

Pediatric early warning systems save lives in Latin American hospitals

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Pediatric Early Warning Systems (PEWS) are quality improvement tools to help identify clinical deterioration in hospitalized children. Investigators from St. Jude Children's Research Hospital, together with partners across Latin America, have worked to bring PEWS into

hospitals in the region. Their analysis of the multi-institutional program's impact, demonstrating that PEWS saves lives, was published today in *The Lancet Oncology*.

Children who are hospitalized can experience clinical deterioration events, defined as a change in a patient's status that requires a transfer to the [intensive care unit](#) (ICU) or an ICU-level intervention such as mechanical ventilation or cardio-pulmonary resuscitation outside the ICU. PEWS are designed to identify early signs of clinical deterioration in patients.

The system starts with an assessment given at the patient's bedside. The assessment includes a scoring tool to evaluate a patient's neurologic, cardiovascular and respiratory status alongside staff and family concerns. It takes into account vital signs, physical examination findings and treatment requirements.

The score is interpreted with an action algorithm that guides the team through the next steps for that patient, which are adapted to the local context and systems for how care can be escalated for a sick patient. This process is often envisioned as a traffic signal: green for a stable patient, yellow for a patient at risk for deterioration, and red for a patient needing immediate intervention.

"When [children](#) with cancer are in the [hospital](#), they may develop clinical changes, that if not recognized early, can become significantly worse, leading to death," said corresponding author Asya Agulnik, M.D., MPH, St. Jude Department of Global Pediatric Medicine and St. Jude Global Critical Care Program director. "Most hospitals in high-resource settings use some form of PEWS to help identify deterioration, but they are very under-utilized in resource-limited settings."

Through the work of St. Jude Global, Agulnik collaborates with doctors

and nurses in hospitals in Latin America to implement PEWS. Their recent study looked at the impact of PEWS in 32 hospitals in 11 countries showing that the intervention saves lives—often in the hospitals with the greatest need.

"We see this as a real call for the need to scale PEWS globally," Agulnik added. "This intervention should be used in the care of every single child with cancer who is hospitalized."

Tailoring PEWS to the Latin American region

The global burden of pediatric cancer is greatest in low- and middle-income countries, which bear over 90% of cases with survival rates as low as 20%. While timely diagnosis and access to cancer care remain a challenge, up to 50% of deaths are due to the toxicity of cancer-directed therapy.

This is because hospitals in low-resource settings frequently lack adequate infrastructure and staff to provide supportive care, resulting in the late identification of clinical deterioration and high rates of preventable deaths. PEWS is a known tool for monitoring clinical deterioration, but there are barriers to implementation.

"There are lots of reasons why PEWS are underutilized," Agulnik explained. "These include being harder to implement in resource-limited settings, as well as language barriers. But these systems are essential for caring for children with cancer, who experience more frequent deterioration, and are more likely to develop a critical illness, have serious consequences, or die.

"In resource-limited settings, children with cancer have worse outcomes and higher treatment-related mortality, often because the supportive care systems and [hospital](#) systems in place to care for critically ill children are

much less developed. This means PEWS are usually not used in the settings where potentially they're the most needed," Agulnik continued.

Proyecto EVAT was created to address this gap in care. It is a multi-center quality improvement collaborative to improve outcomes for children with cancer who develop critical illness by implementing PEWS among hospitals providing childhood cancer care throughout Latin America. The first group of pediatric oncology centers joined Proyecto EVAT in 2017, and 10–15 centers have enrolled in the program every year since.

It includes a mentored implementation process to support the initial assessments and planning, the adaptation of the tools, and then the piloting and implementation of PEWS. Once complete, the program still includes an assessment of outcomes and an emphasis on clinical sustainability. The group has previously published their work about the feasibility of implementing PEWS in low- and middle-income settings, and the barriers and enablers of implementation as reported by partners on the ground.

However, this is the first time the group is sharing quantitative data about the impact of PEWS implementation on patient mortality across Proyecto EVAT centers.

PEWS saves lives

The researchers compared outcomes from 32 centers that implemented PEWS through Proyecto EVAT between April 2017 and May 2021, examining the clinical deterioration event mortality rate before and after PEWS implementation. The researchers found an 18% reduction in the rate of clinical deterioration event mortality and a reduction in the percentage of events that resulted in mortality.

They found fewer cardiac arrests outside of the ICU, and patients with deterioration were identified and transferred to a higher level of care at a lower severity of illness. Notably, there was no increase in the use of ICU resources after PEWS implementation.

"Across the 32 centers overall, there was a very significant improvement in patient outcomes, but there was a different degree of impact in terms of how much benefit each center saw," Agulnik said. "Some centers saw a more significant benefit than others, so we were able to do an analysis looking at center factors that contributed to the magnitude of the impact of PEWS on deterioration event mortality."

The researchers found that centers that started with higher deterioration mortality saw a greater benefit. Additionally, centers using PEWS more consistently saw more benefits. These results show that the intervention is most effective in the hospitals that potentially need it most and also highlight that the implementation process is vital for success.

PEWS implementation work continues

The St. Jude Global team will continue its work to assist hospitals worldwide with implementing PEWS. The current iterations of the intervention are available in English, Spanish and Portuguese, and the team will continue enrolling hospitals into Proyecto EVAT. The team is also looking to more rapidly scale PEWS implementation in Brazil, as well as exploring how to expand PEWS for countries in the African and Asian regions. This work aims to scale up the implementation process more quickly to help more hospitals adopt the program.

"These are preventable deaths; they don't have to happen," Agulnik said. "We're now pleased to show that it is true that PEWS is an effective intervention to prevent these deaths and an intervention to reduce disparities in childhood cancer outcomes globally. This would not have

been possible without the work of hundreds of people on the ground across different institutions doing this work."

More information: Asya Agulnik et al, Effect of paediatric early warning systems (PEWS) implementation on clinical deterioration event mortality among children with cancer in resource-limited hospitals in Latin America: a prospective, multicentre cohort study, *The Lancet Oncology* (2023). [DOI: 10.1016/S1470-2045\(23\)00285-1](https://doi.org/10.1016/S1470-2045(23)00285-1)

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