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Physiotherapists' perceptions of the use of standardised outcome measures in Ghanaian neonatal intensive care units: A cross-sectional survey

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Abstract: *Background:* Neonatal intensive care units (NICUs) in low- and middle-income countries (LMICs) such as Ghana are increasingly improving neonatal survival. However, this progress brings a growing population at risk of long-term neuro developmental disabilities. Physiotherapists play a vital role in early identification and rehabilitation, yet the routine use of outcome measures (OMs) in these settings remains underexplored. This study described the use of OMs among physiotherapists in Ghanaian NICUs, focusing on awareness, utilisation, and perceived barriers and facilitators.
Subject and Methods: A descriptive cross-sectional online survey was conducted among physiotherapists providing neonatal care in Ghana, recruited via the national online platform of the Ghana Physiotherapy Association. A total of 100 clinicians with NICU experience within the past two years completed a structured questionnaire assessing professional characteristics, awareness, current use of OMs, confidence, and perceived barriers and facilitators to implementation. Data were summarised using proportions with 95% confidence intervals for categorical variables and medians with interquartile ranges for ordinal variables. Analytical methods focused on descriptive reporting consistent with the study design.
Results: Thirty-six per cent of respondents (95% CI 27.1–45.9) reported often or very often using at least one standardised neonatal OM. AIMS (28%) and GMA (26%) were most used, while HINE (4%) and Bayley-III (11%) were uncommon. Confidence was low (median 2.0 [IQR 1.5–2.8]), though higher for GMA. Major barriers were insufficient training (78%), lack of resources (71%), and time constraints (67%). Facilitators included access to protocols (85%) and additional training (81%).
Conclusion and recommendations: Despite widespread awareness, the routine use of standardised outcome measures remains limited, reflecting structural and training gaps that contribute to a persistent knowledge-to-practice divide in Ghanaian NICUs. Integrating OMs into clinical protocols, supported by targeted training and resource provision, is essential to strengthen evidence-based neonatal physiotherapy and advance disability-inclusive health services.

Key words: Ghana; Neonatal care; Neonatal intensive care units; Outcome measures; Physiotherapy.

Résumé: *Contexte:* Les unités de soins intensifs néonatals (USIN) dans les pays à revenu faible et intermédiaire (PRFI), comme le Ghana, améliorent progressivement la survie néonatale. Cependant, ces progrès s'accompagnent d'une augmentation de la population à risque d'handicaps neurodéveloppementaux à long terme. Les physiothérapeutes jouent un rôle essentiel dans l'identification précoce et la réadaptation. Mais l'uti

l'utilisation routinière des outils standardises dans ces contextes demeure peu explorée. Cette étude vise à décrire l'utilisation des mesures de résultats (MRs) par les physiothérapeutes exerçant dans les USIN au Ghana, en mettant l'accent sur leur niveau de connaissance, leur degré d'utilisation, ainsi que sur les barrières et les facteurs favorisant leur mise en œuvre en pratique clinique.

Sujets et méthodes: Une enquête transversale descriptive en ligne a été menée auprès de physiothérapeutes fournissant des soins néonatals au Ghana, recrutés via la plateforme en ligne nationale de l'Association ghanéenne de physiothérapie. Au total, 100 cliniciens ayant une expérience en USIN au cours des deux dernières années ont rempli un questionnaire structuré évaluant les caractéristiques professionnelles, le niveau de connaissance, l'utilisation actuelle des MRs, le niveau de confiance, ainsi que les barrières et les facteurs facilitant leur mise en œuvre. Les données ont été résumées à l'aide de proportions avec intervalles de confiance à 95 % pour les variables catégorielles, et de médianes avec intervalles interquartiles pour les variables ordinales. Les analyses se sont limitées à une description conforme au plan d'étude.

Résultats: Trente-six pour cent des répondants (IC à 95 % : 27,1–45,9) ont déclaré utiliser souvent ou très souvent au moins une MR néonatale standardisée. Les outils les plus utilisés étaient l'AIMS (28 %) et la GMA (26 %); tandis que le HINE (4 %) et le Bayley-III (11 %) étaient peu utilisés. Le niveau de confiance était faible (médiane 2,0 [IIQ 1,5–2,8]), bien que plus élevé pour la GMA. Les principales barrières identifiées étaient l'insuffisance de formation (78 %), le manque de ressources (71 %) et les contraintes de temps (67 %). Les facteurs facilitants comprenaient l'accès à des protocoles (85 %) et une formation complémentaire (81 %).

Conclusion et recommandations: Malgré une bonne connaissance, l'utilisation routinière des mesures de résultats standardisées reste limitée reflétant des lacunes structurelles et de formation. Cette situation entretient un fossé persistant entre les connaissances et la pratique dans les USIN ghanéennes. L'intégration des MRs dans les protocoles cliniques, soutenue par des formations ciblées et la mise à disposition de ressources, est essentielle pour renforcer une physiothérapie néonatale fondée sur les preuves et promouvoir des services de santé inclusifs pour les personnes handicapées.

