Journal of Medical Economics, 2009; 12(2): 1–10

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healthcare

ORIGINAL RESEARCH

Less frequent dosing of erythropoiesis stimulating agents in patients undergoing dialysis: a European multicentre cost study

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Abstract

Objective: To calculate the variable costs involved with the process of delivering erythropoiesis stimulating agents (ESA) in European dialysis practices.

Methods: A conceptual model was developed to classify the processes and sub-processes followed in the pharmacy (ordering from supplier, receiving/storing/delivering ESA to the dialysis unit), dialysis unit (dose determination, ordering, receipt, registration, storage, administration, registration) and waste disposal unit. Time and material costs were recorded. Labour costs were derived from actual local wages while material costs came from the facilities' accounting records. Activities associated with ESA administration were listed and each activity evaluated to determine if dosing frequency affected the amount of resources required.

Results: A total of 21 centres in 8 European countries supplied data for 142 patients (mean) per hospital (range 42–648). Patients received various ESA regimens (thrice-weekly, twice-weekly, once-weekly, once every 2 weeks and once-monthly). Administering ESA every 2 weeks, the mean costs per patient per year for each process and the estimates of the percentage reduction in costs obtainable, respectively, were: pharmacy labour (€10.1, 39%); dialysis unit labour (€66.0, 65%); dialysis unit materials (€4.11, 61%) and waste unit materials (€0.43, 49%).

Limitation: Impact on financial costs was not measured.

Conclusion: ESA administration has quantifiable labour and material costs which are affected by dosing frequency.

Key words: *administration; cost savings; erythropoiesis stimulating agents; Europe; haemodialysis*

Introduction

Erythropoesis stimulating agents (ESAs) have markedly improved the management of anaemia secondary to chronic kidney disease (CKD) as well as the quality of life of patients. A key factor affecting the indirect costs of anaemia management with ESAs is the dosing schedule. Darbepoetin alfa is administered either weekly (QW) or every 2 weeks (Q2W) for patients undergoing haemodialysis[1,2]. Two European studies have demonstrated improved operational efficiency by extending the dosing intervals in patients with CKD by switching patients from epoetin alpha to darbepoetin alfa treatment[3,4]. The benefits of less frequent dosing are not just limited to healthcare personnel. In a study of patients with CKD not on dialysis, patients and their families were also positively affected with respect to routine anaemia management when ESAs were administered at extended intervals in the physician's office[5].

Due to budget constraints, the cost of any treatment is coming under scrutiny by healthcare providers all over the world and ESA treatment is no exception. Canadian estimates of the non-acquisition costs of subcutaneous ESA therapy in a haemodialysis unit have shown a substantial annual cost burden to healthcare providers, and have underlined the importance of activity-based costing that accounts for the time taken preparing and administering the drug and for monitoring therapy[6].

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ISSN 0785-3890 print/ISSN 1365-2060 online © Informa UK Ltd
DOI: 10.3111/13696990902925416

To investigate the situation further, this study was conducted to calculate the costs involved with the entire process of ESA delivery in Europe, from the initial drug order placement to the incineration of the ESA syringe. We wanted to find out whether cost savings would be possible with Q2W dosing. Here we present the results of the first study conducted in eight European countries that describes the whole process of ESA delivery at each study centre. We believe that the results of this study may help establish a benchmark for sharing best practice among European haemodialysis centres.

Methods

Study design

The study was designed to measure all possible quantitative and qualitative advantages for the hospital or the haemodialysis centre associated with reducing the frequency of administering ESA. The quantitative aspect of the study included the time and material cost savings of the processes related to the administration of ESA in four departments: the pharmacy, dialysis unit, waste unit and back-office (Figure 1). The qualitative advantages included the organisational efficiency advantages, logistic efficiency advantages and process improvement.

The determination of the advantages of Q2W dosing was estimated for two dosing scenarios: firstly, the current ESA dosing situation and then switch to darbepoetin alfa administered Q2W, and secondly, epoetin administered thrice-weeky (TIW) and then switch to darbepoetin alfa Q2W. For the epoetin to darbe poetin alfa conversion, the recommendation stated in the Aranesp* Summary of Product Characteristics of 200:1 was applied.

Data collection

Data were collected via interviews with relevant stakeholders of haemodialysis, observations at the four departments, and time measurements of the activities (Figure 2). From the information gathered from the interviews and observations, a generic process model was developed to classify the processes and sub-processes routinely followed in the pharmacy (ordering from supplier, receiving and storing and delivering ESA to the dialysis unit) and in the dialysis unit (dose determination, ordering procedures, receipt and storage of ESAs and ESA administration). The generic process flow was used to develop the hospital specific process flow. Based on interviews and observations, we were able to identify which activities are influenced by a change in the frequency of administering ESA treatment.

Input data

For the processes and activities affected by less frequent ESA dosing, time measurements were made that, together with the other data collected for material costs, formed the input for the calculation of the time and material savings. Time measurements were made with a stopwatch by independent researchers and several measurements were taken at random for each individual involved in a process. Every single step (e.g., taking syringe – opening package – taking out disinfec tion tissue – opening package and so on) in a process (e.g., administer ESA) was observed and measured. The average time was calculated for every step measured.

