SPMC JHCS

SOUTHERN PHILIPPINES MEDICAL CENTER

Journal of Health Care Services

Volume 11 Issue 1 • June 2025

11

SPMC JHCS

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SOUTHERN PHILIPPINES MEDICAL CENTER

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Davao City 8000,
Philippines
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The overall quality of this journal greatly relies on the comments and recommendations of peer reviewers. We would like to acknowledge the following peer reviewers for their invaluable contribution in the article selection process for this issue of the ***SPMC Journal of Health Care Services***.

Nadra S Magtulis
Marievien Barett
Hannah Segocio
Rica Marie B Andico
and the peer reviewers who wish to remain anonymous

Many thanks for your participation!

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EDITORIAL

The case for a national health care pricing authority

Alvin S Concha[1]

What kind of 'healing' is possible when, after a hard fall and a three-hour emergency room visit for stitches and a brain injury check, you wake up grateful—only to be hit with a hospital bill covering diagnostics, pain medication, and a brief stay equal to two months of the average salary in the Philippines, plus professional fees that nearly double the total? Health care in the Philippines is becoming increasingly unaffordable. Medical inflation in the country soared to 19.3% in 2024, driven by rising hospital charges, physician fees, costly diagnostics, and expensive treatments.[1] Without a central body regulating health care pricing, hospitals and medical professionals are free to set prices arbitrarily, leading to significant cost disparities and placing a heavy burden on patients. Many patients delay or forgo treatment due to unaffordable health care,[2] often resulting in worsened health conditions and even greater financial strain in the long run. This financial strain underscores the urgent need to fulfill the promise of equitable health care access envisioned in national policy—one that remains unattainable without price regulation.

The Universal Health Care Act of 2019[3] aimed to ensure equitable access to affordable health care for all Filipinos. However, gaps in implementation remain. PhilHealth benefit packages often fall short of covering actual expenses,[4] forcing patients to pay out-of-pocket for essential treatments. PhilHealth case rates are outdated,[5] and programs like the Konsulta Package face implementation challenges.[6] Unlike regulated utilities and essential goods, health care pricing lacks standardization. The cost of the same procedure varies widely by hospital, and physician fees fluctuate unpredictably based on location and hospital affiliation.[7] Patients rarely know the full cost of treatment until it is too late, leaving them trapped in debt or forced to postpone necessary care. In a system where pricing is inconsistent and largely unchecked, affordability remains elusive. As a result, Filipinos continue to experience financial distress when seeking care, revealing significant gaps in the promise of the Universal Health Care Act.

To tackle these challenges, the establishment of a national health care pricing authority is essential.[8] This body should regulate hospital and medical professional fees, standardize the costs of diagnostics and treatment, monitor compliance, and prevent arbitrary price hikes. Health care rates should be determined through a transparent and inclusive process, involving medical and allied health professionals, hospitals, medical societies, insurers, and patient advocacy groups. These rates must be regularly reviewed and adjusted to reflect market dynamics and medical advancements, while maintaining affordability and sustainability. Once set, they should be strictly enforced to maintain consistency and protect patients from excessive costs.

Several countries have successfully implemented pricing regulations, offering valuable lessons in controlling health care costs.[9] Australia's Independent Health and Aged Care Pricing Authority regulates public hospital service costs,[10] while Japan relies on a national fee schedule reviewed by its Ministry of Health.[11] Similarly, Thailand's National Health Security Board, Malaysia's Ministry of Health,[9] as well as independent agencies in France and Germany,[9] oversee pricing structures to ensure affordability and consistency in medical services.

Oversight mechanisms must be robust and effective, leveraging health information systems and data analytics to monitor billing records and claims for signs of overcharging. Following inspections by the designated authority, improper charges must be refunded, and excessive fees adjusted to ensure fairness.[8] Transparency is crucial. Health care providers—including hospitals, clinics, physicians, diagnostic centers, and pharmacies—must publicly disclose their service rates to empower patients to make informed decisions

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Received
11 May 2025

Accepted
27 June 2025

Published online
27 June 2025

Cite as
Concha AS. The case for a national health care pricing authority. *SPMC J Health Care Serv.* 2025;11(1):6. https://n2t.net/ark:/76951/jhcs7m29fc.

about their care.

Fair pricing should also incentivize ethical practice, with financial rewards for physicians who adhere to regulated rates.[8] This balances cost control with professional autonomy. Additionally, value-based purchasing models—paying hospitals for performance, bundling payments for entire episodes of care, and adopting capitation models with built-in quality benchmarks—should be introduced to reward quality and efficiency.

While price regulation offers significant benefits, concerns remain about its impact on health care providers and implementation feasibility. Price controls may reduce incentives for providers to invest in new technologies, enhance services, or continue offering certain treatments. The extensive oversight and high administrative costs—requiring investments in health information systems and trained personnel, among others—can also discourage governments from pursuing regulation.[8] Effective price setting must strike a balance between affordability and maintaining service quality.

Complementary reforms are equally vital. Strengthening primary and community care can play a crucial role in keeping people healthy and reducing reliance on costly hospital services. Empowering barangay health workers and local health units to provide preventive services and early interventions will keep patients from reaching critical conditions that require expensive treatments. Targeted subsidies and expanded funding for Malasakit Centers and the Medical Assistance for Indigent and Financially Incapacitated Patients can further protect the poor from catastrophic spending.

Without systemic oversight, the burden of rising medical costs will continue to fall on patients. Health policymakers must take decisive steps to ensure health care costs are reasonable, predictable, and accessible. Thoughtful, evidence-based regulation can provide stability while safeguarding both patients and providers in a sustainable health care system.

Article source
Submitted

Peer review
Internal

Competing interests
None declared

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RESEARCH

Accuracy of the Brighton Pediatric Early Warning Score in detecting clinical deterioration events among pediatric patients: retrospective cohort study

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Received
13 March 2024

Accepted
17 June 2025

Published online
30 June 2025

Cite as
Godin G, Cansino-Valeroso MA, Dadia DM. Accuracy of the Brighton Pediatric Early Warning Score in detecting clinical deterioration events among pediatric patients: retrospective cohort study. *SPMC J Health Care Serv.* 2025;11(1):8. https://n2t.net/ark:/76951/jhcs4aw6a9

ABSTRACT

Background. Pediatric Early Warning Scores (PEWS) help identify children at risk of clinical deterioration, but their accuracy across diverse settings, populations, interventions, and outcomes remains unexplored.

Objective. To determine the accuracy of PEWS in detecting clinical deterioration events (CDE) among pediatric patients seen at the emergency department (ED).

Design. Retrospective cohort study.

Participants. Pediatric patients aged 1 month to 18 years seen at the ED.

Setting. Southern Philippines Medical Center Emergency Department, Davao City, Philippines from January 2021 to December 2022.

Main outcome measures. Area under the curve (AUC) of PEWS in detecting CDE; Brighton PEWS optimal cut-off and its sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (+LR), and negative likelihood ratio (-LR).

Main results. Among the 345 patients, 56 experienced CDE and 289 did not. Patients with CDE had significantly lower median age (1.00 year vs 5.00 years; p<0.001), oxygen saturation (93.00% vs 98.00%; p<0.001), and pediatric Glasgow Coma Scale scores (8.00 vs 15.00; p<0.0001) compared to those without CDE. Heart rate (135.00 vs 111.00 beats per minute; p<0.001), and respiratory rate (32.50 vs 24.00 breaths per minute; p<0.001) were significantly higher in patients with CDE. The two groups also differed significantly in terms of comorbidity distribution (p<0.001) and diagnosis (p<0.001). The AUC of Brighton PEWS was 0.9064 (95% CI 0.8716 to 0.9357), with an optimal cut-off score of ≥4.00. This threshold yielded 76.79% sensitivity, 88.58% specificity, 56.60% PPV, 95.20% NPV, 6.72 LR+, and 0.26 LR-.

Conclusion. The Brighton PEWS demonstrates strong diagnostic accuracy in predicting CDE among pediatric patients. A cut-off score of ≥4.00 offers a balanced combination of sensitivity, specificity, and likelihood ratios for ED application.

Keywords. emergency department, trigger system, resuscitation, mortality

INTRODUCTION

Early identification of pediatric patients at risk of clinical deterioration in the emergency department (ED) setting is crucial in improving clinical outcomes. Recognizing early warning signs and implementing timely interventions may help prevent serious complications and optimize survival and recovery.[1-3] Pediatric patients who experience clinical deterioration events (CDE) have been shown to have a higher risk of mortality.[4 5] In response to the need to identify high-risk patients, various Pediatric Early Warning Scores (PEWS) have been developed.[1]

PEWS have been adopted by many hospitals worldwide to predict clinical deterioration and guide decisions regarding escalation of care.[3 4 6] These systems are clinical assessment tools that use vital signs along with patient signs and symptoms to effectively detect clinical deterioration.[5 7 8] In the ED setting, PEWS complement existing triage systems by helping to prioritize patients and potentially predict the need for admission to a pediatric intensive care unit

IN ESSENCE

The Pediatric Early Warning Scores (PEWS) were developed to identify children at risk of clinical deterioration.

In this retrospective study, the Brighton PEWS demonstrated an area under the curve of 0.9064 (95% CI: 0.8716–0.9357). The optimal cut-off score (≥4.00) yielded 76.79% sensitivity, 88.58% specificity, 56.60% positive predictive value, 95.20% negative predictive value, 6.72 positive likelihood ratio, and 0.26 negative likelihood ratio.

The Brighton PEWS has strong accuracy in predicting clinical deterioration events in pediatric patients.

(PICU) or other specialized units.[9 10]

The PEWS developed by Monaghan et al. in 2005 at the Royal Alexandra Hospital for Sick Children, Brighton, is one such scoring system designed for pediatric acute care settings. It evaluates three components —behavior, cardiovascular status, and respiratory status—each scored from 0 to 3, with a total of 9 points. A high score indicates poor clinical status,[8 11] which correlates with adverse outcomes among pediatric patients.[12 13]

The effectiveness of PEWS in enhancing patient outcomes depends on various factors, including the specific setting, study population, specific interventions, and outcome measures used.[6] We conducted this study to determine the optimal cut-off point of the Brighton PEWS for predicting CDE among pediatric patients seen in the SPMC ED, and to determine the sensitivity, specificity, and positive and negative likelihood ratios of this threshold.

METHODOLOGY

Setting

We conducted a retrospective cohort study among pediatric patients who presented to the Emergency Department (ED) of the Southern Philippines Medical Center (SPMC) between January 2021 and December 2022. The SPMC ED accommodates approximately 5,000 pediatric patients annually.

