Assessing the cost-effectiveness of contraceptive methods in Shiraz, Islamic Republic of Iran  
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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  
Seven methods of contraception were examined. More specifically, oral contraceptives, male condoms, injectable contraceptives, contraceptive implants, intrauterine devices (IUDs), tubal ligation and vasectomy.

Type of intervention  
Primary prevention.

Economic study type  
Cost-effectiveness analysis.

Study population  
The study population comprised the general population of individuals using contraception.

Setting  
The setting was primary care. The economic study was carried out in Iran.

Dates to which data relate  
The effectiveness and resource use data were gathered in different timeframes, but which ended in 2000. The price year was not reported.

Source of effectiveness data  
The effectiveness evidence appears to have been derived from a single study.

Link between effectiveness and cost data  
It was unclear whether the costing was carried out on the same sample of patients as that used in the effectiveness study.

Study sample  
Different samples of individuals attending primary health care centres were recruited to derive conversion factors used to calculate the outcome measures. Limited information on the study samples was reported. The analysis was based on a sample of 385 users of oral contraceptive pills, 385 regular condom users, 1,100 IUD users, 242 patients who had had a contraceptive implant, and 1,278 and 1,160 clients who had undergone female and male sterilisation, respectively. The mean age for each group was reported and was used to estimate some outcomes measures (see 'Effectiveness Results' section).

Study design
The design of the study was unclear. It appears that the evidence has come from the analysis of different groups of individuals. Data were gathered at several primary care centres in the Shiraz district of Iran. The length of follow-up varied and depended upon the sample of patients.

Analysis of effectiveness
The outcome measures used in the study were:

- the mean age of acceptors,
- the number of acceptors during 12 months,
- the conversion factor,
- the effectiveness,
- the relative pregnancy risk,
- conventional couple-years of protection (CYP), and
- adjusted CYPs.

The conversion factor represents the average duration of protection provided by one application of the contraceptive method. One CYP means that a couple do not conceive during 1 year. An adjusted CYP represents a measure of CYP adjusted by the failure rate and the age-related relative risk of pregnancy. No details on the comparability of the patient groups were given, except for the mean age of acceptors.

Effectiveness results
The mean age of acceptors was 28.8 years with oral contraceptives, 29.1 years with male condoms, 30.2 years with injectable contraceptives, 24 years with contraceptive implants, 32.6 years with IUDs, 34.2 years with tubal ligation, and 33.2 years with vasectomy.

The number of acceptors during 12 months was 196,487 with oral contraceptives, 2,077,540 with male condoms, 13,036 with injectable contraceptives, 257 with contraceptive implants, 4,319 with IUDs, 623 with tubal ligation, and 1,221 with vasectomy.

The conversion factor was 1/15 with oral contraceptives, 1/80 with male condoms, 1/4 with injectable contraceptives, 4.3 with contraceptive implant, 6 with IUDs, 11 with tubal ligation, and 12 with vasectomy.

The effectiveness was 0.940 with oral contraceptives, 0.860 with male condoms, 0.997 with injectable contraceptives, 0.999 with contraceptive implants, 0.995 with IUDs, 0.995 with tubal ligation, and 0.9985 with vasectomy.

The relative pregnancy risk was 0.918 with oral contraceptives, 0.912 with male condoms, 0.899 with injectable contraceptives, 0.980 with contraceptive implants, 0.843 with IUDs, 0.798 with tubal ligation, and 0.826 with vasectomy.

The conventional CYPs were 13,099.1 with oral contraceptives, 25,969.2 with male condoms, 3,259 with injectable contraceptives, 1,105.1 with contraceptive implants, 25,914 with IUDs, 6,853 with tubal ligation, and 14,652 with vasectomy.

The adjusted CYPs were 11,303.5 with oral contraceptives, 20,368.2 with male condoms, 2,921.1 with injectable contraceptives, 1,081.9 with contraceptive implants, 21,670.7 with IUDs, 5,441.3 with tubal ligation, and 12,084.4 with vasectomy.
Clinical conclusions
The effectiveness analysis showed that the highest adjusted CYPs were achieved with IUDs and condoms. The lowest estimates were associated with implants and injections.

Measure of benefits used in the economic analysis
The summary benefit measure used was the adjusted CYP. This was derived directly from the effectiveness analysis. No discount rate was applied because the authors stated that there was no reason to believe that protection in future years is less desirable with time.

Direct costs
The cost analysis was carried out from the perspective of the service provider. The health services in the economic evaluation were grouped into four main categories. More specifically, labour costs, the costs of administrative and supervisory personnel, the costs of contraceptives and supplies, and overheads. Capital costs were not considered because of the lack of adequate data. The unit costs and quantities of resources used were not reported. The costs came from the primary care centre as well as from national sources. It was unclear whether resource consumption referred to the same sample of patients considered in the effectiveness analysis. The price year was not reported. Discounting was not relevant since the costs were incurred during a 1-year timeframe. The analysis focused on the variable costs involved in service provision.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were not considered.

