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Review article

Summary diagnostic validity of commonly used maternal major depression disorder case finding instruments in the United States: A meta-analysis

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ABSTRACT

Introduction: Major Depression Disorder (MDD) is common among mothers of young children. However, its detection remains low in primary-care and community-based settings in part due to the uncertainty regarding the validity of existing case-finding instruments. We conducted meta-analyses to estimate the diagnostic validity of commonly used maternal MDD case finding instruments in the United States.
Methods: We systematically searched three electronic bibliographic databases PubMed, PsycINFO, and EMBASE from 1994 to 2015 to identify relevant published literature. Study eligibility and quality were evaluated using the Standards for the Reporting of Diagnostic Accuracy studies and Quality Assessment of Diagnostic Accuracy Studies guidelines, respectively. Pooled sensitivity and specificity of case-finding instruments were generated using Bayesian hierarchical summary receiver operating models.
Results: Overall, 1130 articles were retrieved and 74 articles were selected for full-text review. Twelve articles examining six maternal MDD case-finding instruments met the eligibility criteria and were included in our meta-analyses. Pooled sensitivity and specificity estimates were highest for the BDI-II (91%; 95% Bayesian Credible Interval (BCI): 68%; 99% and 89%; 95% BCI: 62%; 98% respectively) and EPDS10 (74%; 95% BCI: 46%; 91% and 97%; 95% BCI: 84%; 99% respectively) during the antepartum and postpartum periods respectively.
Limitation: No meta-regression was conducted to examine the impact of study-level characteristics on the results.
Discussion: Diagnostic performance varied among instruments and between peripartum periods. These findings suggest the need for a judicious selection of maternal MDD case-finding instruments depending on the study population and target periods of assessment.

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1. Background

Major depression disorder (MDD) case-finding instruments rely on subjective symptoms, patient experiences and perceptions that are typically validated in the absence of a 'gold standard'. The sensitivity and specificity estimates of these instruments are based on comparing their classification to that of reference standards, which themselves include classification error. Reference standard errors result in biased case-finding instrument diagnostic performance estimates. Among mothers, during the peripartum period which includes antepartum and postpartum periods, the potential for case-finding instrument misclassification error (especially false positives) is likely to be heightened by the presence of 'morning sickness', 'baby blues' and parenting stress symptoms that mimic those of MDD (Pereira et al., 2014). These issues contribute in part to the uncertainty regarding how valid existing maternal MDD case-finding instruments are in detecting true MDD. As a consequence of this uncertainty, various stakeholders in the United States (i.e. US Preventive Services Task Force, American Congress of Obstetricians and Gynecologists, American Academy of Pediatrics, American Academy of Family Physicians and the American College of Nurse Midwives) have recommended inconsistent maternal MDD screening/case-finding practices and policies (Gaynes et al., 2005; Agency for Healthcare Research and Quality AHRQ, 2014; Pignone et al., 2002; O'Connor et al., 2016).

In order to address the uncertainty around the diagnostic validity of maternal MDD case-finding instruments, meta-analyses can be used to generate summary measures of the sensitivity and specificity based on studies deemed to be valid and comparable while maximizing precision estimates. Unfortunately, previous diagnostic validity systematic reviews of maternal MDD case-finding instruments have not generated instrument-specific and/or peripartum period-specific pooled sensitivity and specificity estimates largely due to variability in not only the populations studied, but also in the diagnostic thresholds and reference standards used (Gaynes et al., 2005; Agency for Healthcare Research and Quality AHRQ, 2014; Pignone et al., 2002; O'Connor et al., 2016). Furthermore, because both existing maternal MDD case-finding instruments and reference standards aim to at least partly meet the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria for MDD diagnosis, there could be conditional dependence in the errors (i.e. false positives and negatives) generated by these tests when used on the same individuals. Combined, these issues preclude definitive conclusions regarding the diagnostic validity of maternal MDD case-finding instruments.

Meta-analysis techniques that account and adjust for the above issues exist; (Sadatsafavi et al., 2010; Chu et al., 2009; Walter et al., 1999; Dendukuri et al., 2012; Bernatsky et al., 2005; Dendukuri and Joseph, 2001) however, such methods have not yet been applied to maternal MDD diagnostic accuracy studies. The objective of this study was to conduct meta-analyses to estimate the diagnostic validity of commonly used maternal MDD case finding instruments in the US while accounting for 1) varying diagnostic thresholds, 2) use of multiple imperfect reference standards to validate the same case-finding instrument, 3) and the potential for conditional dependence of errors generated from case-finding instrument and reference standard results.

2. Methods and procedures

2.1. Data sources and searches

Three electronic databases PubMed, PsycINFO, and EMBASE were searched for studies published from January 1st, 1994 to December 31st, 2015. An experienced librarian guided all searches. Older literature was excluded due to the publication of the Diagnostic *and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) in 1994. Briefly, our search strategy included various terms for depression, diagnostic performance, and the names of existing published MDD case-finding instruments and reference standards. To identify additional studies, we reviewed the bibliographies of included articles and previous systematic reviews.

2.2. Phase I – screening of abstracts

Titles and abstracts of identified studies were reviewed by Arthur Owora (AO) for further consideration. AO reviewed all articles without abstracts in full. Two exclusion criteria were used in Phase I: (1) no assessment of MDD, and (2) absence of original data. All articles not meeting these exclusion criteria were reviewed in Phase II.

2.3. Phase II – review of full articles

Articles moved to Phase II were reviewed in full using the following eligibility criteria (eTable 1a): MDD measured among mothers of young children (0–5 years old) in the US and reporting of both case-finding and reference standard instrument results. Articles that included mothers from other countries or mothers with only older children (>5 years) were excluded. Included articles were moved to Phase III for a qualitative review and quantitative data extraction.

2.4. Phase III – qualitative assessment and quantitative data extraction

Articles eligible for Phase III were evaluated for their epidemiological quality by two investigators (JR and AO). The investigators

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