Anti-HIV-1 antibody testing using modified gelatin particle agglutination: a large field study

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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 study investigated modified gelatin particle agglutination (15 microl incubated with non-sensitised (15 microl at 1:8) and sensitised particles (15 microl at 1:16) (GPA, Serodia HIV-1, Fujirebio Inc, Tokyo, Japan); and non modified GPA (25 microl gelatine particle incubated with 25 microl of diluted serum made up of equal volumes) assays for anti-HIV-1 antibody testing. They were compared to second generation enzyme-linked immunosorbance assays (ELISAs)(Genelavia mixt, Sanofi Pasteur, France; Innotest, Innogenetic, Belgium; Enzygnost, Behring, Germany; and Vironostika, Organon, Belgium) or third generation ELISAs (Access, Pasteur Institute, France; and AxSYM, Abbot, USA).

Type of intervention
Diagnosis; screening.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients attending the study setting for routine testing for HIV antibodies.

Setting
The setting was primary care. The economic study was conducted at the Siriraj Hospital, Mahidol University, Bangkok, Thailand.

Dates to which data relate
Effectiveness data were collected between 1992 and 2000. Dates for the collection of resource use and prices were not reported.

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

Link between effectiveness and cost data
Costing appears to have been carried out retrospectively and on a different sample from that used in the effectiveness study.

Study sample
The study sample comprised patients attending the study setting from whom sera samples were taken. Further details and summary statistics were not reported. Power calculations to estimate the impact of chance on the results were not
reported. The authors defined two study populations. In the first, 174,032 sera were obtained with a seroprevalence of greater than 10 percent and in which the reduced volume GPA (rvGPA) was assessed. However, it is not clear if these sera were from 174,032 individual patients. In the second population, 90,560 pregnant women and 48,936 emigrant workers with a seroprevalence of less than 10 percent, were tested in pools of 4 sera by an otherwise unmodified GPA assay. There were no reports of patients being excluded for any reason.

**Study design**
The analysis was based on a diagnostic study with an investigation of sensitivity and specificity. There was a single study centre, the Siriraj Hospital. Follow-up existed only for patients with indeterminate results where sera were re-collected 3 to 6 months later.

**Analysis of effectiveness**
The primary health outcomes were the number of true and false positives, true and false negatives, and the sensitivity and specificity. Western blot assays appeared to be used as the gold standard against which sensitivity and specificity were measured. The groups differed by seroprevalence, but the average for each group was not reported.

**Effectiveness results**
There were 23,881 true positives for rvGPA and 23,879 for ELISA. There were 13 false positives for rvGPA and 35 for ELISA. There were 150,135 true negatives for rvGPA and 150,113 for ELISA. There were 3 false negatives for rvGPA and 5 for ELISA.

Sensitivity was 99.99 for rvGPA and 99.98 for ELISA.
Specificity was 99.99 for rvGPA and 99.98 for ELISA.

The authors then reported that all 2,138 HIV-1 samples reactive by ELISA were also detected by screening pools of 4 sera, and that no discrepant results was found in the 22,640 and 12,334 pools of sera from pregnant women and emigrant workers respectively.

**Clinical conclusions**
The authors concluded that the sensitivity and specificity of rvGPA were almost identical to those of standard methods.

**Measure of benefits used in the economic analysis**
The authors did not derive a summary measure of benefit. As the effectiveness results showed no significant differences between the alternative diagnostic strategies, the economic analysis was based on a cost-minimisation approach.

**Direct costs**
It appears that direct costs included only the cost of reagents. Very few details of the costing analysis were reported. However, the authors did report that costs were based on testing 2000 sera in a population with an HIV seroprevalence of 2 per cent. There was no report of the perspective, discounting, the scope of the costing, sources of prices, dates or a price year.

**Statistical analysis of costs**
Costs were treated as deterministic.
Indirect Costs
Indirect costs were not reported but would probably not have been relevant to the authors’ objectives for the study.

Currency
The authors reported that 46 baht = 1 US dollar. However, they did not state in which of these currencies the costs were reported.

Sensitivity analysis
The authors did not report sensitivity analyses.

Estimated benefits used in the economic analysis
Please refer to the “effectiveness results” section presented previously.

Cost results
The authors reported that the total cost of all tests performed was 204,000 for standard GPA, 122,400 for rvGPA and 66,000 for pools of sera with individual GPA. They stated that the cost savings from a reduced volume of reagents was 40% for rvGPA and 67% for pools, but it was not clear whether these savings were assumed or observed.

Synthesis of costs and benefits
Not relevant as the study was considered to be a cost-minimisation analysis.

Authors’ conclusions
The authors concluded that the “cost savings of using the reduced volume assay and pools of 4 sera with the unmodified assay can be obtained without loss of sensitivity and specificity”.

CRD COMMENTARY - Selection of comparators
The authors compared diagnostic techniques that were used in current practice in their setting. You should decide if these are widely used health technologies in your own setting.

Validity of estimate of measure of effectiveness
The analysis was based on a diagnostic study which focussed appropriately on sensitivity and specificity outcomes. The study lacked a full comparison of the patient samples in each of the study groups which means that it is not possible to determine whether the two groups were directly comparable or whether there should have been adjustments for confounding factors which may have created systematic differences in the result between the two groups. Primarily as a result of this, the study has low internal validity.

Validity of estimate of measure of benefit
The authors did not estimate a summary measure of benefit as this was, in effect, a cost-minimisation analysis.

Validity of estimate of costs
The reporting of costs was extremely limited. No perspective was reported and it is not clear which elements went into the costs that were reported. This prevents readers fully understanding the analysis and the potential importance of the results.
Other issues
The authors drew comparisons between their own findings and those of other studies, stressing the similarity in sensitivity and specificity results. The issue of generalisability was not addressed and, due to the limited reporting of costs, readers are strongly advised not to generalise the results presented. The conclusions reflected the objective of the study and the authors made attempts to qualify their conclusions. No limitations to the study were discussed.

Implications of the study
The authors recommend that "the parallel use of either modified GPA might be considered appropriate for when testing large numbers of samples such as in donated blood and pregnant women to avoid false negative results". However, they did not recommend applying either the modified version of the GPA assay as the first assay for diagnostic or blood bank testing in populations with a high prevalence of HIV infection, or using either modification in populations where HIV-1 and HIV-2 infections coexist. No suggestions for further research are made.

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Other publications of related interest


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