International Journal of Technology Assessment in Health Care, **22:4** (2006), 443–453.

Cost-effectiveness of a preventive counseling and support package for postnatal depression

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Objectives: This study reports the cost-effectiveness of a preventive intervention, consisting of counseling and specific support for the mother–infant relationship, targeted at women at high risk of developing postnatal depression.
Methods: A prospective economic evaluation was conducted alongside a pragmatic randomized controlled trial in which women considered at high risk of developing postnatal depression were allocated randomly to the preventive intervention ($n = 74$) or to routine primary care ($n = 77$). The primary outcome measure was the duration of postnatal depression experienced during the first 18 months postpartum. Data on health and social care use by women and their infants up to 18 months postpartum were collected, using a combination of prospective diaries and face-to-face interviews, and then were combined with unit costs (£, year 2000 prices) to obtain a net cost per mother–infant dyad. The nonparametric bootstrap method was used to present cost-effectiveness acceptability curves and net benefit statistics at alternative willingness to pay thresholds held by decision makers for preventing 1 month of postnatal depression.
Results: Women in the preventive intervention group were depressed for an average of 2.21 months (9.57 weeks) during the study period, whereas women in the routine primary care group were depressed for an average of 2.70 months (11.71 weeks). The mean health and social care costs were estimated at £2,396.9 per mother–infant dyad in the preventive intervention group and £2,277.5 per mother–infant dyad in the routine primary care group, providing a mean cost difference of £119.5 (bootstrap 95 percent confidence interval [CI], −535.4, 784.9). At a willingness to pay threshold of £1,000 per month of postnatal depression avoided, the probability that the preventive intervention is cost-effective is .71 and the mean net benefit is £383.4 (bootstrap 95 percent CI, −£863.3–£1,581.5).
Conclusions: The preventive intervention is likely to be cost-effective even at relatively low willingness to pay thresholds for preventing 1 month of postnatal depression during the first 18 months postpartum. Given the negative impact of postnatal depression on

We thank Claire Lawson, Matt Woolgar, Helena Romaniuk, Christine Hockley, Jackie Peters, Liz Schofield, Liz Andrews, Wendy Vince, and Simon Gates for their contributions to the data collection and data analysis. The research was supported by the National Health Service Executive South East the Department of Health and the Tedworth Charitable Trust. The National Perinatal Epidemiology Unit is core funded by the Department of Health. The views contained in this study are those of the authors and, not necessarily, those of the funding bodies.

later child development, further research is required that investigates the longer-term cost-effectiveness of the preventive intervention in high risk women.

Keywords: Costs, Cost-effectiveness analysis, Postnatal depression

Postnatal depression is a common condition thought to affect approximately 13 percent of women during the early months following childbirth (42). Women with postnatal depression are likely to experience persistent feelings of inadequacy and hopelessness (25), to exhibit an increased propensity to terminate breastfeeding early (15), and to have difficulty with infant sleeping routines, infant crying, and demands for attention (47). These problems in the early mother–infant relationship arising in the context of postnatal depression appear to set in train a process leading to suboptimal cognitive and emotional development of the child (13;36;37;39). This impaired development can be manifested as insecure attachment to the mother (34), impaired socioemotional functioning (49), cognitive deficit (11;26), and behavioral disturbance both at home (34;38) and in school (48). Furthermore, some empirical evidence suggests that postnatal depression results in adverse effects on marital relationships, exacerbated worry about financial problems, and increased perceived stress levels in the wider family (4).

Studies of interventions aimed at alleviating the effects of postnatal depression have been carried out to good effect (31). However, evidence of the benefits of psychosocial and psychological interventions for the prevention of postnatal depression remains rather limited (16). Furthermore, the vast majority of prevention and treatment studies in this area lack information on resource use, thus preventing assessments of cost-effectiveness from being made. This study provides both the clinical information on a preventive strategy for postnatal depression in a controlled environment and the information on the use of resources associated with screening for and treatment of the condition, thereby allowing the cost-effectiveness of a preventive intervention to be assessed.

