Review

Barriers to Pediatric Emergency Care in Low-Resource Settings: A Narrative Review

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Abstract

Pediatric emergency care in low- and middle-income countries (LMICs) faces critical challenges, leading to preventable morbidity and mortality. Limited resources, inadequate infrastructure, workforce shortages, and socioeconomic disparities strain the healthcare system. This narrative review identifies key barriers, including insufficient healthcare infrastructure, a lack of trained professionals, and restricted access to essential medical supplies and emergency services. Financial constraints, caregiver health literacy gaps, and technological limitations, such as poor EMR systems and limited telemedicine, further hinder care. Geographical barriers delay interventions, especially in rural areas with poor transportation. Weak healthcare policies contribute to fragmented care, necessitating urgent reform. Solutions include strengthening infrastructure, expanding pediatric emergency training, leveraging digital health technologies, and reducing out-of-pocket expenses. Community engagement and caregiver education are crucial for timely access, whereas global collaboration is vital for resource mobilization and sustainable improvements in LMICs' pediatric emergency care.

Keywords

pediatric emergency care, low- and middle-income countries, healthcare infrastructure, socioeconomic barriers, telemedicine, policy reform

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Introduction

Since the early 2000s, global child mortality has significantly decreased, largely due to efforts such as the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), which were established by the United Nations (UN). The MDGs targeted preventable causes of death, such as pneumonia, resulting in a marked decline in the under-five mortality rates. Building on these accomplishments, the SDGs have expanded their focus to encompass non-communicable diseases (NCDs), mental health, and access to quality healthcare worldwide.[1,2] Despite this progress, mortality rates in LMICs remain unacceptably high owing to overwhelmed healthcare systems that face competing demands for limited resources. Pediatric needs are often overshadowed by the prevalence of adult NCDs.[3] Healthcare systems in these regions are restricted by resource limitations, inequitable access to care, and socioeconomic disparities that hinder medical interventions.[4] The reduction in child mortality rates has been especially noticeable in Africa, East Asia, and South Asia, where targeted healthcare efforts and

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improved socioeconomic conditions have produced better outcomes. Increased vaccination rates, improved nutrition, access to clean water, and interventions against infectious diseases such as HIV/AIDS and malaria have significantly contributed to these improvements.[5] However, many LMICs struggle with the high burden of pediatric illness. Critical pediatric conditions, including severe dehydration, sepsis, and respiratory distress, require immediate medical attention; however, timely care is often constrained by limited resources, leading to higher rates of preventable deaths.[6] Children's emergency care is underfunded and often overlooked in LMICs, which leads to preventable deaths from conditions that can be treated with proper emergency care.[7] A study conducted in Pakistan highlighted that children die from injuries and infections due to insufficient treatment, demonstrating the need for better systems to track their health and make targeted improvements.[8] Although some childcare units have been established in many regions, insufficient training for doctors and nurses remains a challenge, and common childhood illnesses are often inadequately treated.[9] Infrastructural deficiencies, including a lack of medical supplies, understaffed facilities, and poor transportation networks, exacerbate these challenges and delay essential care for critically ill children.[10]

Although progress has been made in establishing pediatric intensive care units (PICUs) in LMICs, these efforts have been insufficient. Many healthcare providers remain inadequately trained to manage pediatric emergencies, and there is limited appreciation for the urgent need to treat common pediatric critical illnesses, such as pneumonia and severe malaria.[9] Mortality rates are still high, especially among children under 5, who are more susceptible to acute health issues. Overcoming these challenges requires concerted efforts to develop detailed, situation-specific protocols and to enhance the training of healthcare professionals in managing pediatric emergencies.[11] This review aimed to identify and analyze barriers to pediatric emergency care in LMICs, focusing on healthcare infrastructure, human resource constraints, socioeconomic and cultural obstacles, technological and communication deficiencies, and policy and governance limitations. By highlighting these challenges, this review offers solutions for improving pediatric emergency care, reducing child morbidity and mortality, and guiding future research to improve pediatric health outcomes in LMICs.