Participants

We included pediatric patients aged 1 month to 18 years who were seen at the SPMC ED. We excluded those who required cardiopulmonary resuscitation, emergency cardiovascular care, any form of positive pressure ventilation or withdrawal of mechanical respiratory support, or administration of inotropic or vasoactive medications from another institution. We also excluded patients if they were transferred to another institution's intensive care facility, discharged from the ED within 24 hours, or pregnant.

To determine the minimum sample size for this study, we assumed a specificity of 91% for PEWS ≥3 in predicting ICU admission.[14] Using a sample size calculation for diagnostic accuracy studies—with a 5% allowable difference in specificity, a significance level of 5%, and a power of 80% —the minimum required sample size was determined to be 313.

Data collection

We reviewed the medical records of eligible patients and collected demographic data (age and sex) and clinical variables, including weight-for-age Z-scores and the presence of comorbidities (cardiovascular, metabolic, neurologic, renal, respiratory, congenital, COVID-19, and others). We extracted physiologic parameters—mean arterial pressure (MAP), heart rate, body temperature, respiratory rate, oxygen saturation, and pediatric Glasgow Coma Scale (pGCS)—as well as primary diagnosis, which included pediatric community acquired pneumonia, dengue fever, acute gastroenteritis, neonatal sepsis, febrile convulsions, meningitis, bronchial asthma in acute exacerbation, oncologic illness, COVID-19, and others. Brighton PEWS values were computed based on the patient chart upon arrival at the ED. The primary outcome was the occurrence of CDE, defined as any of the following: intubation to secure the airway and provide positive pressure ventilation (manual or mechanical), administration of inotropic medications (for cardiovascular support or as part of resuscitation), cardiopulmonary resuscitation, and/or mortality.

Statistical analysis

Categorical variables were summarized as frequencies and percentages. Proportions were compared using the Chi-square test or Fisher's exact test, as appropriate. Normality of continuous variables was assessed using the Shapiro-Wilk test. Since all continuous variables were non-normally distributed, we reported medians and interquartile ranges (IQR) and used the rank-sum test for comparisons. A two-tailed p-value <0.05 was considered statistically significant. The predictive ability of the Brighton PEWS for CDE was evaluated using the receiver operator characteristic (ROC) curve, with computation of the area under the curve (AUC). The optimal Brighton PEWS cut-off point was identified using the Youden index. We also calculated the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (LR+) and negative likelihood ratio (LR-) for the optimal cut-off. All statistical analyses were performed using STATA/BE 17.0.

RESULTS

We included the records of 345 pediatric

Table 1 Demographic and clinical profile of pediatric patients with versus without clinical deterioration events (CDE).

Characteristics	n	Without CDE	n	With CDE	p-value
Median age (IQR), *years*	289	5.00 (1.00 to 12.00)	56	1.00 (0.08 to 10.50)	<0.001*†
Sex, *frequency (%)*	289		56		0.254
Male		162 (56.06)		36 (64.29)	
Female		127 (43.94)		20 (35.71)	
Z-score, *frequency (%)*	289		56		0.110‡
-3		43 (14.88)		14 (25.00)	
-2		39 (13.49)		6 (10.71)	
-1		96 (33.22)		22 (39.29)	
0		27 (9.34)		1 (1.79)	
1		66 (22.84)		8 (14.29)	
2		8 (2.77)		3 (5.36)	
3		10 (3.46)		2 (3.57)	
Comorbidities, *frequency (%)*	289		56		<0.001*
None		158 (54.67)		18 (32.14)	
Cardiovascular disease		7 (2.42)		3 (5.36)	
Metabolic disease		5 (1.73)		6 (10.71)	
Neurologic disease		14 (4.84)		4 (7.14)	
Renal disease		25 (8.65)		15 (26.79)	
Respiratory disease		42 (14.53)		7 (12.50)	
Congenital disease		8 (2.77)		0 (0.00)	
COVID-19 infections		21 (7.27)		3 (5.36)	
Others		9 (3.11)		0 (0.00)	
Median mean arterial pressure (IQR)	200	70.00 (70.00 to 80.00)	24	70.00 (70.00 to 87.00)	0.879†
Median heart rate (IQR), *BPM*	288	117.00 (101.00 to 133.50)	56	135.00 (111.00 to 158.00)	<0.001*†
Median temperature (IQR), *°C*	289	36.80 (36.60 to 37.20)	56	36.60 (36.25 to 37.10)	0.065†
Median respiratory rate (IQR), *bpm*	289	24.00 (22.00 to 30.00)	56	32.50 (28.00 to 46.00)	<0.001*†
Median oxygen saturation (IQR), *%*	289	98.00 (97.00 to 99.00)	56	93.00 (89.00 to 97.00)	<0.001*†
Median pGCS (IQR)	289	15.00 (15.00 to 15.00)	56	8.00 (6.00 to 13.00)	<0.001*†
Diagnosis, *frequency (%)*	289		56		<0.001*
Pediatric community acquired pneumonia		41 (14.19)		19 (33.93)	
Dengue fever		53 (18.34)		0 (0.00)	
Acute gastroenteritis		45 (15.57)		7 (12.50)	
Neonatal sepsis		31 (10.73)		11 (19.64)	
Febrile convulsions		14 (4.84)		1 (1.79)	
Meningitis		3 (1.04)		10 (17.86)	
Bronchial asthma in acute exacerbation		6 (2.08)		0 (0.00)	
Oncologic illness		40 (13.84)		6 (10.71)	
COVID-19		20 (6.92)		0 (0.00)	
Others		36 (12.46)		2 (3.57)	
Median Brighton PEWS (IQR)	289	2.00 (1.00 to 3.00)	56	6.00 (4.00 to 7.00)	<0.001*†

IQR=interquartile range; BPM=beats per minute; bpm=breaths per minute; pGCS=pediatric Glasgow Coma Scale; PEWS=pediatric early warning score
*Significant at p<0.05
†Rank sum test
‡Fisher's exact

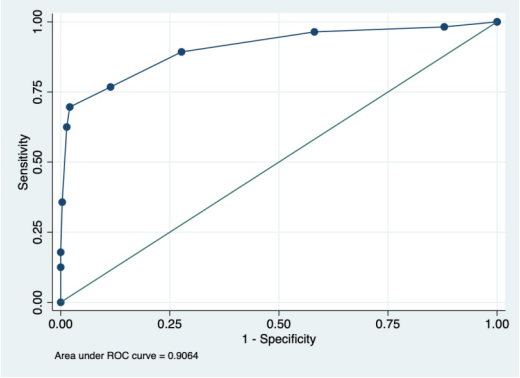

Figure 1 Receiver operator characteristic (ROC) curve of the Brighton Pediatric Early Warning Score (PEWS) in detecting clinical deterioration events (CDE).

Table 2 Optimal cut-off point and accuracy of the Brighton PEWS in detecting CDE.

Characteristics	Values
Optimal cut-off point	4.00*
Sensitivity	76.79%
Specificity	88.58%
Positive predictive value	56.60%
Negative predictive value	95.20%
Positive likelihood ratio	6.72
Negative likelihood ratio	0.26

*Youden index

patients in this study. Table 1 shows a comparison of the demographic and clinical profiles of patients who experienced CDE versus those who did not. The median age of patients with CDE was significantly lower (1.00 year; IQR: 0.08 to 10.50) compared to those without CDE (5.00; IQR: 1.00 to 12.00; p<0.001). Heart rate (135.00 BPM; IQR: 111.00 to 158.00 vs 117.00 BPM; IQR: 101.00 to 133.50; p<0.001), respiratory rate (32.50 bpm; IQR: 28.00 to 46.00 vs 24.00 bpm; IQR: 22.00 to 30.00; p<0.001), and Brighton PEWS (6.00; IQR: 4.00 to 7.00 vs 2.00; IQR: 1.00 to 3.00; p<0.001) were significantly higher among patients with CDE. In contrast, oxygen saturation (93.00%; IQR: 89.00 to 97.00] vs 98.00%; IQR: 97.00 to 99.00; p<0.001) and pGCS (8.00; IQR: 6.00 to 13.00 vs 15.00; IQR: 15.00 to 15.00; p<0.001) were significantly lower. The two groups also differed significantly in terms of the comorbidity distribution (p<0.001) and diagnosis (p<0.001).

The performance of the Brighton PEWS in detecting CDE among pediatric patients seen at the ED was evaluated using the ROC curve (Figure 1). The AUC for Brighton PEWS was 0.9064 (95% CI 0.8716 to 0.9357). The computed optimal cut-off and corresponding diagnostic accuracy are presented in Table 2. Based on the Youden index, the optimal cut-off value was identified as 4.00. A Brighton PEWS score of ≥4.00 has a sensitivity of 76.79%, specificity of 88.58%, PPV of 56.60%, NPV of 95.2%, LR+ of 6.72, and LR- of 0.26.

DISCUSSION

Key results

We evaluated the performance of the Brighton PEWS in detecting CDE among pediatric patients seen at the ED using a ROC curve. The AUC forPEWS was 0.9064, and the optimal cut-off for PEWS was identified as 4.00. A PEWS score of ≥4.00 yielded a sensitivity of 76.79%, specificity of 88.58%, LR+ of 6.72, and LR- of 0.26.

Strengths and limitations

This study demonstrated the diagnostic accuracy of Brighton PEWS in identifying pediatric patients at risk of CDE. However, neonates (0 to 30 days old) were not included in this study. Additionally, given the retrospective design, we could not ascertain consistency in PEWS scoring across different health care personnel. Temporal changes in Brighton PEWS during a patient's ED stay were also not captured, which may have affected classification accuracy.

Interpretation

The purpose of PEWS is to facilitate early detection of patients at risk of developing poor clinical outcomes and ensure timely intervention.[3 8] The Brighton PEWS evaluates three components—behavior, cardiovascular status, and respiratory status—offering a simple, structured approach to assessment.[8] Elevated PEWS values have been consistently associated with a range of clinical deterioration events.[12 14-18] This is likely because PEWS incorporates physiologic parameters that correlate with poorer clinical outcomes.[19-21] In this study, baseline differences in comorbidities, heart rate, respiratory rate, oxygen saturation, pGCS, and diagnoses were significant between groups. These variables are recognized markers of clinical severity,[19-21] and are routinely used to identify patients at risk of clinical deterioration.[22]

In this study, using a cut-off of ≥4.00, we found a balanced trade-off between sensitivity and specificity in predicting CDE. Similar studies showed that among pediatric patients, a Brighton PEWS cut-off of 4.00 was optimal for detecting the outcome 'major intervention required,' a cut-off of 2.00 is optimal in detecting ICU admission, and a cut-off of 5.00 demonstrated good accuracy in detecting mortality.[12 15]

While PEWS serves as a valuable tool for early recognition of clinical deterioration in children,[23] it is essential that its cut-off scores are rigorously validated for the population in which they are applied. Improper implementation may lead to misclassification—either underestimating severity, which delays care, or overestimating it, which can lead to unnecessary interventions and resource strain. Careful validation and context-appropriate use of PEWS are critical to maximizing its clinical benefit.[24]

Generalizability

The findings of this study are applicable to the majority of pediatric patients seen at the ED and may be used in triaging patients at risk for CDE. However, results may not be generalizable to neonates (aged 0 to 30 days), as they were excluded from the analysis.