METHODS

Trial Background

A randomized controlled trial was conducted to test the hypothesis that a preventive intervention beginning antenatally for women at high risk of developing postnatal depression offers long-term benefits to women and their children and to the British National Health Service (NHS). Consecutive primiparous women attending antenatal clinics at 26–28 weeks of gestation in the southern half of the town of Reading, southeast England, were screened using a predictive index developed by Cooper et al. (14) to identify whether they were at high risk of developing postnatal depression. Women identified as being at high risk of developing postnatal depression (index score $\geq$ 24) were approached by a member of the research team, and their consent to participate in the study was sought. Consenting women were randomly allocated to either preventive intervention or routine primary care. For the preventive intervention group, research therapists, who were trained health visitors, visited women in their homes at 35 and 37 weeks antenatally to establish a supportive relationship with the mother, to identify areas of vulnerability, and to help the mother plan for the management of any problems. Women were then visited on days 3, 7, and 17 after delivery, and then weekly up to 8 weeks, and were provided with counseling support and further specific support, principally to focus on any areas of difficulty in the mother–infant relationship and to facilitate good interactions (23;35). The care of women allocated to the routine primary care group was left to the discretion of their primary care teams. An independent researcher, blind to intervention status, assessed the mental state of all women at 8 weeks, 18 weeks, 12 months, and 18 months postpartum using the Structured Clinical Interview for DSM-III-R diagnoses (SCID-II) (24). Information from the first SCID-II assessment was used to estimate the duration of postnatal depression experienced during the first 8 weeks postpartum, whereas information from the SCID-II at subsequent assessments was used to estimate later periods of postnatal depression. We calculated the total duration of postnatal depression experienced by each woman by summing the durations calculated at each SCID-II assessment. All analyses and comparisons were performed on the basis of intention to treat. Ethical approval for the study was obtained from the relevant local ethics committees. Further details of the design and conduct of the trial are reported in the trial protocol (12).

Type of Evaluation, Perspective, and Time Horizon

An incremental cost-effectiveness analysis was performed in which we calculated the incremental costs (ΔC) and incremental effectiveness (ΔE) of the preventive intervention compared with routine primary care and expressed these as a ratio. Incremental cost-effectiveness ratios (ICERs) inform policy makers of the budgetary expansion required to introduce alternative healthcare technologies (21). The economic evaluation was conducted from a public sector perspective and covered all aspects of health and social care provided to the mother and infant between randomization and 18 months postpartum. The time horizon for the economic evaluation mirrored the time horizon for the randomized controlled trial, namely the period between randomization and 18 months postpartum.

Resource Use Data

Two broad strategies were adopted to collect data about the use of resources for all women enrolled in the trial and about the subsequent care received by their infants. First, the research therapists were given diaries and asked to record prospectively all staff inputs, travel and training requirements, stationery and other consumables attributable to the delivery of the preventive intervention between randomization and the end of their direct involvement in the care process. Second, data about the use of health and social care services were obtained during the course of three face-to-face interviews with the women. The interviews were held at a university psychology department at 18 weeks, 12 months, and 18 months postpartum. As part of all three interviews, the women were asked a series of structured closed-ended questions by one of two trained interviewers. The interview held at 18 weeks postpartum recorded total service utilization over the previous 18 weeks, including all health and social care services. The interviews held at 12 months and 18 months postpartum recorded total service utilization over the period since the last interview. The following information was recorded at each interview: the professional and agency that provided the service, its location, the frequency of use; and the duration of each service contact. Any misunderstandings about service encounters for either the woman or infant were resolved following discussion between the interviewer and each woman. All resource use data were entered directly from the research instruments completed by the interviewers into a purpose built data collection program with built-in safeguards against inconsistent entries and then verified by dual coding. Estimates of service provision were derived from these data and usually expressed in terms of contact hours. For all hospital admissions, estimates of service provision were expressed in terms of patient days, with part of a day at each level of care counted as a 24-hour period.

Unit Costs

Unit costs for resources used by the women and infants who participated in the trial were obtained from a variety of sources. All unit costs recorded followed recent guidelines on costing health and social care services as part of economic evaluation (20;21). The calculation of these costs was underpinned by the concept of opportunity cost. For practical purposes, this strategy involved adopting the convention in which short-run current average revenue costs, plus revenue and capital overheads, are sufficiently close to long-run marginal opportunity costs for most purposes (1). An average cost per hospital inpatient day was calculated using information made available by local hospital finance departments. All staff costs included salary information obtained from the finance departments, as well as national insurance costs, superannuation costs, other employer on-costs, and revenue and capital overheads. Drug costs were obtained from the *British National Formulary* (8). The unit costs of community health and social services were largely derived from national sources (41), and took account of time spent by professionals on indirect activities, such as traveling and paper work. However, some unit costs of community health and social services were calculated from first principles using established accounting methods (1). Unit costs were combined with resource volumes to obtain a net cost per mother–infant dyad over the study period. All costs were expressed in pounds sterling and valued at year 2000 prices.

Representation of Cost-Effectiveness

The cost-effectiveness of the preventive intervention was expressed in terms of an incremental cost per month of postnatal depression avoided. The probability that the preventive intervention is cost-effective at 18 months postpartum is represented by cost-effectiveness acceptability curves (6;30). For the purpose of our analysis, we have calculated the probability that the preventive intervention is cost-effective at decision-makers' willingness to pay thresholds (R_c) of between £0 and £4,000 for each month of postnatal depression avoided.