Mots-clés: Ghana ; Soins néonatals ; Unités de soins intensifs néonatals ; Mesures de résultats ; Physiothérapie.

Introduction

Neonatal mortality remains a major public health concern globally, with the burden disproportionately concentrated in low- and middle-income countries (LMICs), particularly in sub-Saharan Africa. Recent estimates indicate that about 2.3 million neonatal deaths occur annually, with the African region accounting for the highest rates.[1,2] While advances in neonatal intensive care units (NICUs) have improved survival rates of preterm and critically ill neonates, these improvements have simultaneously given rise to a growing cohort of infants at high risk of long-term neurodevelopmental impairments and physical disabilities.[3]

Physiotherapists play a critical role in the early identification, management, and rehabilitation of neonates with or at risk of developmental delay, particularly through neurodevelopmental supportive care within NICUs. Globally, outcome measures (OMs) are used by physiotherapists to assess impairments, monitor progress, inform decision-making, and communicate with multidisciplinary teams, and they are central to evidence-based practice.[4,5] However, the adoption and consistent use of standardised OMs remain limited in many LMIC settings, often due to resource constraints and training gaps. In Ghana, broader access barriers to rehabilitation have been documented, underscoring the need to strengthen routine measurement in neonatal services.[6] Embedding standardised measurement also aligns with global policy frameworks that call for disability-inclusive health systems, notably WHO Rehabilitation 2030 and state obligations under the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD).[7,8]

Despite the growing availability of NICU services in Ghana, little is documented about how physiotherapists implement standardised outcome measures within neonatal care. Although global guidance emphasises early detection and disability-inclusive health systems,[7,8] published evidence from LMICs largely focuses on neonatal survival rather than the quality and consistency of rehabilitation practices that follow.[1–3] Existing literature highlights that physiotherapists are essential to neurodevelopmental follow-up and evidence-based care,[4,5] yet there remains a lack of research examining whether these expectations are being met in resource-constrained environments such as Ghana, where broader barriers to rehabilitation access are well recognised.[6] This gap in context-specific evidence limits the ability to evaluate alignment with international standards and to identify the practical challenges physiotherapists face in adopting routine developmental measurement. Therefore, a clearer understanding of current practice and system-level enablers is needed to strengthen neonatal rehabilitation pathways and ensure optimal developmental outcomes for high-risk infants in Ghana.

This study, therefore, aimed to describe the use of OMs among physiotherapists working in NICUs in Ghana. Specifically, it sought to detail the types of measures employed, the frequency and purpose of their use, and the barriers encountered in integrating OMs into routine neonatal care. By generating context-sensitive data, this study contributes to the literature on paediatric and neonatal rehabilitation in Africa and offers insights to in

inform clinical training, health-system planning, and policy reforms towards disability-inclusive neonatal health services.

Method

Study Design

This study employed a descriptive cross-sectional online survey design to explore the use of outcome measures (OMs) among physiotherapists providing services in neonatal intensive care units (NICUs) in Ghana. This design allows collection of data at a single point in time, which is suitable for assessing practices, trends, and perceptions within a defined group of professionals.[9] Reporting follows STROBE guidance for cross-sectional studies; the completed checklist is provided as Supplementary File S1.

Study Setting

The study site was an online platform, specifically a dedicated group that brought together physiotherapists from across Ghana, including those working in tertiary, secondary, and private hospitals. This enabled nationwide reach, with participation from all seven tertiary hospitals. This digital space served as a centralised hub for professionals, facilitating communication, knowledge-sharing, and collaboration.

Study Population and Sampling

The study population comprised physiotherapists who were currently, or within the preceding two years had been, involved in providing physiotherapy services to neonates in NICUs in Ghana. We used a non-probability, platform-based convenience sample, recruiting via the Ghana Physiotherapy Association's national online platform and institutional contacts, with participation drawn from all tertiary, secondary and private hospitals in Ghana. This was not a census of all eligible NICU physiotherapists in the country.

Inclusion criteria: Physiotherapists who were professionally registered with the Allied Health Professions Council and/or the Ghana Physiotherapy Association, had direct clinical experience in neonatal physiotherapy, and provided voluntary informed consent.

Exclusion criteria: Physiotherapists who had *no* neonatal intensive care unit (NICU) caseload exposure despite working in neonatal settings, as well as students or interns still undergoing supervised clinical training.

Numbers approached, eligible, consented, completed, and the response rate are reported in the Results. Because participation required access to the Ghana Physiotherapy Association's online platform and to Google Forms, some eligible clinicians not using these tools may have been inadvertently excluded. The achieved sample (N=100) provides stable descriptive estimates for the main proportions reported (95% CIs).

