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Worldwide Study on Pain Management Strategies in Pediatric Critical Care Units

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Abstract

The assessment and treatment of pain stands as an important but difficult task in pediatric intensive care units (PICUs) throughout the entire world. The research evaluates existing healthcare practices while investigating management barriers and techniques between various healthcare facilities operating worldwide. The research team obtained data from PICU facilities in different countries to understand how standardized pain assessment instruments are utilized together with medication strategies and non-medicinal techniques in addition to reviewing pain management protocol adherence. The investigation reveals differences between how pain management is done by healthcare professionals and explains how resource availability affects clinical care and demonstrates proven strategies to get better pain control and comfort results. The research emphasizes the requirement for international pain management protocols together with more widespread training and modified policies to enhance treatment of pain in seriously ill children.

Keywords: ***Pediatric intensive care, pain assessment, pain management, global study, pediatric pain, critical care, analgesia, sedation, non-pharmacological interventions, international multicenter study.***

1.Introduction

Children in Pediatric Intensive Care Unit (PICU) experiences unavoidable pain because their ailments along with treatment procedures cause it. There exists both a medical requirement and an ethical duty and a humanitarian responsibility for effective pain evaluation and management. The correct practice of pain control within pediatric critical care units improves clinical results while reducing mental distress and provides positive benefits to patients and their families. The critical nature of pain evaluation and therapy stands as a universal medical challenge because healthcare organizations maintain dissimilar implementation standards(1). A variety of elements generate the differences in pain management such as institutional rules and provider education levels along with resource supply and pain understanding customs. High Income countries implement organized guidelines and retain pain management experts but LMICs (Low- and Middle-Income Countries) face financial constraints together with weak standardized practices and minimal workforce of trained specialists. Different socioeconomic circumstances require immediate study to discover effective pain management approaches alongside mapping out the obstacles preventing equal pain relief access.

The approach to pediatric pain management practices has developed through different periods of time. The previous practice showed researchers that pediatric patients often experienced unrecognized and disregarded pain because adults at that time poorly measured their capacity to process pain. Modern pediatric palliative care together with advances in medical science has resulted in better recognition of pediatric pain which demands unique individual methods for pain relief. Cicely Saunders founded modern palliative care when she introduced “total pain” which defined suffering as including psychological and emotional alongside social and spiritual aspects alongside physical pain. The complete view of patient care stands crucial for pediatric patients since their experience of pain depends on their cognitive growth as well as their emotional state and their developmental age. The assessment of pain becomes more challenging when young children and infants fail to communicate their suffering verbally which leads to an increased danger of inadequate pain treatment. Multiple variables such as anxiety along with fear and cultural practices and family interactions affect what patients feel when in pain and these elements need analysis for effective pain treatment planning(2).

The World Health Organization declared pain management as a core human right despite facing worldwide difficulties in providing proper pain relief to patients. WHO predicts that 80% of people worldwide experience insufficient pain treatment while LMICs face the highest level of this access gap. The execution of pain treatment plans remains complicated because of rules that restrict access to opioid medication specifically. Multiple nations enforce rigid regulations on opioid prescription to pediatric patients since they want to prevent addiction but these medications provide essential treatment for managing significant pain levels. Healthcare provider education deficiencies and training shortages lead to inadequate pain management since practitioners need more skills to evaluate pain thoroughly while developing suitable treatment methods.

The research investigates pain assessment and management procedures in PICUs across the world by exploring how healthcare resources together with financial elements and institutional guidelines impact patient results. The study implements an international and multicenter observational approach to evaluate present procedures while examining their conformity with the Initiative for Pediatric Palliative Care (IPPC) recommendations(3). Through this analysis the study identifies how different healthcare systems and income levels affect pain management to enhance global policy changes for pediatric pain care.

The study included 34 PICUs belonging to 18 countries that encompassed hospitals from various environments such as urban, suburban and rural locations distributed across high-income, middle-income and low-income countries. The research gathered information though detailed questionnaires which medical professionals implementing pediatric critical care treatment responded during the period from 2016 to 2018. The questionnaires evaluated four main aspects to measure pain management in PICU consisting of assessment frequency along with validation tools and pharmacological treatments and non-pharmacological approaches and pain specialists involved in the team.

