Economic appraisal of maintenance parenteral iron administration in treatment of anaemia in chronic haemodialysis patients

Sepandj F, Jindal K, West M, Hirsch D

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The use of regular maintenance doses of intravenous iron to treat anaemia in dialysis patients. Patients were given an initial loading dose (400 +/- 300 mg) of intravenous iron dextran complex (IV-FeD) and thereafter a maintenance dose of 100 mg once every 2 weeks.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing dialysis for at least 4 months and with a serum ferritin level less than 100 microgram

Setting
Hospital, renal dialysis population. The study was performed in Halifax, Nova Scotia, Canada.

Dates to which data relate
Dates were not given for the effectiveness analysis, cost collection or prices. The date of publication was 1996.

Source of effectiveness data
Effectiveness data was derived from a single study.

Link between effectiveness and cost data
The costing was undertaken on the same sample as that in the effectiveness study and alongside it.

Study sample
All stable patients in the haemodialysis population at the Victoria General Hospital, who had received dialysis for at least 4 months, were screened. Patients with known hypersensitivity to iron, active or ongoing overt source of bleeding, severe acute illness within the previous 2 months, chronic active inflammatory conditions, history of solid tumours or haematological malignancies, or other unrelated documented causes for anaemia, were excluded from the study. All the remaining patients who had a serum ferritin level less than 100 mg/l were given intravenous iron treatment. These patients had either been unable to tolerate oral iron or had not achieved this level despite taking the maximal tolerated oral dose. There were 50 such patients comprising slightly over half of the haemodialysis population at the hospital. The number of those with iron deficiency who were excluded was not given and it was not...
stated whether any patients refused treatment. There were no controls.

**Study design**
This was a single centre, before and after study. At the time of the analysis patients on maintenance IV-FeD had received treatment for a mean of 6 months with a range of 3 - 15 months. No stated follow up time other than this is given. Patients were withdrawn from the study in the case of death, severe illness or transplantation if those events occurred within 3 months of starting maintenance IV-FeD. Numbers or proportions of such withdrawals were not given.

**Analysis of effectiveness**
Analysis was based on treatment completers only. Health outcomes measured were haemoglobin, serum ferritin and rHuEpo dose required. Measurements of these were taken at the onset and termination of the study period and the paired t-test used to determine statistical significance.

**Effectiveness results**
Mean haemoglobin before treatment was 87.7 g/l (S. D. 12.1). After treatment this rose to mean 100.3 (S. D. 13.6 g/l). The mean rise of 12.8 g/l was statistically significant (p <0.001, 95%CI 7.7-17.9). Mean serum ferritin rose from mean 36 mg/l (S. D. 20) to mean 217 mg/l (S. D. 127). This difference was significant (p <0.001, 95% CI 142-220). At the onset of treatment 19 patients(38%) were on rHuEpo and at the end of 6 months this was reduced to 17 with a further 8 patients needing a reduced dose. The mean weekly dose of in-patients on rHuEpo was reduced from 96 u/kg/week (S. D. 59) to 63 u/kg/week (S. D. 41). This was statistically significant, p <0.05, (CI 1-65).

No anaphylactic reactions or adverse effects were experienced. Nine patients had serum ferritin levels greater than 300 mg/l requiring a reduction in maintenance dose but no patient's ferritin level exceeded 500 mg/l.

**Clinical conclusions**
A regimen of maintenance intravenous iron treatment in the subset of haemodialysis patients for whom oral supplementation has failed was safe and effective when carefully monitored.

**Measure of benefits used in the economic analysis**
Health outcomes used were haemoglobin and serum ferritin levels. As the treatment was the dominant strategy the valuation was not defined. A target range of 100-200 mg/l was chosen for serum ferritin levels based on current available literature: Van Wyck D B (1984), Van Wyck D B et al (1989), and Van Wyck D B (1991). If no response in haemoglobin levels was perceived and transferrin saturation was less than 20% the goal was raised to 200-300 mg/l.

**Direct costs**
Prices were given for intravenous iron per dose, covering the drug, line, iv saline and syringe. Prices per dose of rHuEpo were for drug and syringe and for oral iron (FeSO4) per dose. No dates were given for these prices. There were no additional nursing costs since administration of doses took place as part of routine dialysis. Quantities were not given. Actual costs were measured for 6 months and projected for 12 months. Total costs of IV-FeD maintenance doses were given but costs of Epo administration and oral iron were not; instead an estimate was given of savings through reduction in use of these. A total cost was given for initial IV-FeD loading.

**Currency**
Canadian dollars (Can$).

**Sensitivity analysis**
No sensitivity analysis was carried out.

**Estimated benefits used in the economic analysis**
Mean haemoglobin before treatment was 87.7 g/l (S. D. 12.1). After treatment this rose to mean 100.3 (S. D. 13.6 g/l). The mean rise of 12.8 g/l was statistically significant (p <0.001, 95% CI 7.7-17.9). Mean serum ferritin rose from mean 36 mg/l (S. D. 20) to mean 217 mg/l (S. D. 127). This difference was significant (p <0.001, 95% CI 142-220).

**Cost results**
The total estimated cost for one year of IV-FeD maintenance administration was Can$ 29,692. The cost of initial IV-FeD loading was approximately Can $3,016. No discounting was done: the study took less than one year. Total costs of the comparator strategy were not given: instead an estimate of savings made by a reduction in use of oral iron and Epo administration were given as follows: Can$ 30,120 saved on Epo administration and $2,738 saved on oral iron.

**Synthesis of costs and benefits**
No synthesis has been performed. The authors claimed that since the loading dose only takes place once its cost can be ignored and the intervention is therefore the dominant strategy.

**Authors’ conclusions**
Iron deficiency is a common problem among chronic haemodialysis patients. A regimen of maintenance intravenous iron treatment for those patients in whom oral supplementation has failed was a safe, effective and economically favourable means of iron supplementation when carefully and closely monitored.

**CRD Commentary**
Dates were not given and the timings of this study were not made clear. It was unclear whether all patients started the treatment at the same time and were followed for the same 6 months, especially as a range of follow up times from 3 to 15 months is mentioned. It is not adequate to only give an estimate of savings made and not to cost the comparator strategy. The cost of the initial loading dose should not have been ignored. Even though it may be possible to spread this cost over several years, this cost was not negligible and would probably have meant that the intervention strategy was not dominant and therefore a method of combining costs and benefits should have been used.

**Bibliographic details**

**Other publications of related interest**

**Indexing Status**
Subject indexing assigned by NLM.

**MeSH**
Adult; Aged; Anemia, Iron-Deficiency /drug therapy /economics /etiology; Costs and Cost Analysis; Erythropoietin