Comparison of sputum induction with fiber-optic bronchoscopy in the diagnosis of tuberculosis

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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
Fibre optic bronchoscopy and sputum induction in the diagnosis of tuberculosis (TB).

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
Patients suspected of having active tuberculosis and in whom sputum direct smears for acid-fast bacilli (AFB) were negative or those from whom no sputum could be obtained.

Setting
Hospital. The economic study was carried out in Montreal, Canada.

Dates to which data relate
Effectiveness and resource use data were obtained between September 1992 and February 1994. The fiscal year was not explicitly specified.

Source of effectiveness data
The estimates for final outcomes were obtained from a single study.

Link between effectiveness and cost data
Costing was retrospectively undertaken based on the experience of the study institution.

Study sample
Power calculations were used to determine the sample size: 93 subjects were required to detect a difference in sensitivity of 15% (i.e. microbiological confirmation in 20% of the population) with a specificity of 95% (alpha=0.05) and a power of 80%. A total of 101 patients agreed to participate, 10 refused to participate and 6 were ineligible. Of the 101, 8 did not produce sputum after the induction procedure, leaving 93 to participate fully. Bronchoscopy was performed 2-48 hours after sputum induction.

Study design
This was a non-randomised trial with self-controls. Follow-up was 6 months. No loss to follow-up was reported.

**Analysis of effectiveness**
The principle (intention to treat or treatment completers only) used in the analysis of effectiveness was not explicitly stated. Primary health outcomes assessed were the comparative technology yield, overall sensitivity and specificity, and negative predictive value.

**Effectiveness results**
Of the 26 patients with microbiologically confirmed M-TB, 20 (76.9%) were detected by sputum induction and 19 (73%) by bronchoscopy. Sensitivity and negative predictive values of cultures from bronchoscopy specimens were 73% and 91% compared with 87% and 96%, respectively, for sputum induction when a specimen was obtained. It was reported that sputum induction had a slightly better overall sensitivity and specificity than bronchoscopy.

**Clinical conclusions**
Sputum induction has a higher diagnostic yield, greater patient comfort, and reduced risk of nosocomial transmission and therefore could be more widely used in the diagnosis of smear-negative pulmonary TB.

**Measure of benefits used in the economic analysis**
No summary benefit measure was identified in the economic analysis, and only separate clinical outcomes were reported.

**Direct costs**
Discounting of costs was not required as the follow-up period was only 6 months. Quantities and costs were not analysed separately. Direct costs included the costs of capital and repair costs, supplies, personnel, and physician fees. The source of cost data was mainly the study institution. The perspective of the health service was used. The date of the price data was not explicitly specified. Overhead costs were not included in the cost analysis.

**Indirect Costs**
Not considered.

**Currency**
Canadian dollars (Can$).

**Sensitivity analysis**
No sensitivity analysis was performed.

**Estimated benefits used in the economic analysis**
Not applicable.

**Cost results**
Cost per bronchoscopy was Can$187.60, compared with Can$22.22 for sputum induction.

**Synthesis of costs and benefits**
A synthesis of costs and benefits was not performed since the use of sputum induction was regarded as the weakly
dominant strategy (with slightly better clinical outcomes and substantially lower costs).

Authors' conclusions
Sputum induction was well-tolerated, low-cost, and provided the same, if not better, diagnostic yield compared with bronchoscopy in the diagnosis of smear-negative pulmonary tuberculosis.

CRD COMMENTARY - Selection of comparators
A justification was given for the choice of the comparator. It was regarded as the diagnostic procedure of choice in the context in question.

Validity of estimate of measure of effectiveness
The effectiveness results are likely to be internally valid given the use of a prospective design, power calculations, and self-controls.

Validity of estimate of measure of benefit
With respect to lack of a summary benefit measure in the economic analysis, the study should be regarded as a cost-consequences study.

Validity of estimate of costs
Quantities were not reported separately from the costs. However, adequate details of methods of cost estimation were given.

Other issues
The study lacked a prospective cost analysis. The issue of generalisability to other settings or countries was not addressed.

Source of funding
Supported by the Association Pulmonaire du Quebec and the FRSQ Chercheur Clinicien Award.

Bibliographic details

PubMedID
7582296

DOI
10.1164/ajrccm.152.5.7582296

Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Bronchoscopy /economics /methods; Canada; Costs and Cost Analysis; Female; Fiber Optic Technology; Humans; Male; Mycobacterium tuberculosis /isolation & purification; Optical Fibers; Prospective Studies; Saline Solution, Hypertonic /administration & dosage; Sensitivity and Specificity; Sputum /drug effects /microbiology; Tuberculosis, Pulmonary /diagnosis /economics

AccessionNumber
21995001341

Date bibliographic record published