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Longitudinal and subgroup analysis approach to understand early intervention program outcomes for very preterm infants.

Karli Treyvaud

Murdoch Childrens Research Institute, Royal Children's Hospital, Victoria, Australia

Address:

Murdoch Childrens Research Institute

Royal Children's Hospital

Flemington Road, Parkville

Victoria 3052

Australia

Email: karli.treyvaud@mcri.edu.au

Early intervention programs designed for at-risk preterm children that begin while the infant is in the neonatal intensive care unit or the early post-discharge period have been shown to have a positive effect on child cognitive and motor development in early childhood (1). There has been limited evidence for longer term influences of early intervention on motor outcomes. The study by Van Hus et al. (2) is important because firstly it examines longitudinal outcomes associated with the Infant Behavioral Assessment and Intervention Program (IBAIP), and secondly it demonstrates a sustained positive impact of the IBAIP on motor outcomes across early childhood to 5 years of age in very preterm children.

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One of the novel and stimulating features of the Van Hus et al. study is the longitudinal approach to analyze and report trial outcomes. Perhaps too often, longer-term outcome data from early intervention programs are reported only in cross section, in isolation from previous time points. Analysis of long-term follow up data in isolation does not allow for the examination of the potential influence on outcome data of earlier achievements in children's development. It may also lead to missed opportunities to identify critical time periods where additional "booster" intervention sessions might improve child and family outcomes in the longer term. Van Hus et al. suggested that treatment effects on child outcomes remained stable over time. However, one challenge is how to analyze data from different developmentally appropriate measures across childhood, which is acknowledged by the authors. Another challenge is how to interpret the clinical significance of the effect sizes reported over time.

Importantly, the Van Hus et al. study demonstrated a longitudinal effect of the intervention on cognitive and motor outcomes for a higher-risk subgroup of infants with bronchopulmonary dysplasia. Subgroup analyses are critical to identifying infants at greatest risk who might benefit most from early intervention, but again this form of analysis is often missing from early intervention outcome publications in the preterm population (1). Subgroup analyses of parent-based risk factors is also important, as variables such as socio-economic disadvantage can influence access and uptake of early intervention services in preterm populations (3). Van Hus et al. found evidence that the positive effect of the intervention on motor outcomes was stronger for mothers with higher education levels, prompting the authors to highlight the need to understand how best to promote outcomes for preterm children with parents who are also more vulnerable. Perhaps it is time to delve further into our trial data to better understand the role of parent personal factors on child outcomes. For example, understanding how parental variables such as health literacy influence parental engagement with intervention content, and thus influence child development may help to better tailor the content and format of early intervention programs for the most vulnerable. It is also worth noting that the IBAIP is delivered by physiotherapists primarily in the family home post-discharge, working to support infant self-regulation by enhancing parent responsiveness within the parent-infant relationship. While this focus on the parent-child relationship is a critical component of effective early intervention approaches for preterm infants (1), home-visiting programs can be costly and not feasible in all countries. Moving forward we will need to consider using multiple modes of delivery for early intervention programs in an effort to find targeted and responsive interventions that are effective, feasible, widely applicable, and affordable. Given that very preterm birth is a

major public health issue that places high demands on finite resources including early intervention, educational support, and mental health services (4), understanding the longitudinal effects of early intervention programs and which families and children might benefit most from effective, targeted programs is paramount.

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