Data Analysis

The statistical approach developed by Lin et al. (29) was used to simulate costs for ten mother–infant dyads for whom one of the economic questionnaires was not completed and whose information, therefore, could be described as *censored*. This simulation involved dividing the cost data into discrete periods and then applying the Kaplan–Meier method to estimate costs for each period on the basis of the uncensored cases. Costs and health effects accruing beyond the first year were reduced to present values using discount rates of 6 percent and 1.5 percent, respectively (40).

All results are reported as mean values with standard deviations and as mean differences in costs and effects with 95 percent confidence intervals (CIs) where applicable. We tested for differences in resource use and costs between the trial groups using the Student t-test and considered those differences significant if two-tailed p values were .05 or less, and tending toward significance if two-tailed p values were greater than .05 and less than .1. As the data for costs were skewed, we used nonparametric bootstrap estimation to derive 95 percent CIs for mean cost differences between the trial groups (2;18). Each of these CIs was calculated using 1,000 bias-corrected bootstrap replications. Nonparametric bootstrap simulation of the cost-effect pairs was also performed to generate 1,000 replications of the ICER, which were represented graphically on a four-quadrant cost-effectiveness plane (3;5). Finally, mean net benefits, defined as $R_c.\Delta E - \Delta C$ (50), were estimated for alternative values of R_c, together with their respective 95 percent bootstrap CIs. All analyses were performed with a microcomputer running Excel and Statistical Package for the Social Sciences software.

https://doi.org/10.1017/S0266462306051361 Published online by Cambridge University Press

Sensitivity Analysis

A series of multiway sensitivity analyses was undertaken to explore the implications of uncertainty surrounding the base-case incremental cost effectiveness ratio (7). Changes in the values of three key parameters were considered as part of the sensitivity analyses. First, community service utilization by the mother–infant dyads was increased by 10 percent, 20 percent, and 30 percent, respectively, in response to a tendency, on the part of the participants in health economic studies, to under-report numbers of community service contacts (44). Second, the *per diem* costs generated by our accounting methods for each level of inpatient care were reduced and increased by 20 percent, respectively, to reflect variations in the relative price structures of resource inputs across hospital settings (19). Third, to reflect differing views in the health economics literature regarding the appropriate discount rates for costs and health effects (9;21;43), the discount rate that was applied to both costs and health effects was varied to 0 percent, 1.5 percent, 3 percent, 6 percent, and 10 percent.

RESULTS

Resource use and clinical effectiveness data were collected for 151 women who were randomly allocated to either the preventive intervention ($n = 74$) or routine primary care ($n = 77$). There were no significant differences between the allocation groups with respect to maternal age ($p = .93$), educational qualifications ($p = .41$), length of time with current partner ($p = .60$), satisfaction with area lived in ($p = .61$), mean predictive score for postnatal depression ($p = .41$), and experience of pregnancy ($p = .72$) at the time of random assignment. However, the two groups differed with respect to the treatment of health problems during pregnancy, with only five women in the preventive intervention group requiring hospital admission during pregnancy compared with thirteen women in the routine primary care group ($p = .03$). When the SCID-II data were analyzed in terms of total duration of postnatal depression during the first 18 months postpartum, it was revealed that women in the preventive intervention group were depressed for an average of 2.21 months (9.57 weeks), whereas women in the routine primary care group were depressed for an average of 2.70 months (11.71 weeks), a mean difference of .49 months (2.14 weeks; $p = .41$).

Resource Use

Table 1 shows the utilization of health and social care services by the trial groups. Health visitor/research therapist support represented the most widely used maternal community care service, followed by midwifery care and general practitioner care. Day nursery care represented the most widely used pediatric and child care service, followed by general practitioner care and hospital pediatric care. The utilization of day care services and hospital outpatient and inpatient services by the women closely resembled national service utilization rates for new mothers (32). As expected, the preventive intervention group made a significantly greater number of health visitor/research therapist contacts than the routine primary care group ($p < .01$). The preventive intervention group also made a significantly greater number of midwifery contacts ($p = .02$) and used a significantly greater number of day hospital care services ($p = .03$). The utilization of other community care, day care, hospital outpatient and inpatient care services by both the mother and infant did not differ significantly between the trial groups.

Costs

Unit costs for each resource item were collected from a variety of primary and secondary sources (Table 1) and combined with resource volumes to generate mean costs per mother–infant dyad. In absolute monetary terms, the largest mean cost differences between the trial groups were noted for pediatric hospitalizations (£128.3), health visitor/research therapist support (£120.5), and maternity hospitalizations (£73.1); the former being greater for the routine primary care group, whereas the latter two were greater for the preventive intervention group. Table 2 presents the mean cost per mother and infant through the duration of the study according to overall cost category and trial group. The mean cost of day care services provided to the mother was estimated at £13.3 for women allocated to the preventive intervention group, compared with £3.9 for women allocated to the routine primary care group, a mean cost difference of £9.4 (95 percent CI, 2.1–17.8) that reached statistical significance ($p = .03$). In addition, the preventive intervention increased the mean cost of community care services for the mother by an average of £220.9 (95 percent CI, −31.0–470.8; $p = .09$), and the mean cost of hospital outpatient care services for the mother by an average of £57.7 (95 percent CI, 6.1–137.1; $p = .06$). However, statistical analysis revealed that, at the 10 percent level, there were no significant differences in the mean cost of maternal hospital inpatient care services and pediatric and child care services between the trial groups. The mean health and social care costs were estimated at £2396.9 per mother–infant dyad in the preventive intervention group and £2277.5 per mother–infant dyad in the routine primary care group, providing a mean cost difference of £119.5 (95 percent CI, −535.4–784.9; $p = .72$).