CONCLUSION

In this study, we found that the Brighton PEWS demonstrated excellent discriminatory ability in detecting CDE among pediatric patients, with an AUC of 0.9064. The optimal cut-off, identified using Youden index, was 4.00, yielding a sensitivity of 76.79%, specificity of 88.58%, PPV of 56.60, NPV of 95.20%, LR+ of 6.72, and LR- of 0.26.

Contributors

GG, MACV, and DMD had substantial contributions to the study design, and to the acquisition, analysis and interpretation of data. GG wrote the original draft and subsequent revisions. All authors reviewed, edited, and approved the final version of the manuscript. All authors agreed to be accountable for all aspects of the work.

Ethics approval

This study was reviewed and approved by the Davao Center for Health Development Joint Research Ethics Committee JREC-202384.

Reporting guideline used

STROBE Checklist (http://www.strobestatement.org/fileadmin/Strobe/uploads/checklists/STROBE_checklist_v4_combined.pdf)

Article source

Submitted

Peer review

External

Funding

Supported by personal funds of the authors

Competing interests

None declared

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SPMC JHCS

BRIEF REPORT

Clinical profile of pediatric patients with COVID-19 admitted to Southern Philippines Medical Center before vaccine rollout

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Received
28 February 2024

Accepted
13 March 2025

Published online
16 April 2025

Cite as
Andico RMB, Bangayan AB, Lobo JJ. Clinical profile of pediatric patients with COVID-19 admitted to Southern Philippines Medical Center before vaccine rollout. *SPMC J Health Care Serv.* 2025;11(1):2. https://n2t.net/ark:/76951/jhcs8kwt35

Prior to the availability of COVID-19 vaccines, global reports indicated that children accounted for a small percentage of confirmed cases,[1] with lower rates of severe illness and better prognosis compared to adults.[1] Several theories have been proposed to explain these differences, including the underdeveloped angiotensin-converting enzyme 2 (ACE2) receptors in children, created competition with other viral infections, and a more active immune response.[2] However, pediatric patients still presented a range of clinical manifestations, with fever and cough being the most common symptoms.

During the peak of the COVID-19 pandemic, the Southern Philippines Medical Center (SPMC) served as the primary referral hospital for patients with COVID-19 in Davao City. In 2020, SPMC had admitted about 5,050 COVID-19 cases. Despite this, a comprehensive profile of pediatric patients diagnosed with COVID-19 remains lacking. Understanding their demographic and clinical characteristics is essential, given the unique physiological and immunological factors influencing disease susceptibility and severity in children.

This study aims to describe the demographic and clinical profile of pediatric patients admitted to SPMC for COVID-19 infection prior to the introduction of COVID-19 vaccines, providing baseline data for future comparisons in the post-vaccination era.

We did a descriptive research among pediatric patients with confirmed COVID-19 infection based on reverse transcription polymerase chain reaction (RT-PCR) testing who were subsequently admitted to the Department of Pediatrics in Southern Philippines Medical Center (SPMC) from 1 March 2020 up to 28 February 2021. Medical records of these pediatric patients were reviewed, and data on sociodemographic and clinical profiles--including age, sex, place of residence (within or outside Davao City), nutritional status (normal, stunted, wasted, overweight, or obese), comorbidities (cardiovascular, gastrointestinal, hematologic, metabolic, neurologic, oncologic, renal, and/or respiratory conditions)--were recorded. Data on COVID-19 characteristics, such as disease severity (asymptomatic, mild, moderate, severe, or critical), presenting signs and symptoms (ageusia, altered mental state, anorexia, anosmia, coryza, cough, diarrhea, dyspnea, fever, nausea and vomiting, myalgia, sore throat, and others), initial diagnostic tests performed (complete blood count, C-Reactive Protein (CRP) test, and chest x-ray), and clinical outcomes (length of hospital stay and disposition), were also recorded.

From a total of 668 pediatric patients with COVID-19 infection, we selected 167 patients for inclusion in this study through systematic sampling. The median age of patients upon admission for COVID-19 infection was 8 years (IQR: 2-14 years), with a sex distribution of 90/167 (53.89%) males, and 77/167 (46.11%) females. Most patients resided within Davao City (159/167; 95.21%). Of the 167 patients assessed, 94 (56.29%) had normal nutritional status. Based on the World Health Organization (WHO) Child Growth Standards, 19/167 (5.39%) were moderately stunted (height-for-age < -2 SD) and 6/167 (3.59%) were severely stunted (height-for-age < -3 SD). In terms of wasting, 26/167 (15.57%) were moderately wasted (BMI-for-age < -2 SD) and 6/167 (3.59%) were severely wasted (BMI-for-age < -3 SD). Additionally, 16/167 (9.59%) were classified as overweight (BMI-for-age > 2 SD), and 12/167 (7.23%) were classified as obese (BMI-for-age > 3 SD). Among the 167 patients, 5 (2.99%) had cardiovascular conditions, 7 (4.19%) had oncologic conditions, and 5 (2.99%) had renal conditions.

Most patients were asymptomatic or had mild symptoms (137/167; 82.03%), while the rest had moderate, severe, or critical symptoms. Unlike adult patients with COVID-19 infection, pediatric patients in this study did not present with ageusia, anosmia, and/or sore throat. Most patients presented with cough (33/167; 19.76%) and fever (36/167; 21.56%). Chest x-ray results

Clinical profile of

Pediatric PATIENTS WITH COVID-19

admitted to **Southern Philippines Medical Center** before vaccine rollout

n=167

Comorbidities

Cardiovascular conditions	5
Gastrointestinal conditions	2
Hematologic conditions	4
Metabolic conditions	1
Neurologic conditions	3
Oncologic conditions	7
Renal Conditions	5
Respiratory conditions	1
Others	4
None	128

Signs and symptoms

Ageusia	0
Altered mental state	0
Anorexia	1
Anosmia	0
Coryza	10
Cough	33
Diarrhea	15
Dyspnea	9
Fever	36
Nausea and vomiting	13
Myalgia	1
Sore throat	0
Others	10

Blood count

Hemoglobinemia	14
Normal	115
Anemia	38
Hemoconcentration	11
Normal	118
Hemodilution	38

White blood cell count

Leukopenia	11
Normal	113
Leukocytosis	43
Neutropenia	95
Normal	32
Neutrophilia	40
Lymphopenia	32
Normal	39
Lymphocytosis	96
Eosinophilia	29
Normal	91
Eosinopenia	47
Monocytosis	5
Normal	77
Monocytopenia	84

Platelet count

Thrombocytosis	36
Normal	122
Thrombocytopenia	9

Sex distribution

90 Males

77 Females

Nutritional status

based on the World Health Organization (WHO) Child Growth Standards

Severely stunted (height-for-age <-3 SD*)	Moderately stunted (height-for-age <-2 SD)	Severely wasted (BMI†-for-age <-3 SD)	Moderately wasted (BMI-for-age <-2 SD)	Normal	Overweight (BMI-for-age >2 SD)	Obese (BMI-for-age >3 SD)
6	19	6	26	94	16	12

Location

159 within Davao City

8 outside Davao City

Severity

Asymptomatic	Mild	Moderate	Severe	Critical
80	57	20	2	8

Disposition

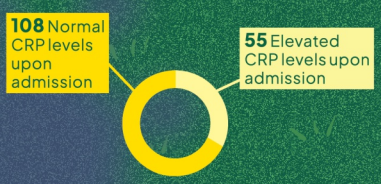
Discharged improved	Transferred	Expired
101	57	9

8 Median age in years (IQR‡: 2-14 years old)

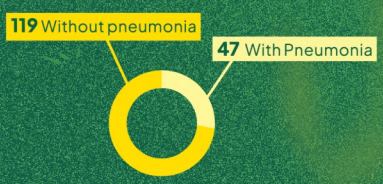
9 Median length of hospital stay in days (IQR: 2-15 days)

1.37 Median neutrophil-to-lymphocyte ratio (IQR: 0.80-2.29)

C-reactive protein



Chest X-ray



*SD=standard deviation
†BMI=body mass index
‡IQR=interquartile range

showed that 47/167 (28.31%) had pneumonia upon admission for COVID-19 infection.

Upon admission, most patients had a normal hemoglobin count (115/167; 68.86%), while some had anemia (38/167; 22.75%), and the rest had hemoglobinemia (14/167; 8.38%). In terms of hematocrit, most patients also had normal hematocrit count (118/167; 70.66%), followed by hemodilution (38/167; 22.75%), and the rest had hemoconcentration (11/167; 6.59%). Most patients also had a normal white blood cell count (113/166; 67.66%), while a smaller percentage had leukocytosis (43/167; 25.75%), and an even smaller percentage had leukopenia (11/167; 6.59%). The median neutrophil-to-lymphocyte ratio (NLR) was 1.37 (IQR: 0.80 to 2.29). Over half of the patients had neutropenia (95/167; 56.89%), lymphocytosis (96/167; 57.49%), monocytopenia (84/167; 50.60%), and normal eosinophil count (91/167; 54.49%). However, a significant number of patients also had eosinopenia (47/167; 28.14%). Most patients had normal platelet count (122/167; 73.05%), while 55/163 (33.74%) had elevated CRP levels upon admission.

The median length of hospital stay was 9 days (IQR: 2-15 days), with most patients in improved condition (101/167; 60.48%) upon discharge.

Our study provides a comprehensive overview of the demographic and clinical profiles of admitted pediatric patients with COVID-19 infection prior to the vaccine rollout, revealing more favorable outcomes than those reported in adults. Unlike adults, who commonly presented with ageusia, anosmia, and sore throat, our pediatric patients were mostly asymptomatic or exhibited only mild symptoms. While adult cases often showed lymphopenia and neutropenia, children in our study had lymphocytosis and neutrophilia, although white blood cell counts were normal in both groups. Platelet counts were generally normal in most patients, but thrombocytopenia occurred in more severe cases, mirroring adult patterns. These findings highlight the distinct clinical profile of COVID-19 infection in pediatric patients.