This research reveals that income level affects pain management at a significant rate since high-income countries show superior results in pain assessment protocols along with better access to specialized pain care providers and more consistent pain score recording. Low-income PICUs encounter multiple problems that include restricted access to vital medications in addition to unstandardized assessment measures and insufficient training for pediatric pain management staff. The research findings highlight the necessity to launch worldwide healthcare programs which will eliminate unequal pediatric pain treatment while guaranteeing proper pain reduction for all critically unwell children across all locations.

The worldwide assessment along with management of pain remains essential for pediatric intensive care yet links poorly to patient care standards. The improvement of best practices alongside increased awareness has occurred but various difficulties especially in thinly funded healthcare settings continue to persist. This research unites different healthcare system knowledge through specific evaluations of pain practice strengths and weaknesses and makes recommendations for strengthening pain care. The study works to reveal such disparities to help establish pain management protocols which can adapt to different clinical settings for achieving better life quality among critically ill children worldwide.

2. Materials and Methods

The research design involved creating an international multi-center cross-sectional observational study for a comprehensive evaluation of pediatric intensive care unit pain assessment and management worldwide. The research evaluated the efficiency of pain assessment along with management techniques across different healthcare environments by assessing the effect that resource availability and economic conditions alongside healthcare policies have on patient outcomes. The study analyzed PICUs from different economic levels to establish clear global patterns in pediatric pain treatment while recommending specific improvement methods.

Study Design and Participant Selection

The researchers conducted their study through 34 PICUs distributed across eighteen different countries while also including facilities from urban and suburban and rural areas. A thorough identification method determined which centers would participate in the study while guaranteeing coverage from various healthcare facilities. The study team identified institutions by gathering them from medical societies along with the Pediatric Acute Lung Injury and Sepsis Investigators Network and publication database research and professional personal contacts(4). Prior to conducting research PICUs chose independent lead investigators who were responsible for protocol oversight while also ensuring ethical compliance and obtaining compliance from Institutional Review Boards (IRB) for data collection.

The research covered PICUs from low- and lower-middle-income (LIC/LMICs) nations and upper-middle-income nations (UMICs) and high-income nations (HICs) as classified by the World Bank. The research group adopted this

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classification method to evaluate the financial resource consequences on pain assessment tools implementation as well as medication accessibility and specialized pain management teams.

Data Collection Process

The research gathered data through structured questionnaires which were implemented across 2016–2018 to evaluate PICU pain assessment and treatment practices. The surveys were distributed to medical experts who treated patients in PICUs and included intensive care physicians in addition to pediatricians and nursing staff. The standardized data collection system provided consistent results while being operational across multiple hospital settings across different countries(5).

A site coordinator responsible for questionnaire distribution and response quality and answering any participant questions was assigned to each PICU. Internet access granted the participants the opportunity to finish surveys on the safe REDCap system which operates as an encrypted web tool specifically tailored for medical studies. When internet access proved unstable the site coordinator managed response collection via encrypted email to sustain data consistency.

The questionnaire concentrated on essential indicators regarding pain evaluation and therapy practice.

- Pain Assessment Practices – Frequency of pain evaluations, use of validated pain scales, and whether pain levels were documented in patient charts.
- Pain Management Strategies – Types of pharmacological (opioid and non-opioid medications) and non-pharmacological (comfort measures, psychological support, and complementary therapies) treatments used.
- Involvement of Pain Specialists – Availability of pain management experts or palliative care teams in the PICU.
- Institutional Policies and Guidelines – Presence of standardized protocols for pain assessment and treatment, as well as training programs for healthcare providers.
- Influence of Economic and Resource Factors – Relationship between a country's income level and the quality of pain management provided.

The study applied the Initiative for Pediatric Palliative Care (IPPC) curriculum as its framework to assess practice adherence. The internationally recognized model proposes six fundamental quality areas for pediatric palliative care which include effective management of pain and symptoms(6). The evaluation of pain assessment in the research included an examination of these factors:

Medicare professionals assessed pain using structured assessment tools on a regular basis.

Questions about pain received scores which healthcare providers recorded in patients' medical documents.

Pain evaluations included information from patient reports and clinical observations as well as physical signs.

Treatment and evaluation decisions for pain involved consultation with family members.

The proposed pain management strategy included medications together with non-drug pain relief approaches.

The scoring system evaluated these indicators based on three possible responses including "Yes," "No," or "Sometimes." A system was developed to allocate numeric scores for each practice response to evaluate best practice implementation levels. The scoring system allowed each PICU to achieve a composite rating between 0 and 100 which reflected their entire pain assessment and management performance.

