



Preterm Delivery and Its Impact on Psychosocial and Emotional Development in Children

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Topic

Prematurity

Introduction

The vulnerability of infants born too small or too early has long been recognized. However, it was not until after World War II that worldwide conventions defined birth weight, gestational age limits, and risk thresholds. In 1948, the World Health Assembly recommended that an infant with a birthweight of 2 500 g (5.5 pounds) or less, or a gestational age of less than 37 completed weeks be deemed immature or premature. These definitions were further refined in 1950, such that prematurity was defined solely in terms of gestational age.¹

Although only about 11% of births in the US are premature, these infants account for the majority of deaths in infancy,² making prematurity a major public health concern. Infant mortality rates increase sharply with decreasing gestational age: close to 90% of all infants born alive at 23 weeks or less die within the first few days of life, but survival improves quickly at 25 to 26 weeks of gestation.³ Despite the fact that rates of preterm and very preterm (<32 weeks) delivery have increased over the past two decades, infant mortality rates have declined sharply. Clearly, the decline in infant mortality reflects the survival of growing numbers of increasingly more premature infants.²

Subject

It has long been established that premature infants are at higher risk than full-term infants with regard to developmental problems. Early studies in this area focused on neurodevelopmental issues, namely, cerebral palsy and cognitive delay.^{4,5} The literature that has accumulated over the past few decades clearly documents that premature infants are not only at increased risk for these disorders but also for congenital malformations, hearing and visual deficits, reactive airway disease, growth failure, and behaviour problems. These health and developmental problems may place stresses on health, educational, and family resources.⁶

Problems

The potential for preventing preterm delivery appears limited in the near term. Meanwhile, the survival of growing numbers of very premature infants has raised two questions:

- 1) What is the impact of the increased survival of such infants on child health?
- 2) Is there potential for decreasing this morbidity with current technology?

Recent Research Results

Multiple reviews have documented the 2- to 4-fold risk of many interrelated outcomes of premature and/or low birthweight infants over time.⁶⁻¹⁰ In general, among infants born weighing less than 1 500 g, about 10% will have cerebral palsy; 15% will have an IQ of less than 70; almost 30% will have clinically significant behaviour problems generally related to attention deficit; and 20% will have reactive airway disease. As a result, from 25% to 60% will experience school grade repetition or will require special education services. In addition, very premature infants tend to remain small through most of their childhood, with their heights and weights averaging in the 25th percentile.

More recently, information has emerged concerning the very tiniest infants, at the edge of viability, who weigh below 800 grams after less than 28 weeks of gestation. Mortality among these tiny infants has decreased to the point that 50% born at 24 weeks have an appreciable chance at survival by 23 weeks of life or less.³ The majority of these infants experience neonatal complications such as chronic lung disease, following respiratory distress and sepsis. A minority of these infants also experience necrotizing enterocolitis (14%), intracranial haemorrhage (26%), and cerebral white matter disorder (7%). Almost universally, they weigh less than one tenth of the normal percentile for gestational age at discharge from hospital. When seen in early childhood, up to 37% have IQs <70 for both cognitive and motor functioning and 3% were blind or deaf.

It is less certain whether morbidity from neonatal complications is entirely attributable to prematurity per se. We are now seeing strategies to reduce morbidity and enhance development in those infants destined to be born prematurely. These strategies include the application of quality improvement approaches to reduce inter-institutional variations in morbidity, such as chronic lung disease,^{14,15} growth failure^{15,16} and sepsis¹⁶ not accounted for by birthweight, gestational age, and admission illness severity. Efforts are also ongoing to reduce the noxious effects of exposure to the NICU milieu and to foster more normal development and better parent-child interactions.¹⁷ Lastly, there is evidence that post-discharge early education interventions can improve cognitive performance and reduce behaviour problems in these infants.¹⁸

Conclusion

Even with optimal prenatal services, rates in preterm delivery have remained stable or decreased only slightly. Declines in infant mortality reflect the increasing technological sophistication of neonatal intensive care to support these fragile infants. Indeed, the efficacy of neonatal intensive care has permitted reproductive strategies that may result in an indicated preterm delivery to protect the health of the mother and/or infant, and increase the risk of preterm delivery (as may be the case when two or three embryos are

implanted in a woman's womb as part of assisted reproductive technology). Thus, it is likely that we will continue to encounter very premature survivors in the foreseeable future. Improving outcomes for these infants should therefore be the focus, where possible. To optimize outcomes, we must begin by rejecting the notion that prematurity should be treated as a "syndrome" with fixed deficits. There are no gestational age cut-offs that clearly delineate a "pathology," albeit the earlier in gestation a birth occurs, the more difficult the transition to extrauterine life may be. Likewise, even if preterm infants survive the newborn period, their optimal development is threatened in much the same way we have seen among impoverished groups or among those receiving sub-optimal medical care. Thus, we need a solid conceptual framework and sophisticated characterizations of the issues facing such infants in order to initiate better interventions.¹⁹

Implications for Policy and Services

The major public health implication of the higher rates of preterm births is their contribution to infant mortality. Infants born in the extreme stages of prematurity, with the highest morbidity rates, represent a tiny proportion — less than 1% — of births. Therefore, while this high risk of morbidity does not significantly contribute to overall rates of child morbidity, overall rates of cerebral palsy may be more significantly increased.

Clearly, the best way to decrease the incidence of developmental and physical morbidity attributable to prematurity is to reduce the number of such births. However, our current understanding of the factors leading to preterm delivery are apparently of little guidance in developing efficacious interventions. Thus, improvements in childhood outcomes among premature infants will have to be based on the technology that is currently available.

First, such infants should be delivered, whenever possible, in a hospital equipped to deal with both the mother and infant. A substantial body of literature supports the benefits of such a strategy.²⁰ In addition, the specialists providing this care must engage in quality improvement activities, comparing institutions and seeking to reduce complication rates to the lowest possible level.

Second, continued attention is needed in supporting normal physical and psychological development in the intensive care unit. Great strides have been made in reducing the barrage of sound and light on infants' senses that characterized early NICU care. However, as evidenced above, we are far from being able to support the equivalent of third trimester weight gain.

Finally, continued attention is needed to identify appropriate support measures for the family during and after their infant's stay in NICU. Apart from the developmental programs designed for premature infants, other investigators²¹ have explored using modern computer technology to improve outcomes. While evidence suggests that subsequent early childhood intervention may be very efficacious, the duration, intensity,

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and the nature of the program needed for subsets of these fragile infants still requires some examination.

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