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Screening for and treating postpartum depression and psychosis: A cost-effectiveness analysis

Andra Wilkinson, Ph.D., M.S.P.H.[a,b], **Seri Anderson, M.P.H.**[c], and **Stephanie B Wheeler, Ph.D. M.P.H.**[c]

[a]Child Trends, 7315 Wisconsin Ave, #1200w, Bethesda, MD 20814

[b]Department of Maternal and Child Health, University of North Carolina at Chapel Hill, 135 Dauer Drive, CB #7445, Chapel Hill, NC 27599-7445

[c]Department of Health Policy and Management, University of North Carolina at Chapel Hill, 135 Dauer Drive, CB #7411, Chapel Hill, NC 27599-7411

Abstract

Introduction—Postpartum depression impacts 6.5–12.9% of U.S. women. Postpartum depression is associated with impaired bonding and development, marital discord, suicide, and infanticide. However, the current standard of care is to not screen women for postpartum depression. This study modeled the cost-effectiveness of physicians screening for and treating postpartum depression and psychosis in partnership with a psychiatrist.

Methods—This study follows a hypothetical cohort of 1,000 pregnant women experiencing one live birth over a two-year time horizon. We used a decision tree model to obtain the outcomes of screening for and treating postpartum depression and psychosis using the Edinburgh Postnatal Depression Scale. We use a Medicaid payer perspective because they cover approximately 50% of births in the U.S. The cost-effectiveness of the intervention is measured in cost per remission achieved and cost per quality-adjusted life-year (QALY) gained. We conducted both deterministic and probabilistic sensitivity analyses.

Results—Screening for and treating postpartum depression and psychosis produced 29 more healthy women at a cost of $943 per woman. The incremental cost-effectiveness ratios of the intervention branch compared to usual care were $13,857 per QALY gained (below the commonly accepted willingness to pay threshold of $50,000/QALY gained) and $10,182 per remission achieved. These results were robust in both the deterministic and probabilistic sensitivity analyses of input parameters.

Discussion—Screening for and treating postpartum depression is a cost-effective intervention and should be considered as part of usual postnatal care, which aligns with the recently proposed recommendations from the U.S. Preventive Services Task Force.

Keywords

Postpartum; depression; screening; cost-effectiveness

Corresponding author: Andra Wilkinson, awilkinson@childtrends.org, (720)394-1660 (m).

Introduction

Postpartum depression (PPD) is characterized by depressed mood, anxiety, guilt and other symptoms (Miniati et al. 2014). In more severe cases, deemed postpartum psychosis (PP), the condition is characterized by agitation, confusion, hallucinations, delusions, in addition to severe depression (Marder 2014). PPD is estimated to impact 6.5 to 12.9% of postpartum women and PP approximately 0.002–3% of postpartum women in the U.S., though the actual prevalence is likely higher due to underreporting/under-diagnosing (Gaynes et al. 2005; Lucas 1994; Marder 2014; Sit et al. 2006). Associated with decreased infant bonding, impaired child development, marital discord, suicide, and infanticide, PPD and psychosis are serious health issues (Roy-Byrne 2014).

Despite the high prevalence and negative implications of PPD, it is not standard care to screen women for it in the U.S., and only about 18%-25% of PPD and PP cases are detected without screening (Goodman & Tyer-Viola 2010; Kelly, Zatzick, & Anders 2001). Fortunately, the Patient Protection and Affordable Care Act included PPD screening in its definition of comprehensive women's preventive care (Kozhimannil et al. 2011). Further, the U.S. Preventive Services Task Force recently drafted a recommendation that all pregnant and postpartum women should be screened (U.S. Preventive Services Task Force 2015). New Jersey was the first state to require physicians in obstetrics/gynecology, pediatrics, and internal/family medicine to screen women for PPD. A subsequent evaluation found no difference in the mental health care utilization of women with Medicaid coverage; the authors suspected this was partly because physicians were not paid for screening (Kozhimannil et al. 2011). If more health care spending is needed to successfully implement PPD screening (e.g., paying physicians for screening), a cost-effectiveness analysis is warranted to test if more spending is likely to translate to better outcomes.

The present study modeled the cost-effectiveness of physicians being compensated to screen for and treat PPD compared to usual care. We assume that in outpatient visits, physicians, under the mentorship of a psychiatrist, via telemedicine, can provide basic therapy and/or prescriptions for their PPD patients and link their PP patients to mental health care. For pediatricians, this care aligns with their existing support of breastfeeding, as PPD is commonly implicated in breastfeeding issues, and the recommendations of the American Academy of Pediatrics (Dias & Figueiredo 2015; Earls 2010; Thomas, 2008). Overall, this care model is akin to the screening, brief intervention, and referral to treatment model or SBIRT, but is responsive to shortages in mental health providers to refer to (Centers for Medicare & Medicaid Services 2015). The research questions were testing differences between screening and not screening for PPD in total costs, number of remissions, and quality-adjusted life years (QALYs). Using these outputs, we calculated incremental cost-effectiveness ratios (ICER) followed by both deterministic and probabilistic sensitivity analyses. Technical terms are defined in Methods.