Contributors

RMBA, ABB and JJL contributed to the conceptualization of this article. All authors wrote the original draft, performed the subsequent revisions, approved the final version, and agreed to be accountable for all aspects of this report.

Acknowledgments

Our sincerest gratitude to the Department of Pediatrics in Southern Philippines Medical Center for their steadfast guidance and support throughout this research. Despite the challenges of the pandemic, we persevered—always in service of the Filipino children.

Ethics approval

This study was reviewed and approved by the Department of Health XI Joint Research Ethics Committee (DOH XI JREC reference JREC-202256).

Article source

Submitted

Peer review

External

Competing interests

None declared

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SPMC JHCS

CASE IN IMAGES

Madura foot in a 42-year-old male: case in images

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Received
17 April 2023

Accepted
3 June 2025

Published online
26 June 2025

Cite as
Aquino JMRM, Diaz RB, Contreras AI, Guillano V. Madura foot in a 42-year-old male: case in images. *SPMC J Health Care Serv.* 2025;11(1):5. https://n2t.net/ark:/76951/jhcs48z2pn

A 42-year-old male patient presented to our outpatient clinic with a mass on his left foot.

CLINICAL FEATURES

The lesion started as a papule on the dorsal surface of his left foot fifteen years prior to consultation. The lesion gradually increased in size and was later associated with pain and swelling. The patient also noticed that the swelling discharged pus and pale granular material. He tolerated the condition, until seven years prior to the consultation, when he was admitted to their local hospital, where debridement was performed. Three years prior to the present consultation, he sought care at the Surgery Department of this institution. A biopsy performed showed acute and chronic inflammation with abscess formation. He was prescribed unrecalled medications, but his condition did not improve. He was subsequently referred to the Orthopedics Department for transfer of service, and then to our department for co-management.

The patient is a farmer who works in the crop fields. He does not have diabetes or any autoimmune disease and has no family history of mycetoma. He has been a smoker for eleven pack-years and is an occasional alcoholic beverage drinker. He denied any previous trauma or injury to the affected foot and reported no travel to mycetoma-endemic areas. The patient had no fever, dyspnea, or other associated systemic conditions.

On cutaneous examination, the patient had a non-tender, subcutaneous, indurated mass on the dorsal surface of the left foot, measuring 15 × 10 cm (Figure 1). The mass contained multiple plaques with hard, woody swelling, discharging sinuses, and white or pale grains, each measuring 1 to 2 mm (Figure 2). Inguinal lymphadenopathy was palpated on the left side. Physical examination findings of the right leg and foot were unremarkable. Based on the patient's history and physical examination, we made an initial diagnosis of Madura foot.

DIAGNOSTICS, THERAPEUTICS, AND OUTCOMES

A magnetic resonance imaging done revealed a soft tissue mass in the medial plantar region of the left foot, with infiltration of the deep plantar muscles, suggestive of plantar fibromatosis. The patient was subsequently admitted for open biopsy with intraoperative frozen section biopsy of the left foot mass, which showed myxoid tissue with chronic inflammation and fibrous tissue with abscess formation. Blood tests were unremarkable except for anemia (hemoglobin: 88 g/L) and thrombocytosis (platelet count: 768 × 10^3/μL). Radiographic examination of the left foot showed irregular osseous lucencies in the metatarsals and calcaneus with overlying tissue swelling suggestive of osteomyelitis. Wound gram stain and bacterial culture, acid fast bacilli, and KOH were all negative.

Tissue and white or pale grain samples were analyzed for bacterial and mycological evaluation. Direct microscopy was positive for pale grains. Fungal culture was negative. At this point, we were considering the diagnosis of a probable actinomycetoma. We prescribed oral co-amoxiclav initially for two weeks, with a plan to continue it for up to six months, and advised the patient to follow-up after two weeks or earlier if grains appeared in the discharge. We requested a repeat fungal culture, but the patient refused.

The patient was lost to follow-up for four years, until he was admitted to our institution, with pneumonia, pulmonary tuberculosis, and type 2 diabetes mellitus. At the ward, we performed another wedge incision biopsy. Histopathology revealed thick orthokeratotic bands overlying an acanthotic epidermis. The superficial dermis contained multiple melanophages and mild to moderately dense interstitial inflammatory infiltrates composed predominantly of lymphocytes, histiocytes, neutrophils, and numerous fibroblasts. Foreign body giant cells were also present. These findings indicated granulomatous and suppurative dermatitis. (Figure 3). Periodic acid-Schiff (PAS) stain was positive for fungal hyphae, which supports the diagnosis of eumycetoma. We then immediately started the patient on itraconazole at 200 mg/day for

six months, with planned surgical debridement thereafter. However, the patient reported poor compliance to the antifungal medication. Concurrently, he was placed on a six-month course of antitubercular therapy. In the fifth month of treatment, he developed severe pain and swelling of the left foot. The Orthopedics service admitted the patient and subsequently performed a below-the-knee amputation.

RELEVANCE

Madura foot, also knon as mycetoma, is a chronic, progressive granulomatous inflammatory reaction caused by fungi (eumycetoma) or anaerobic filamentous bacteria (actinomycetoma). It involves the skin, subcutaneous tissue, muscles, joints, and bones, leading to deformities of the hands, feet, or legs. The global burden of mycetoma is unknown,[1] but in the Philippines, incidence is 0.10 per 100,000 annually.[2 3] Eumycetoma accounts for 40% of global cases, while actinomycetoma comprises 60%.[4 5]

Mycetoma predominantly occurs in male rural workers residing in subtropical and tropical regions who come into direct contact with contaminated soil. Diagnosis can be made by the classic clinical triad of a painless hard subcutaneous mass, sinus tracts, and pathognomonic grains (microcolony aggregates) in the discharge.[6-8] Direct microscopy, cytological, histopathological, and immunohistochemical examinations, as well as grain culture, help identify the causative agent. On histopathology and cytology, the color of the grains helps differentiate between eumycetoma and actinomycetoma. The presence of the black grains points to eumycetoma, while yellow to brown or red to pink grains indicate actinomycetoma. Pale, white, or yellow grains, on the other hand, may be seen in both types of mycetoma.[9]

In our patient, eumycetoma was diagnosed based on clinical presentation and histopathological findings on hematoxylin-eosin and PAS stains. Fungal culture, in combination with internal transcribed spacer region gene amplification, is a key tool in identifying the causative agent of eumycetoma.[10 11] The distinction between eumycetoma and actinomycetoma is crucial, as their treatments differ significantly. Eumycetoma may be refractory to medical treatment and often requires surgical intervention. Actinomycetoma generally responds well to long-term antimicrobial therapy.[12]

In our patient's case, the painless nature of his symptoms led to a delay in seeking medical attention, resulting in progressive foot swelling. The severe pain and swelling he experienced 21 years after symptom onset and during the fifth month of antitubercular therapy--were attributed to mass effect from significant inflammation and edema, ultimately necessitating emergency leg amputation. Given the diagnostic and therapeutic challenges associated with eumycetoma, this case underscores the critical need for early diagnosis and treatment to achieve better patient outcomes.

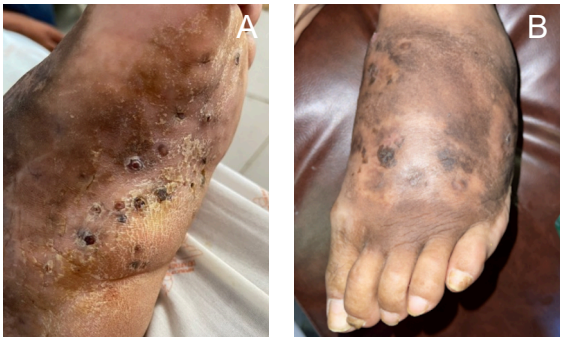

Figure 1 Subcutaneous, ill-defined indurated mass on the dorsal surface of the left foot, measuring 15 × 10 cm. The mass exhibits multiple plaques with hard, woody swelling and discharging sinuses (A), and healing lesions on the dorsal aspect of the left foot (B).

Figure 2 Characteristic white or pale grains, each measuring 1 to 2 mm.