Statistical Analysis

- The analysis of data used multilevel generalized linear models (GLMs) operating under Gaussian distribution and controlled for influence from patient age, gender and institutional characteristics. The research employed center-based clustering to reduce the effects of practice variation between different PICUs.
- The research team performed additional statistical methods which evaluated systematic patterns between different income levels to check if pain management indications registered noticeable statistical changes in wealthier nations. The study examined:
- This section evaluates how often medical staff measured patients' pain together with the consistency at which higher-income centers performed these assessments.
- The study evaluated both chart documentation of pain scores as well as their dependence on national income brackets.

- The availability of professional pain specialists stands as a major distinguishing factor between healthcare systems of resource-rich and resource-poor circumstances.
- The research added qualitative approaches to numerical evaluation by performing content analysis and applying grounded theory methods to process free-form healthcare provider input. Research staff used qualitative data to gain insights into challenges that medical professionals faced with effective pain management(7). Research participants from different World Bank income groups sorted their answers into common themes about service training deficits alongside medicine shortages along with regulatory problems and cultural pain perspectives.

Ethical Considerations

The research project operated under a set of ethical standards while obtaining Institutional Review Board (IRB) clearance from each concerned institution. Before participating in the survey healthcare professionals received permission while patients had their data completely stripped of identifying details to guarantee privacy. The study appeared at Clinical Registry Number ISRCTN12556149 while maintaining ethical standards according to Declaration of Helsinki.

Conclusion

Funding through this extensive method enabled researchers to procure detailed multi-angle data regarding the treatment of pediatric pain within various healthcare facilities and economic zones. The research analyzed pain disparities in global care through mixed quantitative and qualitative methods to produce detailed findings about critical care gaps. Policymakers and better training can use this research to guide their work leading to enhanced pain management practices for critical child patients throughout the globe.

3. Results

This international multicenter research has yielded thorough results regarding pain assessment and management approaches within different economic settings in Pediatric Intensive Care Units (PICUs). The analysis of 34 PICUs across 18 countries revealed major differences regarding pain assessment frequency along with practices for documentation and specialist involvement and the presence of established guidelines which depended on the respective country's income level. The research investigated the obstacles healthcare professionals encounter while providing the best pain treatment to critically sick children in patient care units(8).

Overall Achievement of Pain Management Goals

The goal of pain relief displayed an average accomplishment rate of 72.2% (SD: 21.1) among all participating centers which indicated moderate compliance with Initiative for Pediatric Palliative Care (IPPC) recommendations. The research data demonstrated that organizations situated in different income brackets achieved different levels of successful pain control.

- The ratings for pain management in Low- and lower-middle-income countries (LIC/LMICs) averaged at 62.6% (SD: 27.6).
- Integer results from UMICs indicated a slightly better outcome than other nations as their scores reached 70.1% (SD: 20.0).
- Countries with high national incomes demonstrated the best adherence rates as they scored an average of 80.4% with a standard deviation (SD: 13.8) (p-value for trend: 0.03).

Higher financial capability leads countries to deliver better pain relief to critically ill children because they can recruit more pain specialists while providing enhanced educational programs for proper pain assessment tools.

Routine Pain Assessment and Documentation

The assessment of pain during standard procedures proved to be the most influential factor for successful pain management practices. Higher economy nations carried out stronger and more regular pain assessment programs throughout their healthcare systems while lower income settings lacked these practices.

- The assessment of pain as a routine procedure exists in 89.0% of centers (SD: 26.2) within LICs and LMICs.
- The number of centers using routine pain assessments in UMICs exceeded 97.1% with a standard deviation of 13.4.
- The assessment of pain reached 99.4% (SD: 7.6) of patients in high-income countries showing a significant statistical trend (p-value: 0.004).

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The practice of recording pain measurements in medical records demonstrated similar correlations with income level distribution as found in pain assessment procedures.

- LICs/LMICs: 77.0% (SD: 38.5)
- UMICs: 92.5% (SD: 21.3)
- HICs: 94.7% (SD: 17.2) (p-value for trend: 0.02)

High-income settings appear to have better control of documentation standards because it results in better communication between medical teams and faster interventions for pain relief strategies.

Pain Assessment Methods

- The researchers studied which pain evaluation techniques medical professionals used by examining self-reported pain and observed behaviors as well as physiological indicators and family-reported experiences and daily activity impacts. The evaluation focus toward pain showed no perceptible variations among population groups with varying incomes.
- The assessment of expressed pain through self-report reached 83.5% (SD: 36.0) of subjects across all cases.
- The evaluation of observed pain behaviors occurred in 95.4% (SD: 18.7) of all cases.
- The usage of physiological indicators including heart rate blood pressure and oxygen saturation degree was present in 86.1 percent of cases (SD: 33.2).

