Technology & Innovation in Pediatric ICUs: A Resourceful Look at Latin America

SPEAKERS
Maria del Pilar Arias Lopez, Ledys Maria Izquierdo Borrero, Emmanuelle Fernandez Vera, Emmanuel Soriano

Emmanuel Soriano
Hello and welcome to the World Federation of Pediatrics, intensive and Critical Care societies, world PICU Awareness Week 2025, Podcast Series.
I'm Dr Emmanuel Soriano, pediatric intensivists in Mexico City. I'm former president of the Mexican association of pediatric intensive care. I'm honored to host this session on technology and innovation in PICU today.
I'm joined by an incredible panel of experts leading innovation across Latin America, Dr Maria del Pilar Arias Lopez from Argentina, she's PICU specialist at Hospital de Niños. Ricardo Gutierrez SATI-Q coordinator with master degrees in clinical effectiveness and data science.
Dr Ledys Maria Izquierdo Borrero from Colombia, chief in PICU at Hospital Militar Central, professor at Universidad Militar Nueva Granada, and biomedical engineer, MSC
Dr Emmanuelle Fernandez Vera from Mexico. He is Pediatric Intensivist in Acapulco, Mexico, RENEO and PALSinstructor and SLACIP social media coordinator.
It's an honor to share this space with such an experienced group, especially because all of you are active members of the SLACIP Data Science Committee, contributing to the advancement of pediatric critical care through innovation and collaboration across the region.
Welcome everyone!. This week, the World Federation celebrates the vital work of PICUs worldwide. Today, we'll explore how innovation is shaping pediatric critical care, improving outcomes, addressing challenges and transforming how we deliver care. Innovation isn't just about high tech, it's about creative, practical solutions, from AI and telemedicine to smart strategies in low resource settings, every step forward counts.
Let's begin with our first topic : overcoming barriers to innovation
In Latin America, we face real challenges, limited funding, infrastructure gaps, resistance to change, and fragmented systems.
So to kick things off, what are the biggest obstacles to implementing innovation in PiCUs across our region, and how can we overcome them? Let's start a conversation with some specific questions for each of you.
Dr, Ledys , it's a pleasure to start this round with you
When we think about innovation in healthcare, we often imagine futuristic tools and cutting edge technology. But how realistic is that vision in Latin America? Are we actually ready to bring artificial intelligence into our PICUs or are there still invisible barriers holding us back.

Ledys Maria Izquierdo Borrer
Well, hello, the panorama of innovation and artificial intelligence in Latin America is marked by accelerated growth, structural challenges

and unique opportunities. Although the region l is still in early adoption stages comparing to developed countries, there are significant advances that combine an emerging startup ecosystem, public policies and international collaboration. We have critical challenges such as digital infrastructure. There is currently a huge gap in rural connectivity and access to public data in Latin America to the geographical aspects, for instance, relief, and certain ecosystem, logistic barriers to obstruct the infrastructural progress, especially in the case of modern fiber optic technology or communication towers. As a matter of facts, less than, less than 40% of people have access to the internet in rural areas in Latin American countries, according to the Global Innovation Index, 2024. on the other hand, in rural areas conformed by a small population, the private investment is perceived as no attractive and low remunerating comparing to urban sectors, telecommunication prioritize profitable areas, government lack resources to subsidize projects or associate with companies. Investment in innovation and technology is only between 0.3 and 1.2% of PBI comparing to develop countries that close. to 3 and 4%. The procedures are slow for the bureaucracy and auction of frequency that do not prioritize rural access. Finally, professionals tend to search for better opportunities emigrating to the USA or Europe whilst they are needed in Latin American countries, we really have a talent scape.

Few private hospitals already have digital infrastructure, while some medical institutions are starting to invest in this area. For instance, in countries such as Chile, Brazil, Mexico,. Colombia and Argentina, in which the digital infrastructure, based on data guided management, focuses on a transfer approach to diseases, creating clusters that integrate biological, social and environmental factors, as well as connecting medical specialties, support service and prevention programs.

