Cost-effectiveness of screening the US blood supply for Trypanosoma cruzi
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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.

CRD summary
The objective of the study was to assess the cost-effectiveness of screening the USA blood supply for Trypanosoma cruzi. The authors concluded that T. cruzi transmissibility deserved further investigation in terms of infectious dose and viability in blood products. The quality of the study methodology was adequate. Methods and results were reported satisfactorily. Given the limitations of this study, the authors' conservative conclusions appear valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective of the study was to assess the cost-effectiveness of screening the USA blood supply for Trypanosoma cruzi.

Interventions
Seven strategies were considered: two included screening platelet donations with/without whole blood screening; three included testing of donors (once or twice) and testing those at risk; one involved universal testing; and one involved risk questioning implemented as part of donor eligibility assessment on the donor health questionnaire targeting donors born in Central or South America. Each screening strategy was compared to no screening.

Location/setting
USA/Secondary care.

Methods
Analytical approach:
A deterministic multicyle discrete-time Markov model was used synthesise the evidence. Two hypothetical cohorts were analysed: all-age and 39 years or younger. The time horizon was the lifetime of the patient receiving the blood transfusion. The authors reported that a societal perspective was adopted.

Effectiveness data:
Clinical and effectiveness data were derived from the authors' organisation (Blood Systems, which represents 8% of the USA blood supply) and previously published studies. The authors searched PubMed for relevant studies. The main measure of effectiveness was effectiveness adjustment factors (defined as the percentage of confirmed cases each strategy would interdict out of the total reported). This measure of effectiveness was derived from data from Blood Systems.

Monetary benefit and utility valuations:
Health state utilities were identified from previously published studies.

Measure of benefit:
Quality-adjusted life-years (QALYs) gained. These were discounted at an annual rate of 3%.

Cost data:
Direct costs were: antibody test (including labour), confirmatory tests, annual clinical workup (including visit, X-ray, ecochardiogram and laboratory tests), drug treatment and follow-up and treatment of cardiomyopathy, heart failure and surgery. Costs of screening were derived from data supplied by Blood Systems. Other costs were derived from
previously published studies and the Arkansas 2007 Healthcare Cost and Utilization Project. Indirect costs were costs of early mortality due to heart failure or Chagas disease. These estimates were estimated using the friction-period method and assumed a six-month replacement period at average USA household income.

Analysis of uncertainty:
The authors reported a series of one-way, two-way and probabilistic sensitivity analyses. For the probabilistic sensitivity analysis, probability distributions were fitted alongside each model variable and 10,000 Monte Carlo simulations were performed. Results were presented using a cost-effectiveness acceptability curve.

Results
In all age groups, no screening was associated with 8.57 QALYs gained. Compared to no screening, the incremental (additional) QALYs gained ranged from 0.00000269 for strategies that included screening platelet donations only to 0.00000526 for universal testing.

In all age groups, no screening was associated with an average cost per patient of $0.06. Compared to no screening, the incremental average cost per patient ranged from $0.48 for the risk question strategy to $6.56 for universal testing.

Costs and benefits were combined using an incremental cost-utility ratio (additional cost per QALY gained). Compared to no screening, questioning donors was associated with an incremental cost-utility ratio of $173,000 per QALY gained. Platelet screening only (without combined whole blood screening) was dominated by the questioning strategy. All other screening interventions were found to be greater than $,900,000 per QALY gained.

Results of the probabilistic sensitivity analyses showed a 57% chance that the cost-effectiveness of (one-time) screening donations was equal to or less than $757,000 per QALY gained.

When the analysis was restricted to recipients of blood transfusion who were 39 years or younger, the questioning strategy was associated with an incremental cost-utility ratio of £29,000 per QALY gained when compared to no screening.

Authors’ conclusions
The authors concluded that Trypanosoma cruzi transmissibility, in terms of infectious dose and viability in blood products, deserved further investigation. Selective strategies were more cost-effective than universal screening.

CRD commentary
Interventions:
The interventions under study were reported adequately. Selection of comparators seemed appropriate as there were several screening strategies that included universal screening, which seemed to be recommended practice in the USA setting. These might be valid comparators in other settings.

Effectiveness/benefits:
Clinical and effectiveness data were derived from the authors’ organisation and previously published studies. The main measure of effectiveness was derived from the authors’ organisation (Blood Systems, with 8% of the USA blood supply). The authors did not report whether these data were compared with results published in the literature to check whether or not they were comparable.

Costs:
All major relevant cost categories for the societal perspective seemed to be included in the analysis. The sources from which costs were derived were reported adequately. Some screening related test costs came only from the authors’ organisation and so might not be representative of the wider USA blood supply setting. Price year, time horizon, discount rate and currency details were all reported adequately.

Analysis and results:
The analytic modelling approach appeared appropriate. Adequate details of the model structure were provided, including a graphical depiction. Incremental analysis was appropriate to explore the relative cost-effectiveness of the screening strategies. Uncertainty in the model’s results was tested exhaustively using a series of one-way, two-way and
probabilistic sensitivity analyses. The authors reported as a main limitation to their study that it was unknown whether
the effectiveness estimates used in the study were representative across the spectrum of USA blood collectors.

Concluding remarks:
The quality of the study methodology was adequate. Methods and results were reported satisfactorily. Given the
limitations of this study, the authors’ conservative conclusions appear valid.

Bibliographic details
Agapova M, Busch MP, Custer B. Cost-effectiveness of screening the US blood supply for Trypanosoma cruzi.
Transfusion 2010; 50(10): 2220-2232

PubMedID
20492607

DOI
10.1111/j.1537-2995.2010.02686.x

Original Paper URL

Indexing Status
Subject indexing assigned by NLM

MeSH
Animals; Blood Donors /statistics & numerical data; Blood Transfusion /adverse effects /economics /statistics &
numerical data; Chagas Disease /prevention & control; Cost-Benefit Analysis; Humans; Mass Screening /economics
/methods; Trypanosoma cruzi /isolation & purification; United States

AccessionNumber
22011000025

Date bibliographic record published
12/01/2011

Date abstract record published
08/08/2012