Family ratings about childrens' pain perception were recorded in 70.8% (standard deviation: 42.0) of medical charts.
The evaluation of daily activity performance in children became part of the assessment process in 46.5% (SD: 48.1) of cases(9).
The basic techniques for assessing pain usually maintain consistency among different population income groups even though practices toward frequency and documentation demonstrate inconsistencies.

Availability of Pain Management Experts

The research established major disparities between high-income nations and other income brackets regarding supporting pain management specialists.
Pain specialists were found at 73.7 percent of PICUs (SD: 42.8) in HICs.
Pain management specialists were present in 57.3% of UMIC facilities according to results with standard deviations of 47.8%.
The availability of pain management specialists differed between different country economic levels: 55.5% (SD: 46.5) of centers in LICs/LMICs had pain specialists but the number declined to only 0.4% (p-value for trend: 0.04).
Lower income countries must suffer from trained pain management doctors' and palliative care specialists' shortages since these specialists do not distribute equally among nations.
Existence of Guidelines and Policies
Standardized pain management policies in pediatric intensive care units existed at different rates across facilities yet failed to demonstrate meaningful differences between institutions by their annual income.

- LICs/LMICs: 33.5% (SD: 69.2)
- UMICs: 69.2% (SD: 44.8)
- HICs: 68.7% (SD: 44.7) (p-value: 0.40)

The data shows that multiple pediatric intensive care units possess established policies yet their execution remains inconsistent especially inside resource-constrained environments.

Frequency of Pain Assessments

External research revealed that pain assessments among patients in high-income countries occurred every one to three hours and every four to eight hours but lower-income nations documented less regular checks.

- Every 1–3 hours: HICs (29%), UMICs (7.5%), LICs/LMICs (21%).
- Every 4–8 hours: HICs (28%), UMICs (19.8%), LICs/LMICs (10%).
- Once or twice per day: HICs (8.8%), UMICs (21.1%), LICs/LMICs (25%).
- Continuous or regular assessment: HICs (9.4%), UMICs (37.4%), LICs/LMICs (18%).

The study demonstrates that most high-income countries execute pain evaluation assessments with increased frequency that benefits early pain detection and improved pain management results(10).

4. Discussion

Disparities in Pain Assessment and Documentation

- Usual practices regarding pediatric pain assessment along with documentation show significant discrepancies between the protocols used by high-income countries (HICs) and low- and lower-middle-income countries (LICs/LMICs). The consistent assessment of pain should become an established standard operating procedure in Pediatric Intensive Care Units because proper assessment enables immediate intervention to bring relief to critically ill children. The study established that pain assessment takes place routinely in 89.0% ofLICs/LMICs facilities although routine assessments happen in 99.4% of all HICs facilities. Patient records of pain levels displayed lower numbers in LICs/LMICs (77.0%) compared to HICs (94.7%). Standardized pain assessment methods and proper medical documentation are essential for preventing under-treatment of pain because their absence leads to increased risks for pediatric patients during both short-term and long-term periods.
- Various elements cause this difference in practice. The availability of institutional pain assessment policies plays a major role in this situation. Different high-income countries implement hospital rules which require nurses to assess pain through validated instruments at regular intervals. Pain assessment consistency is difficult to enforce through official procedures in healthcare institutions of lower-income countries. Healthcare providers in LICs/LMICs fail to deploy pain assessment tools because they experience significant knowledge deficits regarding these tools. Healthcare staff in resource-constrained contexts commonly lack comprehensive training about pain evaluation methods which makes their assessment quality irregular. Several factors that contribute to this situation include the excessive number of patients each medical provider must handle in poverty-stricken areas. The health care workforce challenges stem from inadequate staffing while caring for numerous serious patients because they do not have enough time for regular pain evaluations and proper record documentation.
- The challenge becomes more severe because of technical constraints. Electronic medical records systems found in high-income nations present standardized pain assessment documentation while lowering healthcare errors and keeping patient evaluations connected to standard clinical procedures(11). The healthcare facilities serving lower-income patients retain paper-based record systems that cause insufficient documentation and patients lose vital data while tracking their pain patterns becomes challenging. Inadequate documentation interferes with patient care follow-up because different medical staff cannot access pain trend patterns which impedes their ability to deliver appropriate treatment adjustments. Patient pain assessment without documentation in lower-income countries shows a critical gap requiring standard guidelines supported by healthcare professional training together with investment in medical IT solutions to provide proper pain therapy to children.

