Cost and cost-effectiveness of increasing access to sterile syringes and needles as an HIV prevention intervention in the United States

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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
The intervention studied was increasing the availability of sterile syringes and needles for injection drug users (IDUs) as an HIV prevention strategy. Various levels of coverage, defined as the percentage of previously unsterile injections for which sterile syringes would be made available, were compared with the status quo (i.e., zero coverage).

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population was IDUs in the United States.

Setting
This was a community-based intervention. The economic study was carried out in the United States.

Dates to which data relate
The effectiveness data came from studies published from 1995 to 1997 and from the authors' assumptions. All costs were expressed in June 1996 US dollars.

Source of effectiveness data
The effectiveness data came from various published studies supplemented by the authors' assumptions.

Modelling
A mathematical model of HIV transmission was used to estimate the impact of syringe availability levels on the number of HIV infections averted. The formulae of the model were described in the paper.

Outcomes assessed in the review
The model parameters included: the number of active IDUs in the United States, the number of daily injections per IDU and the annual number of new HIV infections among IDUs.

Study designs and other criteria for inclusion in the review
Not stated.
Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
Three primary studies were included in the review.

Methods of combining primary studies
The three studies provide estimates of different parameters and thus there was no need to combine the results except as separate inputs to the model.

Investigation of differences between primary studies
No investigation of differences between studies was discussed.

Results of the review
The reported results were as follows:
the number of active IDUs in the United States, 1,000,000;
the number of daily injections per IDU, 2.8; and
the annual number of new HIV infections among IDUs, 19,000.

Methods used to derive estimates of effectiveness
The authors made assumptions to derive certain model inputs.

Estimates of effectiveness and key assumptions
Based on the proportion of IDU injections currently done with sterile syringes in cities with and without existing syringe exchange programs, the proportion nationally was assumed to take an intermediate value of 15%. The proportion of syringes made available but not used was assumed to be 10% (at every level of syringe availability). The proportion of new HIV infections among IDUs that were caused by injection behaviours was assumed to be 65%.

Measure of benefits used in the economic analysis
The measure of benefit was cases of HIV infection averted. This is a valid benefit measure which defines the analysis as a cost-effectiveness analysis.

Direct costs
The study was carried out from a societal perspective. A gross unit cost per syringe was calculated based on the assumed percentage of syringes distributed by syringe exchange programmes and through pharmacy sales. Differential
costs were estimated (in a previously published study) for each of the two settings so, presumably, the costs included distribution as well as the cost of the syringes themselves. In this way both health service costs and out of pocket payments by IDUs who purchased syringes from pharmacies were included. The cost of syringe disposal was included in these estimates.

No discounting was applied as the study used a one-year time frame. The medical care component of the Consumer Price Index was used to convert the costs into June 1996 US dollars.

**Indirect Costs**
Productivity costs were not included.

**Currency**
US dollars ($).

**Sensitivity analysis**
The authors used threshold one-way sensitivity analysis to state that even if the cost of syringe provision were to increase threefold (from $0.44 to $1.40 per syringe), the full coverage programme would still be cost saving compared with the status quo. This incorporated sensitivity analysis about the percentage of syringes assumed to be dispensed by syringe exchange programmes as opposed to pharmacies, which would influence the average cost per syringe.

This result was also robust to halving the incidence of HIV infection among IDUs, and to decreasing the proportion of new infections caused by injection behaviours from 65.0% to 20.5%.

**Estimated benefits used in the economic analysis**
The number of HIV infections averted at different levels of coverage were:

- 2,347 at 10%
- 4,446 at 20%
- 6,299 at 30%
- 7,904 at 40%
- 9,263 at 50%
- 10,374 at 60%
- 11,239 at 70%
- 11,856 at 80%
- 12,227 at 90%
- 12,350 at 100%

**Cost results**
The annual programme cost of 100% coverage of previously unsterile injections was $423,336,522. The total cost of the comparator (status quo) was, by definition, $0. Total costs were calculated for levels of coverage from 0% to 100% in 10 percentage point increments.
Synthesis of costs and benefits
The marginal cost-effectiveness ratios per HIV infection averted were:

- $18,041 at 10%
- $20,164 at 20%
- $22,852 at 30%
- $26,368 at 40%
- $31,162 at 50%
- $38,087 at 60%
- $48,969 at 70%
- $68,557 at 80%
- $114,261 at 90%
- $342,783 at 100%.

Authors' conclusions
The authors concluded that, compared with the status quo, a one-year programme to provide syringes for all currently unsterile injections would be cost saving due to the avoidance of some new HIV cases and the costly treatment that would ensue.

CRD Commentary
Validity of estimate of measure of effectiveness:
Some of the data were obtained from national sources, however accurate self-reports by IDUs on their injection behaviours may be difficult to obtain. The authors mentioned that the estimated parameters may reduce the reliability of their estimates and not all of these estimated parameters were subjected to sensitivity analysis. In particular, the current proportion of IDU injections made with sterile syringes was assumed to be 15%. This estimate may not apply to all settings.

Validity of estimate of costs:
The unit cost per syringe provided was calculated and multiplied by the quantity derived from the model. Readers are referred to other studies for details about the derivation of these unit costs and the lifetime cost of an HIV diagnosis. Only programme costs were included in this analysis. At all levels of coverage there will be costs of infections, thus it is possible that higher coverage could be cost-saving. It seems that not all the relevant costs were included in the analysis.

Other issues:
The findings of this study may be sensitive to the parameter estimates used for the United States. The situation for the UK NHS might be different and is likely to vary considerably within the United Kingdom, thus it is not possible to apply the overall conclusions to another setting. Also, this study used a one-year time frame. It is not possible to extrapolate these findings further as the expansion of syringe provision may affect the future prevalence of HIV among IDUs, which will in turn affect the model parameters.

Implications of the study
The authors suggested that a programme to increase access to sterile syringes was probably a cost-saving use of public funds in the United States. While this was an encouraging indication for a UK programme, the model parameters used in this study may not be generalisable to the UK.

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**Other publications of related interest**


**Indexing Status**
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