Methods

A comprehensive literature search was conducted using PubMed, Scopus, and Google Scholar databases to identify studies exploring barriers to pediatric emergency care in low-resource settings. The search included Medical Subject Headings (MeSH) and relevant keywords like "Pediatric," "Infant," "Child," "Neonatal," "Emergency care providers," "Emergency medical services," "Emergency medicine," "Emergency department," "Low-resource settings," "Resource-limited settings," "Developing country," "Under-resourced areas," and "Barriers," combined using Boolean operators (AND/OR), to ensure a broad yet focused retrieval of relevant literature. Articles types such as original research, systematic reviews, meta-analyses, narrative reviews, perspectives, and gray literatures with no publication year limit, published in English, focusing on pediatric patients receiving emergency medical care, conducted in or focused on low resource settings, and exploring barriers to pediatric emergency care were included, although a preference was given to more recent articles to ensure up-to-date data. Studies were excluded if they did not align with the review's aim, were not published in English, or were categorized as commentaries, letters to the editor or as opinion pieces. The initial database search yielded a total of 712 articles. After removing duplicates and screening, 37 articles were included for the review. The studies included in this review cover a wide range of regions, including low- and middle-income countries like Malawi, Ethiopia, South Africa, Tanzania, South Asia like Thailand and India, and developing countries focusing on barriers to pediatric emergency care in low-resource and resource-limited settings. Two authors (M.M.A and M.H.O) independently extracted the data, and any discrepancies were resolved by discussion with a third author (O.J.O). The findings were narratively synthesized under appropriate headings relevant to the scope of the review.

Results

Healthcare Infrastructure Barriers

Pediatric emergency care in developing countries is a global public health concern that requires urgent attention. In-hospital pediatric mortality rates remain high in low-income countries, with many deaths occurring within the first 24 h of admission.[12] Infrastructure-related barriers include the limited availability of well-equipped emergency departments, inadequate pediatric intensive care units (PICUs), insufficient emergency transport services, and shortages of essential medical supplies, such as oxygen, ventilators, and defibrillators.[12] Furthermore, unreliable electricity and water supply in some hospitals further impairs the ability to provide consistent, emergency care.[13] However, resource

limitations, medical equipment shortages, and poorly maintained healthcare infrastructure continue to hinder the provision of pediatric emergency services in LMICs.[14,15] In many rural areas, healthcare providers face significant logistical challenges owing to long travel distances, inadequate road networks, and a lack of ambulance services, which delay life-saving care for critically ill children.[15] Addressing these challenges requires sustained investment in healthcare infrastructure, supply chain management, and emergency transport systems.

Human Resource Constraints

The scarcity of adequately trained healthcare professionals, particularly pediatricians, emergency medicine specialists, and nurses, significantly affects the provision of pediatric emergency care in LMICs. In sub-Saharan Africa, for instance, a study found only 0.3 physicians and 2.8 nurses per 1000 people, well below WHO's recommended 4.45 health workers per 1000 people.[16] In addition to workforce shortages, inadequate training remains a major barrier to effective emergency pediatric care. A survey in Kenya found that only 11.8% of healthcare workers in emergency departments had received formal pediatric emergency care training.[17] The lack of specialized skills often results in delayed diagnosis and treatment, increasing pediatric morbidity and mortality rates.[18] Moreover, a lack of updated training materials and insufficient adherence to clinical guidelines further hinder healthcare workers' ability to manage pediatric emergencies effectively.[14,15] To address these human resource constraints, task-shifting strategies have been implemented in some LMICs. For example, Malawi has successfully employed non-physician clinicians trained in emergency and trauma care to compensate for workforce shortages.[18] Additionally, telemedicine initiatives in rural India have demonstrated the potential to bridge the gap between remote healthcare providers and pediatric emergency specialists, enabling real-time consultations and improving clinical decision-making.[19] Expanding these models through structured training programs and digital health integration can enhance workforce capacity and improve pediatric emergency care delivery in LMICs.