Currency
The costs were estimated using Iranian rials and then converted into US dollars ($). The conversion rate was $1 = 1,750 rials.

Sensitivity analysis
Sensitivity analyses were carried out to assess the robustness of the cost-effectiveness estimates to variations in the outcome measure and when CYPs were used instead of adjusted CYPs.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The estimated total costs were $238,330 with oral contraceptives, $490,676 with male condoms, $136,758 with injectable contraceptives, $89,557 with contraceptive implants, $289,772 with IUDs, $151,321 with tubal ligation, and $125,708 with vasectomy.

The proportion of variable costs over total costs was 39% with oral contraceptives, 52% with male condoms, 19% with injectable contraceptives, 8% with contraceptive implants, 18% with IUDs, 47% with tubal ligation, and 28% with vasectomy.

Male condoms therefore turned out to be the most expensive strategy, while contraceptive implants represented the least costly method of contraception.
Synthesis of costs and benefits
Average and incremental cost-effectiveness ratios were calculated to combine the costs and benefits of the alternative methods of contraception.

The average cost per adjusted CYP was $21.1 with oral contraceptives, $24.1 with male condoms, $46.8 with injectable contraceptives, $82.8 with contraceptive implants, $13.4 with IUDs, $27.8 with tubal ligation, and $10.4 with vasectomy.

In the incremental analysis, each strategy was compared with the next most effective alternative. The incremental costs per adjusted CYP were as follows:

- $25.7 for injectable contraceptives compared with contraceptive implants (the least effective strategy);
- $5.8 for tubal ligation compared with injectable contraceptives;
- $14.9 for oral contraceptive compared with tubal ligation;
- vasectomy was dominant with respect to oral contraceptives;
- $44.1 for male condoms compared with vasectomy, and
- IUD (most effective strategy) was dominant with respect to male condoms.

The sensitivity analysis showed that when CYPs were used instead of adjusted CYPs, the greatest variations were observed with condoms and IUDs. These showed, respectively, a 32% decrease (condoms) and a 30% decrease (IUDs) in the costs per CYP compared with the cost per adjusted CYP.

Authors' conclusions
Long-acting methods, such as vasectomy, intrauterine devices (IUDs) and implants, were the most cost-effective methods of contraception from the perspective of the Iranian government services.

CRD COMMENTARY - Selection of comparators
The selection of the comparators appears to have been appropriate as all relevant methods of contraception were considered in the analysis. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
Limited information on the source of the clinical data was provided. Different samples of individuals were used to derive effectiveness estimates for each intervention. Only total sample sizes were reported, and further details of the patient groups were not given. Moreover, the comparability of the study groups was not discussed. It was unclear whether all of the estimates were derived from the samples of patients or were obtained from published sources.

Validity of estimate of measure of benefit
The summary benefit measure was specific to the interventions considered in the study. It is not comparable with the benefits of other health care interventions. Both adjusted and unadjusted CYPs were calculated. No discounting appears to have been applied.

Validity of estimate of costs
The analysis of the costs was consistent with the perspective of the study. The costs included in the analysis were listed, but the unit costs were not presented separately from the quantities of resources used. This limits the possibility of replicating the analysis in other settings. Further, the costs were treated deterministically, and were specific to the study...
setting because sensitivity analyses were not performed on the cost estimates. The costs came from Iranian sources, while the source of the resource use data was unclear. Some categories of costs (e.g. capital costs) were excluded because of the lack of data, although they might have been relevant. The price year was not reported, which would make reflation exercises in other time periods difficult.

Other issues
The authors did not make extensive comparisons of their findings with those from other studies. They also did not address the issue of the generalisability of the study results to other settings. In fact, the whole analysis focused on the Iranian setting. No sensitivity analysis was performed, and the issue of uncertainty around the effectiveness results or costs was not addressed. The study referred to couples looking for contraception and this was reflected in the authors' conclusions. The authors noted some limitations of their study. First, the costs relevant to the clients were not taken into account. Second, the conversion of costs in US dollars might have overvalued imported commodities. The exclusion of capital costs could favour poor-resource allocation decisions. Finally, no discounting was applied to the benefits, which might represent a critical issue.

Implications of the study
The authors recommended a switch from methods with high rates of discontinuation and failure (i.e. condoms) to long-acting methods (i.e. vasectomy and implants).

Source of funding
Funded by the Deputy of Research Affairs of Shiraz University of Medical Sciences, Iran.

Bibliographic details

PubMedID
15330561

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Condoms /economics; Contraception /economics /methods /standards; Contraceptives, Oral /economics; Cost-Benefit Analysis; Drug Implants /economics; Family Planning Services /economics /methods /standards; Female; Humans; Intrauterine Devices /economics; Iran; Male; Needs Assessment; Sensitivity and Specificity; Sterilization, Tubal /economics; Time Factors; Urban Health /statistics & numerical data; Vasectomy /economics

AccessionNumber
22004006541

Date bibliographic record published
28/02/2006