Methods

The hypothetical cohort for this study is 1,000 women of reproductive age (18–49 years) who have experienced one birth in the past year. This study used a hypothetical cohort rather

than human subjects and so is exempt from an Institutional Review Board. The time horizon for a model refers to the length of time over which costs and benefits are modeled and accrue. We chose a time horizon of two years postpartum in order to capture the majority of the impact of PPD for the majority of woman suffering from the disease. PPD is defined to begin within 4 weeks postpartum, and one study found an average time to recovery with IPT treatment of about 29 weeks, with a standard deviation of +/− 17.5 weeks (De Crescenzo, Perelli, Armando, & Vicari 2014; Miniati et al. 2014; Nylen et al. 2010). This suggests that 95% of women will recover within 16 months of starting treatment. The perspective is Medicaid as they cover approximately 50% of births each year in the U.S. and we center specifically on North Carolina to get specific Medicaid fee schedules (Kaiser Family Foundation 2010). Women are assumed to be screened using the validated Edinburgh Postnatal Depression Scale (EPDS), a 10-item screening tool asking about the frequency of symptoms (never, 0; not much, 1; sometimes, 2; often, 3) in the past seven days (e.g., “I have blamed myself when things went wrong (Cox, Holden, & Sagovsky 1987; Cox, Chapman, Murray, & Jones 1996; Montazeri, Torkan, & Omidvari, 2007; Sit, Rothschild, & Wisner 2006). Screening all women with the short-form of the scale and then screening positive women with the long-form, which is only 10 items and takes less than five minutes, is the strategy recently endorsed by the Agency for Healthcare Research and Quality for minimizing false positives/negatives (Cox et al. 1996; Myers et al. 2013). We assume screening will take place during outpatient visits in the weeks and months following birth, as PPD and PP do not present immediately after birth (Marder 2014; Roy-Byrne 2014). We use a decision tree (see Figure 1) rather than a Markov or microsimulation model because decision trees are ideal for non-recurrent processes like PPD, where women rarely experience relapses within the same postpartum period (Roy-Byrne 2014). We developed the decision tree and programmed all calculations in Microsoft Excel 2011 and used Crystal Ball, Fusion Edition for the probabilistic sensitivity analysis.

Table 1 outlines the input probabilities for the model. The data were obtained from literature published between 1995 and 2015 found via PubMed and Web of Science. The following text outlines the assumptions we made to utilize the probabilities we found; text outlining what literature the probabilities were pulled from and why is available in online supplemental material. First, we assumed 100% sensitivity and specificity for diagnosing PP with the EPDS as women with this condition would likely have high scores and present with easily discernible symptoms (e.g., hallucinations) (Sit et al. 2006). Second, to estimate what percentage of women with PP seek care, we used the estimated prevalence of PP from two reviews because we assume many cases remain undetected and untreated (Lucas 1994; Marder 2014; Sit et al. 2006). We also assumed that 100% of care-seeking women with PP will receive care, as PP is usually classified as a medical emergency warranting immediate care (Doucet et al. 2009; Marder 2014). Third, we assumed the same proportion of women with PPD would discontinue treatment in the screening and usual care branches using data from a prospective cohort study (Cohen et al. 2006). Though this study was of pregnant, rather than postpartum women, it is repeatedly cited as an estimate of PPD treatment discontinuation. Finally, the American Psychiatric Association holds that the best treatment plan for PPD is both antidepressant medication and psychological treatment (Gaynes et al. 2005). We assumed women would receive interpersonal therapy if they were given

psychological treatment, which recent research indicates is better suited for PPD treatment (Miniati et al. 2014). Though selective serotonin reuptake inhibitors and interpersonal therapy could have a summative effect for some patients, we are assuming this is canceled out by the patients for whom neither treatment is effective or only one treatment is used (De Crescenzo et al. 2014; Miniati et al. 2014).

The resources required for this intervention from the Medicaid payer perspective are outlined in Table 2, with costs per estimated time increment. Cost estimates were inflated to 2014 dollars using the medical care component of the consumer price index and discounted at the commonly accepted rate of 3% (Bureau of Labor Statistics 2014; Drummond et al. 2005; Weinstein et al. 1996). Several key assumptions guided cost estimation. First, we assumed all women in the cohort will be covered by Medicaid until two years postpartum. Second, the screening and treatment will be billed as care from provisionally licensed mental health providers under the supervision of a licensed psychiatrist (Hervey 2013). Third, fluoxetine (20 mg pills, once per day) will be the prescription for PPD as it is the cheapest per Medicaid fee schedules and is considered safe for breastfeeding (Field 2008; Medicaid 2013). Fourth, women in the usual care branch who seek and accept treatment will receive 38–52 minutes of interpersonal therapy from a psychiatrist. Fifth, we made assumptions regarding average duration of lag times and care episodes, including: one month for women to be screened; three months for women to seek care; and women who discontinue treatment or commit suicide will incur treatment costs for three months. Final general assumptions were that bipolar treatment costs approximate PP treatment costs and that there are no costs associated with a woman delaying care in the usual care branch; this assumption is supported by the fact that PPD can spontaneously remit and relapses are rare (De Crescenzo et al. 2014; Marder 2014; Miniati et al. 2014; Roy-Byrne 2014; Sit et al. 2006).

Table 3 outlines the utility scores used in the analysis. The primary health outcomes of interest were the number of remissions achieved and QALYs gained by the screened and unscreened women, both discounted by 3% in the second year (Gold et al. 1996; Haddix et al. 2003). QALYs are a widely-used outcome measure in comparative effectiveness research that incorporates both morbidity and mortality; one QUALY represents one year of life in perfect health. The QALYs were based only on utilities for the woman, due to the lack of longitudinal data that takes the family or mother and child dyadic perspective. This will result in a conservative estimate for the benefits of treatment. Other outcome measures include the number of: false positives, undiagnosed women, and suicides.