The order data, distribution data and administration data were collected at the research site and were combined with the hospital specific data (wages, prices of materials needed at dialysis unit). Order data included all ESA orders (darbepoetin alfa, epoetin alpha, epoetin beta) from the pharmacy or purchasing department to the suppliers over a period of 1 year and for all dosages used. The distribution data included ESA deliveries from the pharmacy to the dialysis unit (as well as all ESA orders from the dialysis unit to the pharmacy) over a period of 1 year and all dosages used at the dialysis unit. Data on ESA administration were collected for 16 weeks, and the analyses were based on the last 4 weeks of the 16 to simulate routine monthly practice in the haemodialysis unit. Data were collected for the current ESA administrations in the dialysis unit per patient for a period of 4 weeks, i.e. drug, intravenous or subcutaneous, administration dosage per period of 4 weeks, number of administrations per 4 weeks and the number of syringes used per period of 4 weeks.

Model

A generic model was developed to classify the processes and sub-processes routinely followed in the pharmacy (ordering from supplier, receiving and storing and delivering ESA to the dialysis unit) and in the dialysis unit (dose determination, ordering procedure, receipt and storage of ESAs and ESA administration). The processes and activities were modelled on a process modelling tool. This model shows the relationship between activities, processes, the functions of the staff involved in the activities, the used documents, and the locations where the activities are performed. Labour costs were derived from actual fully loaded wages of the staff involved in

*Aranesp is a registered trademark of Amgen Inc, Thousand Oaks, CA, USA.

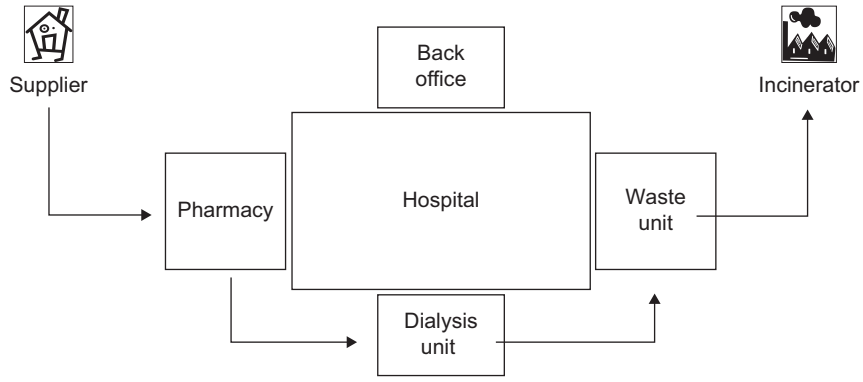

Figure 1. The erythropoiesis stimulating agent delivery process.

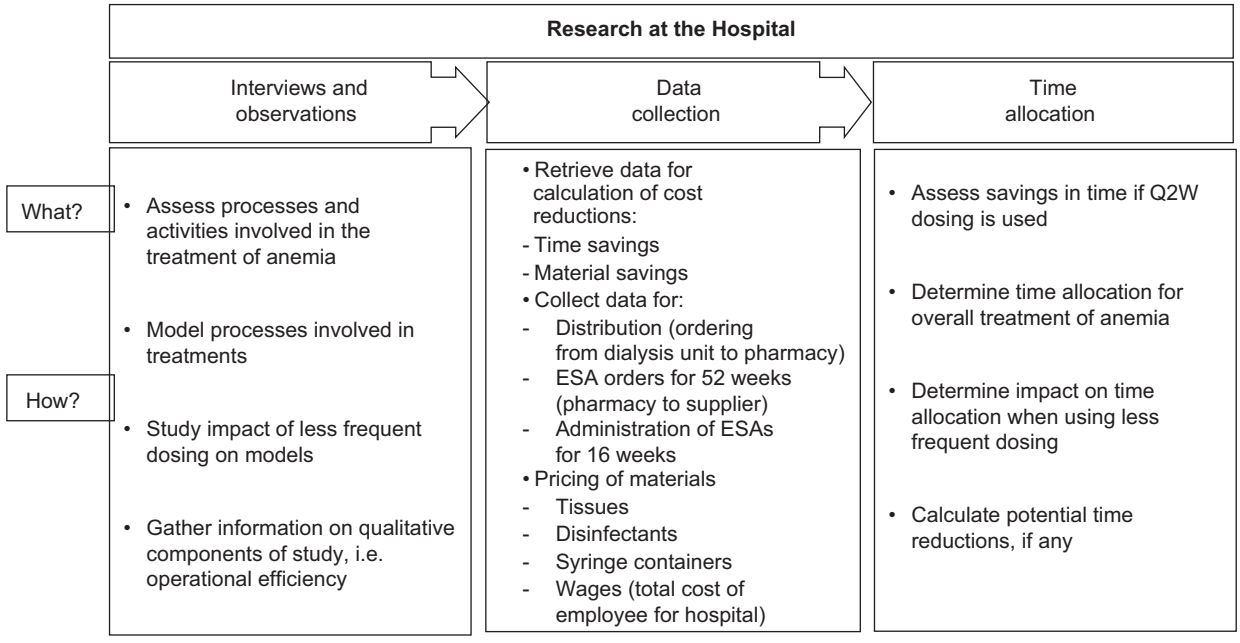

Figure 2. Data collection methodology.

