Complete Summary

GUIDELINE TITLE

NKF-K/DOQI clinical practice guidelines for anemia of chronic kidney disease: update 2000.

BIBLIOGRAPHIC SOURCE(S)

NKF-K/DOQI clinical practice guidelines for anemia of chronic kidney disease: update 2000. Am J Kidney Dis 2001 Jan;37(1 Suppl 1):S182-238. [393 references]

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
QUALIFYING STATEMENTS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY

SCOPE

DISEASE/CONDITION(S)

Anemia of chronic kidney disease

GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Treatment

CLINICAL SPECIALTY

Family Practice
Internal Medicine
Nephrology
Pediatrics

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Clinical Laboratory Personnel
Health Care Providers
Health Plans
Nurses
Patients
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

1. The primary objective of the National Kidney Foundation-Kidney Disease Outcomes Quality Initiative is to improve patient outcomes and survival by providing recommendations for optimal clinical practices, thereby increasing the efficiency of patient care, and positively impacting patient outcomes.
2. To provide evidence-based guidelines on the treatment of anemia of chronic renal failure.

TARGET POPULATION

Adult and pediatric patients with chronic kidney disease and anemia.

INTERVENTIONS AND PRACTICES CONSIDERED

1. Anemia evaluation
2. Administration of recombinant human erythropoietin

   Epoetin alfa (manufactured by Amgen Inc., Thousand Oaks, CA; distributed in the United States as Epogen[R] by Amgen, Inc., and as Procrit[R] by Ortho Biotech, Johnson and Johnson) is the only approved recombinant human erythropoietin (rHuEPO) product available in the United States.

   Epoetin beta, another recombinant human erythropoietin product with similar pharmacologic effects, is available in other countries but not the United States.

3. Intravenous or oral iron supplementation. The commercially available intravenous iron preparations consist of iron dextran, manufactured as INFeD[R] by Watson Pharmaceutical, Inc, Nephrology Division (formerly Schein Pharmaceutical, Inc) and as Dexferrum[R] by American Regent Laboratories Inc. and sodium ferric gluconate complex in sucrose (iron gluconate), manufactured as Ferrlecit by R and D Laboratories and marketed by Watson Pharmaceuticals, Inc, Nephrology Division (formerly Schein Pharmaceutical, Inc). An additional intravenous iron preparation, iron sucrose (Venofer, manufactured by American Regent Laboratories, Inc), was approved by the Food and Drug Administration in November 2000.
4. Red blood cell transfusion

MAJOR OUTCOMES CONSIDERED

- Morbidity due to anemia of chronic renal failure
- Quality of life and rehabilitation of chronic renal failure patients
- Patient survival

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

From the 1997 Guideline

Initial literature searches

With the help of a former senior subject heading specialist from the National Library of Medicine, project staff performed initial searches of four computerized bibliographic databases: The National Library of Medicine's MEDLINE(R), EMBASE, SciSearch(R), and BIOSIS(R) Previews. Staff used free text terms and controlled vocabulary, such as the NLM's Medical Subject Heading (MeSH). Searches were both general in scope for high sensitivity in identification of pertinent literature (for example, a search related to vascular access and end stage renal disease) and specific to preliminary topics selected by the Work Group Chairs for precision (for example, prevention of particular types of complications). In total 5,746 articles were identified by the initial searches.

Work Group Chairs identified the most important papers related to their topic. These papers were retrieved.

Records retrieved from the searches were transferred into topic-specific databases using Reference Manager, a commercial bibliography management software package. Staff used Reference Manager to maintain and track records throughout the process.

Mock guidelines, rationales, and question lists

To enhance both the sensitivity and specificity of the National Kidney Foundation-Kidney Disease Outcomes Quality Initiative literature review, a systematic process was employed at the July 1995 Work Group meeting to define the questions to be addressed in the literature review. The process involved three sequential tasks. First, each Work Group developed a set of "mock guideline" statements that reflected the types of recommendations they would ultimately like to develop. For example, a mock guideline related to peritoneal dialysis adequacy was:

The dose of peritoneal dialysis that is actually delivered should be measured using (method).

Next, each Work Group developed a draft chain of logic or rationale, which delineated the logical sequence of issues and assumptions that would need to be addressed in order to come to a recommendation on each guideline topic.

For example, the draft rationale related to the preceding mock guideline was:

1. _____ and _____ are currently used to measure peritoneal dialysis dose.
2. _____ is more strongly associated with patient morbidity and mortality than is _____.
3. In addition, _____ is a more reproducible measure than _____.
4. In light of these considerations, _____ is the preferred approach for measuring peritoneal dialysis dose.

Finally, each Work Group worked with staff to develop a question list to be addressed in the literature review. The answers to these questions would fill in each link in the chain of logic, which could then be used to develop the practice recommendations. Specific questions for the example above were:

1. What is the association between total weekly urea clearance x time normalized by total body water, the volume of distribution of urea (Kt/V_{urea}) and patient mortality?
2. What is the association between weekly creatinine clearance and patient mortality?
3. Does knowledge of weekly creatinine clearance provide any additional information regarding expected patient survival than does knowledge of weekly Kt/V_{urea}?

Detailed literature abstraction forms were then developed to help Work Group members extract the answers to the questions from the literature review. To the Committee's knowledge, this is the first time such an approach has been employed to focus a guideline development literature review effort. In previous guideline development efforts, expert panels have typically developed a list of questions to be addressed in the literature review without explicitly articulating the types of guideline statements they would ultimately like to issue. The result has often been that, after completing the literature review, a guideline development panel has found that it failed to address in the literature review several pertinent issues that needed to be considered to develop particular practice guidelines. By devoting considerable thought at the outset to "mock guideline" statements and the associated chain of logic that would underlie each, we were able to conduct a comprehensive, yet efficient literature review.

Complete supplemental and update searches

After determining that many pertinent papers were not identified during initial computerized searches, the Chair of each Work Group worked with staff to design supplemental computerized searches. These supplemental searches targeted the authors of important papers that had been missed and additional key words. All searches were updated through approximately September 1995. Additional pertinent articles identified by Work Group members and peer reviewers were added through June 1997.

