A comparison of the case-finding effectiveness and average costs of screening and partner notification

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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
Two case-finding methods - screening and partner notification - to control syphilis in an epidemic situation. Serologic testing for syphilis was implemented or enhanced in the study county health department's sexually transmitted disease (STD) and primary care clinics, local jails, and a variety of community clinics and outreach sites. A Venereal Disease Research Laboratory (VDRL) test was performed on all patients. Positive tests were confirmed by a fluorescent treponemal antibody (FTA) test, unless the statewide syphilis registry documented previous infection. Clinical management of patients with positive serologic tests was based on their diagnostic status as determined by the Centers for Disease Control and Prevention (CDC)-trained Disease Intervention Specialist (DIS) staff using serologic, clinical, and registry data. DIS staff attempted to interview all patients as having early syphilis (primary, secondary, or early latent). The interviews conducted by DIS staff incorporated clustering techniques to identify original patients' social contacts at risk of syphilis. Notification of partners, suspects (individuals with syphilis symptoms or risk factors for infection who are identified by a syphilis patient), and associates (symptomatic or at-risk individuals identified by uninfected social or sexual contacts of a person with syphilis) was carried out using usual techniques. Curative and preventive treatment was offered according to CDC guidelines.

Type of intervention
Screening, diagnosis, treatment and primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
A cohort, tested for syphilis through a county health department in an epidemic situation.

Setting
STD clinic, primary care, and community in the framework of a county health department. The economic analysis was carried out in the USA.

Dates to which data relate
Effectiveness and resource use data corresponded to patients tested between March 1989 and September 1992. The price year does not appear to have been explicitly specified.

Source of effectiveness data
The evidence for the final outcomes was based on a single study.

Link between effectiveness and cost data
Costing was conducted on a subsample of the patient sample used in the effectiveness analysis and appears to have been performed prospectively.

**Study sample**

Power calculations were not used to determine the sample size. In total 35,314 individuals were tested through the study county health department during the study period. Of these, 1,263 were classified as DIS-motivated (those having presented for testing because of contact with an STD), and the remaining 34,051 were classified as self-motivated by symptoms or perceived risk. Of self-motivated individuals, 13,766 (40.4%) were tested through the STD clinic, and the remaining 20,285 (59.6%) were tested through other clinical and non-clinical sites.

**Study design**

This was a community-based prospective cohort study, carried out in the framework of a county health department. The duration of the follow-up does not appear to have been reported. Individuals interviewed and named in DIS case interviews were arranged into preliminary source-spread tree diagrams showing the relationships among epidemiologically-linked cases, contacts, suspects, and associates. Regarding loss to follow-up, complete data necessary for source-spread analysis were not available for 40 (15.6%) of the 256 direct yield cases. These cases were assumed to have indirect yields similar to the fully characterised cases tested through the same type of test site. Data on motivation for testing were extrapolated to the entire study sample based on a prospective analysis of patient-stated reasons for testing in a cohort comprising 10,594 (30%) of the 35,314 individuals tested. This cohort was comparable with the total tested population in gender, race/ethnicity, age distribution, type of site where tested, and seropositivity.

**Analysis of effectiveness**

The clinical outcome measures were direct and indirect yield per 1,000 individuals tested. Direct yield cases were defined as individuals with early syphilis who were diagnosed as a result of testing at a study site and self-motivated (i.e., not named by another individual who could have been the source of infection). Other cases, contacts, suspects, and associates who were epidemiologically linked to a direct yield case were defined as indirect yield. Other outcomes reported were the numbers of contacts and clusters named, not located, not infected, and epidemiologic treatment given.

**Effectiveness results**

The direct yield results per 1,000 individuals tested were as follows:

- primary cases, 2.23 in all sites, 4.36 in the STD clinic, and 0.79 in other sites;
- secondary cases, 2.03 in all sites, 3.19 in the STD clinic, and 1.23 in other sites;
- early latent cases, 3.26 in all sites, 4.65 in the STD clinic, and 2.32 in other sites.

The indirect yield results per 1,000 individuals tested were as follows:

- new primary cases, 0.31 in all sites, 0.41 in the STD clinic, and 0.26 in other sites;
- new secondary cases, 0.28 in all sites, 0.58 in the STD clinic, and 0.06 in other sites;
- early latent cases, 0.70 in all sites, 1.07 in the STD clinic, and 0.45 in other sites.

The number of contacts and clusters named was 13.19 in all sites, 21.36 in the STD clinic, and 7.66 in other sites.

The number of contacts and clusters named but not located was 6.23 in all sites, 10.64 in the STD clinic, and 3.19 in other sites.

The number of contacts and clusters named but not infected was 1.36 in all sites, 1.90 in the STD clinic, and 1.02 in
other sites.

The number of epidemiologic treatments given was 3.45 in all sites, 5.36 in the STD clinic, and 2.17 in other sites.

Clinical conclusions
It appears that, compared to testing, the contribution of field epidemiology to case-finding is relatively small, and that the cases found through this method may not be uniquely important to transmission of disease in the community.

Measure of benefits used in the economic analysis
The measure of benefits used were the number of new (i.e., previously undiagnosed) early syphilis cases detected and the number of CDC’s Weighted Disease Intervention Index points (which recognises and quantifies multiple outcomes of epidemiologic activity). The CDC Index considers cases found, epidemiologic treatments given, and clusters to primary and secondary cases brought to evaluation and treatment. The equation and weighting system were presented in the paper.