Data Collection Instrument

Data were collected using a structured, self-administered questionnaire developed through a review of literature on the use of outcome measures in neonatal and paediatric physiotherapy.[10-13] The questionnaire comprised four sections:

- Section A: Demographic and professional characteristics (e.g., age, sex, highest qualification, years of NICU experience).
- Section B: Common conditions encountered in NICUs and frequency of treating specific conditions.
- Section C: Awareness and use of outcome measures at respondents' NICUs and levels of confidence in using these measures.
- Section D: Barriers and facilitators influencing the use of outcome measures in NICU practice.

All Likert-type items used explicit anchors. Confidence items were rated 1 = Not confident, 2 = Somewhat confident, 3 = Confident, 4 = Very confident. Barrier/facilitator items used 1 = Strongly disagree to 5 = Strongly agree. Items permitting multiple selections (e.g., conditions seen; OMs used) were flagged as multi-response. The instrument was reviewed for content and face validity by three experienced academic physiotherapists and pre-tested with five physiotherapists from non-participating facilities; feedback informed minor revisions to improve clarity, wording, and flow. Internal consistency (Cronbach's alpha) for multi-item domains (e.g., barriers, facilitators, confidence where applicable) was planned a priori and is reported in the Results. The full questionnaire, item coding scheme, and a brief data dictionary are provided as Supplementary Files S2–S3.

Data Collection Procedure

Data collection took place between September 2024 and January 2025. Eligible participants were contacted via the online platform, provided with the study information, and invited to complete an online questionnaire hosted on Google Forms. Electronic informed consent was obtained on the first page of the Google Form before participants could proceed. The questionnaire was self-administered online and could be completed at a time convenient to participants. Responses were submitted anonymously and captured directly in Google Forms, then exported for analysis. All data were stored securely on password-protected drives with access restricted to the research team. To minimise duplicate entries, Google Forms was set to one response per user, and submissions were screened for potential duplicates using non-identifying professional fields; no IP addresses or email identifiers were retained beyond de duplication.

Data Analysis

Data were cleaned, coded, and analysed in IBM SPSS Statistics version 26. Routine use of OMs was defined

descriptively as reporting "often" or "very often" (scores ≥4 on the 1–5 frequency scale). Descriptive statistics summarised demographic characteristics, awareness and use of neonatal outcome measures (OMs), confidence, and perceived barriers and facilitators. Categorical variables are presented as frequencies and percentages with 95% confidence intervals, while ordinal Likert-type items are reported as medians with interquartile ranges, with means (SDs) included for interpretability. The overall confidence score was calculated as the mean of six confidence items (scale 1–4). For multi-response questions, percentages reflect the proportion of total responses and are footnoted accordingly. Item-level missingness is indicated in the Results, with listwise deletion applied where needed. All estimates adhere to consistent rounding conventions: percentages to one decimal place and means/SDs to two decimals.

Ethical Considerations

Ethical clearance was obtained from the Research Ethics Committee of the University of Health and Allied Sciences (Approval number: UHAS-REC A.1 [21] 24-25), with additional administrative approvals granted by the Ghana Physiotherapy Association to post the survey invitation on its online platform. Electronic informed consent was obtained prior to data collection. Data were handled confidentially, with de-identification and secure storage procedures; no IP or email identifiers were retained beyond deduplication. All procedures adhered to the Declaration of Helsinki and its latest amendments.[14]
Bottom of Form

Results

Sample and response flow

A total of 180 invitations were distributed via the professional online platform. After screening, 120 respondents met eligibility criteria; 105 provided electronic consent, and 100 completed the survey (overall response rate 55.6% [180 invited, 100 completed]; completion among consented 95.2%). Item non-response was <5% across variables; per-variable denominators are shown where they differ.

Demographic characteristics of participants

The sample reflected a relatively younger cohort, with the majority (n=55, 55.0%) aged 31–40 years, followed by 20–30 years (n=34, 34.0%). Females (n=52, 52.0%) slightly outnumbered males (n=48, 48.0%). Most participants (n=81, 81.0%) were full-time physiotherapists, with the majority (n=75, 75.0%) working in government hospitals. Regarding qualifications, most held a bachelor's degree (n=84, 84.0%), followed by master's (n=15, 15.0%). Years of professional experience were: >10 years (n=31, 31.0%), 1–3 years (n=24, 24.0%), 7–10 years (n=24, 24.0%), and 4–6 years (n=21, 21.0%). See Table 1.