Screening the literature

Work Group members performed the literature review. This entailed screening the literature for pertinence and then conducting a structured review.

The initial computerized searches of the literature identified 5,746 articles. Supplemental and update searches identified 5,065 more articles, and additions by Work Group members and staff yielded an additional 818 articles for a total of 11,629. To ensure that the detailed literature review process was efficient, a two-step screening process was employed to identify articles that would undergo a structured review.

In the first screen, each Work Group Chair reviewed a list of titles and abstracts obtained from the search of computerized literature databases. The Work Group Chairs were asked to eliminate articles that were clearly not relevant to the questions to be addressed in their Work Group's literature review. Work Group Chairs were instructed not to eliminate articles for any other reason, such as a belief that the journal in which the article was published was not highly regarded. Staff retrieved the full text of articles that passed the first screen.

The full text of articles that passed this first screen were then divided among Work Group members by the Work Group Chair. Work Group members were asked to read these articles and determine whether each was pertinent to the questions being addressed in the literature review or the guideline topic in general. Work Group Chairs typically assigned articles to individual Work Group members based on their expertise. During this pertinence review, two Work Group members reviewed each article and categorized articles as "key," "pertinent, but not key," or "not pertinent." Key articles were articles thought to be particularly important to the development of a particular guideline. Articles identified as either "key" or "pertinent, but not key" by at least one of the two Work Group members were then moved on to the next stage of the process, the structured review.

From the 2000 Update

Rather than conduct an exhaustive search of the articles published since 1996, the Work Group adopted a "top-down" approach, whereby the experts on the Work Groups scanned the literature and selected pertinent articles. These articles were subjected to external review, and the Work Groups selected a final list to undergo structured review.

NUMBER OF SOURCE DOCUMENTS

Summary of Literature Review for Anemia from the 1997 Guideline:

Total articles identified (searches, later additions) = 2,836

First screen: articles retrieved in full text = 841

Second screen: articles that underwent structured review = 530

Total articles cited in final report = 349

Summary of Literature Review for Anemia from the 2000 Update:

Total articles identified since the original 1997 guidelines = 130

Total articles presenting new data that supported the original guidelines, or necessitated changes in a guideline, or resulted in modification of the original rationale for a Guideline = 37

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

In addition to the structured review of the clinical content of pertinent articles that was performed as part of the Disease Outcomes Quality Initiative Guideline development process, a structured assessment of the methodologic rigor of pertinent articles was performed. In this assessment, four tasks were performed. First, the type of study design used in the study was defined and used to assign the article to a United States Preventive Services Task Force Quality of Evidence Category (see Table 3 in the companion document to the original guideline titled "Methods Used to Evaluate the Quality of Evidence Underlying the National Kidney Foundation-Dialysis Outcomes Quality Initiative Clinical Practice Guidelines: Description, Findings and Implications"[*]). Second, for each article that underwent a methods review, up to 24 aspects of study design (the exact number depended on the type of study being reviewed) were rated as being fully, partially, or not fulfilled (see Table 4 in the companion document to the original guideline titled "Methods Used to Evaluate the Quality of Evidence Underlying the National Kidney Foundation-Dialysis Outcomes Quality Initiative Clinical Practice Guidelines: Description, Findings and Implications"[*]). The sum of the scores for those aspects of study design that applied to a given article was then divided by the number of applicable questions, yielding a methods score for the article between 0 and 1. Third, the overall quality of each article that underwent a methods review was rated as excellent, very good, good, fair, or poor based on a global subjective judgment made by the methods reviewer. Finally, based on the results of these ratings, each article was assigned a grade of "a", "b", or "c". An "a" grade was assigned if at least 50% of the answers to the methods review questions that applied to the article (see Table 4 in the companion document to the original guideline titled "Methods Used to Evaluate the Quality of Evidence Underlying the National Kidney Foundation-Dialysis Outcomes Quality Initiative Clinical Practice Guidelines: Description, Findings and Implications"[*]) were answered "yes". A grade of "b" was assigned when less than 50% of the answers to methods review questions that applied to the article were answered "yes". A "c" grade was assigned to an article when at least one of the following four criteria applied to the article: (1) important demographic and/or prognostic characteristics of the enrolled sample were not described, (2) outcome measurements were not made in a similar fashion in the patient groups being compared, (3) the article received a global subjective quality rating of poor, or (4) the article was a case report. All methods reviews were performed by experienced individuals with masters or doctoral degrees in public health, epidemiology, biostatistics, or a similar discipline.

[*] See the companion document to the original guideline: Steinberg EP, Eknoyan G, Levin NW, et al. "Methods Used to Evaluate the Quality of Evidence Underlying the National Kidney Foundations-Dialysis Outcomes Quality Initiative Clinical Practice Guidelines: Description, Findings, and Implications." Am J Kidney Dis 2000 Jul;36(1):1-11. Available from the American Journal of Kidney Diseases Web site.

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Data Abstraction

Three types of data abstraction forms were used in the review process: (1) a content abstraction form designed for use in abstracting clinical data pertaining to each literature review question; (2) a methods assessment form designed to provide a rough assessment of the methodologic rigor of a paper; and (3) a detailed methods review form designed to assess the methodologic rigor of pivotal or controversial papers.

Staff used the detailed list of questions produced by the Work Groups to develop clinical content abstraction forms for each Work Group. Each detailed question posed by the Work Group was decomposed into subquestions that would capture pertinent data from studies that could vary tremendously in design, content, and presentation of data. Reviewers were asked to summarize any pertinent data from each article that were not addressed by the form and to provide comments on the overall quality of the paper. Renal fellows then pilot-tested the forms using articles identified in the search. Staff conducted conference calls with each topic-specific group of fellows following the pilot-test and reviewed issues and problems with the draft forms. In addition, feedback from Work Group Chairs was incorporated into the draft forms before finalizing them.