To quantify the utility of living with PPD, we drew on a variety of utility score estimates for different severities of depression from the Tufts Cost-Effectiveness Analysis Registry (see Table 3) (Kaltenthaler et al. 2002; Tufts Medical Center 2013). Utility scores are values reflecting an individual’s preference for a health state. They range from zero—representing death—to one—representing perfect health. We assumed that women with PP and PPD with suicidal ideation would have the same utility score as people with severe depression; our estimate is drawn from a comprehensive systematic review and economic evaluation of depression and anxiety treatments (Kaltenthaler et al. 2002). Though PPD and depression are not the same, they exhibit similar symptoms and fall under the same care protocol

(Gaynes et al. 2005; Roy-Byrne 2014). We assumed PPD scores would be most similar to a general depression utility score, because PPD can encompass a range of severities (De Crescenzo et al. 2014; Miniati et al. 2014). The PPD utility score was estimated via United Kingdom community-based preferences from pooled Medical Expenditure Panel Survey files for 79,522 individuals with complete EQ-5D scores (Sullivan et al. 2011). In our analysis we then weighted this utility score to account for the approximately 10% of PPD patients with suicidal ideation (Lindahl et al. 2005).

For the one-way sensitivity analyses, the outcomes were assessed at the low and high estimates for each of 30 key parameters one by one to evaluate the effect of uncertainty in individual model inputs on ICER results (Muennig 2008; Petitti 1999). ICERs are calculated as the change in costs from usual care to the intervention divided by the change in outcomes; it represents the extra units of outcome achieved per extra dollar spent on the intervention. In addition to a one-way sensitivity analysis, we also performed a probabilistic sensitivity analysis. In order to do this, we made distributional assumptions for each of the probability and utility input parameters (see Tables 1 and 3) (Briggs et al. 2006; Briggs 2000; Doubilet et al. 1985). We assigned a triangular distribution to the PPD utility using the mild depression utility score (0.78) for the maximum, the moderate depression utility score (0.58) for the minimum, and the suicide weighted overall depression utility score (0.70) for the most likely value (Kaltenthaler et al. 2002). We also assigned a triangular distribution to the sensitivity and specificity of the EPDS for PPD, where the most likely value was a weighted average of estimates from two literature reviews (Gibson et al. 2009; Milgrom et al. 2011). For treatment discontinuation and remission rates we fit beta distributions based on parameters derived from prospective cohort studies of women with PP and PPD (Bergink et al. 2011; Cohen et al. 2006). We used uniform distributions for the remaining parameters. We did not include the cost parameters in either the one-way or probabilistic sensitivity analyses under the assumption that costs to Medicaid are fixed by their fee schedules (Guo et al. 2007; Medicaid 2013; North Carolina Department of Health and Human Services 2012, 2013, 2014a; Qiu et al. 2009). We used Crystal Ball to run the model 1000 times, drawing each input parameter value probabilistically from within its distribution, and calculated incremental costs and incremental QALYs for each of these runs in order to plot them on an ICER plane (Briggs et al. 2006; Briggs 2000). Next, in order to create a cost-effectiveness acceptability curve we calculated net-benefits for each of the 1000 runs using willingness-to-pay thresholds from $0-$80,000 in $2,500 increments (Briggs et al. 2006; Briggs 2000; Briggs et al. 2002).

Results

The outcomes of this model at the end of two years can be found in Table 4. In total, 29 more women with PPD or PP achieved remission in the intervention compared to the usual care branch (32 in intervention vs. 3 in usual care). This remission benefit was associated with a 664%-increase in total costs, from $44,703 for the usual care branch to $341,622 in the intervention branch. Compared to usual care, the intervention costs $296,919 more but results in an additional 21.43 QALYs and 29 remissions achieved for an ICER of $13,857/QALY gained and $10,182/remission achieved. Using the commonly accepted U.S. willingness to pay threshold of $50,000/QALY gained, screening and treating women for

postnatal depression is cost-effective (Hirth et al. 2000). No willingness to pay threshold can be found for our natural unit outcome of remissions achieved, because QALYs have historically been the primary outcome used in cost-effectiveness research on depression (Paulden et al. 2009).

Deterministic one-way sensitivity analyses were performed on all input probabilities and all utilities. In all, 30 individual one-way deterministic analyses were performed, the results of which can be found in Figure 2. None of the tested scenarios resulted in the intervention being dominated by or dominating usual care using the $50,000/QALY threshold. Changing the underlying prevalence of PP resulted in the widest variation in the ICER for QALYs. The ICERs from the sensitivity analyses ranged from $11,281/QALY gained (increasing the remission utility by 10%) to $24,117/QALY gained (low estimate for PP prevalence).

A probabilistic sensitivity analysis was conducted for the QALYs outcome. The ICER plane for the 1000 runs of the probabilistic model can be found in Figure 3. Runs are considered “dominated” if, in that run, the intervention both increases costs and results in poorer outcomes when compared to usual care. In this analysis, screening and treatment was dominated in only 2.9% of runs; in the remainder of runs the intervention increased costs but resulted in improved outcomes. In these runs the willingness-to-pay threshold of the decision maker determines whether the intervention is considered cost-effective. The commonly accepted $50,000 per QALY gained willingness-to-pay threshold is graphed on the plane, and 93% of runs are cost-effective using this threshold (i.e. fall below and to the right of the threshold).

The cost-effectiveness acceptability curve found in Figure 4 shows the probability that the intervention will be cost-effective as compared to usual care for a range of willingness-to-pay thresholds. This analysis finds that the intervention becomes more likely to be cost-effective than usual care at a willingness-to-pay threshold level of ~$10,000/QALY gained, and becomes cost-effective in 95% of cases at a willingness-to-pay threshold value of between $50,000 and $75,000/QALY gained.

Discussion

Based on the ICER per QALY gained over a two-year time horizon, routine screening and treatment of PPD is cost-effective under a wide range of willingness-to-pay thresholds and this conclusion is robust to extensive sensitivity analysis. We still defer to health care professionals and policy makers about their willingness to pay. However, we stress that this cost-effectiveness analysis is conservative, in that we only considered the health outcomes for women, when it is clear that PPD has negative implications for the woman’s family in the short and long term (Grace et al. 2003).

