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Research paper

Cost-effectiveness of In-Home Cognitive Behavioral Therapy for low-income depressed mothers participating in early childhood prevention programs

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ABSTRACT

Background: To determine the cost-effectiveness of In-Home Cognitive Behavioral Therapy (IH-CBT) for low-income mothers enrolled in a home visiting program.
Methods: A cost-utility analysis was conducted using results from a clinical trial of IH-CBT and standard of care for depression derived from the literature. A probabilistic, patient-level Markov model was developed to determine Quality Adjusted Life Years (QALYs). Costs were determined using the Medical Expenditure Panel Survey. A three-year time horizon and payer perspective were used. Sensitivity analyses were employed to determine robustness of the model.
Results: IH-CBT was cost-effective relative to standard of care. IH-CBT was expected to be cost-effective at a three-year time horizon 99.5%, 99.7%, and 99.9% of the time for willingness-to-pay thresholds of US$25,000, US$50,000, and US$100,000, respectively. Patterns were upheld at one-year and five-year time horizons. Over the three-year time horizon, mothers receiving IH-CBT were expected to have 345.6 fewer days of depression relative to those receiving standard home visiting and treatment in the community.
Conclusions: IH-CBT is a more cost-effective treatment for low-income, depressed mothers than current standards of practice. These findings add to the growing literature demonstrating the cost-effectiveness of CBT for depression, and expand it to cover new mothers. From a payer perspective, IH-CBT is a sound option for treatment of depressed, low-income mothers. Limitations include a restricted time horizon and estimating of standard of care costs.

1. Introduction

Major depressive disorder (MDD) is a disabling psychiatric condition, particularly in new mothers (O'Hara and Wisner, 2014). The symptoms of depression, including fatigue, anhedonia, and feelings of worthlessness, contribute to functional impairments in parenting and nurturing. These, in turn, increase the risk for maladjustment and poor developmental outcomes in offspring (Goodman et al., 2011). The onset of depression in new mothers often begins during pregnancy and extends episodically through the child rearing years. Banti et al. (2011) found that 12.4% of women met criteria for minor or major depression during pregnancy. Wisner et al. (2013) reported that 14.0% of mothers exceeded clinical cutoffs on a screen for depression administered during 4–6 weeks postpartum. Another study examined self-reported depression measured at 10 time points over the first 12 years, reporting that 20.7% exceeded clinical cutoffs on average at one or more time points (Campbell et al., 2009). Low-income mothers are especially at risk for developing depression and for experiencing the deleterious consequences of the condition (Goyal et al., 2010).

1.1. Costs of depression in low-income mothers

In addition to its human costs, depression in mothers has financial implications as well. In depressed adults, Greenberg et al. (2003) found that, in 2000, the economic burden of depression was US$83.1 billion. These reflect costs in health care, labor productivity, and mortality. Documented costs associated with maternal depression include increased utilization of health care services (Greenberg et al., 2003), increased rates of prematurity and low birthweight that require specialized care of children (Jarde et al., 2016), and additional health

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and related costs (Smith and Smith, 2010). Ammerman et al. (2016) examined health care and labor productivity costs in low-income, depressed mothers. They documented US$2.41 billion in added direct and indirect costs annually in depressed mothers relative to their non-depressed counterparts. Delivery of effective treatments to depressed mothers who are at highest risk is essential to facilitate recovery, mitigate impact on offspring, and reduce costs to payers and society.

1.2. Treatment of depression in low-income mothers in home visiting

Providing treatment to low-income mothers with depression is complicated by barriers to identification, engagement, and retention. Recently, there have been calls to identify, screen, and treat mothers in the context of other programs that provide services to low-income mothers as a way to overcome these barriers (O'Connor et al., 2016). Early childhood prevention programs, in particular home visiting (Ammerman, 2016), provide a promising opportunity for delivery of effective treatment. Home visiting programs, both targeted and universal, are widely available in many developed countries (Engle et al., 2007). Home visiting programs seek to support new mothers in their roles as parents. They strive to teach parenting skills and promote a safe and nurturing environment for children in order to optimize developmental outcomes. Home visiting services are voluntary, and many routinely screen for depression. Research suggests that up to 61% of mothers in home visiting experience clinically elevated levels of depression during the course of service (Ammerman et al., 2010). A subgroup of mothers experiences a persistently high level of symptoms throughout the first years of the child's life (Teeters et al., 2016). Home visiting alone appears to have little to no impact on depressive symptoms in mothers participating in home visiting (Ammerman et al., 2010), thus warranting direct treatment as the most appropriate response in most cases.