each activity before being applied to the time required to perform each activity. Material costs were drawn directly from the facilities' accounting records. The time and materials associated with waste disposal activities were also recorded, as well as the time required in the back office to order ESAs and process invoices and prescriptions. Using the hospital specific data (wages, prices of materials needed at dialysis unit), projections and simulations for the following dosing situations were made: current dosing situation; darbepoetin alfa administered QW; darbepoetin alfa Q2W; darbepoetin alfa once-monthly (QM); epoetin beta administered thrice-weekly (EPO TIW); epoetin beta administered once-weekly (EPO QW) and epoetin beta administered twice-weekly (EPO BIW). For each situation, the current situation dosing data were used as a starting point in the projections and simulations.

Calculation of cost savings

Cost savings were defined as decreases in costs by switching from one dosing situation to another. Two types of cost savings were possible: time savings representing the amount of time and corresponding costs (the time spent during each stage of the ESA delivery process and cost of the staff performing the activities, i.e. wages) gained when switching to another situation, and material savings representing the amount of current costs (number of disinfection tissues, disinfection liquid, hand-wash liquid and sharps bins used in the dialysis unit) with the corresponding cost in case of a switch to another situation. Figure 3 shows how the data were collected and processed to calculate the different savings. Costs were converted to per patient per year.

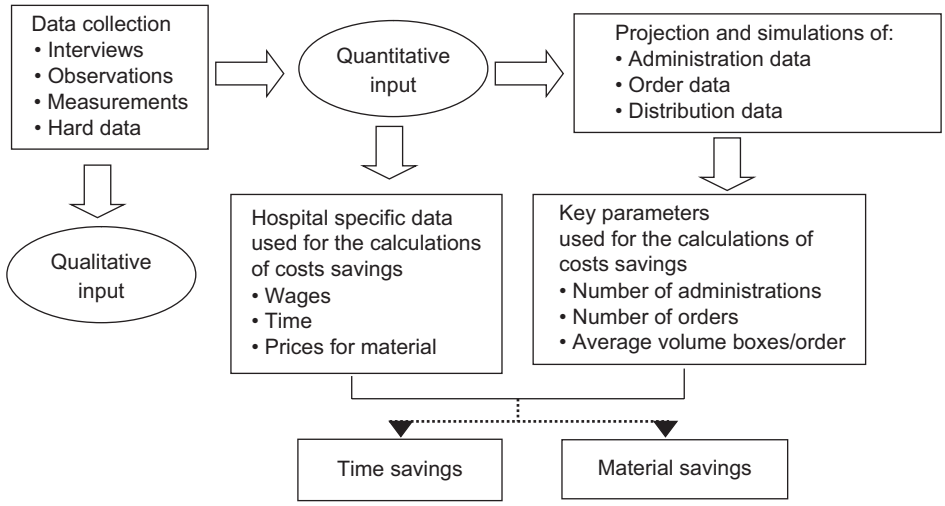

Figure 3.

Statistical analyses

There were no statistical analyses performed.

Results

Current ESA dosing situation in European Hospitals

Altogether we collected data for 2,984 patients treated in 21 hospitals in eight European countries (Belgium, France, Italy, the Netherlands, Spain, Sweden, Switzerland, the UK). The status of the participating centres is described in Table 1. Each centre supplied data for an average of 142 patients (range 42–648). Patients received various ESA dosing regimens (Figure 4); the most common regimen was QW (1,787 patients, 60.0%) and the least common dosing regimen was QM (16 patients, 1.0%).

Time required for ESA administration process

The mean (SD) time spent preparing ESA administrations in the dialysis unit was 58.5 (36.5) seconds (range 9.8–156.1 seconds per patient per year). The actual time required for ESA injection was a mean of 84.3 (82.2) seconds (range 10.0–209.0 seconds per patient per year).

Operational costs

The total operational costs of anaemia management varied considerably in the various hospitals, with the total operational costs for 1 year in the current dosing situation ranging between €1,148.39 and €87,464.83 per year (all patients). The total operational costs are mainly determined by the number of patients (e.g., a hospital with 600 patients will have a larger total operational cost than a hospital with 30 patients, but on per-patient basis the cost can differ). Consequently, the range of total operational costs per patient per year was €13.05–180.70. Various components drive the total operational costs, but time costs were identified as the most important components driving the operational costs. In the current ESA dosing situation, the overall total time cost per patient per year for all of the hospitals varied between €12.74 and €156.89 (min-max); the mean (SD) total time cost per patient for the hospitals was €76.29 (42.82). The total time cost of the processes affected by less frequent dosing was found to be influenced by four factors: number of patients, number of satellites (i.e., small dialysis centres affiliated to the main hospital), dosing frequency and characteristics of the ESA-related processes (driven by the salaries of the person performing the process and the method and time required to carry out the process). The time cost per patient per year in the dialysis units ranged from €10.9 to €154.5 (Figure 5) and this difference in costs can be explained by three of the four influencing components (number of satellites, dosing frequency and process characteristics) since it is a per patient time cost. When we look at a per patient per satellite basis where all units have a Q2W dosing frequency, the difference in time costs is only because of the process characteristic factor (Figure 6).