These results contradict a similar analysis of PPD screening in the UK, which determined routine screening in primary care was not cost-effective. However, the UK analysis used a screening method that inflated the number of false positives, which the authors determined was very costly. Further, the study minimized the utility increases from screening by only

including a one-year time horizon and not including women with PP or suicidal ideation (Paulden et al. 2009).

Other research in this area has produced promising results that are well-aligned with our findings. A multi-center intervention across several states recently trialed pediatricians screening women for depression in every well child visit from zero to 24 months; it found that both the providers and the women were very receptive to the screening (Frayne et al. 2015). Further, a review of screening programs found five studies that concluded screening for depression resulted in decreased depressive symptoms and improved mental health, though there is a lack of well-designed randomized control trials in the field overall (Myers et al. 2013; Thombs et al. 2014). In Canada, a large randomized controlled trial is underway testing prenatal depression screening and online cognitive behavioral therapy via telemedicine technology, and early feasibility studies found that women were very receptive to depression screening and treatment (Kingston et al. 2014). The intervention proposed in this paper models physicians providing depression treatment to women under the supervision of a psychiatrist. North Carolina is in the middle of implementing a statewide telepsychiatry program for acute mental health evaluations and early data show over $1 million in cost savings for the state (Office of Rural Health and Community Care 2014). As 35 counties in North Carolina were classified in 2014 as Mental Health Professional Shortage Areas, the ability to provide telepsychiatry increases the feasibility of our proposed intervention (Office of Rural Health and Community Care 2014).

The results of this model should be considered along with several limitations. First, while the Medicaid payer perspective is appropriate because they cover approximately 50% of births each year in the U.S., in the real world many women will likely lose their Medicaid coverage before the end of our two-year time horizon (Kaiser Family Foundation 2010; Markus et al. 2013; North Carolina Department of Health and Human Services 2014b). Consequently, our cost estimations may not reflect full costs absorbed by payers other than Medicaid, such as the women themselves once Medicaid coverage lapses. Second, this analysis only considered suicide and ideation as potential adverse events due to a lack of data. There are likely other adverse events that might decrease the cost-effectiveness of the intervention— such as treatment side effects—as well as those that might increase the cost-effectiveness of the intervention—such as long-term or intergenerational negative effects of untreated PPD. Third, some of our input estimates came from studies of European populations; unfortunately, U.S.-specific data are lacking. Finally, some physicians may feel the proposed intervention is beyond their scope of practice. However, the intervention is in line with the SBIRT model, previous implementations of PPD screening, guidelines from physician professional organizations, and is responsive to shortages in mental health providers (Centers for Medicare & Medicaid Services, 2015; Dias & Figueiredo, 2015; Earls, 2010; Kozhimannil et al., 2011; Thomas, 2008). Future research of PPD screening should collect more U.S.-specific probability data, consider additional perspectives, include utilities for the benefits of screening for infants and families, and model a longer time horizon where women treated for PPD in one pregnancy would hopefully have better preventive care during subsequent pregnancies.

These findings indicate PPD and PP screening and treatment can be cost-effective under a wide range of willingness-to-pay thresholds despite the existence of uncertainty in the parameter estimates. Early data from trials in this area indicate both patients and providers can be receptive to the proposed intervention and the infrastructure needed to carry it out is already generating cost savings in the state (Frayne et al. 2015; Kingston et al. 2014; Office of Rural Health and Community Care 2014). Prospective research is needed to determine what policies, incentives, and monitoring are needed to increase screening and treatment of PPD and PP, both of which are important health issues for women, children, and families (Kozhimannil et al. 2011; Milgrom et al. 2011; Palladino et al. 2011). For example, in this analysis we assumed physicians would provide the screening, when other studies have had nurses provide the screening and counseling, it would be valuable to know which care pathway maximized patient health outcomes and minimized costs (Myers et al. 2013). Fortunately, the Affordable Care Act and the U.S. Preventive Services Task Force are laying a strong foundation upon which future research and health care in this area can build (Andrews 2015; Kozhimannil et al. 2011; U.S. Preventive Services Task Force 2015).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Significance

Postpartum depression impacts as many as 13% of women in the U.S. in their first postpartum year and is associated with undesirable outcomes for the mother, child, and family. However, the current standard of practice in the U.S. is to not screen women for postpartum depression meaning the majority of cases go undetected and untreated. The present study modeled the costs to a large insurer and care outcomes of screening for and treating postpartum depression and psychosis compared to no screening. The results indicate screening for and treating postpartum depression and psychosis is cost-effective.