Cost-Effectiveness

The incremental cost-effectiveness of the preventive intervention compared with routine primary care with respect to the principal outcome measure is shown in Table 3. The preventive intervention led to a nonsignificant increase in the mean number of months free of postnatal depression and a nonsignificant increase in health and social care costs, resulting in an incremental cost per month of postnatal depression avoided of £43.1. The bootstrapped samples of cost-effectiveness were plotted on the cost-effectiveness plane

Table 1. Resource Use Values from Randomization until 18 Months Postpartum and the Respective Unit Costs for Each Resource Item (UK £ Sterling, 2000 Prices)

Resource use variable	Preventive intervention ($n = 74$)	Routine primary care ($n = 77$)	Unit cost or range[a]	Source of unit cost
Mother–community care services				
Midwifery contacts	8.98 (9.17)	5.87 (4.58)	18.6 per contact hour	Local provider
General practitioner contacts	6.27 (4.15)	5.13 (2.92)	2.0–3.1 per contact minute	Netten and Curtis (2000) (41)
Practice nurse contacts	1.49 (2.56)	.77 (1.29)	21.0–27.0 per contact hour	Netten and Curtis (2000) (41)
Practice counsellor contacts	.30 (1.23)	.32 (1.02)	21.0 per contact hour	Netten and Curtis (2000) (41)
Health visitor/research therapist contacts	10.49 (1.71)	5.47 (2.65)	21.0–72.0 per contact hour	Netten and Curtis (2000) (41) Primary research
Home help/volunteer contacts	.16 (1.17)	0 (0)	10.1 per contact hour	Netten and Curtis (2000) (41)
Social worker contacts	1.16 (4.82)	1.51 (9.06)	23.0 per contact hour	Netten and Curtis (2000) (41)
Physiotherapist contacts	1.65 (4.05)	2.01 (4.95)	34.0 per contact hour	Netten and Curtis (2000) (41)
Community psychiatric nurse contacts	2.28 (7.93)	1.83 (6.83)	56.0 per contact hour	Netten and Curtis (2000) (41)
Community psychologist contacts	.73 (3.97)	.49 (2.34)	61.0 per contact hour	Netten and Curtis (2000) (41)
Other community mental health contacts	.32 (1.61)	.27 (1.36)	56.0–61.0 per contact hour	Netten and Curtis (2000) (41)
Other community health and social care contacts	2.07 (7.92)	2.30 (5.42)	20.0–61.0 per contact hour	Netten and Curtis (2000) (41), Primary research
Mother–day care services				
Day hospital attendances	.38 (1.29)	.09 (.29)	17.0–25.0 per attendance	Netten and Curtis (2000) (41)
Community-based day care attendances	.11 (.73)	.21 (1.82)	17.0 per attendance	Netten and Curtis (2000) (41)
Other day care attendances	.15 (.90)	0 (0)	17.0 per attendance	Netten and Curtis (2000) (41)
Mother–hospital outpatients attendances				
Obstetric care attendances	.23 (.75)	.10 (.38)	51.3 per attendance	Local provider
Accident and emergency care attendances	.23 (.42)	.17 (.47)	60.5 per attendance	Local provider
Other outpatient attendances	1.32 (3.65)	.59 (1.36)	53.0–353.0 per attendance	Netten and Curtis (2000) (41)
Mother–hospital inpatient admissions				
Maternity ward admissions (days)	3.17 (2.78)	2.68 (2.15)	158.0 per day	Local provider
Mother and baby unit admissions (days)	.09 (.81)	0 (0)	158.0 per day	Local provider
Medical/surgical ward admissions (days)	.41 (1.97)	.21 (.98)	182.0 per day	Local provider
Other hospital inpatient admissions (days)	.03 (.23)	.01 (.11)	127.0–345.0 per day	Netten and Curtis (2000) (41)
Infant–pediatric and child care services				
Day nursery attendances	19.24 (35.03)	22.13 (47.65)	20.0 per attendance	Netten and Curtis (2000) (41)
General practitioner contacts	7.46 (4.07)	7.40 (4.86)	2.0–3.1 per contact minute	Netten and Curtis (2000) (41)
Community pediatrician contacts	.16 (.62)	.19 (.65)	97.0 per contact	Netten and Curtis (2000) (41)
Hospital pediatrician contacts	.91 (1.70)	1.38 (2.34)	97.0 per contact	Netten and Curtis (2000) (41)
Accident and emergency care attendances	.58 (.80)	.62 (1.09)	60.5 per attendance	Local provider
Special care baby unit admissions (days)	.18 (.63)	.22 (.66)	556.0 per day	Local provider
Pediatric ward admissions (days)	.46 (1.63)	.94 (2.39)	278.0 per day	Local provider
Physiotherapist contacts	.19 (.89)	.32 (1.65)	34.0 per contact hour	Netten and Curtis (2000) (41)
Other pediatric and child care contacts	.70 (1.80)	1.54 (3.25)	34.0–59.0 per contact hour	Netten and Curtis (2000) (41)