Impact of less frequent dosing

The impact of the current dosing frequency on the total time costs per patient was of high importance. A large part of the total time costs was allocated to processes driven by the number of ESA administrations. Therefore a hospital where most of the patients receive weekly or Q2W administrations had lower time costs per patient than a hospital where most patients receive ESA either

Table 1. Characteristics of the participating centres.

Centre	Number of patients	Status of centre	Darbepoetin alfa		EPO beta		EPO alpha	
			n	(%)	*n*	(%)	*n*	(%)
CH 1	83	Academic hospital	35	42	48	58	0	0
CH 2	55	Academic	19	35	36	65	0	0
CH 3	65	Public	21	32	44	68	0	0
CH 4	51	Public	25	49	14	27	12	24
FR 1	648	Private (non-profit)	234	36	297	46	117	18
FR 2	283	Private (non-profit)	283	100	0	0	0	0
BE 1	68	Academic	31	46	37	54	0	0
BE 2	97	Private (non-profit)	0	0	48	49	49	51
BE 3	85	Academic	16	19	20	24	49	58
UK 1	43	Public	43	100	0	0	0	0
UK 2	474	Public	180	38	2	0	292	62
UK 3	327	Public	312	95	8	2	7	2
SE 1	50	Public	27	54	17	34	6	12
SE 2	42	Public	2	5	40	95	0	0
NL 1	88	Private (non-profit)	88	100	0	0	0	0
NL 2	89	Private (non-profit)	89	100	0	0	0	0
ES 1	52	Academic	29	56	0	0	23	44
IT 1	76	Private (profit)	26	34	26	34	24	32
IT 2	148	Public	71	48	13	9	64	43
IT 3	68	Public	19	28	49	72	0	0
IT 4	92	Public	11	12	0	0	81	88
Total	2,984		1,561	52	699	23	724	24

CH, Switzerland; FR, France, BE, Belgium, UK, United Kingdom; SE, Sweden; NE, Netherlands; ES, Spain, IT, Italy. EPO, epoetin.

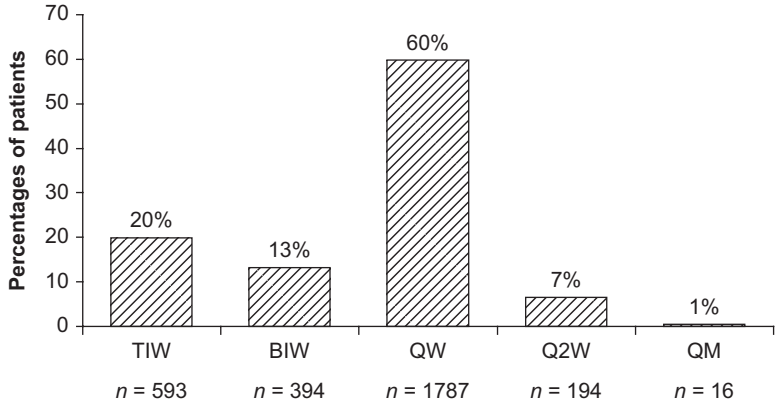

Figure 4. Current dosing frequency in patients with chronic renal disease. TIW: thrice weekly; BIW: twice weekly; QW; once weekly; Q2W: every other week; QM: once monthly

BIW or TIW. In all of the European countries, TIW dosing was associated with a substantially higher pharmacy cost per patient per year compared with Q2W dosing (Figure 7). Dialysis unit costs per patient per year were also higher for patients receiving ESA TIW (Figure 8). Labour was the most powerful cost driver for all dosing regimens in all of the countries, and materials contributed relatively little to the overall cost in the dialysis unit.

Cost of using a Q2W ESA regimen

The mean costs for each process and estimates of the percentage reduction in costs obtainable by using a fixed