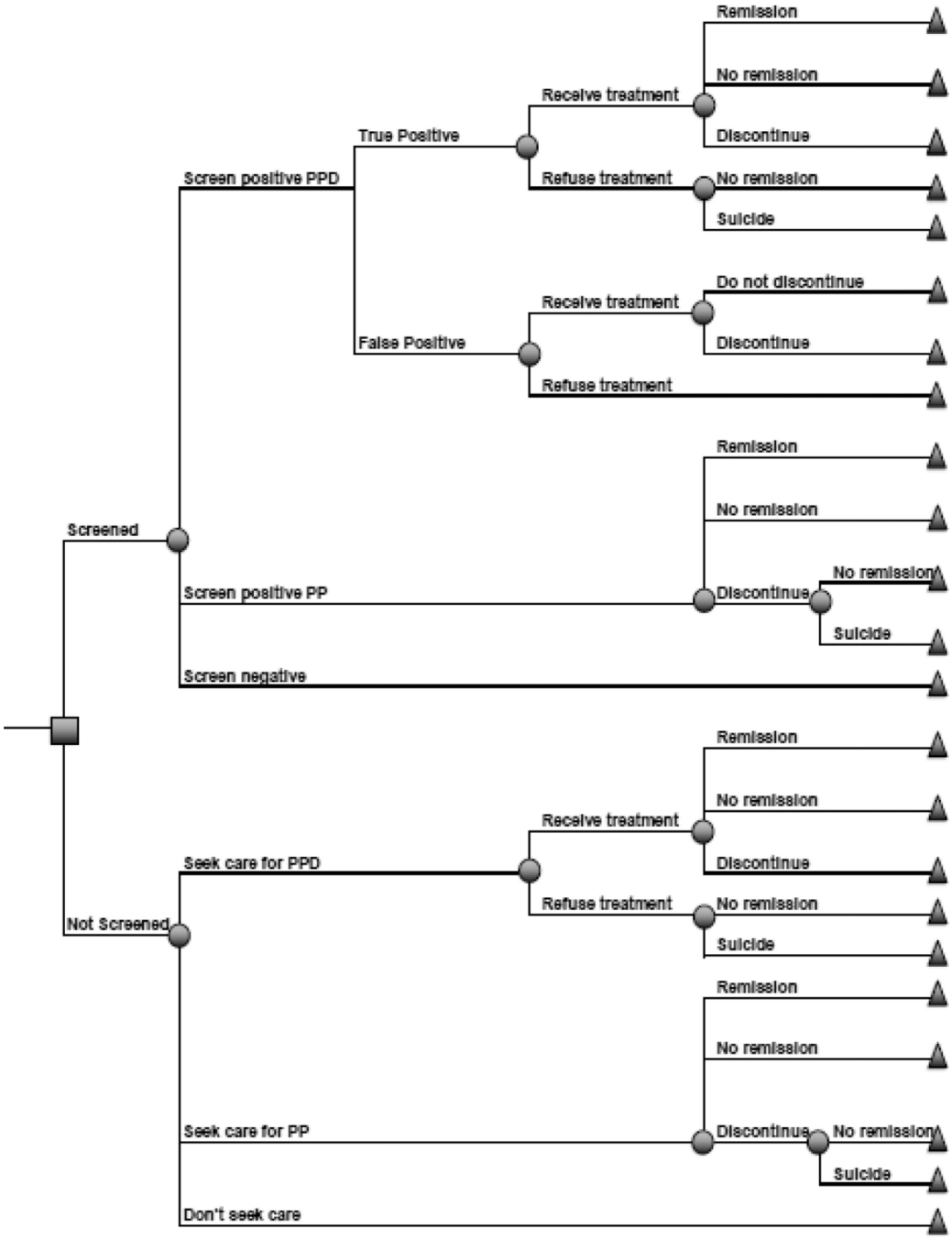

Figure 1.

Decision Tree Modeling Intervention vs. Usual Care for PPD

Figure notes: In the "screened" branch, women are first screened for PPD and PP. Women who screen positive for PPD may not truly have PPD, since the EPDS is not a perfect screening test for PPD (Gibson et al. 2009; Milgrom et al. 2011). However, all who screen positive can choose to receive or refuse treatment with selective serotonin reuptake inhibitors (SSRIs) and/or interpersonal therapy (IPT). These women can then go into remission, not go into remission, or choose to discontinue treatment. In all branches where women refuse

treatment or do not receive treatment for true PPD or PP, they have a small risk of committing suicide. Because we assume the EPDS, in combination with clinical judgment, will be a perfect screening test for women with PP, in the intervention branch there are no false positives for PP. Women with diagnosed PP are compelled into treatment for their own safety, and may go into remission, not go into remission, or discontinue treatment. Finally, in the screened branch women can also screen negative. These may be true negatives or false negatives. False negatives are considered not to be in remission, and have a small likelihood of committing suicide. In the usual care arm, women must choose to seek care for their PPD or PP in order to receive treatment. Once women make their choice, they have the same tree structure as women in the screening branch. There are no false positives in the usual care arm.