[a] Ranges of unit costs are specified where unit costs varied according to location or intensity of care provided.

Table 2. Mean Costs and Mean Cost Differences by Cost Category

Cost category	Preventive intervention		Routine primary care		Mean difference	p value[a]	Bootstrap mean difference (95% CI)[b]
	Mean	(SD)	Mean	(SD)			
Mother–community care	758.4	(885.8)	537.4	(677.5)	220.9	.09	219.6 (−31.0–470.8)
Mother–day care	13.3	(34.5)	3.9	(12.4)	9.4	.03	9.4 (2.1–17.8)
Mother–hospital outpatient care	107.7	(250.0)	50.0	(102.1)	57.7	.06	58.2 (6.1–137.1)
Mother–hospital inpatient care	593.1	(625.0)	462.3	(399.8)	130.8	.13	131.4 (−32.7–309.6)
Infant–pediatric and child care	924.5	(1,087.2)	1,223.8	(1,525.9)	−299.3	.17	−298.9 (−702.4–135.9)
Total	2,396.9	(2,004.6)	2,277.5	(2,018.1)	119.5	.72	119.0 (−535.4–784.9)

[a] The p values were calculated using Student t-test.
[b] Nonparametric bootstrap estimation using 1000 replications, bias corrected.
SD, standard deviation; CI, confidence interval.

https://doi.org/10.1017/S0266462306051361 Published online by Cambridge University Press

Table 3. Incremental Cost-Effectiveness Ratios

Cost and outcome measure	Mean ICER
Incremental cost per month of postnatal depression avoided	43.1
Sensitivity analyses:	
(a) Community service utilization:	
1) 10% greater than reported	74.7
2) 20% greater than reported	106.3
3) 30% greater than reported	137.9
(b) Per diem costs for inpatient care:	
1) 20% less than accounting methods	7.5
2) 20% greater than accounting methods	78.7
(c) Discount rates applied:	
1) Costs and health effects discounted at 0%	62.2
2) Costs and health effects discounted at 1.5%	55.4
3) Costs and health effects discounted at 3%	53.6
4) Costs and health effects discounted at 6%	45.4
5) Costs and health effects discounted at 10%	35.1

ICER, incremental cost-effectiveness ratio.

Table 4. Mean Net Benefit over 18 Months (95% CI) Calculated for Alternative Willingness to Pay Thresholds for Preventing 1 Month of Postnatal Depression

Ceiling ratio (R_c)	Mean net benefit (£)	95% CI[a]
0	−102.0	(−746.1–555.4)
100	−56.9	(−707.4–554.6)
200	−10.5	(−676.1–623.6)
300	41.1	(−658.4–719.4)
400	93.8	(−653.5–827.6)
500	155.9	(−682.1–946.4)
600	193.4	(−696.6–1,072.0)
700	241.3	(−732.4–1,197.5)
800	287.6	(−772.1–1,323.1)
900	339.2	(−824.9–1,442.7)
1,000	383.4	(−863.3–1,581.5)

[a] Nonparametric bootstrap estimation using 1,000 replications, bias corrected.
CI, confidence interval.

(Figure 1) and show the uncertainty surrounding the mean estimate of cost-effectiveness reported by the ICER. Although the majority of the bootstrapped samples fall in the northeast quadrant of the cost-effectiveness plane, some bootstrapped samples fall in all four quadrants, resulting in a problem when interpreting negative ICERs. A negative ICER might represent improved outcomes and lower costs as a result of the preventive intervention, or worse outcomes and higher costs. This finding means that a meaningful ordering of the bootstrapped samples, which is required to make the confidence interval surrounding the ICER interpretable, is very difficult. Under these circumstances, cost-effectiveness acceptability curves represent the appropriate approach to representing the uncertainty surrounding the ICER (6). Figure 2 was derived by plotting the proportion of bootstrapped samples that may be regarded as cost-effective when decision-makers' willingness to pay for each month of postnatal depression avoided was varied from £0 to £4,000. At the notional willingness to pay threshold of £1,000 for each month of postnatal depression avoided, the probability that the preventive intervention is cost-effective by 18 months postpartum was estimated at .71. Similarly, at the notional willingness to pay threshold of £2,000 for each month of postnatal depression avoided, the probability that the preventive intervention is cost-effective by 18 months postpartum was estimated at .77. Finally, mean net benefits were estimated for alternative willingness to pay thresholds for preventing 1 month of postnatal depression (Table 4). Assuming that R_c equals £500 for preventing 1 month of postnatal depression, the mean net benefits of the preventive intervention compared with routine primary care were £155.9 (95 percent CI, −682.1–946.4). Increasing the value of R_c to £1,000 for preventing 1 month of postnatal depression results in an increase in the mean net benefits of the preventive intervention compared with routine primary care to £383.4 (95 percent CI, −863.3–1,581.5).