Other critical challenge is the interoperability. While many hospitals have introduced digital tools, clinical systems often remain silos, labs, monitory devices, pharmacy systems and electronic medical records do not communicate with each other. This lack of system integration prevents the use of real time clinical decision support predictive algorithms or even basic data consolidation.

The Panamericana Health Organization has clearly identified interoperability as one the most pressing obstacles to Health System digital transformation in the region . Thanks.

Emmanuel Soriano

Thank you. Dr, Ledys , thank you for sharing this. Dr, Pilar, let's move to you now. We tend to talk about innovation as something purely technological, but could the real barriers be something less visible? What role do culture, clinical habits and even these data play in the success or failure of innovation in our region?

Maria del Pilar Arias Lopez

Well, Manuel, that's a very interesting question. In my opinion, one of the main barriers to implementing innovation in PICU across Latin America is not merely technological, it is cultural. First, we must acknowledge that Latin America is highly heterogeneous in terms of resources, infrastructure and health system organization. What proves effective or scalable in one country or even in one hospital may not be applicable in another .r A solution designed for a high complexity PICU in a urban center may be entirely misaligned with the needs and capacities of a rural or resource limited unit. This heterogeneity also underscores the importance of cultural context and clinical relevance for the adoption of technology. I consider that cultural resistance to change plays a central role. Many healthcare professionals, especially in high stress environments like PICU, rely heavily on experience and established routines. Innovations, whether electronic health records, digital tools, AIe driven alerts or new clinical protocols, can be perceived as disruptive or even risky, particularly when they challenge

long standing medical practices or introduce workflows that appear to increase rather than ease cognitive burden
Without an appropriate adaptation even well designed tools can be perceived as foreign or impractical. Another important challenge in LATAM is data poverty and its consequence that is the risk of bias. Many machine learning models are trained on data from high income countries or populations that do not reflect the demographic, clinical or social characteristics of our region. As a result, these models may underperform on misclassify patients in LATAM, not because the tools are poorly designed, but because our populations were not represented in the training data. This lack of representativeness is a critical source of algorithmic bias. Finally, we must mention the role of digital literacy and the lack of structural training and human building capacity
Innovation requires sustained multidisciplinary education, ideally involved within a broader culture of learning and quality improvement Unfortunately, in many Latin American Picus, this is difficult to achieve due to staffing shortage, high turnover and limited time for continuing education. As you can realize, these barriers are very complex. Overcoming them means investing not only in technology, but in people and processes, ensuring that the innovation is locally relevant, co created and sustainable. In short, I can say that we don't need better artificial intelligence models. We need better healthcare systems. Thank you

Emmanuel Soriano
Thank you. Well, it's very interesting. Dr Emmanuel, let's wrap up this run with your perspective. Technology and AI are moving so fast, it's like we're living a new revolution. But here's the big question, who's setting the rules, and are we Latin America keeping up? How do we make sure that innovation stays ethical, inclusive, and doesn't make existing inequalities even worse?

Emmanuelle Fernandez Vera
Hi everyone. It's a huge honor be with you. This question is fundamental, because we are in a very important moment related to technological progress. There are even people who call this stage the fourth revolution of humanity. Like you said before, we have seen an impressive exponential growth in technologies and data processing capabilities that told us to present and develop regulatory frameworks that allow our fair access to this advances and their benefits and prevail unethical practices related with it. In fact, ethics is an important part of regulatory schemes, for example, the World Health Organization framed the technology advances in 8 regulatory access focus in data transparency with open and shared data, ethical principles and data security, mainly due to the access to sensitive information that may alter or break existing regulation on privacy and protection of personal data, equity and inclusion. This point is very important in our countries, because data collection itself may discriminate populations that have historical risks related to access to health services, differences in technology may increase this disparity. The regulation around the world have two sides: the first one based on vinculatory binding regulation, and, on the other hand, flexible regulation, where the aim is to adjust as required by the progress of technologies Compared with the other parts of the world, Latin America has a delay in terms of the regulatory schemes. This is in part to the challenging socioeconomic condition facing in this part of the world, which includes economic inequalities, limitation in access to technological infrastructure, a lower investment in research and development. A brief summary of this legislation included only law projects in a few countries, for example, Brazil, Argentina, Mexico, Colombia, Peru and Chile. These law projects focus on ethics and research certification of artificial intelligence systems aligning with OCDE regulation, more oriented to flexible regulations like Japan or Canadá