Structured review

Articles identified as "key" or "pertinent, but not key," underwent structured review for both clinical content and methodologic rigor. Work Group members reviewed all "key" articles. This ensured that clinical experts reviewed the most important papers, and helped inform Work Group members of the content and quality of the papers. "Pertinent, but not key" articles were reviewed by renal fellows assigned to each Work Group.

Pertinent papers with primary or secondary data also underwent a methods review which was performed by staff with training in biostatistics and/or epidemiology. In the end, 1,447 articles, or 13 percent of those identified initially, were subjected to structured review.

Synthesis

The results of the literature review were compiled and synthesized when responses lent themselves to synthesis. Responses to qualitative questions were reported verbatim in tabular format. Quantitative data were presented in tabular format, and aggregated when possible. Since most studies did not report comparable data, aggregation was possible in only a limited number of cases.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Work Groups discussed the available evidence during two meetings and formulated draft guidelines and a rationale for each. In the rationale, the evidentiary basis (specific empirical data or expert opinion) for each recommendation was made explicit. Consensus was not forced. Rather, if divergent opinions emerged, the different viewpoints, and the basis for the divergent opinions, were recorded.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

When all components of the rationale for a guideline are based on published evidence, the guideline has been labeled "Evidence."

When some or all components of a rationale are based on opinion, the guideline has been labeled "Opinion."

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

As was the case with the initial guidelines, the current guideline updates were subjected to a three stage review process.

Stage One

They were presented first to the National Kidney Foundation-Kidney Disease Outcomes Quality Initiative Steering Committee and revised in response to the comments received.

Stage Two

In the second stage, the Kidney Disease Outcomes Quality Initiative Advisory

Board, along with other experts in the field, provided comments. After considering these, the Work Group produced a third draft of the guidelines.

Third Stage
In the final stage, this draft was made available for public review and comment by all interested parties, including end stage renal disease networks, professional and patient associations, dialysis providers, government agencies, product manufacturers, managed care groups, and individuals. The comments received were reviewed and, where appropriate, incorporated in the final version of the updated guidelines.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Evidentiary Basis For Recommendations:

When all components of the rationale for a guideline are based on published evidence, the guideline has been labeled "Evidence."

When some or all components of a rationale are based on opinion, the guideline has been labeled "Opinion."

1. When to Initiate the Work-up of Anemia

   An anemia work-up should be initiated in patients with chronic kidney disease when the:

   - Hemoglobin <11 g/dL (hematocrit is <33%) in pre-menopausal females and pre-pubertal patients (Evidence)
   - Hemoglobin <12g/dL (hematocrit is <37%) in adult males and post-menopausal females (Evidence)
2. Anemia Evaluation
   A. Evaluation of anemia should consist of measurement of at least the following: (Evidence)
      - Hemoglobin and/or Hematocrit;
      - Red blood cell indices;
      - Reticulocyte count;
      - Iron parameters:
        - Serum iron
        - Total iron binding capacity
        - Percent transferrin saturation (serum iron x 100 divided by total iron binding capacity
        - Serum ferritin
      - Test for occult blood in stool.
      - This work-up should be performed before Epoetin therapy is begun. (Opinion)
3. Erythropoietin Deficiency

   If no cause for anemia other than chronic kidney disease is detected based on the work-up outlined in Guideline 2, "Anemia Evaluation," and the serum

creatinine is ≥2 mg/dL, anemia is most likely due to erythropoietin deficiency. Measurement of serum erythropoietin levels usually is not indicated. A figure [algorithm] in the original guideline document provides a guideline for the work-up of anemia in patients with a serum creatinine ≥2 mg/dL, and for those occasional patients with a lower serum creatinine and impaired renal function who have a normocytic, normochromic anemia. (Evidence)

4. Target Hemoglobin/Hematocrit for Epoetin Therapy

   The target range for hemoglobin (hematocrit) should be hemoglobin 11 g/dL (33%) to hemoglobin 12 g/dL (36%). (Evidence) This target is for Epoetin therapy and is not an indication for blood transfusion therapy. (Opinion)

5. Assessment of Iron Status

   Iron status should be monitored by the percent transferrin saturation and the serum ferritin. (Evidence)

6. Target Iron Level
   - Chronic kidney disease patients should have sufficient iron to achieve and maintain a hemoglobin/hematocrit of 11 to 12 g/dL/33% to 36%. (Evidence)

A. To achieve and maintain this target hemoglobin/hematocrit, sufficient iron should be administered to maintain a percent transferrin saturation of ≥20%, and a serum ferritin level of ≥100 ng/mL. (Evidence)

B. In hemodialysis patients in whom percent transferrin saturation is ≥20% and the serum ferritin is ≥100 ng/mL, yet the hemoglobin/hematocrit is 11 g/dL/<33%, as well as in patients requiring comparatively large doses of Epoetin to maintain a hemoglobin/hematocrit of 11 to 12 g/dL/33% to 36%, the patient's response to 1.0 g of intravenous iron given over 8 to 10 weeks should be observed. (Opinion) If in response to this course of iron there is no increase in hemoglobin/hematocrit and no increase in serum ferritin and percent transferrin saturation level, at the same dose of Epoetin, a second course of intravenous iron should be tried. (Opinion) If, in response to this second course of intravenous iron, there still is no increase in hemoglobin/hematocrit, but either the percent transferrin saturation or serum ferritin level increases, then the weekly dose of intravenous iron should be reduced to the lowest amount required to maintain the percent transferrin saturation ≥20% and serum ferritin at ≥100 ng/mL. (Opinion) If, on the other hand, in response to either of these courses of intravenous iron, there is an increase in hemoglobin/hematocrit at a constant dose of Epoetin, or a stable hematocrit at a decreased dose of Epoetin, then it is reasonable to administer 1.0g of iron intravenously over 8 to 10 weeks again in an effort to achieve and maintain the hemoglobin/hematocrit at 11 to 12 g/dL/33 to 36%. (Opinion)

