



## EDITORIALS

## Hospital transfer of extremely preterm infants

Do it before not after birth

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Current evidence suggests that extremely preterm infants born at non-tertiary level facilities might be at increased risk for adverse outcomes, including death and major morbidities.<sup>1,2</sup> Infants born at non-tertiary facilities who are transferred postnatally could also have worse outcomes than infants who are born in tertiary facilities,<sup>3,4</sup> although these data were potentially confounded by differences in baseline risks.<sup>5,6</sup> However, most of the evidence to date comes from studies that are not population based or do not reflect modern care of extremely preterm infants.

In a linked paper, Helenius and colleagues (doi:10.1136/bmj.l5678) report analyses of contemporary population based data from England showing that postnatal transfer (transport) from a non-tertiary level neonatal intensive care unit in the first 48 hours after birth is associated with an increased risk of death or severe brain injury among extremely preterm infants.<sup>7</sup> Keeping these infants at lower level units after birth was associated with a higher risk of death, compared with birth in a tertiary facility.<sup>7</sup>

The strengths of this study include a focus on major outcomes (death and severe brain injury) among the highest risk infants, and the use of a population based nationally representative cohort, which reduces the risk of bias found in other datasets. These findings suggest that perinatal services should prioritize in utero over postnatal transfers, with major implications for patients, families, healthcare workers, and organizations providing perinatal health services worldwide.

The authors appropriately used propensity scoring to account for baseline differences between groups, but there may be residual confounding associated with delivery at a non-tertiary facility or postnatal transfer in the first 48 hours.<sup>7</sup> In a cohort study of very preterm infants in Canada, differences in infant outcomes by level of birth facility were partly related to baseline differences between groups,<sup>5</sup> including treatment with antenatal corticosteroids, mode of delivery, and gestational age.<sup>5</sup> Preterm infants may be born outside of tertiary facilities after a precipitous delivery with insufficient time to administer antenatal corticosteroids.<sup>3</sup>

In Helenius and colleagues' study, however, infants were well matched for treatment with antenatal corticosteroids, mode of delivery, and gestational age.<sup>7</sup> Their findings confirm higher

rates of death among extremely preterm infants delivered at lower level facilities<sup>8,9</sup> and higher rates of severe intracranial hemorrhage among infants transferred to higher level units postnatally<sup>3,4</sup> while rebutting smaller studies that claimed de-regionalization does not adversely affect outcomes.<sup>6,10</sup> The results are likely generalizable to countries with multiple levels of perinatal care, with or without active regionalization programs.

A potential limitation is that infants who died in the delivery room were excluded.<sup>7</sup> The level of care at a delivery facility may influence delivery room practices<sup>11</sup> as well as decisions to provide active care.<sup>12</sup> Infants resuscitated by non-tertiary providers might be more likely to receive chest compressions, less likely to receive promptly administered surfactant after intubation, and more likely to be hypothermic compared with infants managed by tertiary level providers.<sup>11</sup> Infants delivered at facilities without a neonatal intensive care unit were also excluded. It is likely that inclusion of infants who died without active care and infants who were delivered at facilities without access to advanced neonatal care would have strengthened the reported associations.<sup>7</sup>

The study by Helenius and colleagues provides the best evidence to date that delivery of extremely preterm infants at non-tertiary level facilities is associated with major adverse outcomes.<sup>7</sup> Attempted antenatal transfer is clearly the best approach for women with threatened preterm labor: it lowers the risk of delivery at non-tertiary units, eliminates the need for postnatal transfer, and improves outcomes. Such a strategy might include treatment with antenatal corticosteroids to promote fetal maturation before transfer.

Additional advantages include keeping mothers and infants together to promote lactation and bonding. Antenatal transfer is well established in some states within the United States,<sup>13</sup> Australia,<sup>14</sup> and Scandinavia, where up to 95% of at risk infants are transferred in utero.<sup>15</sup> Improved regionalization of perinatal care, prioritizing early and clear transfer pathways for women with threatened preterm labor should increase survival and reduce major lifelong morbidities among extremely preterm infants.

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