if they have cancer or are receiving chemotherapy or radiotherapy. Data on anemia parameters, erythropoietin dosing, iron supplementation, in addition to demographic data were collected. The data were collected over a 7 months period retrospectively from April to the end of May 2008 and prospectively from June to October 2008.

Descriptive statistics and frequency distributions were computed for all the variables. For continuous data independent samples Student's *t*-test or analysis of variance were conducted to determine any significant differences among groups as appropriate. Chi-square test was used for categorical data. Statistical significance was determined at a *p*-value lower than 0.05. All statistical analysis was performed using SPSS (version 15.00).

3. Results

3.1. Demographic and clinical characteristics of patient sample

Data were collected from 87 patients with a mean age of 50 ± 14 years. The majority of patients had been receiving hemodialysis for two or more years. The most common primary cause of end stage renal failure was diabetic nephropathy (22%). Hypertension was the most common comorbidity (76%), followed by diabetes (36%), ischemic heart disease (24%), and viral hepatitis (22%) (Table 1).

3.2. Hemoglobin level

The mean Hgb value was 11.16 ± 0.97 g/dL. Thirty-nine patients (45%) had mean Hgb values between 11.0 and 12.0 g/dL the target range recommended by KDOQI guideline. Twenty-six patients (30%) had mean Hgb values between 10.0 to 11.0 g/dL. Nine patients (10%) had mean Hgb values less than 10 g/dL. Thirteen patients (15%) exceed the recommended range (> 12 g/dL). Fig. 1 shows the distribution of patients based on Hgb values in each hemodialysis center.

3.3. Erythropoietin dose

The mean weekly prescribed dose of erythropoietin was 8099 ± 5946 IU/Week (135 ± 99 IU/kg/Week) (Table 2). The distribution of mean erythropoietin dose in hemodialysis patients from both centers is shown in Fig. 2. Fig. 3 illustrates that the erythropoietin dose decreased with increasing Hgb values. Erythropoietin was given by IV route at the end of dialysis session which is the favored route of administration in hemodialysis patients by KDOQI guideline.

3.4. Monitoring iron status

Out of 87 patients, 71 (81.6%) received iron replacement therapy all of them via the intravenous route. Information on ferritin concentrations was available for 48 (55%) patients. The mean serum ferritin concentration for those patients was 693 ± 420.5 ng/mL. Fifty-two patients had transferrin saturation (TSAT) values recorded. The mean TSAT value was 38.5 ± 19.7%. Nineteen patients had both TSAT and ferritin recorded, of them 12 (63%) were assessed as having adequate iron status, defined by KDOQI guideline as a serum ferritin concentration of ⩾200 ng/mL plus a TSAT value of ⩾20% (Table 3). Fig. 4 shows that the percentage of patients who did not meet the recommended target for transferrin saturation is higher with mean hemoglobin values < 11 g/dL. Iron status monitoring test was performed monthly in PSC and every three months in the KKUH.

3.5. Patient characteristics associated with lower hemoglobin concentrations

Factors such as albumin level and administration of intravenous iron supplementation were investigated (Table 4) and it

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