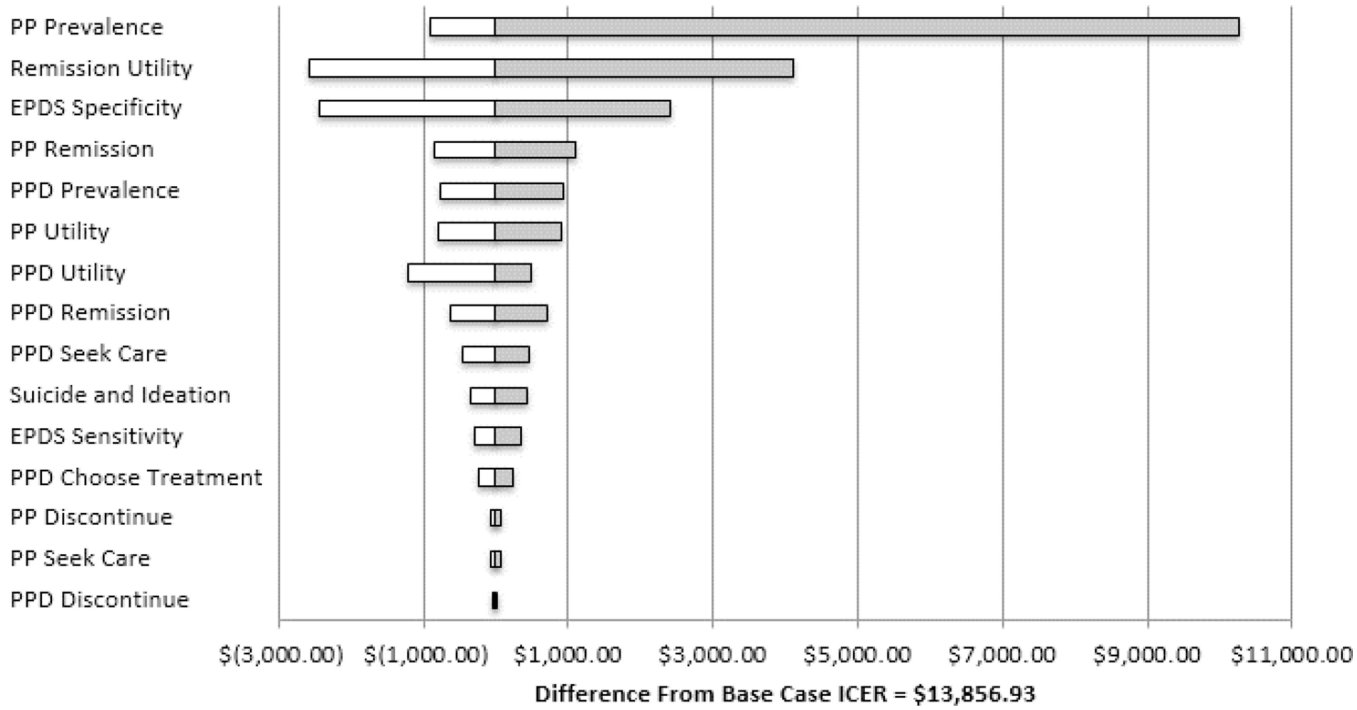

Figure 2.
Results of Sensitivity Analyses of Decision Tree for Routine PPD Screening

