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 study examined the provision of human immunodeficiency virus (HIV) post-exposure prophylaxis (PEP) in France. The PEP programme provides 4 weeks' supply of antiretroviral drugs and counselling. In addition, laboratory tests were conducted. These included tests for pregnancy (in women), HIV and hepatitis B and C.

Type of intervention
Primary prevention.

Economic study type
Cost-utility analysis.

Study population
The study population comprised patients exposed to HIV either occupationally or non-occupationally. Occupational exposure was based on health care workers and was divided into percutaneous exposure to blood (deep injury) and mucous membrane exposure (other injury). Non-occupational exposure examined the use of PEP in population sub-groups, such as men who have sex with men (MSM), injecting drug users (IDUs) and heterosexual individuals.

Setting
The setting was primary and secondary care. The economic study was carried out in France.

Dates to which data relate

Source of effectiveness data
The effectiveness data were derived from a review of published studies.

Modelling
A decision tree was used to estimate the quality-adjusted life-years (QALYs) saved and the total cost of the PEP programme in the years 1999 to 2003, compared with no PEP. A separate decision tree was constructed for each type of exposure event. QALYs were generated by the prevention of HIV infection. The costs included the cost of the PEP programme and lifetime care costs for HIV or acquired immune deficiency syndrome (AIDS).

Outcomes assessed in the review
The outcomes assessed included:
the per-contact HIV transmission risk associated with specific sexual activities and occupational exposures,
the prevalence of HIV in the relevant population sub-groups,

the efficacy of PEP,

the quality-adjusted life expectancy (QALE) of an individual infected with HIV, and

the QALE of a non-HIV-infected individual.

In addition, the review assessed the cost of PEP and the lifetime care costs associated with HIV or AIDS.

**Study designs and other criteria for inclusion in the review**
A national hospital-based voluntary surveillance of the PEP programme for both occupational and non-occupational exposure was used to assess some of the health outcomes (e.g. compliance rates). Other study designs were not reported.

**Sources searched to identify primary studies**
Not reported.

**Criteria used to ensure the validity of primary studies**
Not reported.

**Methods used to judge relevance and validity, and for extracting data**
The validity of the primary studies does not appear to have been assessed.

**Number of primary studies included**
The review included 18 primary studies.

**Methods of combining primary studies**
The authors did not report the methods used to combine the results of the individual primary studies. Where more than one study was used to inform a particular model parameter, the method by which the results were combined was not explained.

**Investigation of differences between primary studies**
It appears that differences between the primary studies have not been accounted for in the analysis.

**Results of the review**
The efficacy of PEP in preventing HIV infection was 0.8 (range: 0.48 to 0.94).

The discounted QALE was 21.13 for a non-HIV-infected individual compared with 17.11 for an HIV-infected individual.

HIV prevalence was 0.14 (range: 0.09 to 0.152) in MSM, 0.16 (range: 0.13 to 0.21) in IDUs and 0.005 (range: 0.0007 to 0.012) in heterosexuals.

**Methods used to derive estimates of effectiveness**
The authors made an assumption to support their analysis.
Estimates of effectiveness and key assumptions
The authors assumed that an uninfected individual would live in full health until the age of 65 years.

Measure of benefits used in the economic analysis
The measures of benefits used were the number of infections averted and the number of QALYs saved. The valuation of health states was obtained from a published paper, but further details of the methods used in that paper were not reported. The QALYs saved were discounted at an annual rate of 3%.

Direct costs
The study included the direct costs to the health service. For PEP these were medication costs, physician visits and laboratory tests. The authors chose to exclude the cost of hepatitis serology and the costs of adverse drug effects and their consequences. The unit costs were reported separately from the quantities for the PEP programme. The lifetime care costs for HIV- and non-HIV-infected individuals were based on a previous study and were discounted at a rate of 3% per annum. The unit costs were derived from public sale prices for medication, reimbursement rates for physician visits and the French price scale for laboratory tests. The price year was 2002. The lifetime care costs were obtained from a previous study and related to the price year 1999. These costs were therefore inflated to the study price year, although the method used to achieve this was not reported. The study reported the incremental costs.

Statistical analysis of costs
Individual sampled data were not available for statistical analysis.

Indirect Costs
Despite the stated societal perspective, the indirect costs do not appear to have been included.

Currency
Euros (EUR).

Sensitivity analysis
The authors conducted several one-way sensitivity analyses around the rate of compliance with PEP and the life expectancy of HIV-infected individuals. Several threshold analyses were also conducted to determine the minimum prevalence, per-contact HIV transmission, or compliance required to achieve a cost-saving or cost-effective threshold in particular population sub-groups. The sensitivity analysis explored variability in the data.

Estimated benefits used in the economic analysis
Compared with no PEP, the PEP programme was estimated to have prevented 7.7 infections and saved 64.46 QALYs among the 8,958 individuals who received PEP in the period 1999 to 2003.