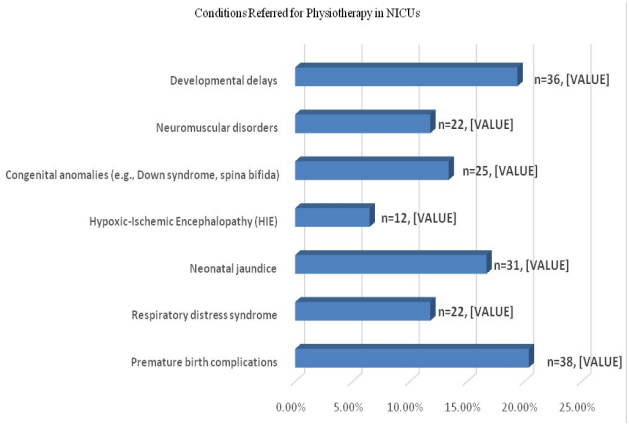
Table 1: Demographic Characteristics of Participants

Variable	Categories	Frequency	Percentage (%)
Age Group	20-30 years	34	34.0
	31-40 years	55	55.0
	41-50 years	11	11.0
Gender	Female	52	52.0
	Male	48	48.0
Employment Status	Full-time/ Established	81	81.0
	Locum	7	7.0
	Part-time	12	12.0
Hospital sector	Mixed practice (government and private)	7	7.0
	Government	75	75.0
	Private	18	18.0
Highest Qualification	Bachelor's Degree	84	84.0
	Master's	15	15.0
	PhD	1	1.0
Years of Experience	1-3 years	24	24.0
	4-6 years	21	21.0
	7-10 years	24	24.0
	More than 10 years	31	31.0

Conditions Referred for Physiotherapy in NICUs

The most frequently reported referral was birth-related complications (38 responses; 20.4% of total responses), followed by developmental delays like not sucking after birth (36; 19.4%), neonatal jaundice (31; 16.7%), and congenital anomalies (e.g., Down syndrome, spina bifida: 25; 13.4%). Respiratory distress syndrome and neuromuscular disorders each accounted for 11.8% (22 responses). Hypoxic-ischaemic encephalopathy (HIE) comprised 6.5% (12 responses).

Fig 1: Conditions Referred for Physiotherapy in NICUs



Note: Multiple responses allowed; percentages are of total responses (Σresponses = 186), not participants.

Frequency of treating different neonatal conditions at the NICU

Participants reported varying frequencies of managing conditions (Table 2). Developmental delays were most treated frequently (47%). HIE was rarely managed by most respondents (65%).

Table 2: Frequency of treating different neonatal conditions at the NICU

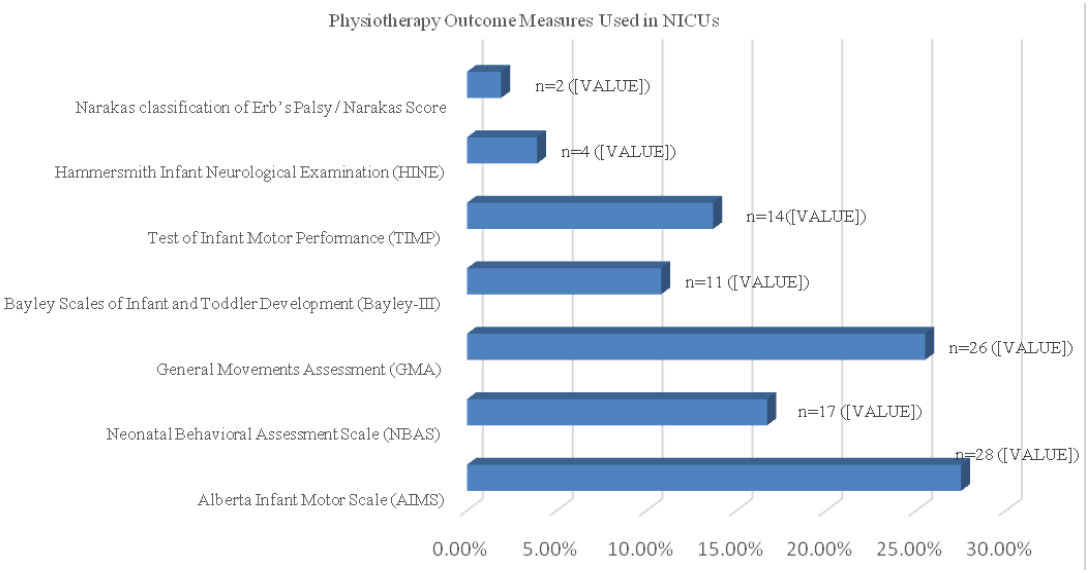
Condition	Percentage Rarely	Occasionally	Frequently	Mean ± SD
Premature birth complications	32.0	44.0	24.0	2.83 ± 1.11
Respiratory distress syndrome	52.0	34.0	14.0	2.49 ± 1.05
Neonatal jaundice	36.0	32.0	32.0	2.85 ± 1.27
Hypoxic-Ischaemic Encephalopathy (HIE)	65.0	30.0	5.0	2.08 ± 0.98
Congenital anomalies	28.0	41.0	31.0	3.00 ± 1.05
Neuromuscular disorders	28.0	41.0	31.0	3.04 ± 1.14
Developmental delays e.g. poor or absent sucking	25.0	28.0	47.0	3.34 ± 1.40

† Scale and collapsing: Underlying response scale was 1–5. For presentation, categories were collapsed to Rarely = 1–2, Occasionally = 3, Frequently = 4–5. Means and SDs are based on the original 1–5 coding.