Direct costs
Costs were not discounted due to the short time frame of the cost analysis. Some resource use quantities were reported separately from the costs. Cost items were reported separately. Cost analysis covered the costs of testing (personnel and materials) and partner notification (DIS activities including original interview, locating named contacts, interviewing located contacts, and case follow-up, including re-interviews). The perspective adopted in the cost analysis does not appear to have been explicitly specified. A time-motion study of DIS activity in managing 49 cases was employed to estimate the amount of DIS time spent on each of the DIS activities using a standardised form recorded by the DIS staff. The personnel input into testing was determined by using a restricted time study in the county clinic and laboratory. Data from the STD clinic were used to estimate costs at all clinics. The costs of the materials were based on the actual purchase costs that incorporated volume discounts. The authors reported that, because of the difficulties inherent in using true marginal costs in this type of study, average costs of testing and partner notification were calculated, and were used as a proxy for marginal costs. This methodology assumed that a partner notification programme existed to carry out epidemiologic management for STDs other than syphilis. The price year was not specified.

Indirect Costs
Not included.

Currency
US dollars ($).

Sensitivity analysis
Not conducted.

Estimated benefits used in the economic analysis
Direct yield cases were discovered at a rate of 7.5 cases per 1,000 individuals tested. The rate in the STD clinic was 12/1,000, and that of other sites was 4.3/1,000.

All generations of epidemiologic management activities, identified an additional 1.3 previously undiagnosed cases per 1,000 individuals tested. The corresponding values for the STD clinic were 2.16 and other sites, 0.97.

The values calculated for the number of CDC’s Weighted Disease Intervention Index points appear not to have been reported (although they can be computed based on the data provided in the paper).
Cost results
The total cost to test a population of 1,000 individuals with a seropositivity rate of 4.3% was $2,883. The average cost of the DIS management of each confirmed case was $83.51.

Synthesis of costs and benefits
The cost of finding a new early syphilis case and the cost to produce one Weighted Disease Intervention Index point were calculated as the measures of cost-effectiveness ratios.

The average cost to discover a previously untreated case through testing was $383 in all sites, $236 in the STD clinic, and $664 in other sites.

The cost of identifying a new case through DIS activities was $486 in all sites, $495 in the STD clinic, and $471 in other sites.

The cost to produce one Weighted Disease Intervention Index point through testing was $785 in all sites, $447 in the STD clinic, and $1,611 in other sites.

The corresponding values for the DIS activities were $390 in all sites, $414 in the STD clinic, and $359 in other sites.

Authors’ conclusions
Sexually transmitted disease control programmes must consider how to balance investments in screening and DIS field intervention. Programmes should also re-evaluate their approach to control of epidemic syphilis in light of the limited effectiveness of traditional control strategies.

CRD COMMENTARY - Selection of comparators
No specific strategy was explicitly regarded as the comparator since it was reported that the emphasis on case finding through testing/screening and epidemiologic management of cases and contacts in syphilis programmes in the USA was a reality at the time of the study. Furthermore, testing and field epidemiology produce outcomes that are potentially complementary. With regard to the above points, it appears that the study may not have adopted a proper comparator.

Validity of estimate of measure of effectiveness
The internal validity of the effectiveness results is likely to be high due to the prospective nature of the study design and the large sample size. However, the fact that not all important data were collected prospectively (and as a result, extrapolation methods had to be used) and complete data were not available for source-spread analysis may weaken the validity of the effectiveness results. The study sample appears to have been representative of the study population.

Validity of estimate of measure of benefit
Estimation of benefits was obtained directly from the effectiveness analysis. The choice of the estimates was justified. Previously undiagnosed cases were chosen as the benefit measure because they were comparable to direct yield cases in being previously undiscovered, and because rediscovery of old cases contributes relatively little to syphilis control. A modification of CDC’s Weighted Disease Intervention Index.11 was used as another benefit criterion since it recognises and quantifies multiple outcomes of epidemiologic activity.

Validity of estimate of costs
The following characteristics of the cost analysis may have enhanced its validity: some resource use quantities were reported separately from the costs; adequate details of methods of cost estimation were given; time-motion studies were used to determine the time spent on each activity (although sometimes restricted). However, the price year and perspective adopted in the cost analysis appear not to have been reported; it is not clear whether true costs or charge
data were used; the effects of alternative procedures on indirect costs were not addressed; statistical analyses were not performed on resource use and cost data. The cost results may not be generalisable outside the study settings.

Other issues
The authors' conclusions appear to be justified given the uncertainties in the data. Regarding the issue of generalisability to other settings or countries, it was acknowledged that the results of this analysis may not be generalisable to other communities due to sensitivity analysis not having been performed. The issue of whether the study sample was representative of the study population was not discussed. An incremental cost-effectiveness ratio could be calculated by using an appropriate comparator (not using any case-finding method, for example).

Implications of the study
The study results suggest that large-scale testing should be restricted to sites where the prevalence of infection makes testing cost-effective. It is important for STD programmes to examine their own local data when making programme design decisions. The results of this study should also prompt a wider re-evaluation of syphilis control activities. Coupled with the results of other research in the authors' community, this study suggests that testing combined with field epidemiology does not exert positive effects deeply into the affected population. This situation calls for more research to clarify the effectiveness of intervention techniques. It also demands consideration of alternate interventions (e.g., primary prevention, selective mass treatment, and more effective field methods for reaching "core" transmitters) to achieve more effectively the personal and public health goals of syphilis control programmes.

Source of funding
Financially supported by The Centers for Disease Control and Prevention, Grant number R30/CCR0011571-01.

Bibliographic details

PubMedID
8801644

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Adolescent; Adult; Cohort Studies; Contact Tracing /economics; Cost-Benefit Analysis; Costs and Cost Analysis; Humans; Mass Screening /economics; Syphilis /diagnosis /epidemiology /prevention & control

AccessionNumber
21996000214

Date bibliographic record published
31/03/2001

Date abstract record published
31/03/2001