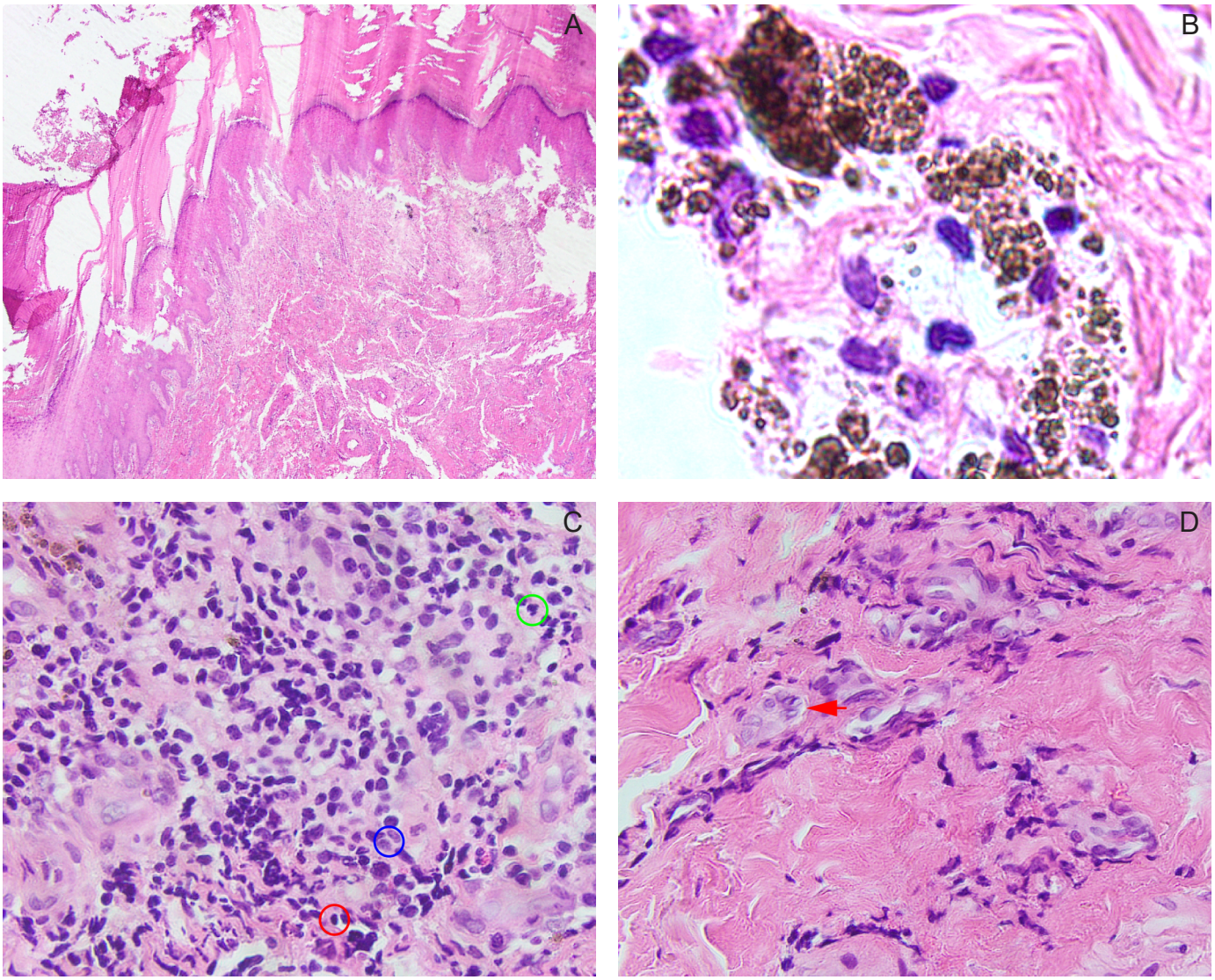

Figure 3 Histopathology of the skin lesion showing thick bands of orthokeratosis overlying an acanthotic epidermis (A). The superficial dermis shows multiple melanophages (B) and mild to moderately dense interstitial inflammatory infiltrates composed predominantly of lymphocytes (C: red ring), histiocytes (C: blue ring), and neutrophils (C: green ring). Foreign body giant cells (D: red arrow) were also observed. (Hematoxylin-eosin stain; A: ×40, B: ×1000, C: ×400, D: ×400).

Contributors
JMRMA, RBD, AIC and VG contributed to the diagnostic and therapeutic care of the patient in this report. All authors acquired relevant patient data, and searched for and reviewed relevant medical literature used in this report. JMRMA wrote the original draft, performed the subsequent revisions. All authors approved the final version, and agreed to be accountable for all aspects of this report.

Patient consent
Obtained

Article source
Submitted

Peer review
External

Competing interests
None declared

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SPMC JHCS

CASE IN IMAGES

Linear IgA Bullous Dermatosis in a 7-year-old Filipino male: case in images

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Received
28 March 2023

Accepted
24 February 2025

Published online
28 February 2025

Cite as
Quijote KLV, Guevara BEK. Linear IgA Bullous Dermatosis in a 7-year-old Filipino male: case in images. *SPMC J Health Care Serv.* 2025;11(1):1. https://n2t.net/ark:/76951/jhcs2g5uq8

A 7-year-old male patient presented to our outpatient clinic with generalized, multiple vesicles and bullae.

CLINICAL FEATURES

The lesions, which initially appeared as erythematous pruritic tense vesicles, first developed in his genital and inguinal areas five months prior to the consultation. These lesions rapidly spread to his trunk, extremities, scalp, and face, with spontaneous rupture and crusting. Three months prior to the consultation, a local physician diagnosed the patient with psoriasis and prescribed oral antibiotics and an unrecalled topical ointment. There was partial symptom resolution. However, one month before the consultation, the lesions worsened, requiring a five-day admission at a local hospital for an unspecified skin infection. The patient received unrecalled intravenous antibiotics, which provided slight improvement of the lesions. After discharge, a pediatrician prescribed oral prednisone, oral cefixime, and tar shampoo, which afforded partial symptom relief. Twenty days before we saw the patient at our Dermatology Clinic, a private dermatologist performed a skin punch biopsy on him, which revealed a subepidermal blistering disease compatible with linear IgA bullous dermatosis (LABD). He was then prescribed dapsone at a dose of 50 mg per day and immediately referred to us for complete work-up. The patient had no family history of similar skin diseases, autoimmune diseases, or malignancies, and no history of food or drug allergies. The patient had no recent fever, cough, colds, or abdominal or joint pain. Upon examination, there were multiple tense, clear, fluid-filled vesicles and bullae with erosions distributed on the scalp, face, trunk, extremities, and genital areas, some forming a "string of pearls" pattern, with areas of erosions topped with yellowish crusts, as well as hyperpigmented patches on previously affected areas (Figure 1 and 2). There were no oral or nasal mucosal lesions, nor lymphadenopathy.

DIAGNOSTICS, THERAPEUTICS, AND OUTCOMES

Hematologic and biochemical examinations, including a G6PD test, were unremarkable. A skin punch biopsy of an intact vesicle on the upper back revealed a subepidermal blister containing numerous neutrophils (Figure 3). A direct immunofluorescence (DIF) study performed on the perilesional area of the patient's upper back showed strong linear IgA deposition along the basement membrane zone (Figure 4), confirming the diagnosis of LABD. We started the patient on dapsone at an initial dose of 1.4 mg/kg/day for two weeks and gradually increased the dose to 2.7 mg/kg/day. We also prescribed daily skincare with mild soap and emollients. This resulted in a dramatic symptom resolution and a decrease in new-onset lesions after four weeks of therapy (Figure 5). The patient and his family were counseled on the usual course of the disease, which may recur despite treatment, but generally has a good long-term prognosis, with remission usually achieved within two years. The patient followed up every two weeks at the outpatient department, where clinical hemodynamic parameters such as blood pressure and pallor, along with laboratory tests including hemoglobin, reticulocyte count, and lactate dehydrogenase, were monitored to ensure tolerability to dapsone and to rule out any signs of hemolytic anemia or methemoglobinemia. After eight weeks of follow-up, the patient was able to tolerate the medication without any signs of adverse effects.

RELEVANCE

LABD is a rare autoimmune blistering disease of unknown mechanism, characterized by the deposition of IgA autoantibodies in the basement membrane zone, leading to the formation of tense subepidermal blisters. When present in children, it is also known as chronic bullous disease of childhood. The global incidence is reported to be 0.2–2.3 cases per million per year,

with only 130 reported cases in the Philippines and two cases reported at Southern Philippines Medical Center in the past 10 years.1-3 It classically presents as tense vesicles that start in the abdominal and perioral areas and later spread to cover the entire body. New vesicles develop at the periphery of resolving ones, forming the characteristic "string of pearls" or "crown of jewels" appearance.[4] Given the patient's history and physical examination findings, we were considering an initial diagnosis of an autoimmune subepidermal blistering disorder. Differential diagnoses include bullous pemphigoid, epidermolysis bullosa acquisita, and dermatitis herpetiformis (DH), which has very similar findings to LABD on immunohistochemical staining. However, DIF shows a granular pattern of IgA deposition at the dermoepidermal junction in DH, in contrast to the linear deposition along the basement membrane found in LABD.[5] The most commonly used treatment for LABD is oral dapsone, with rapid improvement seen within 2 to 3 days after initiation.[6] The prognosis of LABD in children is generally promising, with spontaneous remission occurring within 2 to 4 years after onset.[5]

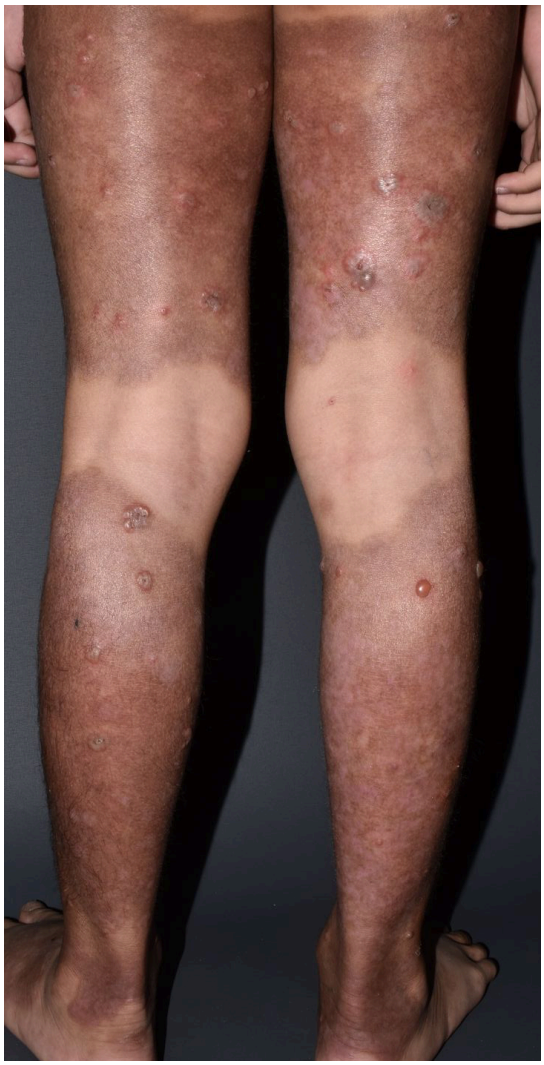

Figure 1 Multiple tense, clear, fluid-filled vesicles and bullae with erosions distributed on the lower extremities. Hyperpigmented patches are noted on previously affected areas.

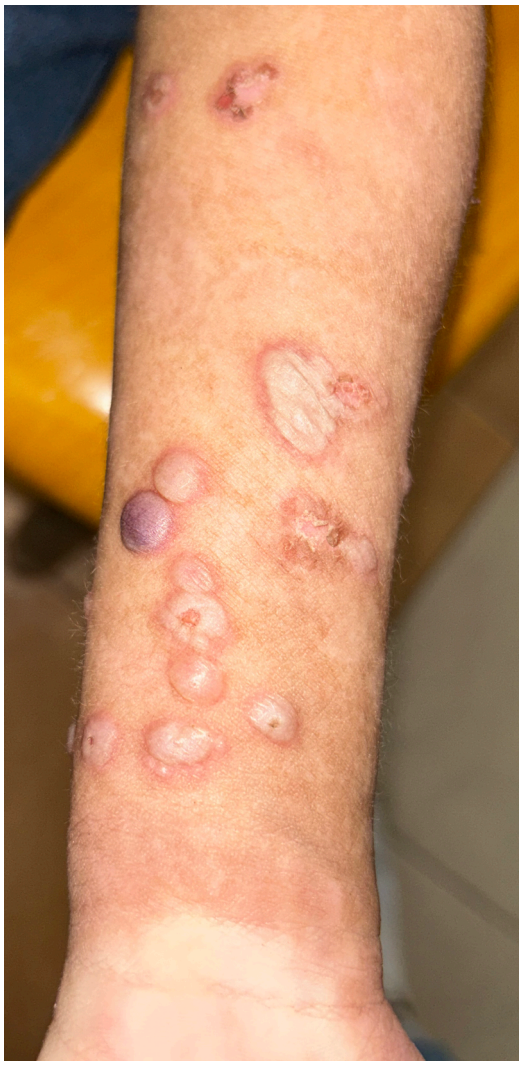

Figure 2 Multiple polycyclic lesions with central crusting and a marginal rim of vesicles, forming a classic string-of-pearls appearance.

