Risk of brain damage and death in premature babies may reduce if born in specialist units

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Extremely premature babies born in English hospitals with specialist neonatal intensive care units may have a reduced risk of brain damage and death, compared to premature babies born in hospitals without such specialist units.

This is the finding of research, by a team from Imperial College London and the University of Turku, Finland, that involved 17,000 infants born in England earlier than 28 weeks gestation.

The study, published in the *BMJ*, found that transferring extremely premature babies to a different hospital within 48 hours after birth was associated with an increased risk of severe brain injury.

The paper found that 27.5 per cent of babies who were transferred to a different hospital within 48 hours of birth were recorded as having a severe brain injury, compared to 14 per cent of babies who were born in a hospital with a specialist neonatal unit.

However, the results also suggest that in extremely premature babies, staying in a hospital without a specialist neonatal unit was associated with an increased risk of death. In this study 26.3 per cent of babies who stayed in a hospital without a specialist unit died, compared to 21 per cent of babies born in a specialist centre.

The team behind the findings say organising health services so that mothers give birth to the most premature babies in hospitals with specialist neonatal services could reduce the risk of brain damage, and save lives.

Dr. Chris Gale, lead author of the research from Imperial's School of Public Health explained: "Babies born this prematurely are very fragile. If a mother goes into labour at a hospital not equipped to care for such a premature baby—and so does not have experienced, specialist staff and facilities—the baby will often be moved by ambulance soon after birth to a more specialist hospital. Previous research suggested moving a baby may cause complications. "

"This is the largest study to date to show that for extremely preterm babies, being born in the wrong place can have grave consequences. Establishing national systems and processes to ensure women are moved to the right hospital at the first indications of premature labour should be a health service priority to ensure the most premature babies are born in the right place."

Premature birth is defined as birth before 37 weeks gestation, and around 60,000 babies are born prematurely in the UK every year. Out of these premature births, around one in 20 in the UK are born at less than 28 weeks gestation.

These babies need to be looked after by experienced, specialist neonatal doctors and nurses. They often need intensive care, such as being placed on a respiratory support like a ventilator to help them breathe, soon after birth. Not all hospitals have these facilities, meaning the new born baby must be transferred, by a specialist ambulance team, to a different hospital.

The latest research, from researchers funded by the Medical Research

Council and the Foundation of Neonatal Research of Southwest Finland, suggests transferring an extremely premature baby between hospitals in the 48 hours after birth was associated with over double the risk of severe brain injury, and 40 per cent lower chance of the baby surviving without severe brain injury.

The researchers say the study shows the importance of ensuring babies are born in a suitable hospital with a neonatal intensive care unit.

Dr. Kjell Helenius, first author of the study, from the University of Turku, Finland said: "This research suggests that the UK should prioritise the development of a more effective national system of moving women at risk of premature birth to suitable hospitals before they give birth. Countries with much larger distances between hospitals, such as Finland and Australia, are more effective at ensuring babies are born in the right hospital. We need to look at the systems used in other countries and how they could be implemented in the UK."

The researchers examined 17,577 extremely premature babies born in the UK between 2008 and 2015. The team found one in five of these babies were transferred within 48 hours, and that this proportion has been gradually increasing (the number of babies transferred increased from 18 per cent in 2008 to 21 per cent in 2015). Out of 17,557 babies, 10,866 were in the control group, and born at a hospital with a neonatal intensive care unit; 2,158 were transferred to another hospital, while 2,668 remained at a hospital without a neonatal intensive care unit.

Babies who remained at hospitals without a neonatal intensive care unit did not have a significantly higher rate of severe brain injury. The researchers explained that this result could be due to the babies dying before brain injury was detected (babies in this group had a higher rate of death than those born in hospitals with specialist neonatal intensive care units) or possibly due to the transfer itself.

The research team also studied 306 babies born in a hospital with a neonatal intensive care unit but transferred to another similarly specialist hospital due to a lack of available cots. These babies did not have an increased risk of severe brain injury or death, but the researchers urge caution with this finding as this group was very small. The team add that this suggests there are not enough specialist neonatal intensive care beds in England, and this can lead to the most premature babies being moved between hospitals unnecessarily.

Extremely premature babies in England are transferred by specialist neonatal staff and ambulance teams. This study suggests that even when the greatest care is taken, and specialist neonatal transport services are used, the risk of brain injury is still higher compared to babies who are not moved to a different hospital in the first two days.

The researchers accounted for other factors that might explain differences in death and brain injury between the groups of babies, such as whether the mother had been given treatments such as steroids before birth (which help protect a premature baby's lungs and brain), as well as the baby's sex and gestational age.

Justin Irwin, Chief Executive of the premature and sick baby charity Bliss, said: "In order for every baby to have the best chance of survival and quality of life they must be born at the right level of neonatal unit for their needs.

"This study adds significantly to our understanding of how critical it is for extremely premature babies in particular to be born at a hospital with Neonatal Intensive Care Unit (NICU) onsite.

"It shows that babies born earlier than 28 weeks at a hospital without a NICU are at significantly increased risk of dying or sustaining a severe brain injury. While most babies born in the UK at 27 weeks or under are

delivered at a hospital with a highly specialist unit onsite, one in four are not.

"We are pleased that work is ongoing across England to improve outcomes for extremely premature babies, and that the importance of being born in the right place has been recognised. However, it is critical that the Government and NHS maintain this momentum and ensure that enough resources are available to make sure every baby receives the care they need at the right place and at the right time."

The research team added that the work was only possible using data held in the National Neonatal Research Database, which is led by co-author Professor Neena Modi. This holds data on babies that received neonatal care across the UK. The team thank the NHS staff who record the data, and the parents who agree that their babies' data are included in the database.

More information: Association of early postnatal transfer and birth outside a tertiary hospital with mortality and severe brain injury in extremely preterm infants: observational cohort study with propensity score matching, DOI: 10.1136/bmj.l5678 , www.bmj.com/content/367/bmj.l5678

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