Sensitivity Analysis

Sensitivity analysis was performed to determine the impact that uncertainty surrounding individual parameter values might have on the incremental cost-effectiveness for the principal outcome. Table 3 shows that assuming that community service utilization was 10 percent greater than reported by the women had the effect of increasing the incremental cost per month of postnatal depression avoided by £31.6. The respective increases in the incremental cost-effectiveness ratio were £63.2 and £94.8 when community service use was assumed to be 20 percent and 30 percent greater than reported by the women. A 20 percent reduction and increase in the *per diem* cost for each level of inpatient care had the effect of reducing and increasing, respectively, the incremental cost per month of postnatal depression avoided by £35.6. Finally, variations in the rate at which future costs and health effects were discounted had a minimal impact, the most notable of which was a £19.1 increase in the incremental cost per month of postnatal depression avoided when both costs and health effects were left undiscounted. Simultaneous variation of the key economic parameters did not significantly affect the baseline study results (data available upon request).

DISCUSSION

The study presented here represents a comprehensive economic evaluation of a preventive intervention for postnatal depression, which was conducted according to nationally agreed design and reporting guidelines (20). It was based on a trial that was randomized and controlled, pragmatic in design, and provided a vehicle for collecting a broad set of resource use and clinical effectiveness data. Moreover, the

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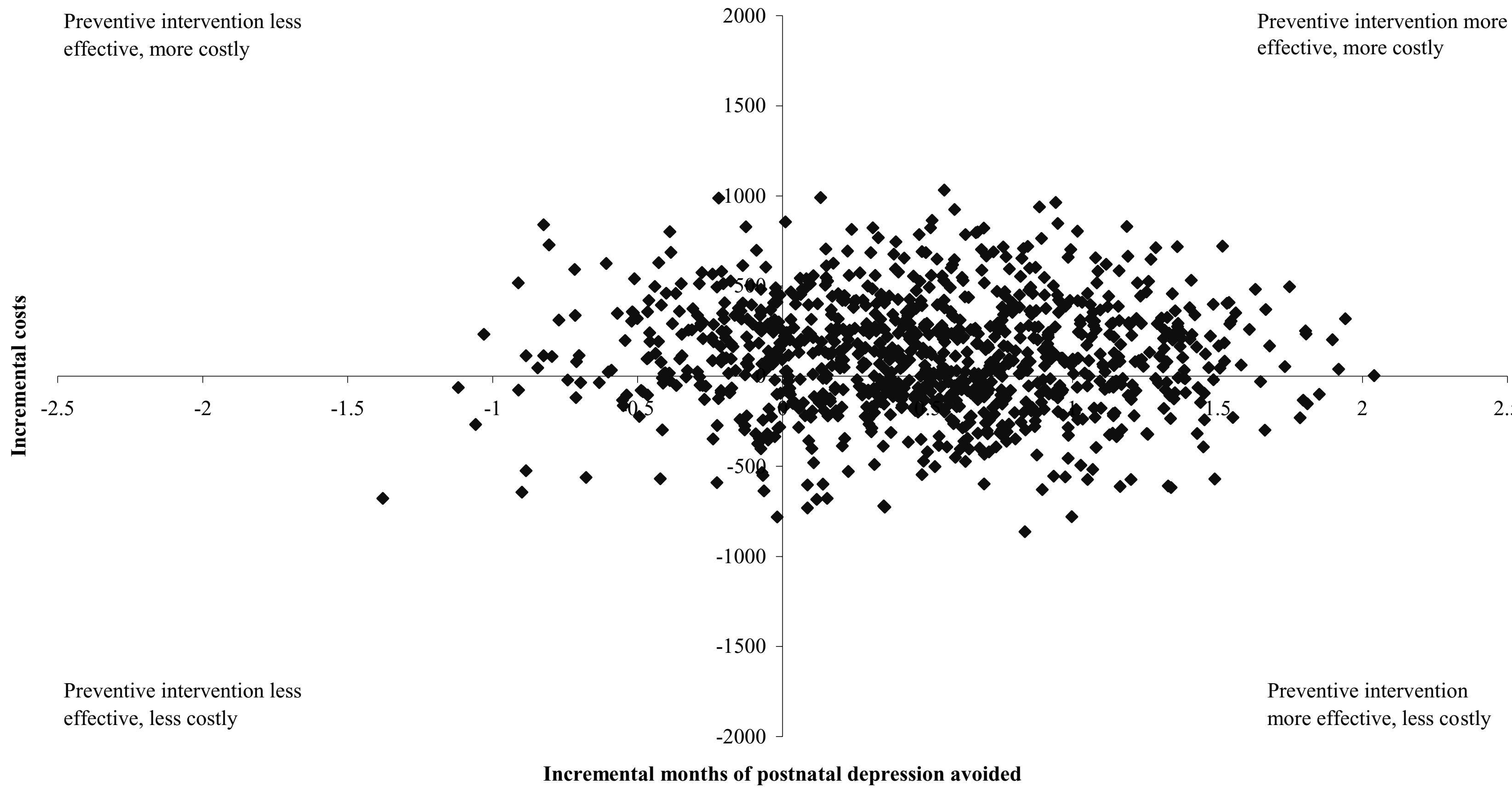

