Economic evaluation of alternative indicators for screening for diabetes mellitus
Shirasaya K, Miyakawa M, Yoshida K, Takahashi E, Shimada N, Kondo T

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
Alternative indicators for screening for diabetes mellitus.

Type of intervention
Screening and secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
For the effectiveness study the population consisted of males who attended an annual health checkup at a general hospital in Tokyo, Japan. Subjects with a history of diabetes mellitus or gastrectomy were excluded. For the modelled economic evaluation a hypothetical cohort of 1,000 men was used.

Setting
Hospital. The study was carried out in Tokyo, Japan.

Dates to which data relate
Effectiveness data were collected from a single study between July and September 1993 or between January and March 1994, and from studies published between 1968 and 1990. Cost data were collected from a 1997 source. The price year was 1997.

Source of effectiveness data
Effectiveness data were derived from a single study and review of previously published studies.

Link between effectiveness and cost data
Not relevant.

Study sample
The subjects were 891 men aged between 26 and 80 years. No power calculations were reported. The exclusion criteria are reported above in the Study Population field.

Study design
The study was a case series in which each subject was screened using all three indicators. The study was carried out at a single centre. No loss to follow-up was reported.
Analysis of effectiveness
The primary health outcomes used included the number of NIDDM and IGT diagnoses, the sensitivity and specificity of the three screening tests, and the area under the receiver operating characteristics (ROC) curve of each screening test.

Effectiveness results
37 subjects (4.2%) were diagnosed as NIDDM, and 164 subjects (18.4%) were diagnosed as IGT. The sensitivity of 1,5-AG for detecting NIDDM only, varied between 78.4% and 83.8%, and the specificity between 79.3% and 88.1%. The sensitivity and specificity of HbA1c for detecting NIDDM only varied between 75.7% and 86.5%, and between 57.6% and 91.3%, respectively. The sensitivity of FRA for detecting NIDDM only, varied between 54.1% and 83.8%, and specificity between 51.4% and 92.9%. The sensitivity and specificity of 1,5-AG for detecting NIDDM was 62.7% and 61%, respectively. The sensitivity of HbA1c for detecting NIDDM was 53.2% and specificity was 68.6%. The sensitivity and specificity of FRA for detecting NIDDM was 61.2% and 55.4%, respectively. The area under the ROC curve of 1,5-AG was the largest among all indicators for detecting NIDDM alone. The area under the ROC curve of FPG was the largest among all indicators for detecting both IGT and NIDDM.

Clinical conclusions
Not reported.

Modelling
A model was developed to perform the cost-effectiveness analysis of alternative methods of screening for diabetes mellitus.

Outcomes assessed in the review
The following outcomes were assessed in the review: the prevalence of NIDDM alone, the prevalence of both IGT and NIDDM, the ratio of the former to the latter, and the rate of progression of IGT to NIDDM.

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
Data from individual studies.

Number of primary studies included
Approximately 4 studies were included.

Methods of combining primary studies
A meta-analysis was conducted based on the random effects model.
Investigation of differences between primary studies
Not stated.

Results of the review
The ratio of the prevalence of NIDDM alone to the prevalence of both IGT and NIDDM was 18.4%.

Measure of benefits used in the economic analysis
Three measures of benefit were used: the final number of NIDDM patients detected, the final number of both IGT and NIDDM patients detected, and the number of patients who would progress from IGT to NIDDM within 10 years. The analysis was based on the sensitivity and specificity at the optimal cut-off point on the ROC curve of each indicator. The optimal cut-off point is the point on the ROC curve at which the sensitivity is closest to 100% and the false positive rate is closest to 0%. A model was adopted for the cost-effectiveness analysis using the derived test parameters, prevalence and cost data.

Direct costs
Costs were discounted at an annual rate of 5% when necessary. Quantities and costs were reported separately. Direct costs included costs for each screening test and costs for 75gGTT. These costs included costs of the screening tests needed until more than 99% of the false negatives were detected (during n years) and costs of the 75gGTTs needed in the year in which the false negatives were detected. The quantity/cost boundary was that of the health service. The estimation of quantities and costs was based on actual data. Cost data were derived from Japanese government sources. The price year was 1997.

Statistical analysis of costs
Not reported.

Indirect Costs
Not included.

Currency
Japanese yen. One US dollar was approximately 115 yen in July 1997.

Sensitivity analysis
A sensitivity analysis was conducted on the optimal cut-off point on the ROC curve of each indicator.

Estimated benefits used in the economic analysis
Among the three indicators, 1,5-AG detected the highest number of NIDDM patients, of both IGT and NIDDM patients, and of present and prospective NIDDM patients.

Cost results
Total cost results were not reported. However, the charges for FRA were 500 yen, 950 yen for HbA1c, 1,450 yen for 1,5A-G and 2,000 yen for 75g GTT.

Synthesis of costs and benefits
The most cost-effective indicator is FRA in Japan.
Authors' conclusions
FRA was the most cost-effective of the three indicators without relying on fasting conditions in all cases calculated on the basis of costs in Japan. However, the screening tests using 1,5-AG or HbA1c would produce a larger effectiveness than when using FRA.

CRD COMMENTARY - Selection of comparators
rationale for the choice of the comparators was clear. You, as a user of this database, should verify whether these health technologies are relevant to your setting.

Validity of estimate of measure of benefit
relevant benefit measures were considered. It should be noted that the prevalence of diabetes mellitus may vary among cohorts due to differences in ages and other characteristics.

Validity of estimate of costs
y direct costs falling to the provider of the screening services were included. Charges rather than full opportunity costs were used. Cost data were derived from Japanese government sources and are unlikely to be generalisable to other settings. Cost results were not synthesised in the final reporti

Other issues
en the uncertainty surrounding the prevalence of diabetes mellitus and medical costs, the authors indicated the equilibrium points at which the cost-effectiveness ratios of each indicator intersect, using equations, in order to make the results generalisable.

Implications of the study
Preventive health providers, the authors suggest, should judge whether the incremental costs are worth the incremental benefits in comparison with FRA.

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None stated.

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Other publications of related interest


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