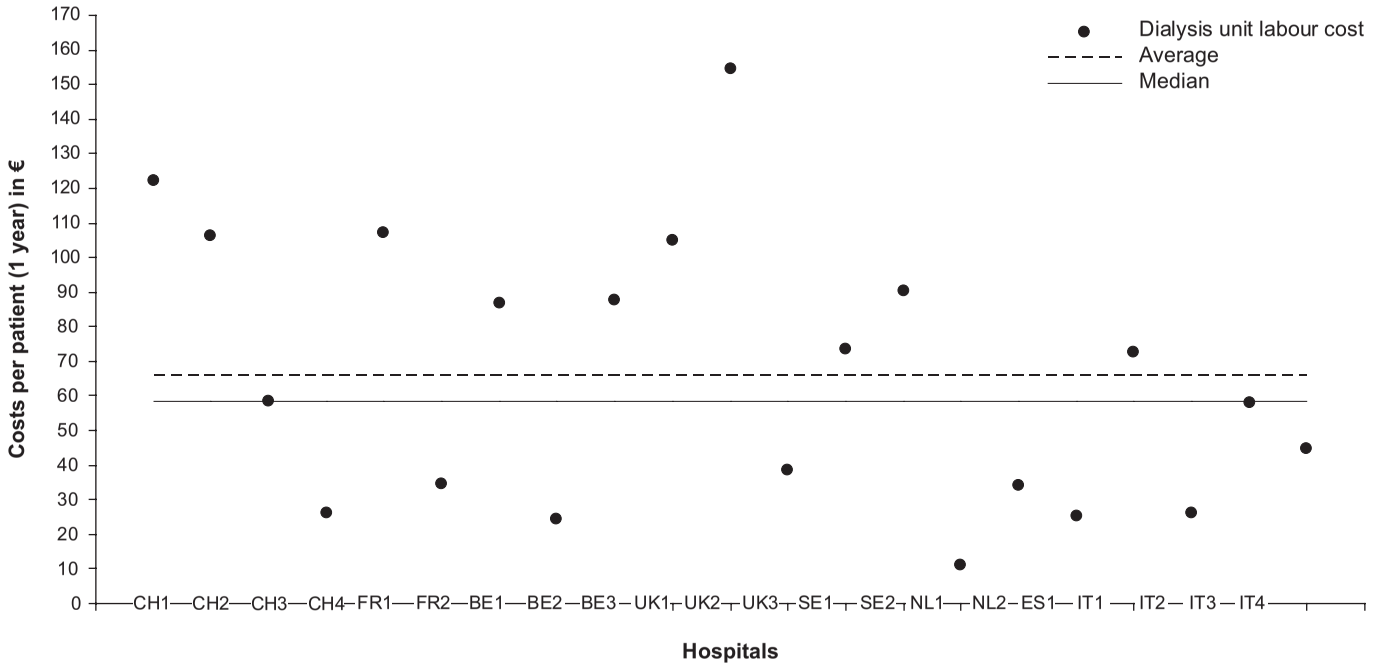

Figure 5. Dialysis unit labour cost per patient (1 year)*.
*Differences between centres may be explained by the influence of the remaining three factors upon coast (number of satellites, dosing frequency, and process characteristics). The impact of the main influencing factor (number of patients) is eliminated since coasts per patient are shown.

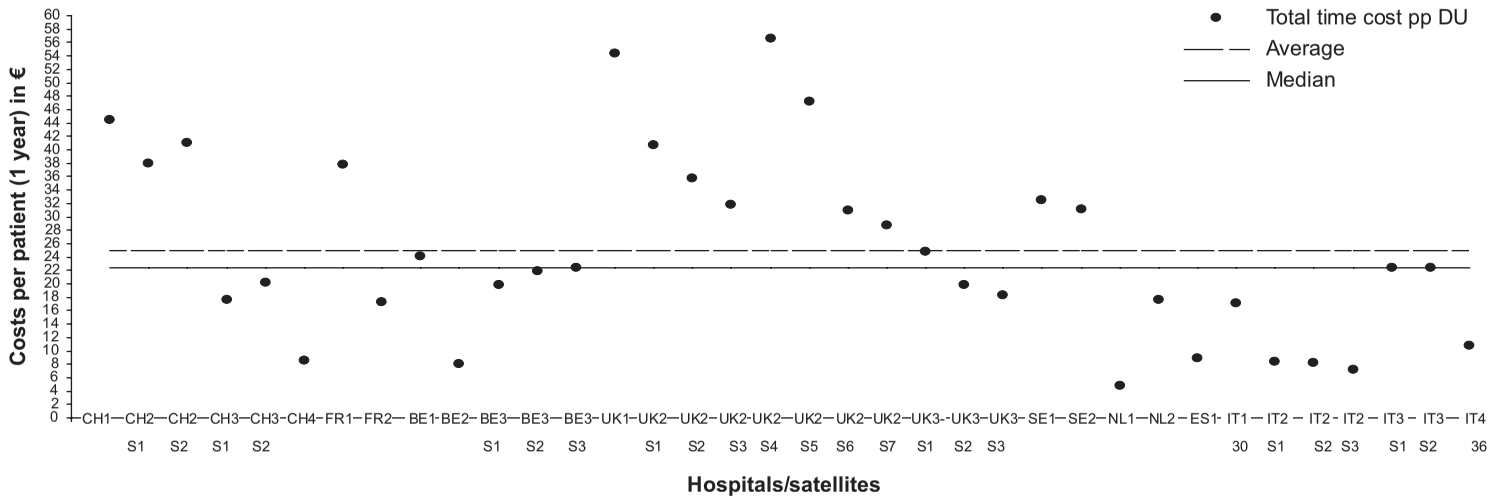

Figure 6. Dialysis unit labour cost per patient (1 year) per satellite in a erythropoiesis stimulating agent Q2W situation.