Socioeconomic and Cultural Barriers

In low-resource settings, financial constraints are significant barriers to accessing pediatric emergency care. The costs of emergency medical services, including consultations, diagnostic tests, and medications are often prohibitively high. For example, a study in Uganda found that out-of-pocket payments for child health services accounted for up to 23.9% of household income.[20] Such high costs often lead to catastrophic health expenditures, which push families further into poverty and debt. Geographical barriers further compound these access challenges, particularly for rural populations.[21] Many LMICs suffer from an uneven distribution of healthcare facilities, with pediatric emergency services being disproportionately concentrated in urban areas.[21] In rural regions, the lack of nearby hospitals and emergency departments means that families must travel long distances, often over poorly maintained roads, to receive care.[22] Studies have shown that in sub-Saharan Africa, the median travel time to a healthcare facility can exceed 5 hours, leading to critical delays in emergency interventions.[23] Additionally, unreliable or absent ambulance services force caregivers to rely on alternative transportation methods, such as motorcycles or walking, which can further delay access to life-saving treatment.[24] Beyond infrastructure limitations, extreme weather conditions such as seasonal flooding in South Asia and droughts in sub-Saharan Africa further restrict movement and hinder access to healthcare facilities.[25] Geographic barriers are particularly detrimental to children requiring urgent care for conditions such as pneumonia, malaria, and neonatal sepsis, where timely intervention is crucial for survival. Expanding emergency transport networks, implementing community-based first-response systems, and integrating mobile health solutions for early triage in remote areas are essential strategies for mitigating the impact of geographical barriers on pediatric emergency care. Additionally, cultural beliefs and practices influence healthcare-seeking behaviors, sometimes delaying or preventing access to emergency care. For example, some caregivers prefer traditional healers to formal healthcare providers, leading to delays in seeking treatment.[26] Gender biases also play a role, as girls often face more barriers to receiving medical care than boys.[27]

Technological and Communication Barriers

Pediatric emergency care in LMICs is further constrained by technological and communication barriers. One of the most critical challenges is the absence of electronic medical records (EMRs). Without EMRs, healthcare providers have difficulty tracking patient histories, monitoring treatments, and ensuring the continuity of care. EMRs have been shown to improve clinical outcomes and patient safety in emergency departments, but their implementation in LMICs is

hindered by limited technological infrastructure and resource constraints.[28,29] Similarly, telemedicine has the potential to address pediatric care gaps, especially in rural areas, but poor technological infrastructure and high costs have slowed its adoption.[30,31] Communication challenges between primary and tertiary care providers further complicate timely patient transfers and coordinated care, contributing to suboptimal outcomes in pediatric emergencies.

Policy and Governance Challenges

Weak health care policies and governance structures exacerbate the challenges faced by pediatric emergency care in LMICs.[32] The absence of national guidelines for managing pediatric emergencies has led to inconsistent care and higher mortality rates. For example, in Uganda, the lack of standardized protocols for treating severe pediatric conditions such as malaria and dehydration has contributed to poor outcomes.[33] Additionally, weak healthcare policies in countries such as Tanzania, combined with limited government support, have worsened pediatric emergency care, particularly in rural regions.[34] Policy reforms are essential for improving pediatric emergency services, and increased government support is crucial for the development of effective healthcare systems.

Community Engagement and Health Education. A critical component of improving pediatric emergency care in low-resource settings is the involvement of local communities in healthcare delivery and the promotion of health education.[35] Empowering families and caregivers to recognize the signs of pediatric emergencies and seek timely medical care can significantly reduce morbidity and mortality rates among children. In many LMICs, socio-cultural beliefs and lack of health literacy often contribute to delays in seeking emergency care, which can result in preventable deaths.[36] Addressing these gaps through community-based health initiatives can help bridge the divide between health care providers and the communities they serve.

Health Literacy and Awareness Campaigns. In many low-resource settings, poor health literacy significantly impedes timely responses to pediatric emergencies. Caregivers may be unaware of the symptoms of critical illnesses in children, such as fever, respiratory distress, dehydration, or lethargy, or they may turn to traditional healers instead of seeking formal medical care.[37] Enhancing health literacy empowers caregivers to recognize early warning signs and seek immediate medical attention when necessary.[37] To achieve this, culturally appropriate community health education programs should be developed and implemented that focus on the identification of pediatric emergencies. These programs can be disseminated through various channels, including local health workers, schools, radio broadcasts, and mobile health apps, thus ensuring broad outreach.[38] Furthermore, involving traditional leaders, religious figures, and other community influencers in these campaigns could enhance their credibility and effectiveness. By leveraging the trust that these local figures command, health education efforts can promote behavioral changes and reduce the cultural stigmas associated with seeking formal medical care.

