Acute normovolemic hemodilution is a cost-effective alternative to preoperative autologous blood donation by patients undergoing radical retropubic prostatectomy

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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
Using acute normovolemic hemodilution (ANH) versus preoperative autologous blood donation (PABD) in radical retropubic prostatectomy.

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
Male patients undergoing radical retropubic prostatectomy.

Setting
Hospital. The economic study was carried out in Washington, the USA.

Dates to which data relate
No dates were reported.

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

Link between effectiveness and cost data
The costing was retrospectively performed on the same patient sample as that used in the effectiveness analysis.

Study sample
The intervention (hemodilution) group consisted of 30 consecutive patients undergoing radical retropubic prostatectomy performed by a single surgeon and attended by the same anesthesiologist. These patients underwent acute normovolemic hemodilution according to an established protocol (at a target hematocrit (Hct) level of 28%, with transfusion taking place in the preoperative period to maintain Hct>25%). A historical group of 30 matched control subjects (non-hemodilution group) were chosen from the files of the institution from a pool of 125 subjects who underwent surgery after donating 3 units of blood for autologous use. All of these subjects had the same surgeon and were subject to the same surgical, anaesthetic and monitoring techniques as for the intervention group, but they did not undergo hemodilution during the operation.
Study design
The study was a non-randomised trial with historical controls (chosen from a pool of patients treated during a 3-year period immediately before the introduction of hemodilution at the study site). The study was carried out in a single centre. The duration of the follow-up was 30 days after surgery.

Analysis of effectiveness
The principal used in the analysis of the clinical outcomes was treatment completers only. Primary health outcomes were allogeneic blood exposure and Hct levels before, during and after the operation, and complications. If a study patient could be matched to more than one control subject, the closest in age was chosen. The groups were shown comparable in terms of clinical characteristics.

Effectiveness results
The preoperative donation of 3 units by all patients in the non-hemodilution group caused lower admission Hct levels (39.7 +/- 2.1%) than the hemodilution group patients (41.7 +/- 3.1%) (P<0.05). The mean intra-operative Hct nadir was lower in the hemodilution group (26 +/- 2% versus 29.2 +/- 3.3 for the control group, P<0.05), but Hcts were similar in the groups in the post-anesthesia care unit and on the first postoperative day. In terms of allogeneic blood exposure, the study revealed no difference between groups. In the postoperative period, the control group had a complication rate of 7% versus 3.5% in the hemodilution group.

Clinical conclusions
The absence of pre-operative cardiovascular morbidity in the patients support the conclusion that limited ANH is safe and well tolerated even in elderly patients. The study suggested that the efficacy of hemodilution was related, in part, to conservative transfusion practice. Though, it is doubtful that a difference in transfusion practice of half a unit of blood relative to the non-hemodilution group (based on discharge Hct levels), was clinically significant.

Measure of benefits used in the economic analysis
No summary benefit measure was introduced in the economic study and only separate clinical outcomes were reported.

Direct costs
Quantities and costs were analysed separately. The costs measured were as follows: total blood costs as the sum of blood acquisition costs, laboratory-derived costs, administration costs and overhead costs. The boundary adopted was the hospital. The estimation of quantities and costs was based on actual data and on the costs of acquiring blood from the American Red Cross. The source of data for the control group was the files of the School of Medicine at Washington University. The dates of the price data were not specified.

Statistical analysis of costs
Student’s t test was used to compare the groups in terms of total blood costs per patient.

Indirect Costs
Not considered.

Currency
US dollars ($).

Sensitivity analysis
Not reported.
Estimated benefits used in the economic analysis
Not applicable.

Cost results
The non-hemodilution group had significantly higher total blood costs per patient in comparison to the hemodilution group ($330 +/- $100 against $191 +/- $55, respectively with p<0.001).

Synthesis of costs and benefits
A synthesis was not performed since ANH was regarded as the dominant strategy.

Authors' conclusions
ANH is well-tolerated and simple to implement and is a cost-effective alternative to pre-admission donation for the procurement of autologous blood for patients undergoing radical prostatectomy. An integrated blood conservation programme using hemodilution and a defined transfusion trigger can decrease the requirement for PABD.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear.

Validity of estimate of measure of benefit
The internal validity of the effectiveness results may be weakened by the lack of a randomised design.

Validity of estimate of costs
Adequate details of the methods of cost estimation were given.

Other issues
Given the lack of randomisation and sensitivity analysis, the results may need to be treated with some caution. The issue of generalisability to other settings/countries was not addressed.

Source of funding
None stated.

Bibliographic details
Monk T G, Goodnough L T, Birkmeyer J D, Brecher M E, Catalona W J. Acute normovolemic hemodilution is a cost-effective alternative to preoperative autologous blood donation by patients undergoing radical retropubic prostatectomy. Transfusion 1995; 35(7): 559-565

PubMedID
7631387

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM
MeSH
Aged; Blood Banks /methods; Blood Loss, Surgical /prevention & control; Blood Transfusion /economics /methods; Costs and Cost Analysis; Humans; Male; Middle Aged; Prostatectomy /adverse effects

AccessionNumber
21995000873

Date bibliographic record published
31/03/1999

Date abstract record published
31/03/1999