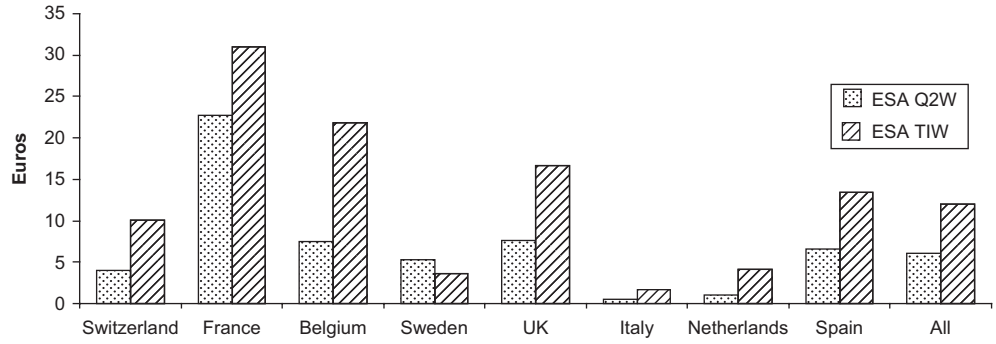

Figure 7. Current pharmacy cost per patient per year*: Q2W versus TIW.
***Actual drug cost not included in the calculation.**

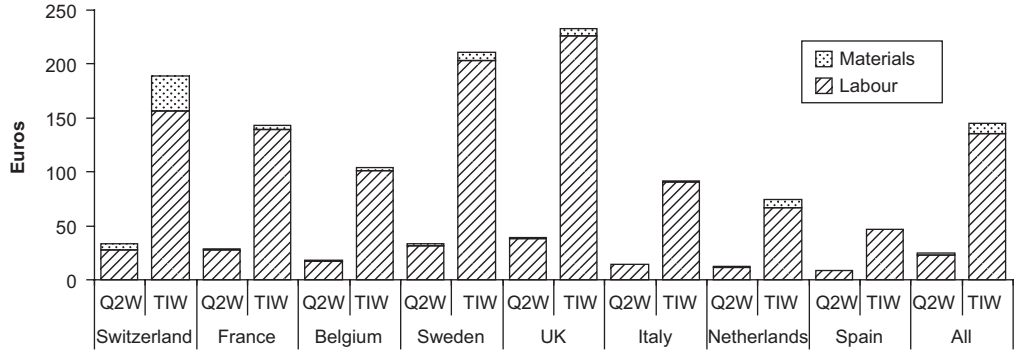

Figure 8. Current dialysis unit cost per patient per year*: Q2W versus TIW.
***Actual drug cost not included in the calculation.**

Q2W ESA administration are summarised in Table 2. By using a fixed Q2W ESA administration, the mean variable costs for each process and the estimates of the percentage reduction in variable costs obtainable, respectively, were: pharmacy labour (€10.1, 39%; range €0.06–42.25 per patient per year); dialysis unit labour (€66.0, 65%; range €10.85–154.5 per patient per year); dialysis unit materials (€4.11, 61%; range €0.00– 48.2 per patient per year) and waste unit materials (€0.43, 49%).

Discussion

This study was initiated to assess the operational advantages of less frequent dosing of ESA in terms of cost savings and efficiency advantages. Our results indicate clearly that each hospital has its own unique procedures and costs for administering ESA, and consequently there is substantial variation in the time it takes to perform routine ESA delivery activities in European haemodialysis centres. As expected, besides the cost of drugs, the highest costs associated with ESA delivery are in the dialysis unit (labour costs). Material costs are mainly accumulated in the dialysis unit (disinfection liquid, sharps bins, tissues) and only a relatively small amount in the waste unit.

In this study, switching a patient population to a less frequent dosing interval resulted in the greatest achievable reductions in operational costs because of the corresponding reduction in ESA administrations required. The largest reductions in the operational costs were observed in labour costs in the dialysis unit. Fewer administrations have a direct impact on the work effort for nurses at an haemodialysis unit. Taking into account the time required to prepare and administer an ESA injection to a patient, a decrease in the number of administrations has a significant impact on labour cost. Fewer administrations also have an effect on the quantity of disinfection liquid, tissues and sharps bins required by the dialysis unit and subsequently result not only in a reduction in material savings but also in an important ecological impact by reducing the amount of waste.

The improved operational efficiency following the switch from epoetin alpha to darbepoetin alfa treatment observed in this study is in agreement with the data reported in other European studies. In the UK, the results of an audit of 82 patients receiving dialysis who were switched from epoetin to darbepoetin alfa showed that the cost of prescribing epoetin was £62 per patient per week compared with £48 per patient per week for darbepoetin alfa – this resulted in yearly savings of £75,000 for the dialysis unit[3]. Similarly, in a Spanish study of 40 patients undergoing dialysis, Ardèvol *et al* reported that switching patients from epoetin to darbepoetin alfa resulted in mean monthly savings of €40.2, €117.5 and €146.3 for 1, 3, and 6 months of treatment, respectively[4].

Table 2. Costs for each process and estimates of the percentage reduction in variable operational costs obtainable by using a fixed Q2W ESA administration in 21 European dialysis centres.

