

Survivors of neonatal heart repair surgery face lifelong risk of kidney disease, high blood pressure

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U of A pediatric nephrologist Catherine Morgan with a young patient at the Stollery Children's Hospital. Morgan was involved in two studies indicating that patients who had heart surgery as babies should be monitored for kidney disease and high blood pressure. Credit: Richard Siemens

Babies who have life-saving surgery for congenital heart problems within the first month of life face a lifelong risk of chronic kidney disease and high blood pressure, according to new research led by University of Alberta pediatric specialists.

"We know that kidneys, like all organs, have to last a lifetime," said Catherine Morgan, associate professor and interim divisional director of pediatric nephrology in the U of A's Faculty of Medicine & Dentistry. "Most children who have had [cardiac surgery](#) as neonates will survive and are going to live a long time, so we need to look at what associated [kidney damage](#) during this critical time might mean for them throughout their lives. The numbers were quite significant and worrying, and really important for us in terms of thinking about followup."

The researchers examined 58 six-year-old cardiac surgery survivors at Edmonton's Stollery Children's

Hospital and the Montreal Children's Hospital. Seventeen percent of the children were found to have chronic kidney disease, compared with two percent of the general pediatric population in Canada. Thirty percent of the survivors had high blood pressure, compared with less than one percent overall.

In a second study, the researchers found that only a third of the cardiac survivors had an assessment of their kidney function within the first six years of life.

"Up until now there has been really no data about the long-term impact of acute kidney injury after cardiac surgery as it relates to high blood pressure and chronic kidney disease in childhood," said Andrew Mackie, professor and Stollery Science Lab Distinguished Researcher.

Mackie, a cardiologist with Western Canada's largest pediatric heart program, said 90 percent of children born with a heart defect survive to adulthood.

"This is a huge advance compared to 20 or 30 years ago," Mackie said. "Now the focus in newborns with complex heart disease is less on survival and more on their long-term outcomes."

New tests, better follow-up

Mackie explained that patients of any age can experience acute injury to the kidneys during and after cardiac surgery because the organs are sensitive to blood flow from a bypass machine or a repaired heart that may not yet be fully functional. Some medications can also damage kidneys.

"We know in adults, other pediatric populations and also now in neonates, that if you have acute kidney

injury in hospital, your outcomes are not as good, so the hospital stays are longer, they're ventilated longer, the risk of death is higher," Morgan said. Sara Rodriguez-Lopez et al. Paucity of renal follow-up by school age after neonatal cardiac surgery, *Cardiology in the Young* (2020). DOI: [10.1017/S1047951120001067](https://doi.org/10.1017/S1047951120001067)

Morgan estimated that 40 to 60 percent of neonatal heart surgery patients experience [acute kidney injury](#), but noted it can be hard to detect because the only available test is not considered definitive, especially in infants. The blood creatinine test measures a muscle waste product that can be elevated if the kidneys are not working properly, but measurements can go up for other reasons as well and are highly variable, particularly in babies and in children in intensive care.

Provided by University of Alberta

"We define kidney injury based on just one blood marker, which raises the question of whether that is a good enough way to define it," she said, adding that research is underway around the world to find better biomarkers to test for kidney injury.

Unchecked, chronic [kidney](#) disease and high [blood](#) pressure can lead to more heart problems later in life.

"Being a survivor of a congenital heart defect equates to living with a chronic health condition and requires lifelong followup and screening for late complications, not just of the heart but other organ systems as well, and not only through childhood but into adulthood," said Mackie.

Morgan said the research results, which were funded by the Canadian Institutes of Health Research, should lead to new clinical practice guidelines to ensure neonatal [heart](#) patients are monitored every year or two for [chronic kidney disease](#) and [high blood pressure](#), and given treatment if necessary.

"The real driver for me is about improving the quality of care for these children as they grow into adulthood," she said.

More information: Louis Huynh et al. Follow-up after neonatal heart disease repair: watch out for chronic kidney disease and hypertension!, *Pediatric Nephrology* (2020). DOI: [10.1007/s00467-020-04621-4](https://doi.org/10.1007/s00467-020-04621-4)

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