Physiotherapy Outcome Measures Used in NICUs

Among outcome measures (OMs) reported, the Alberta Infant Motor Scale (AIMS) was most frequently selected (n=28, 28.0%, 95% CI 19.6–37.6), followed by General Movements Assessment (GMA) (n=26, 26.0%, 95% CI 17.2–35.9) and Neonatal Behavioural Assessment Scale (NBAS) (n=17, 17.0%, 95% CI 10.9–25.5). Less frequently reported were Bayley-III (n=11, 11.0%, 95% CI 6.3–18.6), HINE (n=4, 4.0%, 95% CI 1.6–9.8), and Narakas classification (n=2, 2.0%, 95% CI 0.6–7.0). See Fig 2.

Fig 2: Commonly Reported Physiotherapy Outcome Measures Used in NICUs



Note: Multiple responses allowed; percentages are % of participants selecting each tool.

Proportion of respondents routinely using ≥1 standardised OM: The prevalence of routine use of ≥1 standardised OM is reported with 95% CI in Supplementary Table S4, alongside a brief profile of the most frequently used instruments to mirror Figure 2.

Awareness of Outcome Measures

Awareness of OMs was moderate, with the most recognised being AIMS (28%) and GMA (26%), followed by NBAS (17%) and Bayley-III (11%). Fewer participants reported awareness of HINE (4%) or TIMP (≈3%). (Multi-response; % of participants).

Participants' confidence in using NICU outcome Measures

Confidence in using standardised neonatal OMs was generally low (overall mean 2.19 ± 0.66 on a 1–4 scale; median 2.0 [IQR 1.5–2.8]) (Fig 3 and Table 3). Based on empirical tertiles, 72% of respondents were categorised as low confidence, 23% moderate, and 5% high. Internal consistency for the confidence scale was acceptable (Cronbach's $\alpha = 0.78$).

Fig 3: Participants' Level of Confidence in the Use of the various Standardised outcome measures at the NICU

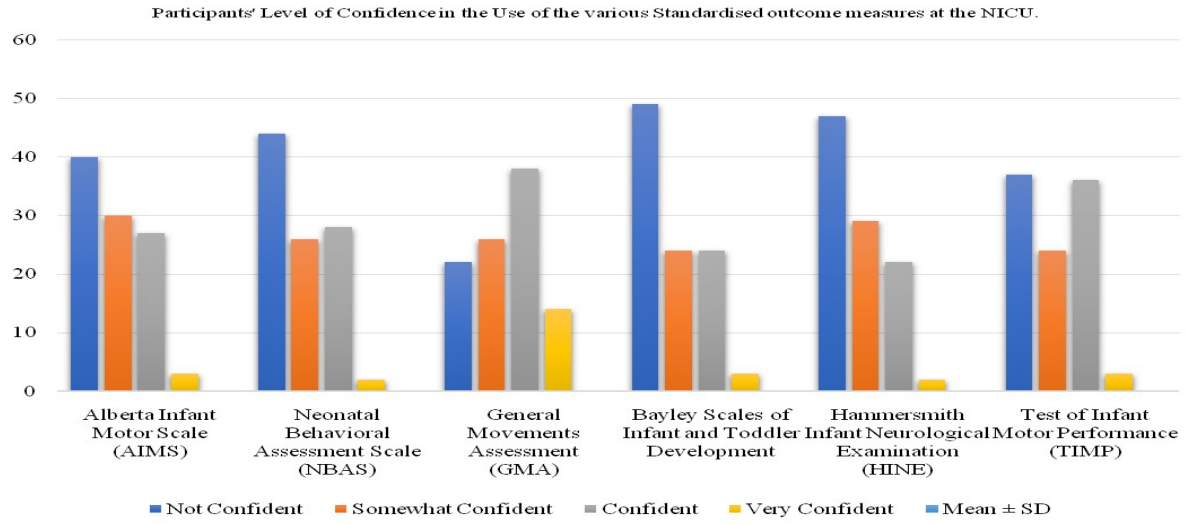


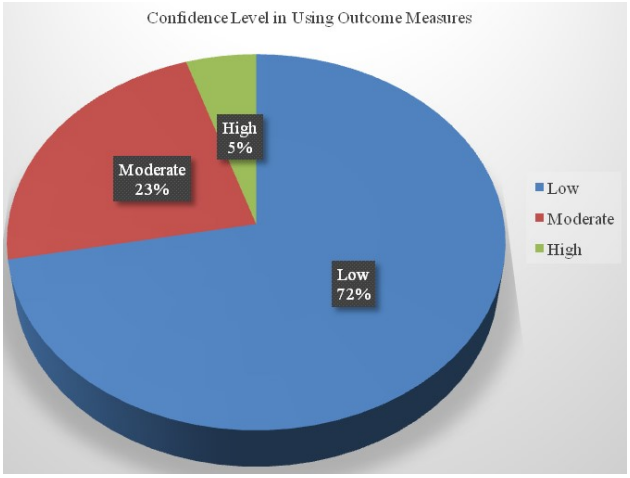
Table 3: Participants' Level of Confidence in using the various NICU Outcome Measures