Ammerman et al. (2011) adapted cognitive behavioral therapy to meet the needs of depressed, low-income mothers enrolled in home visiting. In-Home Cognitive Behavioral Therapy (IH-CBT) is implemented by therapists who provide treatment concurrently with ongoing home visiting. IH-CBT uses strategies that facilitate engagement, make content relevant to the needs of low-income mothers, allow delivery in the home, and promote a collaborative relationship between the therapist and home visitor in order to smoothly coordinate services. Empirical support for IH-CBT was established in a clinical trial comparing mothers who received IH-CBT and concurrent home visiting with those who received home visiting alone (Ammerman et al., 2013). In this study, 93 mothers were first identified using the Edinburgh Postnatal Depression Scale (Cox et al., 1987) administered at three months postpartum as part of a standardized screening schedule. This was followed by diagnosis of MDD using a semi-structured interview. Following random assignment to treatment and control groups, mothers were re-assessed at post-treatment and at three-month follow-up. Results indicated that mothers receiving IH-CBT experienced significant benefits in terms of depression reduction relative to controls. Compared to those receiving home visiting alone, mothers in the IH-CBT condition were less likely to meet diagnostic criteria for MDD at post-treatment, reported fewer depressive symptoms, and obtained lower scores on clinician ratings of depression severity.

Mothers receiving IH-CBT also reported increased social support, improved functioning in day-to-day activities, and decreased psychological distress. Gains were maintained at three-month follow-up. Findings remained when controlling for other psychiatric conditions, severity of MDD, therapist, home visiting model, and number of home visits. It is noteworthy that some mothers in the standard home visiting condition received treatment in the community, although as expected, this was often insufficient or ended prematurely. Mothers received a significantly larger dose of IH-CBT treatment than what is typically observed in center-based mental health settings (Hansen et al., 2002; 11.2 vs. 4.3 sessions). Mothers who completed all sessions of IH-CBT treatment did especially well, with 78.3% no longer meeting criteria for major depressive disorder at post-treatment and 90.5% recovered at follow-up. Mothers who recovered from depression reported increased ability to cope with stress related to the parenting role and more nurturing parenting of their children (Ammerman et al., 2014).

1.3. Study objectives

Although empirical testing documents the clinical impact of IH-CBT in depressed mothers in home visiting, there is a need to examine the cost-effectiveness of the treatment. The purpose of a cost-effectiveness analysis is to determine if a treatment confers greater benefits at a given level of cost or equivalent benefits for less cost (Byford and Bower, 2002). Cost-effectiveness analyses guide decision makers in selecting and paying for certain treatments over others given limited resources. Despite a broad consensus that such studies are important to clinical decision-making (Hill, 2012), relatively few such analyses have been undertaken in the treatment of depression generally (Barrett et al., 2005; Brettschneider et al., 2014) or for maternal depression in particular (Dennis, 2005). For cognitive behavioral therapy (CBT) as a treatment of depression in adults, findings have been mixed. Some studies have suggested that CBT is cost-effective relative to antidepressant medications, while others have reported the opposite finding (Barrett et al., 2005). As such, determining the cost-effectiveness of IH-CBT is an important undertaking both in understanding its economic value for low-income, depressed mothers and for the field as a whole in order to guide selection of and payment for this treatment option.

The purpose of this study was to estimate the cost-effectiveness of IH-CBT delivered concurrently with home visiting compared to home visiting alone in low-income, depressed mothers. We hypothesized that IH-CBT would be more cost-effective than the home visiting in conjunction with the most commonly used treatment approach (antidepressant medications). Specifically, we reasoned that IH-CBT would result in decreased costs given its high degree of clinical effectiveness with low-income depressed mothers participating in home visiting. The study was performed using the perspective of the payer, Medicaid, for services to this population in the United States. Home visiting and access to antidepressant medications was assumed in the comparison cohort over a three-year time horizon. We performed a cost utility analysis, expressing benefits in terms of quality-adjusted life years gained (QALYs). An incremental cost effectiveness ratio was computed, which compared the change in costs divided by the change in QALYs under IH-CBT versus home visiting alone.

2. Methods

2.1. Study population

The study population consisted of 93 new, low-income mothers who were enrolled in a home visiting program and were diagnosed with MDD. [A full description of the sample and recruitment procedures is in Ammerman et al. (2013).] Mothers were enrolled in Every Child Succeeds, a community-based home visitation program serving Southwestern Ohio and Northern Kentucky (USA). The geographic area covered by the program included urban, suburban and rural areas. Two models of home visiting were utilized in this program: Nurse-Family Partnership (NFP; Olds, 2010) and Healthy Families America (HFA; Holton and Harding, 2007). Participating mothers had at least one of the following demographic risk characteristics needed for eligibility: unmarried, low-income, ≤18 years, inadequate prenatal care. Mothers were enrolled in home visiting prior to 28 weeks' gestation in NFP as per model parameters and from 20 weeks' gestation through the child reaching three months of age for HFA. Mothers were referred from prenatal clinics, hospitals, social service agencies, and community physicians. In the NFP home visits were