Strengthening the Role of Community Health Workers. Community Health Workers (CHWs) are pivotal in connecting rural populations with healthcare services, especially in LMICs where they often serve as the first point of contact for families in underserved areas.[39] Their role is crucial in the identification and management of pediatric emergencies. To enhance their effectiveness, it is important to provide CHWs with advanced training that equips them to recognize pediatric emergencies and offers basic first aid or stabilizing care.[39] This training should be tailored to address region-specific diseases such as pneumonia, malaria, and diarrheal illnesses.[39] Moreover, integrating CHWs into formal emergency care networks through established protocols can significantly improve response times and streamlined communication. By guiding families through the referral process and ensuring that they receive timely access to appropriate care, CHWs can play a central role in improving the emergency care outcomes for children in rural areas.

Community-Based Emergency Preparedness. In regions where formal emergency services are either unavailable or difficult to access, community-based emergency preparedness programs play a vital role in safeguarding children's lives.[40] By equipping residents with the skills to respond swiftly during emergencies, these programs enable communities to stabilize patients before they can access formal healthcare services.[40] A key component of this strategy is providing widespread emergency first-aid training, which should include essential skills such as CPR, bleeding control, and shock prevention.[41] These training sessions, ideally conducted in community centers or schools, can be supported by local healthcare workers to ensure comprehensive instruction. Furthermore, the establishment of local emergency response teams comprising trained volunteers can enhance community readiness.[42] These teams can deliver immediate

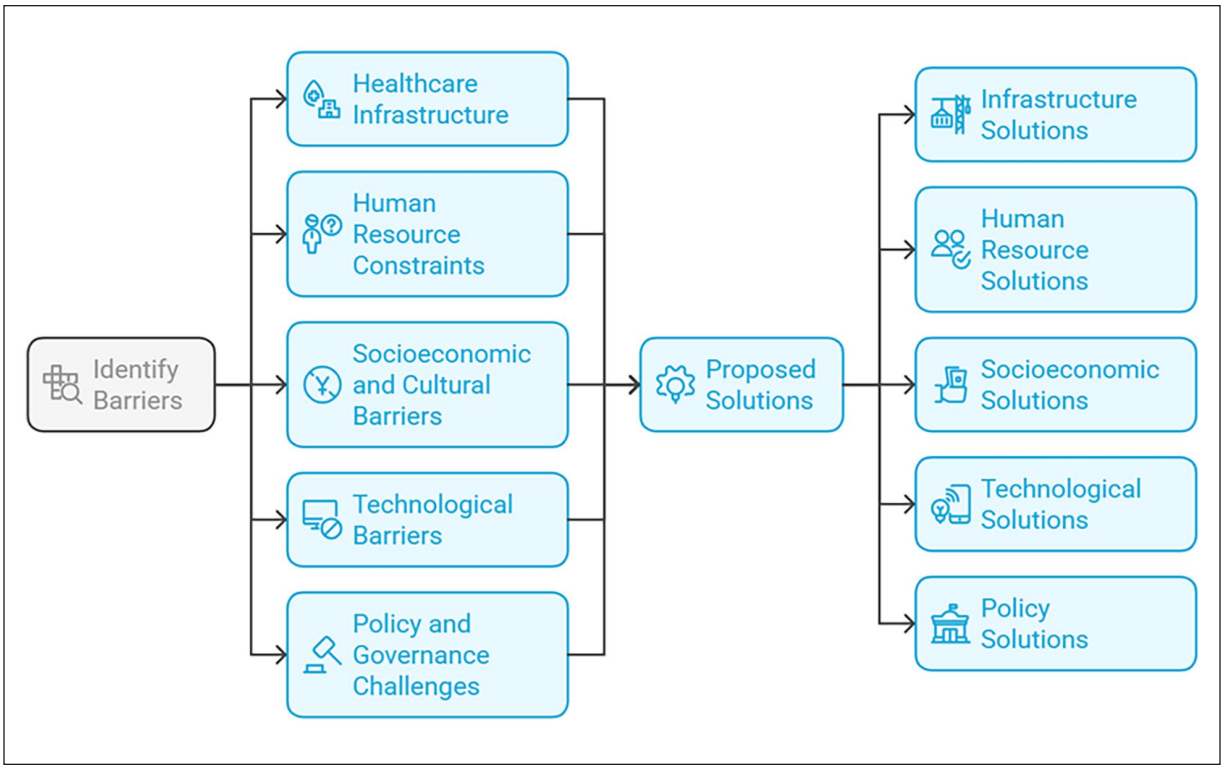

Figure 1. Barriers and solutions in pediatric emergency care.

