

# Large Study Identifies Risk Factors in Children with Chronic Kidney Disease

Chronic Kidney Disease (CKD) in children is rare, which makes it difficult to study and leaves major gaps in the quantity and quality of evidence that informs the care of pediatric patients with the condition.

Even the largest prospective studies are limited in their usefulness, as they are constrained by selection bias and relatively small sample sizes for different causes and courses of the disease. In a [new study](#) led by Children's Hospital of Philadelphia (CHOP) and Nemours Children's Health in USA, researchers have overcome the obstacle of scale by analyzing electronic health record data from [PEDSnet](#), a national multicenter pediatric network, to identify a large cohort of children with CKD, evaluate CKD progression, and examine clinical risk factors for kidney function decline. The findings were published in the *Clinical Journal of the American Society of Nephrology*.

## Clinical decision making

"The overarching goal of this project was to demonstrate that real world EHR data can be used to model kidney function decline in children. Chronic kidney disease in children is rare and as such there are few high-quality studies that inform clinical decision making," said Caroline Gluck, MD, physician, Division of Nephrology at Nemours Children's Health, Delaware. "In contrast to prospective cohort studies, this study represents an unbiased sample of the US source population and to our knowledge represents the largest cohort of children with CKD to date."

To better understand factors contributing to the decline in kidney function in patients with CKD, the researchers focused on children from six pediatric health systems in the PEDSnet database who were seen between January 1, 2009, to February 28, 2022. Of more than 7.1 million children, the researchers identified 11,240 (0.157%) with CKD.

They divided the group into subcohorts based on CKD type: glomerular, non-glomerular, and malignancy-associated. CKD progression was determined based on estimated glomerular filtration rate (eGFR), a calculated index of kidney function based on serum creatinine level that determines the stage of kidney disease; the need for long-term dialysis; and the need for a kidney transplant. The researchers found that the following attributes in children with CKD were associated with a more rapid decline in kidney function: disease of glomerular or malignancy-associated origins; high levels of protein in the urine (proteinuria); hypertension; younger age; more advanced CKD; male sex; and greater medical complexity at the start of follow-up care. For example, over an average follow-up time of five years, 40% of patients with glomerular CKD required long-term dialysis or transplant or experienced more than a 50% reduction of eGFR, whereas the same was true of only 13% of patients with non-glomerular CKD.

## Study also included children with cancer

Given the size of the population analyzed in the study – which also included children with cancer, who have a high burden of CKD but have been excluded from or underrepresented in prior studies – the findings can be applied more broadly to the pediatric CKD population.

"Children with the risk factors identified in our study are of particular concern for CKD progression and may be targeted for comparative effectiveness studies to preserve kidney function," said senior author [Michelle Denburg](#), MD, MSCE, a nephrologist at Children's Hospital of Philadelphia and co-director of the CHOP [Pediatric Center of Excellence in Nephrology](#) and of the [Penn-CHOP Kidney Innovation Center](#). "The findings and methods in this study are foundational to future research in children with CKD, including the [PRESERVE study](#) I am co-leading with Dr. Christopher Forrest, Director of PEDSnet, which is leveraging EHR data from 16 pediatric health systems to analyze blood pressure management and preservation of kidney function in pediatric CKD. This study can also serve as a roadmap for use of EHR data networks to adequately power the study of rare disease."

**About Children's Hospital of Philadelphia:** A non-profit, charitable organization, Children's Hospital of Philadelphia was founded in 1855 as the nation's first pediatric hospital. Through its long-standing commitment to providing exceptional patient care, training new generations of pediatric healthcare professionals, and pioneering major research initiatives, the 595-bed hospital has fostered many discoveries that have benefited children worldwide. Its pediatric research program is among the largest in the country.

The institution has a well-established history of providing advanced pediatric care close to home through its [CHOP Care Network](#), which includes more than 50 primary care practices, specialty care and surgical centers, urgent care centers, and community hospital alliances throughout Pennsylvania and New Jersey, as well as a [new inpatient hospital](#) with a dedicated pediatric emergency department in King of Prussia. In addition, its unique family-centered care and public service programs have brought Children's Hospital of Philadelphia recognition as a leading advocate for children and adolescents. For more information, visit <http://www.chop.edu>.

**About Nemours Children's Health**

Nemours Children's Health is one of the nation's largest multistate pediatric health systems, which includes two free-standing children's hospitals and a network of more than 70 primary and specialty care practices. Nemours Children's seeks to transform the health of children by adopting a holistic health model that utilizes innovative, safe, and high-quality care, while also caring for the health of the whole child beyond medicine. Nemours Children's also powers the world's most-visited website for information on the health of children and teens, [Nemours KidsHealth.org](https://www.NemoursKidsHealth.org).

The Nemours Foundation, established through the legacy and philanthropy of Alfred I. duPont, provides pediatric clinical care, research, education, advocacy, and prevention programs to the children, families and communities it serves. For more information, visit [Nemours.org](https://www.Nemours.org).

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