The Santiago declaration adopted during the Forum called "Ethics of artificial Intelligence in Latin America and the Caribbean" in 2023 make emphasis in the need for an ethical and responsible approach to the develop and use of AI, highlighting the importance of aligning these technologies with universal human rights and international norms. The declaration proposed the creation of an intergovernmental Council of artificial intelligence for Latin America and the Caribbean, with the objective of improve governance and collaboration in our area. Thank you for the question.

Emmanuel Soriano
Thank you, Dr Emmanuelle, now that we've looked at the barriers, I'd like us to shift focus and here are some success stories.
We know that innovation doesn't always have to be about cutting edge stage. It can also come from collaboration, adaptation and smart use of available resources.
So for this round, can you share an example of a successful innovation in pediatric intensive care in your country region?, something that made a real impact and could inspire others?
Dr Emmanuel, let's start with you. You've been following the progress of telemedicine very closely. Can you walk us through how do. this has evolved in Latin America, and maybe share some concrete example of how it's helping to close access gaps in pediatric critical care?.

Emmanuelle Fernandez Vera
Yes, thank you. Since the COVID pandemic in previous years, telemedicine began to play a fundamental role in trying to reduce the gaps that exist in remote location or hospitals with a shortage of highly trained personnel in specific pathologies, for example, the lack of pediatric critical care in every hospital in Latin America, access to this care are true in two types, the first one called centralized telemedicine with devices specifically designed for this purpose, and decentralized telemedicine with the use of mobile devices like cell phones or tablets, that allows a greater increase in the adoption of this technology, despite the limited economic resources for the acquisition of the first type. Latin America is a region characterized by a hard work, even with limited resources. As an example of two success telemedicine services in Latin America, we have the Garraham Hospital in Argentina that includes a tele ICU program with a scope in six years of almost 1600 consultation that results in major satisfaction of family members and the resolution of the doubts of the doctor on the site, as well as avoiding transfer to centers of greater complexity, with a decrease In morbidity associated with the transfer of a serious Ill l The telemedicine program of the Navy in Mexico, whose services are used to provide consultation follow all and guidances to treating physicians in places with a lack of specialists in certain areas, With a scope of 380 consultations in the last year, reducing the need for referrals to a high complexity center. Future challenges in this field shall include the resolution of emergencies 24 hours a day, as well as the regulatory framework for tele-consultation. Thank you,

Emmanuel Soriano
Thank you, Dr Emmanuel, where Dr Ledys , now to you. Colombia has shown impressive growth in healthcare and innovation in recent years. Could you highlight some initiatives or partnerships that you feel are truly transforming the way care is delivered in your country.