assistance during emergencies and collaborate with healthcare providers to coordinate timely transport and referrals to critically ill children, ensuring faster access to necessary medical care.

Reducing Barriers to Care-Seeking Behavior. In many LMICs, a combination of socioeconomic challenges, gender biases, and cultural traditions prevent families from seeking timely emergency care.[43] Financial limitations, long distances to healthcare facilities, and cultural norms, particularly those that undervalue medical interventions for female children, contribute to delayed or avoided medical care.[44] To address these issues, it is essential to reduce financial obstacles by implementing government or international initiatives aimed at lowering or eliminating out-of-pocket costs for pediatric emergency services. This could include subsidies for transportation to healthcare facilities and ensure that critical care for children is affordable.[44] Additionally, health education programs must become gender-responsive, addressing biases that influence care-seeking behavior. By involving community leaders and educators, these programs can work toward changing cultural attitudes, ensuring that all children, regardless of gender, have equal access to the necessary medical intervention. A summary of these key barriers and their corresponding solutions is presented in Figure 1.

Discussion and Recommendations

This review highlights the significant barriers to pediatric emergency care in LMICs, particularly in comparison to high-income countries, where pediatric emergency departments are well-equipped and staffed by highly trained healthcare professionals. Pediatric emergency care differs significantly from adult care because of the unique physiological, developmental, and psychological needs of children. Children have different vital sign thresholds, require age-appropriate medical equipment (eg, appropriately sized endotracheal tubes and oxygen masks), and are more vulnerable to rapid deterioration in conditions such as dehydration, sepsis, and respiratory distress.[20,45] Furthermore, pediatric patients often rely on caregivers for decision-making, which introduces additional challenges related to caregiver education and timely healthcare-seeking behaviors. Socioeconomic factors, technological limitations, and poor policy implementation exacerbate these challenges, resulting in delayed and inadequate care for critically ill children

in the country. In LMICs, the high cost of care, combined with cultural preferences for traditional medicine, often leads to delayed or neglected medical intervention.[35] Addressing these issues requires context-specific interventions that explicitly consider the needs of children. For example, task-shifting strategies, such as training non-physician healthcare workers to manage pediatric emergencies, should include child-specific resuscitation protocols and pediatric triage systems.[46,47] Additionally, mobile health initiatives and telemedicine services should be adapted to support pediatric-focused consultations, ensuring that healthcare workers in resource-limited settings can access real-time pediatric expertise.[38] Strengthening prehospital care with pediatric-appropriate transport and emergency stabilization protocols will further improve the outcomes of critically ill children.

Policy reforms are also essential for addressing the healthcare gaps in LMICs. Governments must prioritize pediatric emergency care by developing national guidelines, expanding training programs, and increasing investment in healthcare infrastructure. Innovative financing models, such as performance-based financing, could help alleviate the financial burden on families and healthcare providers.[48,49] Lessons from countries that have successfully implemented universal health coverage schemes can guide such efforts. For example, Thailand's experience with pay-for-performance models demonstrates the importance of tailoring healthcare strategies to local contexts.[50] Global collaboration is crucial for closing the gap between pediatric emergency care in high-resource and low-resource settings. International organizations, governments, and non-governmental organizations (NGOs) must work together to provide technical assistance, share best practices, and mobilize resources for healthcare systems in LMICs.[32] By fostering partnerships and encouraging knowledge transfer, the global health community can significantly improve pediatric emergency care in underserved regions. Specific recommendations for improving pediatric emergency care in LMICs focus on strengthening healthcare infrastructure, expanding healthcare worker training, developing national care guidelines, improving healthcare accessibility, leveraging technology, and fostering global collaboration. First, increasing investment in pediatric emergency units (PEUs) is crucial, particularly in rural areas, where resources are limited. Governments and international organizations must prioritize building and upgrading facilities to ensure access to critical care equipment such as oxygen, ventilators, and resuscitation tools. Additionally, improving prehospital care and transportation infrastructure, including ambulance networks, is vital for timely referrals and rapid response, especially in underserved regions. Strengthening these components of the healthcare infrastructure will significantly improve access to emergency care for critically ill children.