C. Chronic kidney disease patients are unlikely to respond with a further increase in hemoglobin/hematocrit and/or a further reduction in Epoetin dose required to maintain a given hemoglobin/hematocrit if the percent transferrin saturation increases to≥50% and/or the serum ferritin level increases to ≥800 ng/mL. (Evidence)

7. Monitoring Iron Status
   - During the initiation of Epoetin therapy and while increasing the Epoetin dose in order to achieve an increase in hemoglobin/hematocrit, the percent transferrin saturation and the

serum ferritin should be checked every month in patients not receiving intravenous iron, and at least once every 3 months in patients receiving intravenous iron, until target hemoglobin/hematocrit is reached. (Opinion)

A. Following attainment of the target hemoglobin/hematocrit, percent transferrin saturation and serum ferritin should be determined at least once every 3 months. (Opinion)

B. Intravenous iron therapy, if given in amounts of 100 to 125 mg or less per week, does not need to be interrupted in order to obtain accurate measurements of iron parameters. (Evidence)

C. If individual doses of intravenous iron are 1,000 mg or larger, an interval of 2 weeks should occur before accurate assessment of serum iron parameters can be determined. (Evidence) Accurate assessment of iron parameters after intravenous infusion of 200 to 500 mg of iron may require an interval of 7 or more days. (Opinion)

D. In chronic kidney disease patients not treated with Epoetin and whose percent transferrin saturation is $\geq$20% and serum ferritin is $\geq$100 ng/mL, the iron status should be monitored every 3 to 6 months. (Opinion)

8. Administration of Supplemental Iron

. Supplemental iron should be administered to prevent iron deficiency and to maintain adequate iron stores so that chronic kidney disease patients can achieve and maintain a hemoglobin 11 to 12 g/dL (hematocrit 33% to 36%) in conjunction with Epoetin therapy. (Evidence)

A. If oral iron is given, it should be administered at a daily dose of at least 200 mg of elemental iron for adults and 2 to 3 mg/kg for pediatric patients. (Evidence)

B. The adult chronic kidney disease, home hemodialysis, and peritoneal dialysis patient may not be able to maintain adequate iron status with oral iron. (Evidence) Therefore, 500 to 1000 mg of iron dextran may be administered intravenously in a single infusion, and repeated as needed, after an initial one-time test dose of 25 mg. As of January 2000, it is not recommended to give these large doses of iron gluconate as a single infusion. (Opinion)

C. A trial of oral iron is acceptable in the hemodialysis patient (Opinion), but is unlikely to maintain the percent transferrin saturation >20%, serum ferritin >100 ng/mL, and hemoglobin/hematocrit at 11 to 12g/dL/33% to 36%. (Evidence)

D. To achieve and maintain a hemoglobin 11 to 12 g/dL (hematocrit of 33% to 36%), most hemodialysis patients will require intravenous iron on a regular basis. (Evidence)

E. Intravenous iron can be given on a variety of dosage schedules. If the percent transferrin saturation is <20% and/or the serum ferritin is <100 ng/mL, the Anemia Work Group recommends that, in adults, 100 to 125 mg of iron be administered intravenously at every hemodialysis for 10 to 8 doses, respectively. (Opinion) If the percent transferrin saturation remains <20% and/or the serum ferritin <100 ng/mL, another course of intravenous iron (100 to 125 mg per week for 10 to 8 weeks) is recommended. Once the patient's percent transferrin saturation is $\geq$20% and the serum ferritin is $\geq$100 ng/mL, the Anemia Work Group recommends that 25 to 125 mg of iron be given intravenously once per week. (See Guideline 6, "Target Iron Level.") (Opinion) Schedules for intravenous iron administration ranging from three times per week to once every 2 weeks are also reasonable in order to provide 250 to 1000 mg of iron within 12 weeks. (Opinion)

F. Most patients will achieve a hemoglobin 11 to 12g/dL (hematocrit of 33% to 36%) with percent transferrin saturation and serum ferritin levels <50% and <800 ng/mL, respectively. (Evidence) In patients in whom percent transferrin saturation

is ≥50% and/or serum ferritin is ≥800 ng/mL, intravenous iron should be withheld for up to 3 months, at which time the iron parameters should be re-measured before intravenous iron is resumed. (Opinion) When the percent transferrin saturation and serum ferritin have fallen to ≤50% and ≤800 ng/mL, intravenous iron can be resumed at a dose reduced by one-third to one-half. (Opinion)

G. It is anticipated that once optimal hemoglobin/hematocrit and iron stores are achieved, the required maintenance dose of intravenous iron may vary from 25 to 100 mg/week for hemodialysis patients. The goal is to provide a weekly dose of intravenous iron in hemodialysis patients that will allow the patient to maintain the target hemoglobin/hematocrit at a safe and stable iron level. The maintenance iron status should be monitored by measuring the percent transferrin saturation and serum ferritin every 3 months. (Opinion)

H. Oral iron is not indicated for the chronic kidney disease patient who requires maintenance doses of intravenous iron. (Opinion)

9. Administration of a Test Dose of Intravenous Iron

Prior to initiating intravenous iron dextran therapy, a one-time test dose of 25 mg (in adults) should be given intravenously. For pediatric patients weighing <10 kg, the test dose should be 10 mg; for pediatric patients weighing 10 to 20 kg, the test dose should be 15 mg. If no immediate allergic reaction occurs, subsequent routine doses can be given without a test dose. According to the package insert, iron dextran should be administered by slow intravenous push at a rate not to exceed 1.0 mL (50 mg, if undiluted) per minute. (Opinion)

Prior to initiating intravenous iron gluconate therapy in adults, a one-time test dose of 25 mg should be given intravenously. If no immediate allergic reaction occurs, subsequent routine doses can be given without a test dose. According to the package insert, the test dose should be diluted in 50 mL 0.9% sodium chloride for injection and administered over 60 minutes. Also, according to the package insert, iron gluconate has not been established to be safe and effective in pediatric patients.