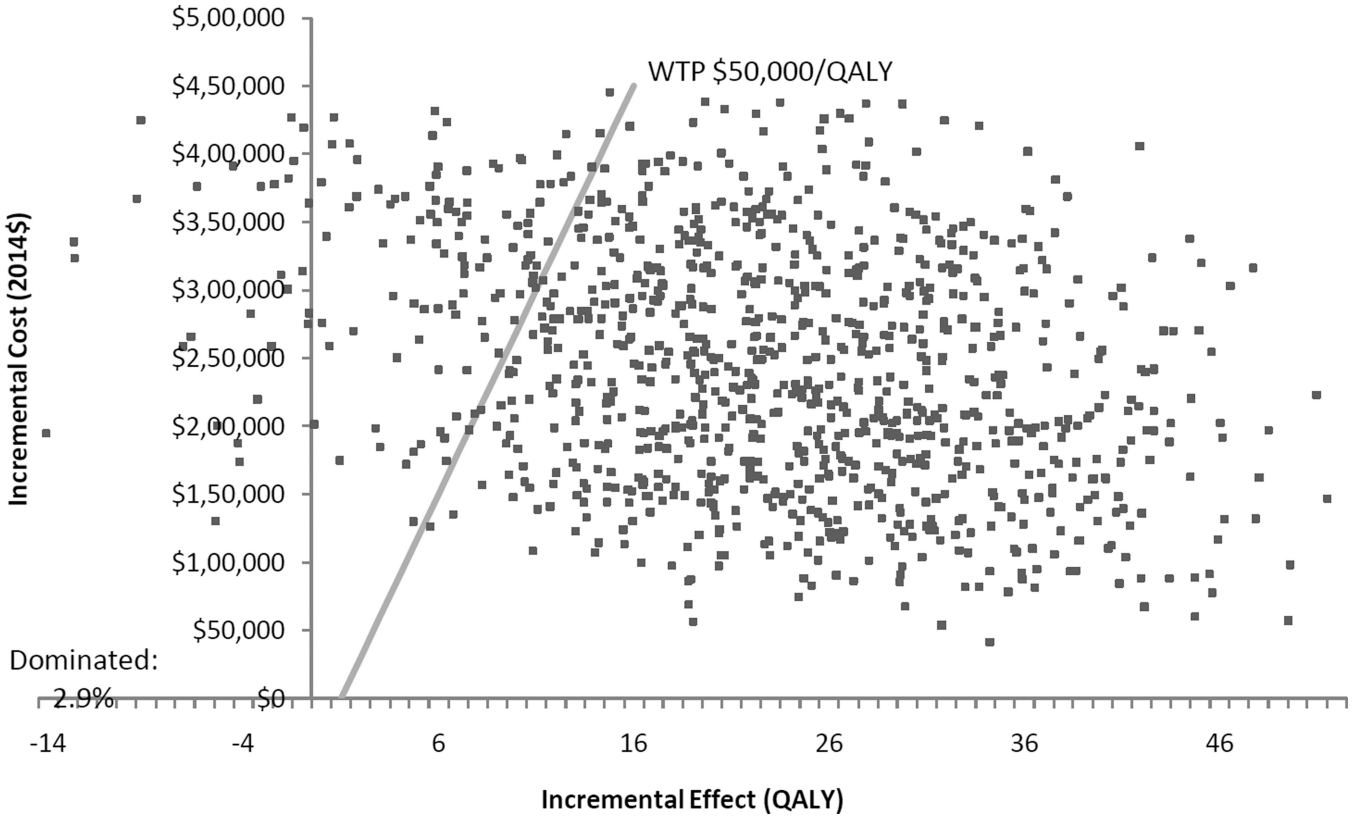

Figure 3.
Incremental Cost-Effectiveness Ratio Plane

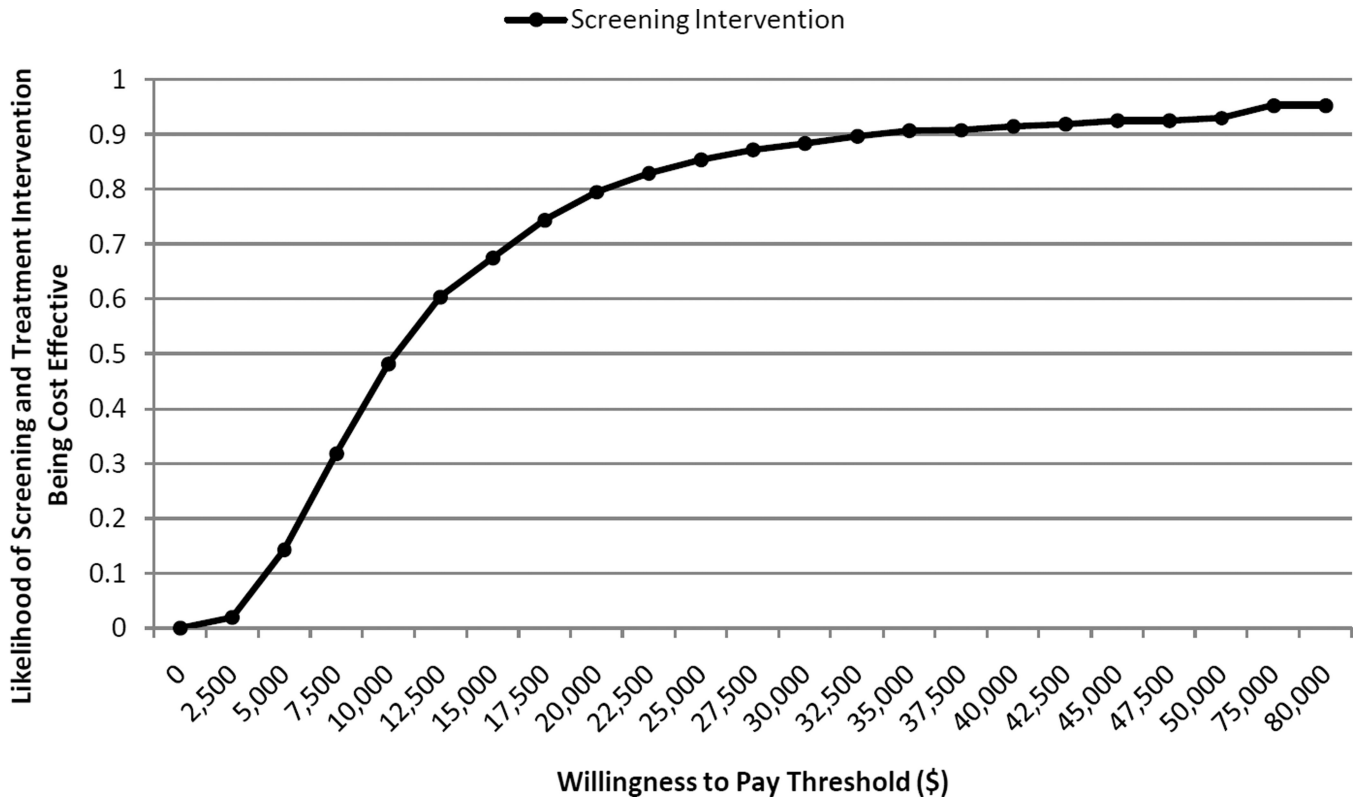

Figure 4.

Likelihood that the Screening and Treatment Intervention for PPD is Cost Effective Based on a Range of Willingness to Pay Thresholds (Cost Effectiveness Acceptability Curve)

Table 1

Base-case, low, and high estimates of probabilities for the decision analysis model

Input Parameter	Base Case	Range	Distribution	Sources
All Patients				
Prevalence of PPD	12%	8%-16%	Triangular	(CDC 2013; Gaynes et al. 2005; Roy-Byrne 2014)
Prevalence of PP	1.5%	0.002%-3%	Uniform	(Lucas 1994; Marder 2014; Sit et al. 2006)
PPD: Sensitivity for EPDS	77%	54%-100%	Triangular	(Gibson et al. 2009; Milgrom et al. 2011)
PPD: Specificity for EPDS	90%	81%-99%	Triangular	(Gibson et al. 2009; Milgrom et al. 2011)
PP: Sensitivity for EPDS	100%	-		(Doucet et al. 2009; Marder 2014; Sit et al. 2006)
PP: Specificity for EPDS	100%	-		(Doucet et al. 2009; Marder 2014; Sit et al. 2006)
Suicide	0.5%	0%-0.9%	Uniform	(Appleby et al. 1998; Appleby and Turnbull 1995; Lindahl et al. 2005)
Suicidal ideation	10%	5%-14%	Uniform	(Lindahl et al. 2005)
Postpartum Depression Patients				
Discontinue Treatment	32%	29%-36%	Beta (65,136)	(Cohen et al. 2006)
Treatment to remission (IPT)	53%	44%-58%	Uniform	(Miniati et al. 2014)
Treatment to remission (SSRI)	49%	37%-65%	Uniform	(De Crescenzo et al. 2014)
Average SSRI and/or IPT	51%	40%-62%		(De Crescenzo et al. 2014; Miniati et al. 2014)
Choose to Receive Treatment	46%	32%-60%	Uniform	(Myers et al. 2013; Scholle et al. 2003)
Seek Care,	36%	24%-47%		(McIntosh 1993)
Source 1				
Source 2	33%	12%-54%		(Whitton et al. 1996)
Average	34.2%	17.8%-50.7%	Uniform	(McIntosh 1993; Whitton et al. 1996)
Choose to Receive Treatment	15%	0%-30%	Uniform	(Myers et al. 2013)
Postpartum Psychosis				
Patients				
Discontinue Treatment	8%	7%-9%	Beta(4,47)	(Bergink et al. 2011)
Treatment to Remission	92%	83%-100%	1-Discontinue	(Bergink et al. 2011)
Seek Care	0.15%	0.10%-0.20%	Uniform	(Marder 2014; Sit et al. 2006)
Choose to Receive Treatment	100%	-		(Doucet et al. 2009; Marder 2014)