Availability of Pain Management Experts

- This investigation reveals significant differences regarding healthcare specialists specializing in pain management treatment that exist between wealth-related setting groups. The provision of expert consultation and training and implementation of multimodal pain relief strategies by pain management experts including pediatric anesthesiologists and palliative care specialists and dedicated pain teams helps to optimize pain treatment of patients. This research discovered that LICs/LMICs established only 55.5% pain management expert availability but HICs reached 73.7%. PICUs face an inability to provide detailed pain treatment to critically ill children because lower-income areas lack sufficient specialists.
- The lack of specialized pain training programs in lower-income regions stands as the main cause behind this difference in care. Medical schools together with residency programs which operate in LICs/LMICs do not deliver established pain management education leaving their medical personnel untrained in pediatric pain treatment methods. Healthcare professionals cannot access pain medicine specialization through available training programs because financial restrictions and logistics issues prevent their participation. Developing nations face substantial professional exodus since their medical specialists prefer to work in wealthy countries to achieve better salaries and improved career prospects and workplace standards. The shortage of experts becomes worse in low-resource areas because PICUs remain without sufficient pain management services.

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- Financial restrictions serve as an important factor that stands in the way of obtaining pain-specializing medical personnel. The financial resources of hospitals determine whether they can establish dedicated pain management teams with heightened likelihood for high-income countries but limited resources exist for lower-income healthcare institutions to recruit staff. General pediatricians along with critical care doctors serving in LICs/LMICs conduct pain management tasks without pain specialist education which results in suboptimal pain relief practices. The deployment of specialized pain management providers remains challenging for these environments because it limits their ability to use advanced pain treatment methods consisting of multiple medication doses with regional anesthesiology and behavioral treatments including therapy.
- To solve this problem governments need to allocate funds for pain management education along with monetary benefits for specialists to remain in practice and collaboration between developed and developing nations to expand information sharing. Virtual learning systems together with telemedicine tools create opportunities for specialist consultations that supplement limited specialist availability. The lack of substantial workforce training combined with limited specialist numbers will make pediatric patients in low-income areas face inconsistent pain management leading to poor health results and elevated levels of untreated pain.

Influence of Economic Factors on Pain Treatment

- The level of economic resources available determines how accessible and plentiful pain treatment options remain in various healthcare centers. The research revealed that developing nations face critical shortages of crucial pain medications with opioid analgesics among them because of stringent regulatory rules and expensive treatment and unpredictable pharmaceutical delivery systems. High-income countries promote unrestricted opioid usage which permits their patients to choose from different prescription medications and non-drug approaches to pain management. The unequal availability of medications leads to inconsistent pain treatment methods because critically ill children from lower-income regions receive inferior or inadequate pain management solutions.
- The main challenge for pain management in LICs/LMICs originates from strict governmental controls on opioid usage because officials fear addiction and misusage occurrences. The legitimate public health concern of opioid abuse should not block medical use in pediatric pain management although some policies become too restrictive. Numerous developing countries have strict import laws and countless paperwork obligations together with legal hurdles which create obstacles to hospital access of vital opioids including morphine and fentanyl. The current limitations force medical staff to treat pediatric patients suffering severe pain with inadequate analgesics that prove insufficient for treating serious conditions including postoperative pain and cancer pain and severe trauma situations.
- The expense of obtaining essential pain medications combined with regulatory issues blocks many lower-income facilities from building sustainable medicine supplies. Some facilities struggle to obtain both basic non-opioid analgesics including paracetamol and ibuprofen because supply chains experience disruptions or financial resources remain inadequate. Hospitals within LICs/LMICs need to dedicate their priority funding to vital life-preserving medical procedures because pain management operates as a secondary concern. Clinicians operating in resource-limited environments must use non-medical methods including distraction therapy along with parent engagement and traditional remedies instead of pharmaceutical pain medication because affordable medications remain unavailable to treat severe or chronic pain conditions effectively.
- The World Health Organization (WHO) together with United Nations Office on Drugs and Crime (UNODC) should help governments through reforms of opioid regulations while creating safe prescribing guidelines. Global programs for financial support and health initiatives need expansion to enhance medication access in areas with limited resources. The execution of healthcare solutions for economic pain management obstacles can help healthcare systems achieve better equalities and effectiveness when treating child pain across the globe.