Ledys Maria Izquierdo Borrer
Well, according to the Sustainable Development ODS nine, the Innovate capacity of Colombia reach 16% comparing to the global index that reaches 55%
However, our starter ecosystem in Colombia has grown 56% since last year. Scientific and technology and technological capabilities have been concentrated primarily in partnership with leaders of public

and private hospital universities. The government proposal with the Health Tech program is transforming the health system, integrating software, hardware and life sciences such as genetic and biotechnology. Bogota and Medellin are the two cities with the greatest geographical participation in the country. The most used technologies are biotech. 38% Internet of Things, 26% artificial intelligence, 20% 3D printing, 20% robotics, 10% nanotech, 2%
2025 promised to be years of grid advance in the development of biopharmas and cell therapy for obesity and cancer. Alliance of public and private institution in Bogotá shows an advance in research such as the one that is currently being carried out between the United districts GMO hemo center with four public hospital of the public Subnetwoork and cancer hospital added to alliance with public and private universities such as Universidad Nacional de Colombia, the Universidad de los Andes and the Universidad de Rosario. Advanced tumor , immunotherapy is being worked on
Another great advance in Colombia is the acquisition made by the Universidad de los Andes of a quantum computer that will help us in scenarios such as drug simulation, large amounts of data processing, which, in principle, will be used for education purposes l. Despite the scope of this innovative technology, the asymmetries within the private sectors are significant and even greater in relation to the public sector. Thank you.

Emmanuel Soriano
Thank you. Dr, Ledys
Dr Pilar, and finally, to wrap up, this round, with your perspective: You've been deeply involved in research and registry networks across the region. Can you share how these collaborative efforts like SATI-Q or LaRed are helping to build evidence and improve outcomes in our local Picus?

Maria del Pilar Arias Lopez
Yes. Manuel, thank you for the question. I think that one of the most impactful and sustainable innovations in PICUs across Latin America has been the creation and expansion of clinical registries and collaborative research networks. As a leading example, I can mention the SATI-Q registry that is sponsored by the Argentine Society of intensive care. Since 2005 this initiative has brought together PICU from both public and private institutions located in different regions of Argentina, and enable them to benchmark performance across centers and monitor outcomes through standardized data collection. Data is recorded by participating units through the static SATI-Q software that is specifically designed to operate with minimal technological requirements. Taking into account that the use of electronic health records is increasing in the country, in recent years, the ICUs can participate also in an interoperable format, sending the data using an electronic data submission document
Beyond surveillance, the registry has evolved into a powerful tool for epidemiological research. Since 2013 the group has produced numerous publications, including the validation of mortality prediction scores such as PIM 2 and PIM3 in Argentina and across Latin America, the prevalence of patients with chronic, complex conditions in PICU, or the prevalence and outcomes of children admitted with sepsis in different regions of the country, among others.
Similarly, regional research collaborations have grown stronger in recent years, networks such as LaRed or collaborations involving PICU in Brazil or ILAS , the Latin America Institute of Sepsis have produced high quality multi center research addressing regional priorities like sepsis, prevalent outcomes of respiratory diseases or trauma. These efforts have helped to generate evidence that is contextually relevant and reflective of realities in the region. As examples, we can mention, for example, the SPREAD LATAM study led by the Latin America Institute of Sepsis that addresses the topic of sepsis prevalence. In my point of view, another milestone has been the inclusion of regional data in the

development of the Phoenix score , enabling the representation of Latin American children in the training of the model.
I think that what makes this innovation successful is not just the technology or the data infrastructure, it's the emphasis on shared learning, local ownership and capacity building
By engaging clinicians directly in data use and research design, these initiatives promote a culture of continuous improvement, foster leadership and strengthen regional identity in the global pediatric critical care community
From my point of view, registry and research networks in LATAM are a powerful example of innovation that is collaborative, sustainable and tailored to local needs.

Emmanuel Soriano
Wow. Thank you. Dr Pilar , all the things that you have said really are very interesting.
Well, today's conversation made something very clear, innovation in PICU isn't just possible in Latin America, it's already happening. Yes, we face challenges, but we also saw inspiring examples of how creativity, collaboration and commitment are transforming care for critical youth, children across the region. Thank you to our panelists and thank you for joining us.
Let's keep pushing for solutions that are ethical, inclusive and truly centered on our patients.
This was the World Federation, world PICU Awareness Week 2025, podcast Until next time, keep innovating. Keep caring. Thank you.