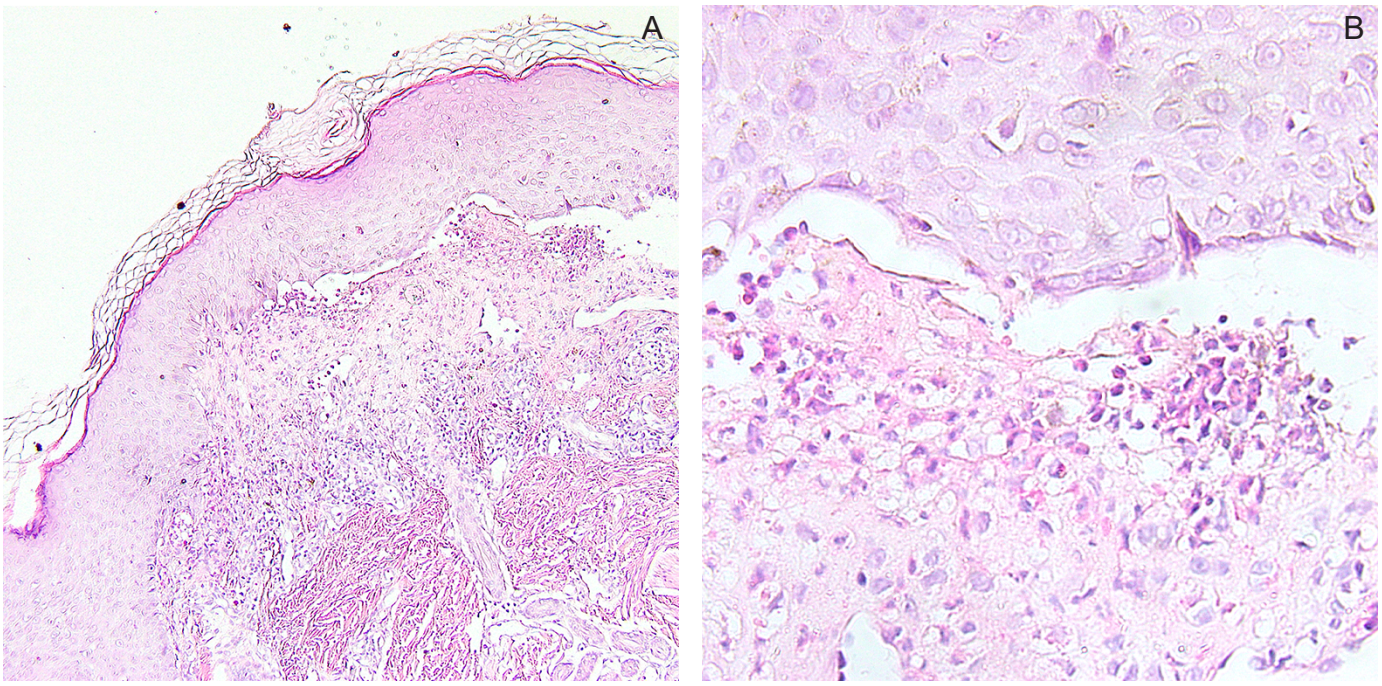

Figure 3 Histopathology showing subepidermal split (A: hematoxylin-eosin stain, ×40) with abundant neutrophils (B: hematoxylin-eosin stain, ×100).

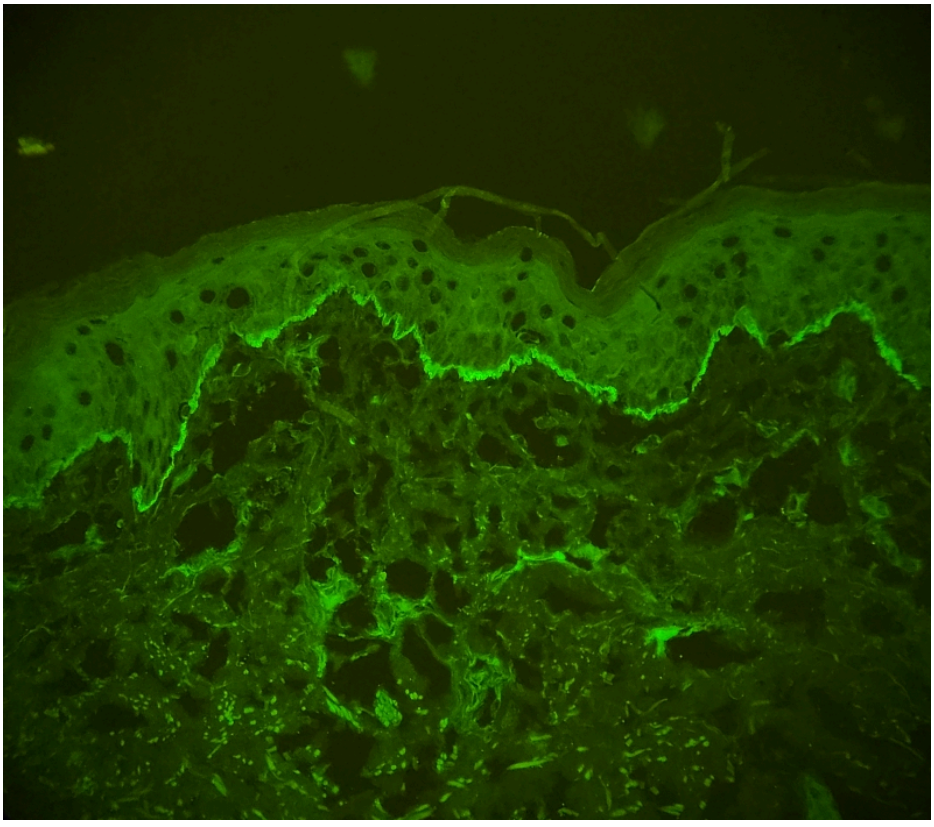

Figure 4 Direct immunofluorescence showing strong linear IgA deposition along the basement membrane zone (x40).

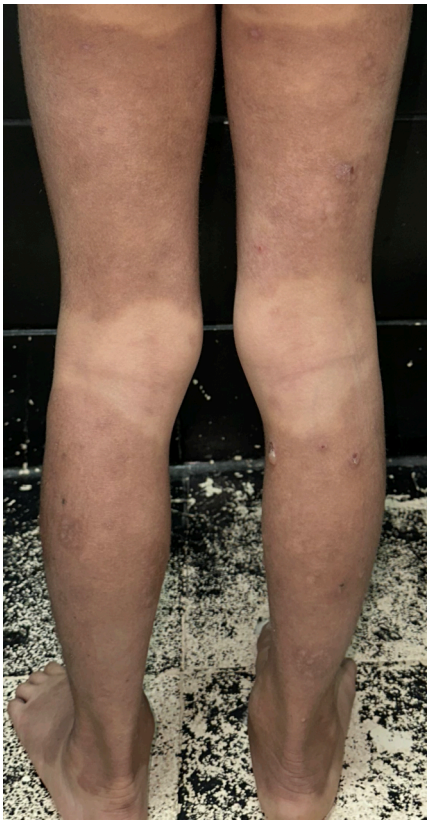

Figure 5 Decrease in tense blisters, leaving only some erosions and post-inflammatory hyperpigmentation after four weeks of treatment.

Contributors
KLVQ and BEKG contributed to the diagnostic and therapeutic care of the patient in this report. Both authors acquired relevant patient data, and searched for and reviewed relevant medical literature used in this report. KLVQ wrote the original draft, performed the subsequent revisions. Both approved the final version, and agreed to be accountable for all aspects of this report.

Acknowledgments
We would like to sincerely acknowledge Dr Nadra Magtulis and Dr Inez Benedicto of the Department of Dermatology in Southern Philippines Medical Center, for their invaluable contributions to the clinical management of the patient, and assistance in obtaining relevant resources for this article.

Patient consent
Obtained

Article source
Submitted

Peer review
External

Competing interests
None declared

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SPMC JHCS

PROGRAM PROFILE

Newborn Screening Continuity Clinics in Davao and Caraga Regions

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Received
4 February 2025

Accepted
30 April 2025

Published online
22 May 2025

Cite as
Beley GJ. Newborn Screening Continuity Clinics in Davao and Caraga Regions. *SPMC J Health Care Serv.* 2025;11(1):3. https://n2t.net/ark:/76951/jhcs2kc4s3

ESTABLISHMENT

Following the enactment of Republic Act (RA) 9288 or the Newborn Screening (NBS) Act of 2004, newborn screening centers (NSC) were established to conduct mandated laboratory tests and provide recall and follow-up services for newborns with heritable disorders.[1] Local government units (LGU) ensured the availability of these services in rural/city health units, lying-ins, and local hospitals, with monitoring performed by physicians, subspecialists, or rural health units.[2]

In 2014, the Department of Health (DOH) issued Administrative Order 2014-0035, establishing newborn screening continuity clinics (NBSCC) to serve as referral centers for the long-term management of positive cases, including counseling, treatment, monitoring and follow-up.[3] Initially, 14 continuity clinics were set up.[4] Each NBSCC must be based in a tertiary hospital, ideally with one clinic per region, as designated by the DOH. Over time, additional provincial continuity clinics were established. One of the existing clinics is found in the Southern Philippines Medical Center (SPMC), which serves patients from Davao Region (Region XI) and Caraga Region (Region XIII).

The Davao NBSCC was established under Dr. Leopoldo J. Vega, then SPMC Chief of Hospital, and led by Dr. Genelynne Beley. Together with the follow-up nurse, Dr. Beley ensured timely patient recall, appropriate medical management per newborn screening protocols, and referrals to subspecialists and hospital units. Before the NBSCC establishment in SPMC, diagnosed patients were managed by general pediatricians, with no integrated continuity of care within the extended services of the NBS program.

GOALS

In addition to patient consultations, the NBSCC team actively promotes various advocacies, including conducting lay fora and support groups for patients with glucose-6-phosphate dehydrogenase deficiency, congenital hypothyroidism, and congenital adrenal hyperplasia. The team also launched the annual "Reunion of Saved Babies," celebrating the lives of diagnosed patients.