It is recommended that the test dose and subsequent doses of iron dextran, iron gluconate, or iron sucrose be administered by personnel trained to provide emergency treatment and that there be immediate access to the medications needed for the treatment in the rare case of a serious allergic reaction.

10. Oral Iron Therapy

When oral iron is used, it should be given as 200 mg of elemental iron per day, in 2 to 3 divided doses in the adult patient, and 2 to 3 mg/kg/day in the pediatric patient. Oral iron is best absorbed when ingested without food or other medications. (Evidence)

11. Route of Administration of Epoetin

. Epoetin should be administered subcutaneously in chronic kidney disease patients and peritoneal dialysis patients. (Opinion)

A. The most effective route of Epoetin administration is subcutaneous in hemodialysis patients. (Opinion)

B. When Epoetin is given subcutaneously, the site of injection should be rotated with each administration. (Opinion)

12. Initial Epoetin Administration

. Subcutaneous Administration (Evidence)

1. When Epoetin is given subcutaneously to adult patients, the dose should be 80 to 120 units/kg/week (typically 6,000 units/wk) in two to three doses per week.

2. Pediatric patients who are younger than 5 years of age frequently require higher doses (300 units/kg/week) than older pediatric patients and adults.

A. Intravenous Administration (Evidence)

If the initial administration of Epoetin is intravenous for hemodialysis patients, the dose should be 120 to 180 units/kg/week (typically 9,000 units/wk), given in three divided doses. (Evidence)

13. Switching from Intravenous to Subcutaneous Epoetin

. For hemodialysis patients who are being switched from intravenous to subcutaneous administration of Epoetin but have not yet achieved the target hemoglobin/hematocrit, the total weekly intravenous dose should be administered subcutaneously in two to three divided doses. (Evidence)

A. For hemodialysis patients who are being switched from intravenous to subcutaneous administration of Epoetin after achieving the target hemoglobin/hematocrit, the initial weekly subcutaneous dose should be two-thirds the weekly intravenous dose. (Opinion) Subsequent dose adjustments should be made as recommended in Guideline 6, "Titration of Epoetin Dosage."

14. Strategies for Initiating and Converting to Subcutaneous Epoetin Administration

The use of the strategies listed below is suggested to increase patient acceptance of subcutaneous administration of Epoetin: (Opinion)

- When patients begin dialysis treatments, continue Epoetin administration subcutaneously
- Educate hemodialysis patients on the advantages of subcutaneous administration (improved hemoglobin/hematocrit response and economic savings).
- Establish a unit-wide policy under which all hemodialysis patients are started on subcutaneous administration at the same time.
- Use the smallest possible gauge needle for injection (for example, 29 G).
- Use a multi-dose Epoetin preparation that contains benzyl alcohol.
- Divide the doses (a smaller volume for injection may reduce discomfort).
- Administer a single, weekly injection to patients receiving a small dose.
- Rotate injection sites between upper arm, thigh and abdominal wall areas.
- Encourage patients to self-administer Epoetin when possible.

15. Monitoring of Hemoglobin/Hematocrit During Epoetin Therapy

For purposes of monitoring response to Epoetin, hemoglobin/hematocrit should be measured every 1 to 2 weeks following initiation of treatment or

following a dose increase or decrease, until a stable target hemoglobin/hematocrit and Epoetin dose have been achieved. Once a stable target hemoglobin/hematocrit and Epoetin dose have been achieved, hemoglobin/hematocrit should be monitored every 2 to 4 weeks. (Opinion)

16. Titration of Epoetin Dosage

If the increase in hematocrit after initiation of Epoetin therapy or after a dose increase has been <2 percentage points over a 2- to 4-week period, the dose of Epoetin should be increased by 50%. If the absolute rate of increase of hemoglobin/hematocrit after initiation of Epoetin therapy or after a dose increase exceeds 3 g/dL (or 8 hematocrit percentage points) per month (for example, an increase from a hemoglobin 7 to 10 g/dL or hematocrit change from 20% to 28%), or if the hemoglobin/hematocrit exceeds the target hemoglobin/hematocrit, reduce the weekly dose of Epoetin by 25%. When the weekly Epoetin dose is being increased or decreased, a change may be made in the amount administered in a given dose, and/or the frequency of dosing (if given subcutaneously). (Opinion)

17. Inability to Tolerate Subcutaneous Epoetin; Intravenous Epoetin Dose

When a hemodialysis patient is unable to tolerate subcutaneous administration of Epoetin, intravenous administration should be used. The intravenous Epoetin dose should be 50% higher than the subcutaneous dose, if known, or 120 to 180 units/kg/week (typically 9,000 units/week), given in three divided doses. (Opinion)

18. Intraperitoneal Epoetin Administration

For peritoneal dialysis patients in whom subcutaneous or intravenous administration of Epoetin is not feasible, intraperitoneal (IP) administration may be considered. Intraperitoneal administration must be done into a dry abdomen or one with a minimal amount of dialysate. Intraperitoneal dose requirements may be higher than those associated with intravenous or subcutaneous administration. (Evidence)

19. Epoetin Dosage Perioperatively or During Intercurrent Illness

A decision to continue or increase the Epoetin dose must be made on an individual basis in patients receiving Epoetin who undergo surgery, develop significant acute intercurrent illness, or require transfusion of red blood cells for acute blood loss. (Opinion)

20. Causes for Inadequate Response to Epoetin

The most common cause of an incomplete response to Epoetin is iron deficiency. In the iron-replete patient with an inadequate response to Epoetin, the following conditions should be evaluated and treated, if reversible: (Evidence)

0. Infection/inflammation (e.g., access infections, surgical inflammation, AIDS, systemic lupus erythematosus)
1. Chronic blood loss
2. Osteitis fibrosa
3. Aluminum toxicity
4. Hemoglobinopathies (e.g., alpha and beta thalassemias, sickle cell anemia)
5. Folate or vitamin B12 deficiency
6. Multiple myeloma
7. Malnutrition
8. Hemolysis

21. When to Obtain a Hematology Consultation

If Epoetin resistance occurs in the absence of the conditions listed in Guideline 20, "Causes for Inadequate Response to Epoetin," a hematology consultation is recommended. (Opinion)