Outcome Measure	Not Confident	Somewhat Confident	Confident	Very Confident	Mean ± SD
Alberta Infant Motor Scale (AIMS)	40.0	30.0	27.0	3.0	1.93 ± 0.89
Neonatal Behavioral Assessment Scale (NBAS)	44.0	26.0	28.0	2.0	1.88 ± 0.89
General Movements Assessment (GMA)	22.0	26.0	38.0	14.0	2.44 ± 0.99
Bayley Scales of Infant and Toddler Development	49.0	24.0	24.0	3.0	1.81 ± 0.91
Hammersmith Infant Neurological Examination (HINE)	47.0	29.0	22.0	2.0	1.79 ± 0.86
Test of Infant Motor Performance (TIMP)	37.0	24.0	36.0	3.0	2.05 ± 0.93
Overall confidence level					2.19 ± 0.66

‡ Scale: 1 = Not confident, 2 = Somewhat confident, 3 = Confident, 4 = Very confident. Confidence was treated as ordinal; empirical tertiles (p33, p66) were used to describe low/moderate/high distributions

Overall confidence in using standardised neonatal OMs was low (mean 2.19 ± 0.66), with most respondents categorised as low confidence (72%) and a further 23% demonstrating moderate confidence (Table 3; Fig 4).

Fig 4: Confidence Level in Using Outcome Measures



Facilitators and Barriers to Implementing Outcome Measures in NICUs

Facilitators

Participants strongly endorsed practical enablers such as access to up-to-date protocols and additional training (Table 4). For brevity in the main text, we report combined agree/strongly agree proportions: access to up-to-date guidelines and protocols 85%; additional training programmes 81%; collaboration with other professionals 80%; increased availability of resources 80%; time-management training 82%; institutional support 79%;

Table 4: Facilitators to Implementing Outcome Measures in NICUs

Facilitator	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean ± SD
Additional training programmes are essential for implementing standardized outcome measures	0%	9%	10%	81%	0%	4.17 ± 1.12
Increased availability of resources (e.g., equipment, tools) would enhance implementation	0%	11%	9%	80%	0%	4.18 ± 1.09
Institutional support is a key facilitator for effective implementation	0%	7%	14%	79%	0%	4.13 ± 1.00
Collaboration with other healthcare professionals would facilitate implementation	0%	7%	13%	80%	0%	4.17 ± 1.04
Access to up-to-date guidelines and protocols is crucial for implementation	0%	4%	11%	85%	0%	4.35 ± 0.94
Time management training would help in the implementation of outcome measures	0%	7%	11%	82%	0%	4.14 ± 0.98
Support from leadership/management would facilitate the use of outcome measures	0%	7%	15%	78%	0%	4.10 ± 1.03

0% reflects rounding of values <0.5%

Barriers

Insufficient training, resource constraints, and time pressure emerged as the most salient barriers (Table 5). Combined agree/strongly agree proportions were: insufficient training 78%; lack of resources 71%; time constraints 67%; high patient load 66%; limited access to up-to-date guidelines 68%; lack of awareness among staff 68%; lack of institutional support 57%.

Table 5: Barriers to Implementing Outcome Measures in NICUs

Barrier	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean ± SD
Lack of resources (e.g., equipment, tools) is a significant barrier to implementation	0%	13%	16%	71%	0%	3.87 ± 1.18
Insufficient training on outcome measures hinders their implementation	0%	9%	13%	78%	0%	4.04 ± 1.04
Lack of institutional support is a major obstacle to the use of outcome measures	0%	15%	28%	57%	0%	3.63 ± 1.13
Time constraints prevent the regular use of standardized outcome measures	0%	8%	25%	67%	0%	3.83 ± 0.99
High patient load limits the ability to implement standardized outcome measures effectively	0%	16%	18%	66%	0%	3.79 ± 1.18
Limited access to up-to-date guidelines hinders the implementation of standardized outcome measures	0%	18%	14%	68%	0%	3.68 ± 1.20
A lack of awareness among staff about the benefits of standardized outcome measures acts as a barrier	0%	14%	18%	68%	0%	3.78 ± 1.12

Notes: Percentages are by item; minor deviations from 100% reflect rounding

Discussion

This study sought to assess the extent to which physiotherapists utilise outcome measures (OMs) within neonatal intensive care units (NICUs) in Ghana, as well as to explore their awareness, frequency of use, and perceived barriers to implementation. The findings contribute critical evidence to the growing body of literature on disability-inclusive neonatal care in sub-Saharan Africa, where rehabilitation services remain underdeveloped despite increasing survival rates of high-risk neonates.