5.Conclusion and Future work

Critical care practices in pediatric intensive care units (PICUs) need adequate pain management as an essential yet scattered approach to patient care. The assessment and treatment of pain in critically ill children differs substantially worldwide depending on countries' economic levels. Although some regression in awareness and best practice implementation occurred more medical system challenges exist primarily in resource-deprived environments. The research demonstrates how high-income nations (HICs) conduct standardized pain protocols more effectively than low- and lower-middle-income nations (LICs/LMICs) which encounter substantial obstacles regarding standardized pain care. The research data reveal a critical situation that demands quick policy changes along with funding distribution and healthcare training initiatives to provide proper pain relief to all children regardless of their residential location.

The frequency of pain evaluation turned out to be one of the major gaps between different regions in this research. Medical staff in high-income areas evaluated pain symptoms at greater frequency than lower-income areas and kept comprehensive documentation records. The established medical guidelines together with EMR systems and heightened regulatory requirements explain this outcome. Pain evaluations occurred with less frequency while documentation stayed insufficient or completely lacking in settings with lower income. The inconsistent healthcare practices weaken patients' ability to report their pain thereby delaying their care and extending their suffering periods. Research findings indicate that upper-level education for medical staff in areas with limited resources in combination with established pain assessment protocols will help health providers recognize and address pain better.

Research findings reveal the scarcity of pain management specialists as one essential problem in medical care. Data shows HICs maintain 73.7% of pediatric anesthesiologist specialists and palliative care specialists and pain management teams while LICs/LMICs have 55.5% of these professionals present. A lack of specialists exists in resource-limited facilities because training initiatives are inadequate and financial support is insufficient while skilled healthcare workers choose to move to wealthier nations. Children from low-income nations face inadequate pain treatment because their medical caregivers struggle to manage complex pain conditions since they lack specialized knowledge in pain care. Upper-income nations should create financing systems for specialists to stay in low-income areas concurrently with training programs expansion and establishing interprofessional working relationships to resolve the expert shortage.

The scarcity of vital pain medication emerged as a major problem for this area. Medical professionals in lower-income nations encounter opioid analgesic restrictions in their prescription practices which reduces their ability to administer morphine and fentanyl and other potent analgesics. Unintended negative effects from these regulations occur because valid opioid addiction concerns result in children having their serious or chronic pain inadequately managed. The combination of supply chain breakdowns and budgetary constraints stops numerous lower-income hospitals from keeping closing supplies of fundamental pain medication which includes paracetamol and ibuprofen. Successful resolution of these matters depends on implementing policies which maintain opioid standards alongside medical requirements and worldwide health strategies to enhance drug availability in underprivileged regions.

The performance of pain management depends heavily on institutional policies that exist in healthcare organizations. The majority of healthcare institutions in HICs maintain established guidelines yet implementation and strict following of protocols among lower-income sites remains variable. Establishing basic guidelines alone will not lead to successful pain management since hospitals require trained staff and systematic assessment to maintain consistent delivery of proven best practices. Medical institutions serving LICs/LMICs should establish multidisciplinary staff teams who master cost-effective pain management solutions incorporating both drug-based along with non-drug approaches.

Multiple important strategies exist which will help combat worldwide disparities in treating pediatric pain. Priority status in healthcare rights issues must be achieved by World Health Organization (WHO) and other global organizations for pediatric pain relief. Rapid growth of funding programs targeting healthcare training along with medication access enhancement and institutional policy implementation should occur. Rationalizing opioid regulatory systems is essential for governments to let children with severe pain obtain their needed pain medicine through streamlined bureaucratic processes. The access to telemedicine and electronic medical records should be maximized to enhance both pain documentations and specialist consultations in limited-resource areas. High-income and lower-income countries establishing global partnerships can distribute valuable knowledge combined with resources and advanced expertise which will improve universal standards of pain management.

This study shows how pediatric pain management requires an entirely new approach which includes global inclusivity right now. The leading countries making progress in standardized pain evaluation and specialist healthcare

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involvement and medication availability have not achieved similar levels of improvement throughout many parts of the world. Children within lower-income environments will face unnecessary pain unless targeted interventions along with educational development and funding resources become implemented. Beyond being a call to action this research evidence should force policymakers as well as healthcare providers and international organizations to work together on resolving healthcare inequities by securing optimal pain relief for all children across critical care units irrespective of their economic level.

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Conflicts of interest

The authors have no conflicts of interest to declare

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