Modifying the Parent Evaluation of Developmental Status to Target 4-month-old Infants Who Would Benefit From the Meade Movement Checklist During Community Screening☆

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To evaluate infant development using a modified Parent Evaluation of Development Status (PEDS) of 6 questions and the Meade Movement Checklist (MMCL). Parents of 4 to 6 month old infants attended community screening clinics, listed concerns on 6 questions (modified PEDS) and were then screened using the MMCL (n = 55). Individual PEDS questions were evaluated and MMCL results were compared to a gold standard, the Bayley Scales of Infant Development II. Significant correlation was found between infant risk-positive status, eligibility for special educational or medical services and parent concerns (RR = 1.7; $P = .003$). A second screen using the MMCL demonstrated 66.6% sensitivity, 94.1% specificity, 85.7% positive predictive value and 84.2% negative predictive value. Four of 6 questions on a "Modified" parent concerns test accurately targeted infants for a second screen (MMCL). Evaluating parent concerns and risk-positive status, increased PPV from 70% to 85.7% at the expense of decreased sensitivity. An algorithm is recommended to increase infant screening effectiveness.

Keywords: Developmental screening; Infant identification; Community health

Early intervention services provide critical early experiences to improve functional developmental skills and the quality of life in infants with developmental delay or disability.[1,2] The United States federal government recognized the importance of early and accurate identification of children with developmental delay or disability through the IDEA mandate to identify 1% of infants, and requires states to set up methods to find those eligible for services (child-find activities).[3]

Eligible infants are not always identified in a timely manner.[4] Current researchers suggest that 12.8% of children from birth through age 17 have a health care need[5] and current prevalence rate of all disabilities may be as high as 18%[2]; however, between 30% and 50% of these children reach kindergarten without identification.[4] An even higher rate is estimated for children with autism (approximately 60%).[6]

Developmental screening is now considered an important component of child health care. The 2006 American Academy of Pediatrics recommendation reaffirmed the 2001 policy statement[7] that all children should be screened at each well child visit. A current survey of American Academy of Pediatrics members suggests that more children are being screened using standardized tests than in the previous survey (23% in 2002 vs. 47.7% in 2009)[8]; however, most children were identified at 2 to 3 years of age and not in early infancy.[8,9]

Many pediatric and community practices use parent information as a strategy for monitoring the development of young children.[9–11] A recent report of the implementation of developmental screening indicated that 15 of 17 pediatric practices, representing both community and large, urban pediatric practice settings, chose to use parent report measures to assist with work flow.[9] King and colleagues[10] evaluated the use of parent information tests and found that twice as many children had a concerning result on the Parent Evaluation of

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Development Status (PEDS) than on the Ages and Stages Questionnaires (ASQ) (22% vs 11%; $P = .001$) although referral rates for concerns listed on the PEDS were far lower than those for a failed ASQ (43% vs 72%; $P = .001$). Rhdz et al[11] evaluated 317 parents (90%) who agreed to complete the Ages and Stages Questionnaire (81%) and the Child Development Inventory (CDI) (75%). Predictive values were calculated for the ASQ and the CDI (sensitivity: 0.67 and 0.50; specificity: 0.39 and 0.86; positive predictive value: 34% and 50%). The authors reported concerns that using parent information alone for screening did not meet current recommended screening standards for sensitivity and specificity of between 80 and 90%.[11] Schoenwald et al[9] studied the efficacy of using parent concerns in a busy practice and reported that while screening of children increased by 61%, referrals only increased for those over the age of 3 years. This study contributes to current knowledge by determining which parent information assists earlier identification and referral, particularly of infants younger than 1 year.

Identifying Very Young Infants

Prediction of developmental delay in individual infants is a challenge faced by primary care providers and requires flexibility and creativity in the implementation of screening programs.[12,13] The purpose of screening is to identify infants who may be delayed or “at risk” in one or more areas of development.[14,15] Professionals determining the primary goal of a screening program decide upon acceptable levels of sensitivity and specificity based upon the consequences of false negatives and false positives.[16] Sensitivity, ruling in those with the condition, is important when the risk of missing a diagnosis is high, as in the case of disease or debilitating deformity. Specificity, ruling out the condition, is more important than sensitivity if the costs associated with intervention are high.[16] The positive predictive value (PPV) reflects the accuracy of correct referrals and therefore, the efficacy of the screening program.[16] Targeting a population and increasing the specificity of a test are the 2 methods recommended by Portney and Watkins[16] and used in this study to increase positive predictive values.

Current research reported on a previously undetected group of infants. Older preterm infants were shown to be at very high risk of developmental problems; this group is often not targeted for screening programs.[17,18] In one recent study, late preterm infants, between 33 and 37 weeks, accounted for 74% of the lifetime disabilities of all infants born preterm.[18] This study will highlight the value of inviting parents to specify their concerns during community screening, create a risk group which included late preterm infants, and increase screening efficacy for young infants.

Gathering Parent Information

Researchers have focused on gathering information from parents to decrease professional time and costs.[9,19] Parent information consisted of 2 broad categories: parent descriptions and parent appraisals.[19] Parent descriptions may use recall of past events, which is not a valid strategy, or descriptions of current skills, which becomes valid when questions are specifically worded.[19]

Parent appraisals or opinions on the quality of a child's development includes 3 areas: parent estimations of their child's development, predictions (not a valid measure), and concerns.[19] Table 1 reflects relevant research[19–29] on the 3 valid methods (parent descriptions, parent estimates and parent concerns), used to create the 6 questions for gathering parent information in this study.

Parents' Identification of Disabilities

Parents have many concerns and questions about their young infants, which could be tapped into by inviting parents to attend screening clinics. In a follow-up study of infants with very low birth weight, the parents who chose to attend follow-up clinics had infants with more delays in their development compared to infants and their parents who did not attend.[28] This finding supported the assumption that parents who attended clinics were appropriately concerned about their infants.[29] The parents not attending clinics had infants who scored higher on developmental testing and may have been more confident that their infants were developing normally. It is possible that a parent's choice of whether to attend a clinic may increase the specificity of the program.[29]

Parents of very young infants may have concerns without being sensitive to the presence of a disability. Bailey and colleagues[30] found that parents were not concerned about the presence of a ‘problem’ in development until the average age of 7 months. Parent concerns may not lead to identification of a disability (increased sensitivity) but may identify a target group of infants for a second screen. In a PEDS study of infants (aged birth through 18 months), 19 of the 86 parents had significant concerns about their children, while only 3 of these 19 children had a disability.[19] For this young age group, the PPV was only 16% but reportedly increased in older age groups of children.[19]

In the PEDS validation studies, 7 children with cerebral palsy were identified.[19] These parents estimated their child's development as lower for their age or had concerns with feeding skills.[19] When infant nutritive sucking skills at 6 months of age were compared to outcomes on the BSID-II, researchers found that sucking was 78% specific and 80% sensitive, supporting the need to add a question concerning feeding for very young infants.[31]

This target group, similar to Glascoe's group of over-referrals using the PEDS, could benefit from further evaluation, education, and anticipatory guidance.[29] In this study, a community-based screening program used parent information as a first step to screen very young infants. Parents were invited to attend the screening clinics and answered 6 questions, modified from the Parent Evaluation of Development Status (PEDS),[26] [which included 4 significant predictor questions on the PEDS for early infancy], and added one question estimating the infant's development[26] and one “feeding” question.[31]