Economic Benefits of Less Frequent Dosing of Erythropoietic Stimulating Proteins in Patients on Dialysis

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BACKGROUND

- Anemia is common in patients with end stage renal disease (ESRD) and is typically treated in dialysis facilities using an erythropoiesis stimulating agent (ESA).
- Erythropoiesis stimulating agents such as epoetin alfa required treatment to be administered multiple times per week (eg, thrice weekly [TIW]). Darbepoetin alfa, a longer-acting ESA, requires less frequent dosing at either weekly (QW) or every other week (Q2W) dosing in the dialysis population.[1-3]
- Less frequent dosing using darbepoetin alfa is based on an initial conversion ratio of 200 IU:1 mcg epoetin:darbepoetin alfa, per the approved label in Europe.[4] This has achieved savings in doses (~20%) needed to achieve comparable Hb outcomes (11 g/dL< [Hb] < 13 g/dL).[5,6]
- Previous studies have focused on the time needed for ESA administration at dialysis facilities.[7] However, the total operational costs associated with ESA delivery using different dosing frequencies (TIW, QW, or Q2W) in ESRD patients have not been adequately studied.

OBJECTIVES

- To characterize the entire process of ESA delivery, from the initial drug order placement to the incineration of waste products after ESA administration.
- To evaluate the impact of changing from the current distribution of ESA products and dosing frequencies to less frequent dosing (Q2W) using darbepoetin alfa in European patients undergoing dialysis.

METHODS

- The Mercurius study was conducted at multiple facilities throughout Europe. Here, we report preliminary results from 83 patients at 1 center in Switzerland and from 707 patients at 1 center in France.
- The general process for ESA administration is shown in Figure 1.
- Structured interviews with facility staff were used to develop a comprehensive list of processes that are associated with and routinely followed during the administration of ESAs to ESRD patients (Figure 2). This includes activities specific to the ordering of the drug, the administering of the drug to patients, and the disposing of waste products after administration of the drug.
- Activities were evaluated to determine if less frequent dosing affected the amount of time needed or the quantity of materials used during the entire process of ESA administration.
- The time and materials associated with each activity were measured by observing each activity on multiple occasions within each study center.
- Labor costs were derived from actual fully loaded wages for the staff involved in each activity. These costs were then applied to the amount of time required for the staff member to complete each activity.
- Material costs were abstracted directly from the facilities' accounting records.
- The changes in costs from the current treatment paradigm to Q2W dosing are summarized. A sensitivity analysis presenting the potential cost reductions as a function of the range of dosing frequencies is also presented.
- Swiss frances (CHF) were converted to Euros (€) using an exchange rate of 1 € = 1.56 CHF.

Figure 1. Administration of Erythropoietic Stimulating Agents in ESRD Patients

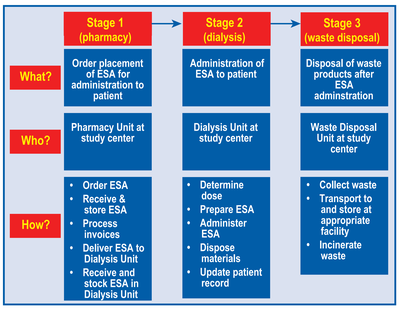
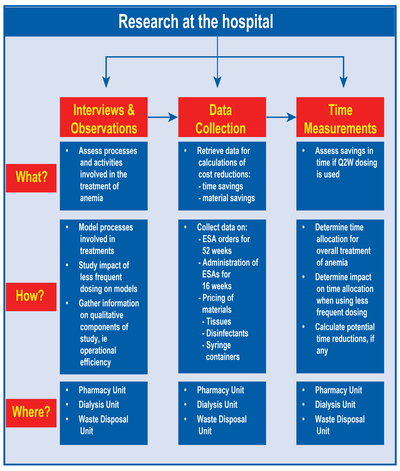


Figure 2. Data Collection Methodology



RESULTS

Dosing Frequency of ESAs

- In the current situation, most patients were receiving an ESA one or more times each week.
- The most frequently used regimen was QW, with 48% of Swiss patients and 47% of French patients receiving QW ESA treatment.
- The dosing frequency distributions are shown in Figures 3a (by facility) and 3b (by ESA).