22. Epoetin-Resistant Patients

Anemia in Epoetin-resistant patients should be treated in a manner similar to that in which dialysis patients were treated before recombinant human erythropoietin was available. (Opinion)

23. Red Blood Cell Transfusions in Patients with Chronic Renal Failure

Red blood cell transfusions are indicated in:

. The severely anemic patient with recognized symptoms or signs due to the anemia, e.g., the patient with acute blood loss associated with hemodynamic instability. (Opinion)

A. The Epoetin-resistant patients who has chronic blood loss. (Opinion)

24. Possible Adverse Effects Related To Epoetin Therapy: Hypertension

Blood pressure should be monitored in all patients with chronic kidney disease, particularly during initiation of Epoetin therapy. Initiation of anti-hypertensive therapy or an increase in anti-hypertensive medication and reduction in Epoetin dose if there has been a rapid rise in hemoglobin/hematocrit, may be required to control an increase in blood pressure related to Epoetin therapy. (Evidence)

25. Possible Adverse Effects Related To Epoetin Therapy: Seizures

There is no need to restrict patient activities due to a concern about new onset seizures or a change in seizure frequency in patients being treated with Epoetin. A prior history of seizures is not a contraindication for Epoetin use. (Evidence)

26. Possible Adverse Effects Related To Epoetin Therapy: Increased Clotting Tendency

. There is no need for increased surveillance of access thrombosis in hemodialysis patients with either native fistulae or synthetic grafts when patients are treated with Epoetin. (Evidence)

A. Epoetin-treated hemodialysis patients do not need more heparin than patients not treated with Epoetin. (Evidence)

27. Possible Adverse Effects Related To Epoetin Therapy: Hyperkalemia

Epoetin-treated hemodialysis patients do not need more intensive potassium monitoring than patients not treated with Epoetin. (Evidence)

CLINICAL ALGORITHM(S)

An algorithm is provided in the guideline document for anemia work-up for chronic kidney disease patients.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

Evidentiary Basis for Guidelines

The National Kidney Foundation-Kidney Disease Outcomes Quality Initiative guidelines were developed using an evidence-based approach similar to the one used by the Agency for Healthcare Research and Quality (AHRQ) (formerly the Agency for Health Care Policy and Research [AHCPR]). That is, before formulating recommendations, the Work Groups reviewed all published evidence pertinent to the topics being considered, and critically appraised the quality and strength of that evidence. For many issues that the National Kidney Foundation-Kidney Disease Outcomes Quality Initiative Work Groups chose to address, there either was no pertinent literature available, or available evidence was flawed or weak. As a result, in many instances the Work Groups formulated their recommendations based on the opinions of the Work Group members and comments received from the peer reviewers. In all instances, the Work Groups have documented the rationale for their recommendations. That is, they have articulated each link in the chain of logic they used as the evidentiary or opinion-related basis for their recommendation. This approach will help readers of the National Kidney Foundation-Kidney Disease Outcomes Quality Initiative guidelines determine the quantity and quality of evidence underlying each recommendation.

Although some of the National Kidney Foundation-Kidney Disease Outcomes Quality Initiative guidelines are clearly based entirely on evidence or entirely on opinion, many are based in part on evidence and in part on opinion. Such "hybrid" guidelines arise when some (or even most) of the links in the chain of logic underlying a guideline are based on empirical evidence, but some (that is, at least one) are based on opinion. The opinion of the Work Group members can enter the chain of logic that supports a guideline either to fill in a gap in available evidence on some scientific or clinical issue, or in the form of a value judgment regarding what they feel is appropriate clinical practice based on available evidence. Thus, many opinion-based guidelines may have substantial empirical evidence underlying them.

To help readers determine the basis for each guideline, the Work Groups have provided their rationale for each guideline. When all components of the rationale for a guideline are based on published evidence, the guideline has been labeled "Evidence." When some or all components of a rationale are based on opinion, the guideline has been labeled "Opinion."

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Decreased morbidity due to anemia of chronic kidney disease
- Improved survival
- Improved quality of life

POTENTIAL HARMS

- The authors address the following possible adverse effects associated with Epoetin that were identified in the initial clinical trials, most of which were uncontrolled:
    - Hypertension: In the authors' review of 47 publications, 785 of a total of 3,428 patients (approximately 23%) developed hypertension or an increase in blood pressure during treatment with Epoetin.
    - Seizures: Among ten studies which analyzed the incidence of seizures among patients receiving Epoetin, the mean percentage of patients with seizures was 3% (59 of 2,203 patients), with a range of 0% to 13%. None of these studies reported the presence or absence of seizure history prior to the use of Epoetin. There is only one controlled study which has examined the incidence of seizure activity in dialysis-dependent end-stage renal disease patients in the absence of Epoetin therapy. In this study, one out of 20 patients (5%) not on Epoetin had a seizure. Except in the case of patients with hypertensive encephalopathy, there appears to be no evidence of an increased risk of seizures in chronic kidney disease patients treated with Epoetin when appropriate dosage and titration recommendations are followed. Use of Epoetin in the patient with a prior history of seizures is not contraindicated since there is no evidence of an increase in the risk of seizure in end-stage renal disease patients receiving Epoetin therapy.
    - Access thrombosis: In the authors' review of 26 studies in which 4,110 hemodialysis patients were enrolled, the average incidence of thrombosis of any access in patients on Epoetin was 7.5%. No difference was reported in the rate of access thrombosis in one study that compared patients receiving and not receiving Epoetin. There is evidence that Epoetin therapy does not increase the risk of progressive stenosis in native fistula. The evidence that Epoetin therapy increases the risk of polytetrafluoroethylene graft thrombosis is equivocal.
    - Heparin dose: There are many studies indicating that clotting function improves as the hematocrit increases to above 30% in dialysis patients. However, there is no evidence from the large, North American multicenter studies that increasing the red blood cell mass with Epoetin increases dialyzer heparin requirements, although a 20% to 40% increase in heparin requirements was noted in one European study.