Figure 1. Cost-effectiveness plane, expressed in terms of incremental costs and incremental months of postnatal depression avoided.

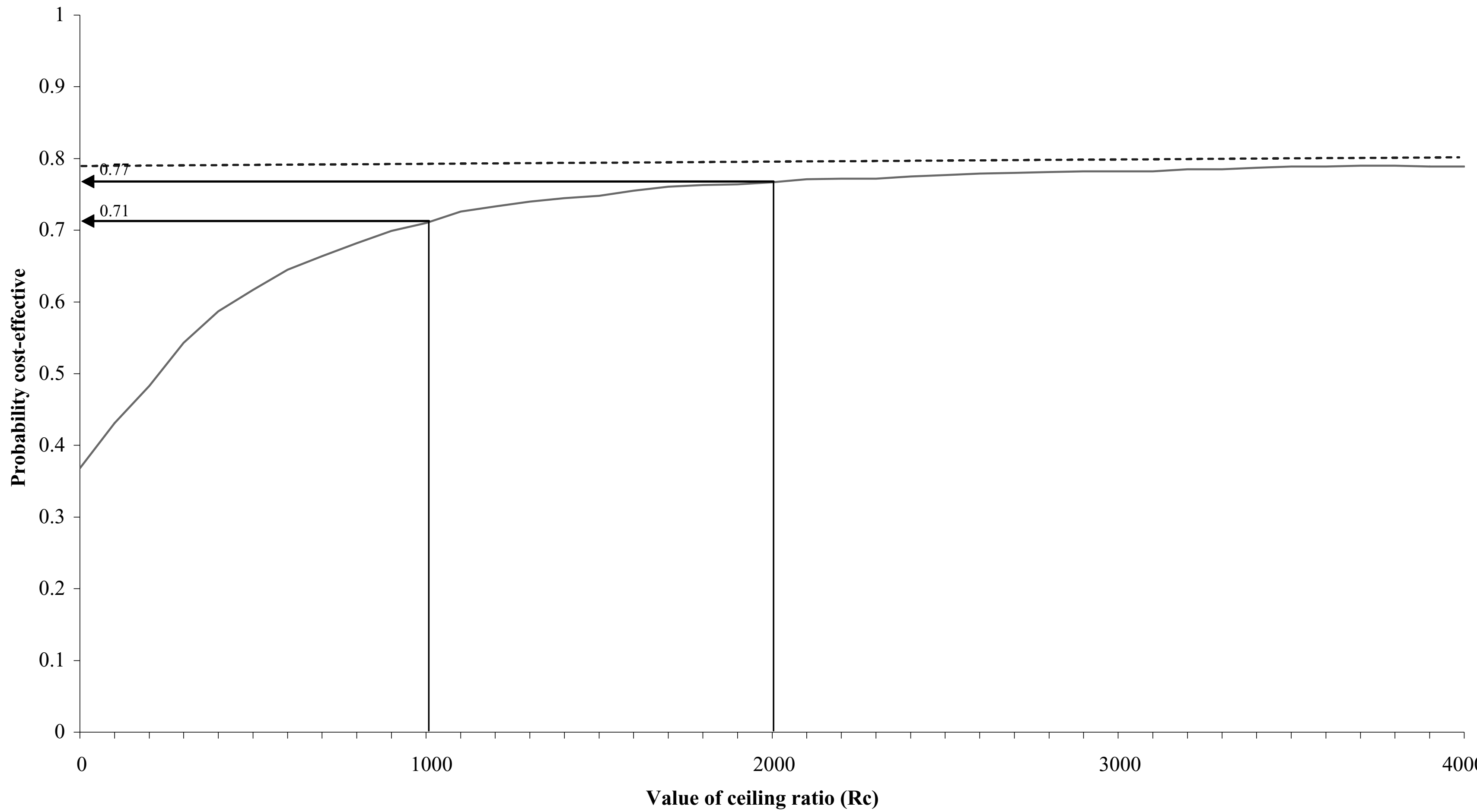

Figure 2. Cost-effectiveness acceptability curve, probability that preventive intervention is cost-effective plotted as a function of decision maker's willingness to pay per month of postnatal depression avoided.

study cost accounting was rigorous and included all significant health and social service cost items.