Centre	Current costs per patient per year (€)					Centre	Percentage reduction for Q2W dosing				
	Pharmacy labour cost	Dialysis unit labour cost	Waste unit labour cost	Dialysis unit material cost	Waste unit material cost		Pharmacy labour cost	Dialysis unit labour cost	Waste unit labour cost	Dialysis unit material cost	Waste unit material cost
CH 1	10.32	122.14	0.01	48.15	0.09	CH 1	20	64	—	64	40
CH 2	5.82	106.19	0.00	3.82	2.08	CH 2	29	62	—	64	70
CH 3	5.07	58.29	0.00	3.48	0.05	CH 3	55	68	—	74	68
CH 4	1.82	26.26	0.00	2.20	1.24	CH 4	18	67	—	0	0
FR 1	24.31	107.14	0.00	3.39	0.13	FR 1	20	65	—	71	65
FR 2	39.94	34.46	0.00	0.92	0.08	FR 2	35	50	—	50	34
BE 1	22.59	86.86	0.00	1.93	0.15	BE 1	61	72	—	74	33
BE 2	18.36	24.33	0.00	0.21	0.37	BE 2	50	67	—	63	63
BE 3	8.26	87.53	0.00	1.53	0.38	BE 3	45	76	—	72	69
UK 1	42.25	105.07	0.00	0.83	0.13	UK 1	49	48	—	45	42
UK 2	1.63	154.51	0.00	4.06	0.17	UK 2	50	75	—	74	68
UK 3	0.43	38.66	0.00	3.20	0.61	UK 3	19	46	—	47	38
SE 1	9.96	73.71	0.06	4.59	0.91	SE 1	14	56	—	43	43
SE 2	2.05	90.30	0.00	2.03	0.12	SE 2	-1	65	—	58	50
NL 1	1.89	10.85	0.01	0.17	0.14	NL 1	53	56	—	0	0
NL 2	2.21	33.88	0.00	4.44	0.18	NL 2	44	48	—	47	35
ES 1	11.06	25.38	0.00	0.00	0.61	ES 1	40	65	—	—	53
IT 1	0.00	72.59	0.00	0.00	0.00	IT 1	—	76	—	—	—
IT 2	1.58	25.93	0.00	0.00	0.61	IT 2	61	70	—	—	72
IT 3	2.48	58.09	0.00	0.00	0.69	IT 3	48	62	—	—	58
IT 4	0.06	44.88	0.00	1.29	0.22	IT 4	8	76	—	71	61
Mean current cost per patient per year (€)	10.10	66.05	0.00	4.11	0.43	Mean percentage reduction for Q2W dosing	39	65	—	61	49

CH, Switzerland; FR, France, BE, Belgium, UK, United Kingdom; SE, Sweden; NE, Netherlands; ES, Spain, IT, Italy. Q2W, every 2 weeks; ESA, erythropoiesis stimulating agent.

We noted that in hospitals where a lot of manual work is involved in ordering ESA from the supplier, more time savings are possible compared with hospitals where ordering is fully automated. Another factor influencing the amount of time savings is the order procedure. If a hospital combines the ESA order with other orders (e.g., to a wholesaler), then the possible savings associated with less frequent dosing tend to be smaller relative to hospitals that order ESAs separately. With respect to drug delivery, we found that differences in delivering the ESA between the dialysis unit and the pharmacy do not have as big an impact as does the order policy, but nonetheless are not insignificant. If the unit is located next to the pharmacy, then the time savings gained from less frequent dosing are smaller than if the pharmacy is situated 10 miles from the hospital and a transport van is required.

The time savings that can be gained in the dialysis unit by less frequent dosing become more obvious when multi-dose vials are used. With the multi-dose vial, more processes are required by the nurse before the actual ESA administration (preparing the multi-dose vial, withdrawal of the individual syringes, additional checking procedures). All of these factors influence the time taken for each ESA administration, and less frequent dosing would result in substantial time gains. In one of the hospitals, the dosing procedure was affected by a restricted choice of vial sizes. In this particular hospital, only epoetin alpha and beta were used, of which the pharmacy ordered two dosages of each product. This meant that once a month the nurse had to divide this monthly dosage over the weeks of that month. Due to the limited number of dosages ordered, there was no fixed dosing and administration policy, and dosages as well as administration frequency could differ from week to week. This is an example of how the ESA delivery process can be improved.

Another factor affecting the time saving results is the obligation in some countries to execute traceability procedures, for example in France. Due to this traceability requirement, some hospitals have extra processes to undergo when ordering and administering ESAs, and less frequent dosing would again lead to extra time savings because this procedure would not have to be completed so often.

We discovered that, with the goal of process improvement, hospitals could definitely benefit from sharing best practices with one another. For instance, in the context of disinfection, there were large variations in practice. In some hospitals disinfection is a key step in the ESA administration process, while in others there is no disinfection at all prior to ESA administration. Another major difference between the hospitals is the timing of ESA administration during the haemodialysis session, and this issue remains unresolved despite substantial clinical debates in the past. In some hospitals, ESA is administered in the middle of the haemodialysis session. In others, ESA is administered in the first or last hour of the session or at the end of the dialysis session just before the machine is disconnected. Each hospital has its own motive for the timing of administration – some following what is stated in medical journals or as recommended by the ESA supplier or according to hospital policy.