A discount rate of 3% per annum was applied to the QALE. The side effects of antiretroviral treatment provided in the PEP were excluded from the analysis.

Cost results
The PEP programme was estimated to have an incremental cost of EUR 5,717,075 in comparison with no PEP provision for the 8,958 individuals treated between 1999 and 2003.

Synthesis of costs and benefits
The costs and benefits were synthesised to calculate the cost per QALY saved.
Overall, the PEP programme was estimated to cost EUR 88,692 per QALY saved in the period 1999 to 2003.

The authors pointed out that the cost-effectiveness ratio varied widely according to the type of exposure.

PEP after receptive anal intercourse (RAI) with an individual known to be HIV infected was found to be cost-saving, as was PEP for IDUs after needle sharing with an individual known to be HIV infected.

The cost-effectiveness ratio fell below EUR 50,000 per QALY saved in health care workers after percutaneous exposure to material from an individual known to be HIV infected, and for MSM who have RAI with an individual of unknown HIV status. However, for the majority of exposures, PEP was found to be not cost-effective (i.e. the cost-effectiveness ratio was greater than EUR 50,000 per QALY saved).

**Authors' conclusions**
The French post-exposure prophylaxis (PEP) programme is moderately cost-effective, with only 15.7% of PEP courses being considered cost-effective. PEP guidelines should be revised to target high-risk exposures more effectively.

**CRD COMMENTARY - Selection of comparators**
The comparators were chosen to represent current practice in the study setting. You should consider whether the French PEP programme assessed in this study is relevant to your own setting.

**Validity of estimate of measure of effectiveness**
The estimate of effectiveness was derived from a review of published studies. The authors did not state that a systematic review had been undertaken. The quality of the studies was not assessed and differences between the studies were not investigated. In addition, it was unclear how estimates of effectiveness were combined where multiple studies were available in order to inform a particular model parameter, and the authors might have used data from the available studies selectively. Although the authors carried out several sensitivity analyses to investigate uncertainty around the estimates used and to improve the generalisability of the results, it was difficult to determine whether the ranges used in the sensitivity analyses were appropriate given that the methods used to derive these ranges were not discussed.

**Validity of estimate of measure of benefit**
The estimation of benefit was modelled using a decision tree to estimate the number of HIV infections averted through the use of PEP. The difference in QALE between HIV-infected and non-HIV-infected individuals was derived from published studies. The authors excluded the side effects associated with the antiretroviral medicine provided under PEP, and so might have overestimated the QALE of individuals receiving PEP.

**Validity of estimate of costs**
The authors stated that they adopted a societal perspective, but they did not include the indirect costs in the analysis. This omission is likely to be conservative with respect to PEP as preventing HIV infection is likely to reduce lost productivity arising from HIV-related illness and mortality. The costs of laboratory tests for hepatitis were excluded from the analysis, and the justification for this was not clear. This omission will have led to an underestimation of the cost of PEP. The costs were reported separately from the quantities. The resource use quantities were based on current service provision associated with PEP in France, as well as previous studies. The sensitivity analyses do not appear to have included any cost parameters. The unit costs were based on prices and reimbursement rates in the study setting. A statistical analysis of the prices was not conducted. The costs were inflated to the price year used in the study, although the method used was not reported.

**Other issues**
The authors compared their findings with the results of other studies assessing preventive or screening programmes in France, and studies assessing the cost-effectiveness of PEP in other settings. The authors speculated that the reason why
PEP appeared more cost-effective in some studies was because the programmes in those settings were targeted specifically at high-risk individuals, such as MSM, whereas the French programme included the whole population. The authors did not present their results selectively and their conclusions reflected the scope of the analysis. The authors acknowledged that the omission of adverse effects associated with PEP might have been favourable to PEP, but stated that the inclusion of adverse effects would only have resulted in PEP appearing even less cost-effective. They also stated that the number of HIV infections predicted by their decision tree was higher than that observed in practice, but noted that the difference was difficult to assess as HIV serology was available for only 18% of the total number of patients who received PEP.

**Implications of the study**
The authors recommend that the current guidelines in France be revised to target PEP at high-risk exposure events.

**Source of funding**
None stated.

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**Other publications of related interest**
Because readers are likely to encounter and assess individual publications, NHS EED abstracts reflect the original publication as it is written, as a stand-alone paper. Where NHS EED abstractors are able to identify positively that a publication is significantly linked to or informed by other publications, these will be referenced in the text of the abstract and their bibliographic details recorded here for information.

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Adult; Antiretroviral Therapy, Highly Active /economics; Cost-Benefit Analysis; Female; France /epidemiology; HIV Infections /economics /epidemiology /prevention & control; Humans; Life Expectancy; Male; Middle Aged; Occupational Exposure /adverse effects; Quality-Adjusted Life Years; Substance Abuse, Intravenous /epidemiology; Unsafe Sex

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