    - Hyperkalemia: The authors' review of five papers with a cumulative total of 1,167 patients revealed only 12 cases of hyperkalemia. In the two series accounting for 1,000 patients, the incidence of hyperkalemia was less than 1%. When patients receiving Epoetin were compared to patients not receiving Epoetin, the incidence of hyperkalemia in Epoetin-treated patients was less than or equal to the incidence in non-Epoetin-treated patients in two of the three studies.
- The safety of intravenous iron dextran, iron gluconate, and iron sucrose must be considered before recommending their routine use in adult or pediatric patients as part of the overall approach to the management of anemia of chronic kidney disease. There are very few large-scale studies that have examined the incidence of adverse effects associated with these preparations. The incidence of life-threatening/serious acute reactions to intravenous iron dextran has been reported to be 0.65% (3 of 471 general patients) and 0.7% (4 of 573 dialysis patients). Because patients may have a serious adverse reaction to intravenous iron dextran after having received intravenous iron dextran without incident in the past, and because patients who have a serious adverse reaction to intravenous iron dextran tend not to receive intravenous iron dextran again, the rate of serious or potentially life-threatening adverse reactions to intravenous iron dextran, as a proportion of injections, rather than patients, is even smaller-approximately 0.1%. Although this incidence is low, it suggests that 1,200 life threatening/serious acute reactions could occur in the current 200,000 hemodialysis patients in the United States if all received intravenous iron dextran.
- Delayed reactions to intravenous iron dextran, characterized by arthralgias and myalgias, are dose-related and rarely occur with doses of 100 mg or less. By contrast, as many as 59% of patients experience the arthralgia-myalgia syndrome after total dose infusion. Occurrence of an arthralgia-myalgia reaction should prompt a decrease in the dose of intravenous iron dextran administered. Low dose administration, however, may require more frequent dosing to maintain optimum iron status. Although arthralgias and myalgias have been reported with iron gluconate, these are acute, rather than delayed, and are likely attributable to the same mechanism as the arthralgias and myalgias associated with iron dextran. The relationship of arthralgias and myalgias to the rate of administered or total dose of iron gluconate has not been examined.
- Use of ferric sodium gluconate may rarely be associated with hypotension and flushing, loin pain and intense upper gastric pain, the latter without hypotension.
- Anaphylaxis-like reactions occur in fewer than 1% of iron dextran or iron gluconate administrations. Fatalities associated with the use of iron dextran are rare and have not been reported in association with the use of iron gluconate.
- One report on iron sucrose (Venofer) noted that if transferrin levels were less than 180 mg/dL, free iron might occur if 100 mg of iron saccharate were administered. The administration of doses of 10, 20, or 40 mg of iron saccharate did not result in free iron.

Subgroups Most Likely to be Harmed:

1. A history of multiple drug allergies is associated with increased risk of an acute iron dextran reaction, but a similar association has not been reported for iron gluconate.
2. An uneventful response to either iron dextran or iron gluconate does not preclude an adverse reaction to the other agent or to repeated administration of the same agent. There is no evidence that acute, anaphylaxis-like reactions to iron dextran or iron gluconate are less severe after a 25 mg test dose than after a therapeutic 100 or 125 mg dose. For iron dextran, most patients who suffer severe acute reactions have successfully received both a test dose and multiple therapeutic doses in the past.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

From the 1997 Guideline

- These guidelines are based upon the best information available at the time of publication. They are designed to provide information and assist decision making. They are not intended to define a standard of care, and should not be construed as one. Neither should they be interpreted as prescribing an exclusive course of management. Variations in practice will inevitably and appropriately occur when clinicians take into account the needs of individual patients, available resources, and limitations unique to an institution or type of practice. Every health-care professional making use of these guidelines is responsible for evaluating the appropriateness of applying them in the setting of any particular clinical situation.
- Some of the practices recommended in these guidelines are at variance with current policy of the Health Care Financing Administration (HCFA)* and with information contained in the package inserts for Epoetin and iron dextran. In these instances, the Anemia Work Group believes there is sufficient published scientific data to justify its recommendations.
- There is little information in the literature which clearly establishes the upper limit of safety for serum ferritin in patients receiving intravenous iron therapy.
- There are insufficient data in the literature to make a recommendation for a specific site of administration of Epoetin. Therefore, it would seem prudent to rotate the site of injection with each administration.
- There are no reported studies which have systematically compared different Epoetin dose adjustment protocols. Therefore, a single most effective and/or cost-effective protocol cannot be based on data reported in the medical literature. The dose adjustment strategies the Anemia Work Group recommends are similar to those which have been used safely and effectively in clinical trials.

From the 2000 Update

- While extensive effort has gone into the guideline development process, and careful attention has been paid to detail and scientific rigor, it is absolutely essential to emphasize that these documents are guidelines, not standards or mandates. Each recommendation in the guidelines is accompanied by a rationale, enabling caregivers of patients with chronic kidney disease to make

informed decisions about the proper care plan for each individual patients. Variations in practice are expected and can be appropriate.