Figure 3a. Dosing Frequency - by Facility

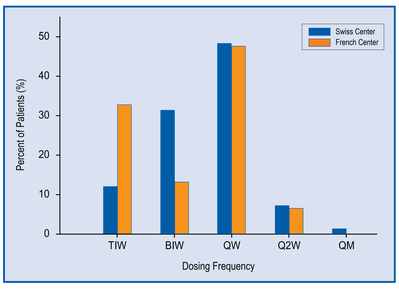
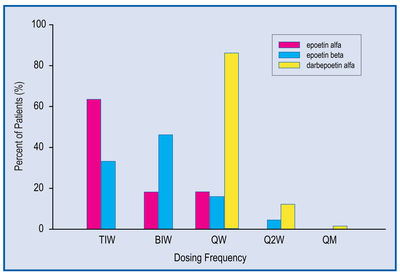


Figure 3b. Dosing Frequency - by ESA Administered to Patients



Cost Associated With ESA Delivery

- The majority of costs associated with ESA delivery was concentrated in the Dialysis unit, in particular the costs of labor at the Unit itself (Tables 1a and 1b).
- The current cost structures at both study centers appeared to be different, but both were positively associated with the number of patients treated. The French study center appeared to be achieving economies of scale in the delivery of ESAs to patients.
- At both sites, costs associated with labor and materials were predicted to decline with less frequent ESA administration (Figure 4).
- The largest reductions were found in the labor costs at the Dialysis unit due to the length of time required to prepare and administer the ESA injection to a patient and also due to the required meticulous accounting of the ESA at the French study center (as required by French regulations).
- Cost reduction in materials within the Dialysis unit were driven by decreases in:
  - amount of disinfectant liquid (French center)
  - amount of disinfectant liquid and tissues (Swiss center)

Table 1a. Annual Variable Costs Associated With ESA Administration Using Current Dosing Regimens

Study Center/ Operating Unit	Annual Operating Costs (€) Labor	Material	Total
Swiss Study Center (N = 83)			
Pharmacy	923.53	N/A	923.53
Dialysis	13,662.69	4,008.97	17,671.66
Waste Disposal	0.84	10.39	11.23
TOTAL	***14,587.06***	***4,019.36***	***18,606.42***
French Study Center (N = 707)			
Pharmacy	15,755.02	N/A	15,755.02
Dialysis	69,428.37	2198.03	71,626.40
Waste Disposal	N/A	83.41	83.41
TOTAL	***85,183.39***	***2,281.44***	***87,464.83***

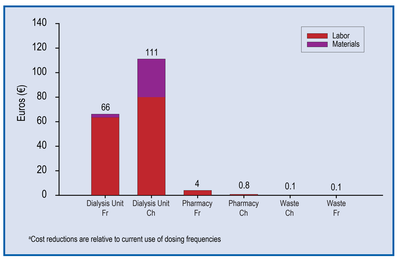
N/A = Not applicable

Table 1b. Annual Variable Per Patient Costs Associated With ESA Administration Using Current Dosing Regimens

Study Center/ Operating Unit	Operating Costs (€) Labor	Material	Total
Swiss Study Center (N = 83)			
Pharmacy	11.12	N/A	11.12
Dialysis	164.61	48.30	212.91
Waste Disposal	0.01	0.13	0.14
TOTAL	***175.74***	***48.43***	***224.17***
French Study Center (N = 707)			
Pharmacy	22.28	N/A	22.28
Dialysis	98.20	3.11	101.31
Waste Disposal	N/A	0.12	0.12
TOTAL	***120.48***	***3.23***	***123.71***

N/A = Not applicable

Figure 4. Estimated Annual Variable Cost Reductions Per Patient Using Q2W Dosing[a]



[a]Cost reductions are relative to current use of dosing frequencies

Estimated Cost Reductions With Q2W Dosing

- The maximal cost reductions were found when ESA administration was reduced from TIW to Q2W dosing (Figure 5a).
- The decrease of ESA administration from QW to Q2W dosing also resulted in cost reductions, but less than that observed when dosing was reduced to Q2W from the TIW regimen (Figure 5b).

Figure 5a. Estimated Annual Variable Cost Reductions per Patient After Switching From TIW to Q2W Dosing

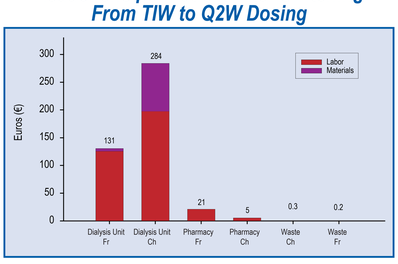
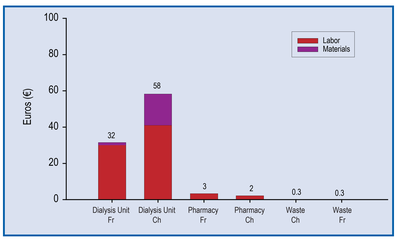


Figure 5b. Estimated Annual Variable Cost Reductions Per Patient After Switching From QW to Q2W Dosing



DISCUSSION

- There are quantifiable labor and material cost benefits associated with less frequent dosing of ESAs in the European anemic dialysis population.
- Total costs of ESA administration may be reduced by converting to darbepoetin alfa Q2W administration.
- The primary drivers of cost reduction due to less frequent dosing are labor and material costs at the Dialysis Unit.

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