Abbreviations: IPT (interpersonal therapy), SSRI (selective serotonin reuptake inhibitor)

Table 2

Cost estimates for the decision tree comparing screening and treatment for postpartum depression to no screening[a]

Branch	Cost Category	Time	Uninflated Cost for Time	Inflated Cost (2014 US$)	Inflated Annualized Cost (Year 1)	Inflated Annualized Cost (Year 2)	Applicable Population	Date	Source
Screening	Drug Costs	Daily from diagnosis on	$ 0.03	$ 0.03	$ 10.18	$ 11.03	All diagnosed women who choose treatment	2014	(Medicaid 2013)
Screening	Drug Costs (Discontinued)	Daily for three months after diagnosis	$ 0.03	$ 0.03	$ 2.54	$ -	All diagnosed women who discontinue treatment	2014	(Medicaid 2013)
Screening	Psychiatrist Time for Weekly Check-In	One hour weekly	$ 98.81	$ 98.81	$ 5,155.77	$5,155.77	All physicians desiring consult	2014	(North Carolina Department of Health and Human Services 2013), CPT Code 90792
Screening	Doctor's Time for Screening #1	15 minutes; one time only	$ 13.87	$ 14.21	$ 14.21	$ -	All women	2012	(North Carolina Department of Health and Human Services 2012), CPT Code H0031
Screening	Doctor's Time for Screening #2	15 minutes; one time only	$ 13.87	$ 14.21	$ 14.21	$ -	Women + on test 1	2012	(North Carolina Department of Health and Human Services 2012), CPT Code H0031
Screening	Doctor's Time for IPT	15 minutes, weekly	$ 19.81	$ 20.30	$ 978.08	$1,059.28	All diagnosed women	2012	(North Carolina Department of Health and Human Services 2012), CPT Code H0004
Screening	Doctor's Time for IPT (Discontinued)	15 minutes, weekly for three months	$ 19.81	$ 20.30	$ 243.61	$ -	All diagnosed women who discontinue treatment	2012	(North Carolina Department of Health and Human Services 2012), CPT Code H0004
Screening	EPDS	Once	$ -	$ -	$ -	$ -	All women		
Screening	Treatment for PP Women	Monthly	$383.00	$440.58	$ 4,846.41	$5,286.99	PP Women	2009	(Qiu et al. 2009)
Screening	Treatment for PP Women (Discontinue)	Monthly	$383.00	$440.58	$ 1,321.75	$ -	PP Women who discontinue	2009	(Qiu et al. 2009)
Usual Care	Drug Costs	Daily from diagnosis on	$ 0.03	$ 0.03	$ 8.49	$ 11.03	Daily from treatment on	2014	(Medicaid 2013)

Branch	Cost Category	Time	Uninflated Cost for Time	Inflated Cost (2014 US$)	Inflated Annualized Cost (Year 1)	Inflated Annualized Cost (Year 2)	Applicable Population	Date	Source
Usual Care	Drug Costs (Discontinued)	Daily for three months after diagnosis	$ 0.03	$ 0.03	$ 2.54	$ -	All diagnosed women who discontinue treatment	2014	(Medicaid 2013)
Usual Care	Diagnosis from Psychiatrist	Once	$125.39	$126.13	$ 126.13	$ -	All women who seek care	2013	(North Carolina Department of Health and Human Services 2014a), CPT Code 90791
Usual Care	IPT from Psychiatrist 38-52 minutes	Weekly	$ 67.85	$ 68.25	$ 2,742.30	$3,561.33	All women being treated	2013	(North Carolina Department of Health and Human Services 2014a), CPT Code 90834
Usual Care	IPT for Psychiatrist 38-52 minutes (Discontinue)	Weekly for three months	$ 67.85	$ 68.25	$ 819.03	$ -	All treated women who discontinue	2013	(North Carolina Department of Health and Human Services 2014a), CPT Code 90834
Usual Care	Treatment for PP Women	Monthly	$383.00	$440.58	$ 3,965.25	$5,286.99	PP Women	2002	(Guo et al. 2007)
Usual Care	Treatment for PP Women (Discontinue)	Monthly for Three Months	$383.00	$440.58	$ 1,321.75	$ -	PP Women who discontinue	2002	(Guo et al. 2007)

[a] All cost estimates, except for PP treatment are non-facility fees

Abbreviations: IPT (interpersonal therapy)

Table 3

Utility Scores Adapted for PPD and PP for the decision tree cost-effectiveness analysis

Condition	Utility	Used For	Distribution	Source
Depression	0.70	PPD score	Triangular (0.58,0.70,0.78)	(Sullivan et al. 2011)
Severe Depression	0.38	PP score	Base Case ±10%	(Kaltenthal er et al. 2002)
Depression Remission	0.88	Remission Score	Base Case ±10%	(Kaltenthal er et al. 2002)
Healthy	1	Healthy score		
Dead	0	Suicide score		

Table 4

Outcomes of Decision Tree Cost-effectiveness Analysis of Routine Screening for PPD[a]

	Intervention	Usual Care	Incremental Change
PPD, in remission (n)	14	2	12
PPD, not in remission (n)	101	113	−12
PP, in remission (n)	18	1	17
PP, not in remission (n)	2	19	−17
Suicides (n)	0.34	0.58	−0.24
False Positives (n)	86	0	86
Undiagnosed Women (n)	27	94	−67
Costs	$341,622	$44,703	$296,919
Total QALYs	1892.75	1871.33	21.43
QALYs per Woman	1.89	1.87	0.02

[a]Note that the intervention and usual care columns do not sum to 1000 because all person counts were rounded.