The study demonstrated that, for women who are screened antenatally and considered at high risk of developing postnatal depression, a package of counseling with specific support for the mother–infant relationship results in a nonsignificant increase in the mean number of months free of postnatal depression and a nonsignificant increase in health and social care costs. When translated into a cost-effectiveness metric, the preventive intervention resulted in an incremental cost per month of postnatal depression avoided of £43.1. Given the difficulties in interpreting point estimates of cost-effectiveness in cases of an observed lack of significance in the effect and cost differences between technologies, a comprehensive analytical strategy was pursued to handle uncertainty surrounding the baseline incremental cost-effectiveness ratio. This approach included the use of cost-effectiveness acceptability curves to represent the likelihood of the preventive intervention being cost-effective at 18 months postpartum at alternative willingness to pay thresholds that decision makers would consider acceptable, as well the use of sensitivity analysis to handle uncertainty surrounding individual parameter values.

The study results require careful interpretation. The probability that the preventive intervention is cost-effective exceeds .7 once decision makers express a willingness to invest £1,000 to prevent each month of postnatal depression. Because the increase in the mean number of months free of postnatal depression attributable to the preventive intervention did not reach statistical significance, the probability that it is cost-effective does not exceed .8 even at substantially higher willingness to pay thresholds. Decision makers are required, therefore, to judge whether the cost-effectiveness evidence is sufficiently compelling to invest in the preventive intervention. Three additional factors require consideration by decision makers as they make their judgments. First, by focusing on the cost of health and social care services provided to women and their infants, the economic evaluation adopted a public sector perspective. Adopting a broader, societal perspective would have allowed us to measure the direct nonmedical costs (e.g., travel and child care costs), indirect costs (e.g., lost productivity), and intangible costs (e.g., costs of fear, pain, and suffering) attributable to postnatal depression (21;28). It is likely that measurement and valuation of these wider societal costs would improve the relative cost-effectiveness of the preventive intervention, because the reduced duration of postnatal depression attributable to the intervention is likely to reduce broader resource utilization. Second, the time horizon for the economic evaluation, which extended to 18 months postpartum, is likely to have underestimated the long-term cost-effectiveness of the preventive intervention, because the cognitive, behavioral, and emotional advantages procured by the intervention are likely to have longer-term consequences in terms of health status and health service utilization over the mother's and infant's lifetime (10). Third, the effectiveness of the preventive intervention has not been measured in terms of a preference-based outcome measure, such as the quality-adjusted life year (QALY) (51), which would have been more useful for comparative purposes (40). It may be possible to map the trial outcomes onto a multiattribute utility measure, such as the EQ-5D (22), and then to infer QALY gains attributable to the preventive intervention. However, decision makers will still be required to judge whether the cost-effectiveness evidence is sufficiently compelling to warrant adoption of the preventive intervention.

POLICY IMPLICATIONS

The prevention of mental health problems in the perinatal period and their deleterious consequences is regarded as a priority both politically (46) and professionally (45). The British government has published several documents that emphasize the need for effective strategies for preventing mental health problems during this period (17;27). Randomized controlled trial-based evidence of the benefits of preventive interventions for postnatal depression remains rather limited (16). Furthermore, only one of the trials conducted in this area to date has collected detailed economic information and assessed the cost-effectiveness of a preventive intervention (33). Our study provides further economic information to decision makers as they consider allocating resources in an important area of health care in a manner that is both clinically effective and cost-effective.

The study shows that a preventive intervention consisting of counseling with specific support for the mother–infant relationship, which is delivered to women at high risk of developing postnatal depression, results in a nonsignificant increase in the mean number of months free of postnatal depression and a nonsignificant increase in health and social care costs. The analytical focus of the study was on the estimation of the joint density of effect and cost differences and, consequently, use was made of cost-effectiveness acceptability curves and the mean net benefits statistic to estimate the degree of uncertainty surrounding the baseline incremental cost-effectiveness ratio. The analysis revealed that the preventive intervention has a relatively high probability of being cost-effective even at low willingness to pay thresholds held by decision makers. This finding may constitute sufficient evidence to support the adoption of the preventive intervention in routine practice. However, if decision makers require evidence that the preventive intervention is cost-effective within the bounds of conventional levels of statistical significance, then larger studies may be required.

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