Expanding specialized training programs for healthcare workers is another key recommendation. Healthcare professionals, including nurses, general practitioners, and paramedics, must be equipped with skills to manage pediatric emergencies. Training should emphasize the early recognition of critical illnesses, effective triage, and the use of life-saving interventions. In settings with physician shortages, task-shifting models should be scaled up to train nonphysician clinicians in emergency and trauma care. Furthermore, telemedicine offers an opportunity to bridge the gap between rural healthcare providers and pediatric specialists in urban centers, ensuring that, even in remote areas, children can receive expert care. Developing national pediatric emergency care guidelines is essential to standardize care across LMICs. Countries should prioritize creating evidence-based protocols tailored to local healthcare realities. These guidelines should cover the emergency triage, treatment, and referral processes for common pediatric conditions. Regular updates to these clinical guidelines are necessary to ensure that they reflect the latest research and best practices, particularly in response to emerging health challenges.

To increase accessibility, healthcare systems in LMICs must integrate universal health coverage (UHC) to reduce the financial burden on families seeking pediatric emergency care. Governments should implement health financing mechanisms that reduce out-of-pocket costs for critical services, such as expanded insurance coverage or government subsidies. Alongside financial support, improving health literacy and raising awareness within communities regarding the importance of early care-seeking behavior can further enhance access to timely care. Community-based education programs should be developed to address cultural barriers, such as reliance on traditional healers, which delay access to medical treatment. Technological solutions also play a significant role in improving pediatric emergency care. Expanding the use of EMR systems can enhance the continuity of care, improve diagnosis accuracy, and facilitate data-driven decision-making. EMRs are essential not only for better patient management but also for conducting research that supports pediatric health improvements in LMICs. Telemedicine and mobile health applications offer innovative ways to support triage, referrals, and

education, enabling healthcare providers and communities to better manage pediatric emergencies.

Finally, global collaboration is crucial in advancing pediatric emergency care in low-resource settings. International partnerships between LMIC governments and organizations such as WHO, UNICEF, and various NGOs are essential for capacity building, technical assistance, and resource allocation. Resource mobilization from international donors and the private sector will further support initiatives aimed at strengthening pediatric emergency services. Sustainable funding models are necessary to ensure that improvements in pediatric care are long-lasting and adaptable to changing healthcare needs. By implementing these recommendations, LMICs can address critical gaps in pediatric emergency care and significantly reduce child mortality. Collaboration between national governments, healthcare systems, and the global health community will ensure that children in low-resource settings receive timely, life-saving care regardless of geographical or socioeconomic barriers.

Conclusion

This narrative review highlights the significant barriers to pediatric emergency care in low-resource settings, including inadequate healthcare infrastructure, critical shortages of trained healthcare professionals, financial constraints, cultural beliefs, and geographical limitations of the healthcare system. These challenges contribute to delays in care and high pediatric mortality rates, underscoring the urgent need for targeted interventions. Strengthening healthcare infrastructure, expanding pediatric emergency training programs, integrating telemedicine and electronic medical records, and implementing financial protection mechanisms are essential to improve access and quality of care. Policy reforms, community engagement, and international collaboration are key to developing sustainable solutions that enhance pediatric emergency care and reduce preventable mortality in LMICs.

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Ethical Considerations

Approval from the ethics committee was not required.

Author Contributions

MA conceptualized and designed the study. MMA, MO, OJO, MA, PG, and SMMA conducted the literature review and data curation. MMA and MO wrote the first draft of the manuscript. All the authors critically revised the manuscript for important intellectual content. MA supervised the study. All authors have read and approved the final manuscript.

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Data Availability Statement

Not applicable because no new data or databases were used in the preparation of this work.

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