Researchers call for cheaper, better screening for brain-threatening newborn condition

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Babies may be missing out on treatment for a common, brain-threatening condition and others receiving unnecessary treatment due to the wide use of a screening test known to be unsuitable.

Auckland researchers have now shown that a more accurate test is cheaper in the long run – delivering potential annual savings of $365,250—despite greater up-front costs, and are calling for hospitals to make the switch.

The condition, known as neonatal hypoglycaemia or low blood sugars, affects one in six babies. Left untreated, it can cause developmental delay, brain damage and lowered education outcomes later in life. At-risk babies – up to a third of all born—are those born preterm, smaller or larger than usual, and babies whose mothers have diabetes.

Currently, many hospitals use heel-prick test strips to screen for low blood sugars. The test strips are cheaper per test than the alternative enzymatic test, and are readily available and familiar to medical staff because they are also widely used for monitoring diabetes. But since 1997 the World Health Organisation has stated that they are "unsuitable for diagnosing neonatal hypoglycaemia", being designed to pick up high rather than low blood sugar levels.

Researchers from the University of Auckland's Liggins Institute and Faculty of Medical and Health Sciences modelled the full costs of each test, and found that in practice the test strip approach is more expensive

because it gives a false result 20-30 percent of the time, requiring a second blood-test to confirm borderline results.

They calculated that hospitals could save $24.35 per baby tested, based on a false positive rate of 20 percent. An estimated 20,000 babies a year require testing in Aotearoa New Zealand. No exact figures are available for how many of those babies receive the less accurate test strip screening, but study lead, Distinguished Professor Jane Harding, says an educated guess is three-quarters, or 15,000. That suggests that switching to enzymatic tests could deliver annual savings of $365,250.

Professor Harding, who works from the Liggins Institute, says the test strips' inaccuracy undermines care of babies. "Test strips are more likely than the enzymatic test to give false positive results – the test says they have low blood sugars when they don't – which results in unnecessary treatment. They are also more likely to miss cases—false negatives—meaning some babies do not get the treatment they need.

"Also blood tests – even ones as necessary as this –can be distressing for babies and their families. So doing a test that has to be repeated adds to distress for families at this critical time."

Professor Harding and her collaborators Liggins Institute Ph.D. student Matt Glasgow and Dr. Richard Edlin, a senior lecturer in the School of Population Health Science, have published a paper on the study in high-ranking journal *Neonatology*.

"It is hard to imagine another scenario in medicine where screening to guide diagnosis and management of a brain-threatening condition is commonly undertaken using an instrument known to be inaccurate and requiring abnormal results to be repeated, and which is justified primarily on the basis of apparently lower short-term costs," they wrote.

Last year, a separate study led by Professor Harding showed that children who had experienced low blood sugar as newborns were two to three times more likely to have difficulties with executive function (skills for problem-solving, planning, memory and attention) and visual-motor co-ordination (skills for fine control of movement, and understanding what you see) at age 4.5 years than children who had normal blood sugar levels. Children who had experienced a drop in blood sugar not picked up by routine blood sugar screening were four times more likely to have difficulties.

"Not only would switching to the enzymatic tests save money, it would improve the care and potentially the health outcomes for these babies," says Professor Harding. "Our study clearly shows the advantages of switching tests, and hospitals should do so as soon as practicably possible."

More information: Matthew J. Glasgow et al. Cost Analysis of Cot-Side Screening Methods for Neonatal Hypoglycaemia, *Neonatology* (2018). DOI: 10.1159/000489080

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