- A new erythropoietin-like molecule, called NESP, or novel erythropoietic stimulating protein (manufactured by Amgen, Inc), is being used in clinical trials and as of July 2000 is being reviewed by the Food and Drug Administration. There have been no peer-reviewed clinical studies published about this molecularly engineered hormone prior to January 2000 when the structure literature review of this update was closed.
- The Work Groups recommends that a work-up of anemia be initiated when the hemoglobin/hematocrit level declines to approximately 80% of the mean level for defined healthy, normal subgroups (for example, in females, 80% of hematocrit 41 = hematocrit 33; in males, 80% of hematocrit 47 = hematocrit 37). Anemia is likely to be present in individuals when hemoglobin/hematocrit concentrations are below these levels. However, the mean hemoglobin/hematocrit in the general population is only a statistical benchmark and may not be the best indication of anemia in every individual.
- Additional studies are needed to clarify the relationship between hemoglobin/hematocrit and outcomes in chronic kidney disease patients, particularly those with heart disease. Such studies should be designed to determine the highest hemoglobin/hematocrit that provides incremental benefits without serious side effects. Several multicenter studies addressing this question are in progress outside the United States. A study determining whether the "prevention" of anemia and its associated adverse effects could also be of value, since one of the aims of treating anemia is to prevent or retard the development of heart disease.
- Since there are so little data published concerning the possible adverse effects of intravenous iron preparations, the Anemia Work Group recommends the establishment of a registry for monitoring the incidence of severe, acute, adverse reactions to intravenous iron in chronic kidney disease patients. Such a registry should be designed by a committee of clinical, scientific, and methodological experts, maintained by parties, such as National Kidney Foundation-Kidney Disease Outcomes Quality Initiative without an economic interest in parenteral iron or Epoetin therapy, and used to provide periodic, published reports.
- There are no reported studies that have systematically compared different protocols (that is, different frequencies of hemoglobin/hematocrit measurements) for monitoring the hemoglobin/hematocrit response to Epoetin therapy. Therefore, a single most clinically and/or cost-effective protocol cannot be based on data reported in the medical literature.

[*] NGC Editor's note: As of July 1, 2001, the Health Care Financing Administration became the Centers for Medicare and Medicaid Services.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

National Kidney Foundation-Kidney Disease Outcomes Quality Initiative Implementation Planning

Based on broad-based input and careful thought, the National Kidney Foundation-Kidney Disease Outcomes Quality Initiative leadership has decided to undertake three types of activities to promote implementation of its recommendations.

- Translating recommendations into practice. National Kidney Foundation-Kidney Disease Outcomes Quality Initiative will develop core patient and professional education programs and tools to facilitate the adoption of their recommendations.
- Building commitment to reducing practice variations. National Kidney Foundation-Kidney Disease Outcomes Quality Initiative will work with providers and insurers to clarify the need for and the benefits of changes in practice patterns and to encourage the adoption of the guidelines.
- Evaluation. National Kidney Foundation-Kidney Disease Outcomes Quality Initiative will develop performance measures that can be used to assess compliance with the Disease Outcomes Quality Initiative practice guidelines. In addition, the association between compliance with the Disease Outcomes Quality Initiative guidelines and patient outcomes will be evaluated in an effort to validate and improve the guidelines over time.

IMPLEMENTATION TOOLS

Clinical Algorithm

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

NKF-K/DOQI clinical practice guidelines for anemia of chronic kidney disease: update 2000. Am J Kidney Dis 2001 Jan;37(1 Suppl 1):S182-238. [393 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1997 (updated 2000)

GUIDELINE DEVELOPER(S)

National Kidney Foundation - Disease Specific Society

SOURCE(S) OF FUNDING

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GUIDELINE COMMITTEE

NKF-K/DOQI (National Kidney Foundation-Kidney Disease Outcomes Quality Initiative) Anemia Working Group

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Anemia Work Group Members: Joseph Eschbach, MD, Work Group Chair; Peter DeOreo, MD, Work Group Vice-Chair; John Adamson, MD; Jeffrey Berns, MD; Geraldine Biddle, RN, CNN; Thomas Comstock, PharmD; Kathy Jabs, MD; J. Michael Lazarus, MD; Allen Nissenson, MD; John Stivelman, MD; David Van Wyck, MD; Jay Walsh, MD

K/DOQI Co-Chairs: Garabed Eknoyan, MD; Nathan W. Levin, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

All Work Group members completed a disclosure statement certifying that any potential conflict of interest would not influence their judgement or actions concerning the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (NKF-K/DOQI).

Peter DeOreo, MD, FACP is an internist and consulting nephrologist for University MedNet.

Jeffrey Berns, MD, FACP, reported receiving research grant funding from Amgen, Inc. and R&D Laboratories, Inc. and has received lectureship honoraria from Schein Pharmaceuticals.

Kathy Jabs, MD, is a member of the speaker´s bureau for Schein Pharmaceuticals.

Allen Nissenson, MD, has consulted for Rand Corporation on end stage renal disease (ESRD) reimbursement and Baxter Healthcare Corporation on peritoneal dialysis.

GUIDELINE STATUS

This is the current release of the guideline. It updates a previously issued version of the guideline (Clinical practice guidelines for the treatment of anemia of chronic renal failure. New York [NY]: National Kidney Foundation; 1997. 183 p. [Dialysis outcomes quality initiative (DOQI)]).

GUIDELINE AVAILABILITY

Electronic copies: Available from the National Kidney Foundation (NKF) Web site.

Print copies: Available from NKF, 30 East 33rd St., New York, NY 10016. These guidelines are also available on CD-ROM from NKF.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Eschbach, JW. Treatment of anemia of chronic kidney disease. Executive summary. 2001. Available from the National Kidney Foundation (NKF) Web site.
- Steinberg EP, Eknoyan G, Levin NW, Eschbach JW, Golper TA, Owen WF, Schwab S. Methods used to evaluate the quality of evidence underlying the National Kidney Foundation-Dialysis Outcomes Quality Initiative clinical practice guidelines: description, findings and implications. Am J Kidney Dis 2000 Jul;36(1):1-11.
- Eknoyan G, Levin NW, Eschbach JW, Golper TA, Owen WF Jr, Schwab S, Steinberg EP. Continuous quality improvement: DOQI becomes K/DOQI and is updated. National Kidney Foundation's Dialysis Outcomes Quality Initiative. Am J Kidney Dis 2001 Jan;37(1):179-94. Available from the NKF Web site.

Print copies: Available from NKF, 30 East 33rd St., New York, NY 10016.

PATIENT RESOURCES

The following patient information is available.

- Getting the most from your treatment. What you need to know about anemia. New York (NY): National Kidney Foundation (NKF), 1998.

Print copies: Available from NKF, 30 East 33rd St., New York, NY 10016.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC STATUS

This summary was completed by ECRI on September 1, 2001. The information was verified by the guideline developer as of November 19, 2001.

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