Another interesting observation which became clear from the study is how the process of ordering ESA from the pharmacy is organised in the haemodialysis units. Since ESA is prescribed on a monthly basis in most hospitals, it is reasonably easy to determine the usage of the haemodialysis centre for 1 week, 2 weeks, or a month. It is therefore surprising to see that many centres do not use the prescriptions when determining the quantity for their order to the pharmacy. This can cause over ordering of ESA which may lead to an increased risk of expired goods, and result in additional work because the expired ESAs need to be disposed of and new stock ordered. Other hospitals work with a minimum stock principle. If the minimum stock is related to the usage of the haemodialysis unit, this is an efficient way of working, but in most hospitals the minimum stock level is static: when prescriptions change, the minimum stock levels are not adjusted to this change and this leads to inefficient ordering. In general, the most efficient way of working for ESA orders is to order based on what is prescribed for that week taking into account a small buffer stock to anticipate possible changes.

During the research in the dialysis units with nurses and doctors, one of the issues that came up was the fear of forgetting to administer the drug. Many nurses are concerned that a Q2W dosing schedule would increase the chance of forgetting to administer ESA; moreover, they state that the risk involved in forgetting to administer it is bigger since the dosage administered Q2W is larger. There may also be concern that the larger doses of ESAs necessary with Q2W dosing could be associated with safety considerations. Extensive research into this topic has not convincingly demonstrated that high doses of ESAs are associated with higher patient morbidity and mortality. In a recently published paper investigating the association between cumulative average epoetin dosage and survival in 18,454 patients aged >65 years, it was found that, on average, epoetin dosages of >30,000 U/week did not confer additional harm or benefit in elderly haemodialysis patients[7]. In actual fact, it seems that it is ESA hypo-responsiveness which is a strong, independent predictor of increased risk of patient morbidity and mortality[8]. As a dialysis unit runs on a fixed routine which nurses have followed for years, it is possible that these concerns originate from the fear to change the current routine. Education and training will be very important in this context to reassure the medical staff involved.

The clinical applicability of less frequent dosing for some patients was also one of the worries of some nurses and doctors, but they also acknowledged that, while not universal, a certain percentage of their patient

population would benefit from Q2W dosing. The staff also recognised that additional potential beneficial effects associated with less frequent dosing included the reduction in the potential for incorrect doses, less waste from packaging and cooling elements for transport and a reduction in the risk of accidental needle stick injuries. In addition, the value of the time savings that could be obtained in the dialysis unit because of less frequent dosing means that extra time can be devoted to patients or other activities, such as training. This may have a positive effect on the quality of care for the patients, the stress level of the nurses and the atmosphere in the haemodialysis unit. Moreover there is a benefit because more staff time becomes available due to a switch to Q2W dosing, and this may mean that additional staff may not be required.

Similarly for the pharmacist, less frequent dosing of ESA would reduce the number of inventory activities required and result in time savings that could be directed towards other activities. Meanwhile in the back office, although not in direct contact with the patient or the drug, time saving is also enhanced by less frequent dosing because fewer orders need to be placed, deliveries recorded and registration noted for reimbursement purposes.

Limitations of the study

Acquisition costs of ESAs are only a fraction of the costs to manage anaemia and it should be noted that this study focused exclusively on the operational advantages of less frequent dosing. The operational advantages observed in this study are reductions in labour costs, material costs and financial costs. Within this manuscript only the impact on labour and material costs are described, due to the complexity of the financial costs which would have required considerable and lengthy discussion. The combination of the country-specific reimbursement system, the payment policy of the ESA suppliers and the hospital's order policy results in an ESA-related financial cost for a hospital. If ESA invoices are paid before the ESA is reimbursed, the hospital has a financial cost (i.e., pay or lose interest) while in the case of reimbursement before invoice payment, the hospital has a financial benefit (i.e., negative cost, earn interest) for the days between reimbursement and payment. In the calculation of this financial cost, price and payment term differences of the ESA administered were not taken into account, and any possible influences of these factors were excluded by converting real ESA prices to a fixed price per microgram.

Another possibility of this study could have been to evaluate the benefit for the patient of extending the ESA dosing interval by investigating, for example, the duration of treatment with ESA, the range of haemoglobin values achieved in the patients receiving Q2W dosing and the clinical outcomes of the patients. Unfortunately such analyses were not possible due to the confidentiality of the patient data.

Conclusion

This was the first comprehensive study to assess the process of anaemia management in European haemodialysis centres. Given the high variation in the operational costs between centres due to differences in environmental and structural factors and because practice patterns vary considerably, these results cannot be extrapolated to the practice of dialysis in the United States. Each haemodialysis centre should therefore analyse its own cost structure to estimate its potential cost savings. The authors believe that the results of this study may enable a benchmark to be set, and encourage the sharing of information among European haemodialysis centres in an effort to optimise best clinical practice and patient care.

Acknowledgements

Declaration of interest: This study was sponsored by Amgen Europe GmbH, Zug, Switzerland. M.B. is a consultant for Amgen, and has also presented data at scientific conferences on behalf of Amgen. M.B. and J.A.D. have received research support from Amgen. HICT, represented by A.T. and J.D., received financial support from Amgen. L.P. is a consultant for Amgen. C.F. and S.R. are employees of Amgen.

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