Over time, unrecalled and lost-to-follow-up cases have steadily increased. Challenges include failure to return after initial consultation, unrecalled cases, and poor treatment compliance—often due to financial constraints, transport issues, limited awareness about the disorder, family conflicts, and poor access to specialized care, particularly in geographically isolated and disadvantaged areas, as in some parts of Caraga Region.

To address these issues, the NBSCC team developed a long-term plan to establish at least one satellite clinic per province, prioritizing the Caraga Region, followed by the Davao Region. These clinics, aligned with designated NBSCCs, were strategically set up to enhance tracking and follow-up care for patients diagnosed with one of the conditions included in the NBS panel.[5] The first was launched at Agusan del Norte Provincial Hospital in Butuan City in March 2020, followed by clinics in Surigao del Sur, Surigao City, and Agusan del Sur over the next three years. With these clinics and the hiring of a regional NBS nurse tasked with locating unrecalled and lost-to-follow-up patients, Caraga Region's recall rate significantly improved. Patient compliance also rose as follow-up visits and repeat laboratory tests became more accessible, eliminating the need to travel to SPMC in Davao City.

In 2022, in collaboration with the DOH Center for Health Development, a satellite clinic was established at Davao Regional Medical Center, later transitioning into a stand-alone clinic. That same year, satellite clinics were also launched at Davao del Sur Provincial Hospital and, in 2023, at Davao Occidental General Hospital. The one in Agusan del Norte Provincial Hospital became a stand-alone clinic, joining 17 others nationwide.

With guidance from the Center for Human Genetics and Services (CHGS) DOH funding, the NBSCC team launched the Multidisciplinary Clinic Consultation (MDC) in October 2023. This one-day consultation brought together specialists from Pediatric Metabolism, Endocrinology,

Developmental Pediatrics, Neurology, Hematology, Gastroenterology, and other departments, including Dental Medicine, Ophthalmology, Otorhinolaryngology—along with geneticists, genetic counselors, dietitians, and social counselors—serving around 50 patients in a single venue. Due to its success, MDCsare now held yearly to reach more patients in Davao Region and nearby regions lacking specialist care. The initiative has since grown into a collaborative effort among different NBSCCs in Mindanao and is being replicated by other clinics, with regional offices now allocating funds for similar programs. The NBSCC team also extended services to patients with birth defects through close coordination with the CHGS.

CURRENT OPERATIONS

Long-term follow-up and management begin once a confirmed positive case is endorsed by the NSC's short-term follow up team--typically after diagnosis and treatment initiation. The NSCs forward the roster of confirmed patients, along with management protocols and required follow-up laboratory procedures, to the NBSCC. The NBSCC team contacts patients to arrange treatment, ongoing care, and monitoring. When needed, referrals to subspecialists within the facility or region are made. For genetic consults unavailable locally, the Telegenetics Referral System is used to provide remote evaluations.[3]

Despite the best efforts of the SPMC NBSCC team, many patients fail to complete follow-ups, hindering progress tracking. To address this, the NBSCC team conducts regular home visits in Davao City to locate lost-to-follow-up and unrecalled patients, aiming to improve recall rates and reduce adverse outcomes.

FUTURE PLANS

Currently, 33 continuity clinics operate within tertiary and government hospitals across all 17 regions of the Philippines.[5] Over the years, the SPMC NBSCC has seen a significant rise in patient volume, driven by the growing number of children diagnosed through the NBS program. The establishment of satellite clinics in the Davao and Caraga Regions has further improved access to long-term follow-up care, optimizing continuity of care for patients in these areas.

Contributors
GJB conceptualized this article. GJB wrote the original draft, performed the subsequent revisions, approved the final version, and agreed to be accountable for all aspects of this article.

Article source
Commissioned

Peer review
Internal

Competing interests
None declared

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SPMC JHCS

INFOGRAPHIC

Region XI Newborn Screening Continuity Clinic census from 2014 to May 2025

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Received
4 June 2025

Accepted
30 June 2025

Published online
30 June 2025

Cite as
Beley GJ, Sibug M, Roño RC, Ladrero CXD. Region XI Newborn Screening Continuity Clinic census from 2014 to May 2025. *SPMC J Health Care Serv*. 2025;11(1):7. https://n2t.net/ark:/76951/jhcs864spq.

Following the Department of Health (DOH) Administrative Order 2014-0035, newborn screening continuity clinics (NBSCC) were established in 2014 to facilitate continuity of care for patients with confirmed heritable disorders within the specific geographic areas assigned to each clinic.[1] These clinics serve as referral centers for the long-term management—encompassing counseling, treatment, monitoring, and follow-up—of confirmed cases screened by the Newborn Screening Centers.[1 2] One such clinic is the Region XI NBSCC, located in Southern Philippines Medical Center (SPMC).[2]

At its inception, the Region XI NBSCC in SPMC was tasked with serving confirmed cases from the NSC-Mindanao, covering the Davao Region (Region XI) and the Caraga Region (Region XIII). Currently, the Region XI NBSCC at SPMC has two satellite clinics, one in Davao del Sur Provincial Hospital (Digos) and another in Davao Occidental General Hospital (Malita).[2]

The infographic below illustrates the census of the SPMC-based NBSCC as of May 2025. Of the 336 patients with confirmed heritable disorders endorsed by NSC-Mindanao to the SPMC NBSCC, 214 were successfully contacted. Among those reached, 199 have ongoing follow ups (122 of whom are seen in person at the clinic, while the remaining 77 are either seen during home visits by the NBSCC team or are still due for follow-up, 9 have died, 4 have been discharged from the continuity clinic, and 2 have migrated abroad. The remaining 122 patients could not be contacted and were classified as unrecalled. Of these, 77 had been unrecalled for less than 6 months, while 45 had been unrecalled for more than 6 months and were classified as lost-to-follow up.

Among the 336 endorsed patients, 138 are classified as indigent. In terms of diagnosis, 276 (82.14%) were diagnosed with congenital hypothyroidism, 18 (5.36%) with congenital adrenal hyperplasia, 7 (2.08%) with galactosemia, 6 (1.78%) with phenylketonuria, 2 (0.60%) with maple syrup urine disease, 2 (0.60%) with tyrosinemia type I, 1 (0.30%) with tyrosinemia type III, 1 (0.30%) with medium-chain acyl-Coenzyme A dehydrogenase deficiency, 1 (0.30%) with very long-chain acyl-Coenzyme A dehydrogenase deficiency, 7 (2.08%) with 3-methylcrotonyl-CoA carboxylase deficiency, 12 (3.57%) with HbH A thalassemia, and 2 (0.60%) with β-thalassemia/hemoglobin E.

Before the Davao NBSCC was established, patients had to follow up at NSC-Mindanao or the SPMC outpatient clinic, often resulting in poor tracking and loss to follow-up. The NBSCC has since improved recall rates, but gaps remain, with many patients still not returning for care. Sustained improvements will require targeted strategies, better resource allocation, and transition protocols from pediatric to adult services.

Contributors
GJB, MS, RCR, and CXDL contributed to the conceptualization of this article. GJC, MS, and RCR wrote the original draft while CXDL rendered the original draft of the infographic. All authors performed the subsequent revisions, approved the final version, and agreed to be accountable for all aspects of this article and its corresponding infographic.

Article source
Commissioned

Peer review
Internal

Competing interests
None declared

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2. Beley GJ. Newborn Screening Continuity Clinics in Davao and Caraga Regions. SPMC J Health Care Serv. 2025;11(1):3. https://n2t.net/ark:/76951/jhcs2kc4s3.

REGION XI NEWBORN SCREENING

Continuity Clinic

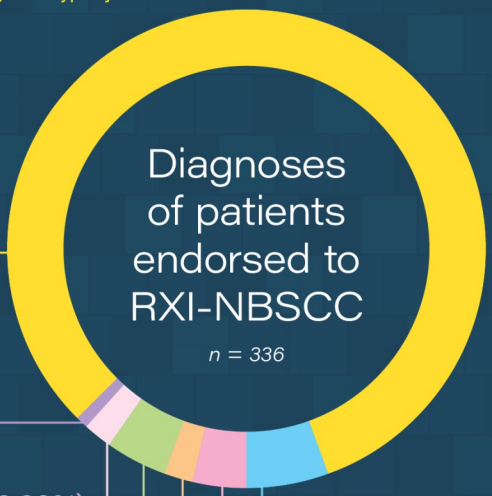
CENSUS FROM 2014 TO MAY 2025

Total number of endorsed patients by the Newborn Screening Center Mindanao (NSC-M)

336

214 Recalled

122 Unrecalled



276 (82.14%)
Congenital hypothyroidism

2 (0.60%)
Maple syrup urine disease

7 (2.08%)
Galactosemia

14 (4.17%)
Hemoglobinopathies*

6 (1.78%)
Phenylketonuria

13 (3.87%)
Expanded newborn screening conditions**

18 (5.36%)
Congenital adrenal hyperplasia

122

Total number of patients seen at the Region XI Newborn Screening Continuity Clinic (RXI-NBSCC) as of May 2025

138

Number of patients classified as indigent

*Hemoglobinopathies include **12** patients with HbH A thalassemia, and **2** patients with B Thalassemia/Hemoglobin E

Expanded Newborn Screening conditions include **2 patients with Tyrosinemia type-1, **1** patient with Tyrosinemia type-3, **1** patient with Carnitine uptake defect, **1** patient with Medium-chain acyl-coenzyme A dehydrogenase deficiency, **1** patient with Very long-chain acyl-CoA dehydrogenase deficiency, and **7** patients with 3-methylcrotonyl-CoA carboxylase deficiency

Characteristics and outcomes of non-traumatic out-of-hospital cardiac arrest during the COVID-19 pandemic: policy notes