A key finding from this study is the relatively high level of awareness among physiotherapists regarding the value and purpose of OMs in neonatal practice. This is encouraging and aligns with prior research conducted in Zimbabwe and South Africa, where physiotherapists recognised OMs as essential tools for tracking progress and guiding clinical decisions.[15] However, while awareness was widespread, actual routine use of standardised outcome measures was notably inconsistent, and overall confidence was low. This knowledge-to-practice gap is well described in rehabilitation and physiotherapy implementation research and is frequently attributed to time pressure, resource constraints, and limited organisational support.[12]

The study further revealed that non-standardised and informal assessments, such as clinical observations and locally modified checklists, were more commonly used than internationally validated tools. This preference may be driven by the lack of access to appropriate tools, limited time during NICU rounds, and insufficient training on neonatal-specific OMs. These findings echo concerns raised by global reviews, which have noted the absence of culturally and contextually adapted measures for LMICs, particularly in neonatal populations.[13,19] The pattern observed here, where AIMS was the most frequently reported tool yet confidence was comparatively

higher for GMA, suggests habit-driven adoption without commensurate training and underscores the need for competency-based education and protocolised tool selection.

Moreover, barriers to OM use were prominently reported. These included insufficient institutional support, lack of continuous professional development, and the perception that using OMs increases workload without clear institutional expectations or reward structures. Such barriers are not unique to Ghana; similar patterns have been observed across other low-resource settings.[15,16] System-level evidence further indicates a substantial, unmet global need for rehabilitation, reinforcing the case for investment in neonatal rehabilitation capacity and routine measurement.[17] In this study, facilitators and barriers scales demonstrated acceptable internal consistency, supporting the reliability of these constructs for local quality improvement. Given that insufficient training, time constraints, and resource limitations were frequently endorsed, and that access to up-to-date protocols and additional training were the most supported facilitators, a practical response is a competency-based training programme, inclusion of a minimum validated OM bundle in NICU protocols, and provision of simple data-capture templates.

Although many participants acknowledged the potential benefits of OMs for improving communication with other healthcare professionals, few reported interdisciplinary collaboration in selecting or interpreting these measures. This points to missed opportunities for team-based care and highlights the need for integrated NICU protocols that formally incorporate physiotherapists into decision-making processes. Evidence from family-integrated NICU models shows that structured interdisciplinary approaches can improve outcomes and care coordination, making a stronger case for embedding physiotherapist-led outcome tracking within routine pathways.[20]

Furthermore, the limited use of condition-specific OMs, such as those designed for preterm infants or neonates with hypoxic-ischaemic encephalopathy, raises concerns regarding early identification and intervention planning. High-quality evidence supports early detection packages that include the General Movements Assessment and the Hammersmith Infant Neurological Examination for identifying infants at high risk of cerebral palsy and other neurodevelopmental impairments.[18,21-24] The absence or inconsistent application of these tools may contribute to delayed referral or inconsistent early identification practices. National and institutional clinical guidelines should therefore include a minimum package of validated neonatal OMs, supported by periodic training, mentorship, and access to practical protocols.

While the study included physiotherapists from all seven tertiary, private, and secondary hospitals in Ghana through nationwide online recruitment, the findings have broader relevance for other African settings facing similar systemic constraints. Strengthening neonatal rehabilitation is not merely a technical task; it represents a step towards disability-inclusive health systems and improved developmental trajectories for at-risk infants.

This study has limitations. The convenience, online sampling via a professional online platform introduces selection bias and may not represent all Ghanaian NICU physiotherapists. Self-report may over- or under-estimate true OM use, and there is also a risk of social desirability bias, whereby respondents may have over-stated evidence-based behaviours. Additionally, digital platform-based recruitment may have excluded physiotherapists working in facilities with limited internet access. Several constructs used single-item indicators; however, multi-item domains demonstrated acceptable internal consistency. Causal inferences are not possible given the cross-sectional design.[25]

Conclusion

Strengthening neonatal rehabilitation requires integration of a minimum validated OM bundle into NICU protocols, with competency-based training, practical data-capture templates, and organisational support. Routine outcome measurement is essential not only for evidence-based physiotherapy but also for early disability identification and inclusive neonatal care in Ghana.

Ethics approval and consent to participate

Ethical clearance was obtained from the Research Ethics Committee of the University of Health and Allied Sciences (Approval number: UHAS-REC A.1(21),24-25), with additional administrative approvals granted by the Ghana Physiotherapy Association to post the survey invitation on its online platform. Electronic informed consent was obtained prior to data collection. Data were handled confidentially, with de-identification and secure storage procedures; no IP or email identifiers were retained beyond deduplication. All procedures adhered to the Declaration of Helsinki and its latest amendments.[14]

The de-identified data that support the findings of this study are available from the corresponding author upon reasonable request.