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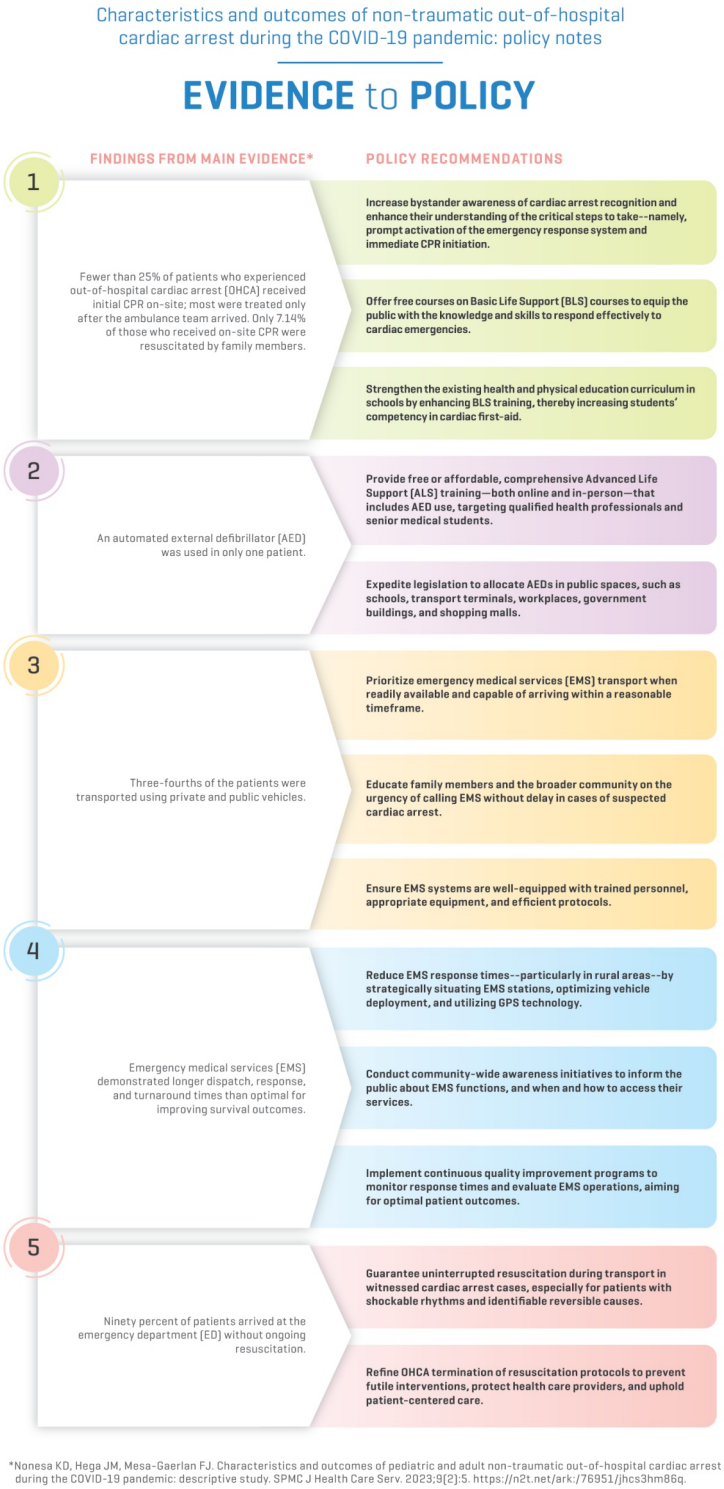
Received
10 June 2025

Accepted
27 June 2025

Published online
27 June 2025

Cite as
Perandos-Astudillo CM, Roño RC. Characteristics and outcomes of non-traumatic out-of-hospital cardiac arrest during the COVID-19 pandemic: policy notes. *SPMC J Health Care Serv*. 2025;11(1):4. https://n2t.net/ark:/76951/jhcs3x8kw3



INTRODUCTION

Out-of-hospital cardiac arrest (OHCA) presents a significant public health challenge, marked by high global mortality rates. The worldwide incidence of OHCAs managed by emergency medical services (EMS) ranges from 30 to 97.1 per 100,000 individuals, with survival to hospital discharge estimated at 8.6%-9.9%.[1] In the Philippines, the incidence is 1.1%, with a return of spontaneous circulation (ROSC) or resuscitation success rate of 9.5%.[2]

The COVID-19 pandemic markedly affected the incidence and outcomes of OHCA worldwide. Regions with a high COVID-19 burden experienced an uptick in OHCA cases and a decrease in bystander-initiated cardiopulmonary resuscitation (CPR).[3] Cardiac arrests increasingly occured at home, while incidence in public settings declined.[4] Additionally, patients with chronic conditions often deferred their regular medical check-ups and avoided emergency departments (ED) for fear of infection. These factors—delays in emergency medical response, reduced bystander CPR, and limited health care services utilization—significantly undermined OHCA survival rates.[5]

This article aims to recommend health care policies informed by findings from a study conducted at a tertiary hospital in Davao City, examining the characteristics and outcomes of non-traumatic OHCAs during the COVID-19 pandemic.

MAIN EVIDENCE

The study of Nonesa, et al. in 2023[6] aimed to describe the demographic, clinical, and logistical characteristics of patients who experienced OHCA during the peak of the COVID-19 pandemic and were subsequently brought to the Southern Philippines Medical Center (SPMC) ED, at a time when vaccines were not yet available in the country. The study utilized data from the cardiac registry of the Pan-Asian Resuscitation Outcomes Study Clinical Research Network (PAROS CRN), to which the SPMC ED has been contributing since 2018. The study included 194 patients who experienced OHCA between March 15 and December 31, 2020. The majority of arrests (76.80%) occurred at home, with less than a quarter (21.65%) receiving initial CPR on-site. Of those, only 7.14% were resuscitated by family members. Most received CPR by ambulance crew upon arrival. An automated extracorporeal defibrillator (AED) was used on-site in only one (0.52%) patient. Most patients (75.77%) were transported using non-ambulance (private and public) vehicles. EMS average dispatch time (from call receipt to ambulance departure from the station), response time (from call to on-site arrival), and turnaround time (from call to ED arrival) were 8, 19, and 56 minutes, respectively. Notably, 90.72% of patients were transported to the ED without continuous resuscitation. Upon arrival at the ED, 94.84%) had an unknown arrest rhythm. Only one patient (0.52%)achieved ROSC and was immediately admitted to the ICU. The remainder (99.48%) expired within 10 to 15 minutes of arrival.

Policy recommendations based on these findings are outlined in the evidence-to-policy diagram in the previous page.

RELATED EVIDENCE

The clinical outcomes of OHCA are significantly affected by the "chain of survival," which includes early recognition and activation of the emergency response system, bystander CPR, timely defibrillation, and EMS.[7] [8] This sequence of interventions was greatly disrupted during the COVID-19 pandemic, particularly in prehospital settings.[9]

Only a small proportion of patients experiencing OHCA receive bystander CPR on-site. Most are resuscitated only upon the arrival of ambulance personnel. During the pandemic, hesitancy among first responders to initiate CPR was noted,[10] likely due to concerns about exposure and inadequate personal protective equipment (PPE). In 2021, the Department of Education issued the implementing rules and regulation for Republic Act 10871—the Basic Life Support Training in Schools Act—which integrates emergency cardiovascular care into the health and physical education curriculum of elementary and secondary schools.[11]

Raising public awareness of cardiac arrest signs and equipping bystanders with the knowledge and confidence to perform CPR are crucial. The timing of CPR initiation is the main factor influencing survival and recovery following an OHCA, rather than the technical skills of the individual administering it. Timely CPR, even if not perfectly executed, greatly enhances the likelihood of a favorable

outcome compared to late CPR.[12]

EMS providers rely on AEDs, which detect shockable rhythms and deliver appropriate shocks. The presence of an initial shockable rhythm in OHCA is linked to better survival outcomes.[13-15] To support early interventions, Public Access Defibrillation (PAD) systems place AEDS in public spaces such as airports, malls, and government buildings. These systems are associated with improved OHCA survival rates.[16] However, timely AED access remains a challenge in low to middle-income countries (LMICs). In 2024, the Philippine Heart Association called on legislators to expedite legislation mandating AED availability in public spaces.[17] Some local government units in Metro Manila have begun implementing PAD systems.[18] Policies should also be formulated to improve public awareness of AEDs and encourage their use, which can be achieved through education, training, and strategic placement.[16]

In Vietnam, research suggests that non-EMS transport (e.g., private vehicles or taxis) is frequently used because it is perceived as faster and more accessible, especially in congested urban areas.[19] EMS response may also take longer in rural or remote settings due to geographic and logistical constraints.[20] While private transport can shorten time to hospital arrival, it may limit access to critical interventions during transit, unless bystanders are trained in life support techniques. Conversely, EMS crews can deliver Advanced Life Support (ALS), including CPR, defibrillation, and medications, provided they are properly equipped.[19] However, one study found lower survival rates among patients transported by EMS compared to those using non-EMS transportation modalities.[21] These findings highlight the importance of considering patient condition, transport timing, and local EMS capacity when determining the most effective mode of transport.

Longer dispatch, response, and turnaround times have a documented negative impact on survival rates. During the pandemic, many studies reported approximately one-minute delays in EMS response, partly due to time spent donning PPE.[4 22 23] Each minute of delay reduces the likelihood of detecting a shockable rhythm by 8%.[24] Shorter response times are consistently associated with better outcomes, including higher survival rates and reduced risk of neurological damage. Ideally, EMS should be dispatched immediately upon receiving the call, with a target response time of 6.5 to 8 minutes when bystander CPR is performed.[25 26] Response time improvements may be achieved through protocol optimization and training,[27] expanded AED accessibility, and technological solutions—such as GPS-based localization systems that alert first responders to episodes of fatal arrhythmia.[28]

Globally, OHCA survival remains low--ranging from 8-15.8% in a few high-income Western and Asia-Pacific countries,[29-31] and dropping to 1-3% in many LMICs in Asia.[32 33] For countries with developing EMS infrastructure like the Philippines, a multifaceted approach is essential. This includes strategic ambulance and PAD deployment, robust communication networks using GPS, and enhanced public awareness through community-based programs and mass media campaigns emphasizing early recognition, activation of emergency services, and high-quality CPR. Strengthening these pillars holds great promise for improving OHCA outcomes.

Contributors
CMPA, and RCR contributed to the conceptualization of this article. CMPA, and RCR wrote the original draft. Both authors performed the subsequent revisions, approved the final version, and agreed to be accountable for all aspects of this article and its corresponding infographic.

Article source
Commissioned

Peer review
Internal

Competing interests
None declared

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Table 1 **Reporting guidelines and checklists** (http://www.equator-network.org/)

Study/article types	Checklists and diagrams
Case report	CARE checklist
Randomized controlled trial	CONSORT checklist; CONSORT flow diagram
Observational studies (cohort, case-control, cross-sectional)	STROBE checklist
Meta-analysis and systematic reviews	PRISMA checklist; PRISMA flow diagram
Diagnostic accuracy studies	STARD checklist; STARD flow diagram
Prediction model for individual prognosis or diagnosis	TRIPOD
Qualitative studies	COREQ
Economic evaluation	CHEERS

therapeutics, outcomes, description of the individual photos
4. Photo/s with description/s
5. Acknowledgments

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2. Authors and affiliations
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4. Photos with descriptions
5. Acknowledgement

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