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References

1. World Health Organization. Newborn mortality. Geneva: WHO; 2024. Available from: https://www.who.int/news-room/fact-sheets/detail/newborn-mortality
2. United Nations Inter-agency Group for Child Mortality Estimation. Levels & trends in child mortality: Report 2023 (2024 update). New York: UNICEF; 2024. Available from: https://data.unicef.org/resources/levels-and-trends-in-child-mortality-2023/
3. Mwaniki MK, Atieno M, Lawn JE, Newton CR. Long-term neurodevelopmental outcomes after intrauterine and neonatal insults: a systematic review. *Lancet. 2012;379(9814):445-52.*
4. Jette DU, Halbert J, Iverson C, Miceli E, Shah P. Use of standardized outcome measures in physical therapist practice: perceptions and applications. *Phys Ther. 2009;89(2):125-35.*
5. Kyte DG, Calvert M, van der Wees PJ. An introduction to patient-reported outcome measures (PROMs) in physiotherapy. *Physiotherapy. 2015;101(2):119-25.*
6. Nyante GG, Carpenter C. The experience of carers of children with cerebral palsy living in rural areas of Ghana who have received no rehabilitation services: a qualitative study. *Child Care Health Dev. 2019;45 (6):815-22.*
7. World Health Organization. Rehabilitation 2030: a call for action. Geneva: WHO; 2017. Available from: https://www.who.int/initiatives/rehabilitation-2030
8. United Nations. Convention on the Rights of Persons with Disabilities (CRPD). New York: UN; 2006. Available from: https://www.un.org/disabilities/documents/convention/convoptprot-e.pdf
9. Creswell JW, Creswell JD. Research design: qualitative, quantitative, and mixed methods approaches. 5th ed. Thousand Oaks (CA): Sage Publications; 2018.
10. Sawadogo A, Sogbossi ES, Everard GJ, Kpadonou T, Batcho CS. Use of standardised outcome measures among physiotherapists in French speaking sub-Saharan Africa. *S Afr J Physiother. 2024;80:a1981.*
11. Ponto J. Understanding and evaluating survey research. *J Adv Pract Oncol. 2015;6 (2):168-71.*
12. Fitzgerald TL, Thompson N, Frakes KA. The role of physiotherapy in NICUs: a review of outcome measurement tools. *Pediatr Phys Ther. 2020;32(1):16-22.*
13. Novak I, Morgan C, Fahey M, Finch-Edmondson M, Galea C, Hines A, et al. State of the evidence traffic lights 2020: systematic review of interventions for preventing and treating children with cerebral palsy. *Curr Neurol Neurosci Rep. 2020;20(3):3.*
14. World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. *JAMA. 2013;310 (20):2191-4.*
15. Inglis G, Faure M, Frieg A. The awareness and use of outcome measures by South African physiotherapists. *S Afr J Physiother. 2008;64 (2):102.*
16. Akinpelu AO, Elly O, Odole AC. Barriers to the use of standardized outcome measures among physiotherapists in Nigeria. *Physiother Res Int. 2022;27(2):e1951.*
17. Cieza A, Causey K, Kamenov K, Hanson SW, Chatterji S, Vos T. Global estimates of the need for rehabilitation based on the Global Burden of Disease study 2019. *Lancet. 2020;396(10267):2006-17.*
18. Einspieler C, Bos AF, Libertus ME, Marschik PB. The General Movement Assessment helps us to identify preterm infants at risk for cognitive dysfunction. *Front Psychol. 2016;7:406.*
19. Lannin NA, Madden VJ, Sinclair C, Conroy J, Carr B, Cadilhac DA. Outcome measurement in rehabilitation: a scoping review of systematic reviews. *PLoS One. 2022;17 (4):e0266093.*

20. O'Brien K, Robson K, Bracht M, Cruz M, Lui K, Alvaro R, et al. Effectiveness of family integrated care in neonatal intensive care units on infant and parent outcomes: a multicentre, cluster-randomised controlled trial. *Lancet Child Adolesc Health. 2018;2(4):245-54.*
21. Novak I, Morgan C, Adde L, Blackman J, Boyd RN, Brunstrom-Hernandez J, et al. Early, accurate diagnosis and early intervention in cerebral palsy: advances in diagnosis and treatment. *JAMA Pediatr. 2017;171(9):897-907.*
22. Romeo DM, Cioni M, Scoto M, Pizzardi A, Romeo MG, Guzzetta A. Prognostic value of a scorable neurological examination from 3 to 12 months post term age in very preterm infants: a longitudinal study. *Early Hum Dev. 2009;85 (6):405-8.*
23. Spittle AJ, Doyle LW, Boyd RN. A systematic review of the clinimetric properties of neuromotor assessments for preterm infants in the first year of life. *Dev Med Child Neurol. 2008;50(4):254-66.*
24. Romeo DM, Bompard S, Serrao F, Leo G, Cicala G, Velli C, et al. Early neurological assessment in infants with hypoxic–ischemic encephalopathy treated with therapeutic hypothermia. *J Clin Med. 2019;8(8):1247.*
25. Swinkels ICS, van Peppen RPS, Wittink H, Custers JWH, Beurskens AJHM, van der Wees PJ. Current use, barriers and facilitators for implementation of standardized outcome measures in physical therapy in the Netherlands. *BMC Health Serv Res. 2011;11:171.*