Original Article

Comparative Efficacy of New Ballard and Parkin's Scoring Systems for Postnatal Gestational Age Assessment in Neonates: A Prospective Diagnostic Accuracy Study in a Tertiary Care Hospital

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ABSTRACT

The determination of gestational age remains a cornerstone of neonatal clinical practice, particularly in resource-limited settings where prenatal dating is often imprecise or unavailable. This study sought to compare the diagnostic accuracy of the New Ballard Score and the Parkin's Score in a cohort of 486 neonates at a tertiary care hospital in Rajkot, Gujarat. The primary objective was to evaluate the correlation between these postnatal scoring systems and obstetric gestational age determined by the last menstrual period or first-trimester ultrasonography. The investigation employed a prospective hospital-based design, assessing neonates within the first seven days of life. Findings indicated that while both methods demonstrate a high positive correlation with obstetric gestational age, the New Ballard Score displayed a superior correlation coefficient ($r = 0.939, p < 0.001$) compared to the Parkin's Score ($r = 0.811, p < 0.001$). Agreement analysis via Cohen's kappa showed substantial agreement for the New Ballard Score ($\kappa = 0.742$) and moderate agreement for the Parkin's Score ($\kappa = 0.572$). Notably, the Parkin's Score, focusing exclusively on four physical parameters—skin texture, skin color, ear firmness, and breast size—offered significant practical advantages in terms of ease of use and reduced interpersonal bias, suggesting its utility as a screening tool for semi-skilled health personnel in environments where complex neurological assessment is unfeasible.

Keywords: Gestational Age Assessment, Neonates, Diagnostic Accuracy, Prospective Observational Study.

INTRODUCTION

The accurate determination of gestational age is far more than a mere chronological exercise; it represents a critical clinical diagnostic that dictates the immediate and long-term management of the newborn.[1] In the realm of neonatology, gestational age serves as a primary predictor of the spectrum of possible complications, ranging from respiratory distress syndrome and necrotizing enterocolitis to neurological sequelae such as intraventricular hemorrhage.[1] Precise dating is essential for the appropriate titration of intravenous fluids and medications, particularly in sick neonates where minor physiological deviations can lead to significant morbidity.[1] Despite its importance, the assessment of gestational age remains a multifaceted challenge globally, often complicated by the unavailability of early prenatal care and the variability of biological indicators.[3]

The knowledge of gestational age is important for both obstetricians and neonatologists, and it is routinely estimated prenatally and postnatally.[1] The development of some neonatal problems during and immediately after birth is known to be dependent, to a large extent, on gestational age rather than birth weight.[1] The determination of gestational age is therefore important in planning appropriate treatment for the fetus or infant and may modify details of their care.[1] Generally, the gestational age of a newborn is estimated by the mother's Last Menstrual Period (LMP) and/or Ultrasonography (USG).[1]

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However, wrongly determined gestational age delays the chances of prompt recognition of complications and the initiation of treatment.[1]

Postnatal assessment of gestational age is mostly done by the New Ballard's Score, which comprises physical and neurological characters of the newborn.[1] However, the neurological characters of the New Ballard's Score have been noted to have interpersonal observational bias, which leads many pediatricians to use only physical characteristics to determine gestational age.[1] The Parkin's Score estimates the gestational age of newborns taking into account only four physical characteristics—skin texture, skin color, ear firmness, and breast size—and seems to have more practical usage, being easier to apply in clinical settings.[1]

This study was undertaken to find the correlation between the New Ballard's Score and Parkin's Score and whether they correlate with obstetric gestational age estimated by LMP and/or first-trimester USG, thereby evaluating their practical usage in the Neonatal Intensive Care Unit (NICU).[1] Prenatally, gestational age estimation can be done by use of LMP, clinical examination of the mother, USG, and laboratory examination.[1] Antenatal gestational age is usually calculated from the first day of the last menstrual period.[1] Franz Naegele in 1812 explained the method for GA counting from LMP; he believed that pregnancy lasts 10 lunar months from the first day of the LMP, a rule that was not based on empirical data.[1]

Naegele's rule is a simple method of pregnancy dating.[1] The Expected Date of Delivery (EDD) is calculated by counting back three months from the LMP and adding seven days.[1] This method assumes that the patient has a 28-day menstrual cycle with fertilization occurring on day 14.[1] However, several factors limit the diagnostic performance of EDD based on the LMP date.[1] Many women do not have regular 28-day cycles due to variability in the length of the follicular phase; thus, ovulation often does not occur on day 14.[1] There are small variations in the duration of time between fertilization and implantation, and early pregnancy bleeding or recent use of hormonal contraceptives may lead to an incorrect assumption of the date of LMP.[1]

Comprehensive Review of Literature

Gestation is defined as the period between the conception and birth of a baby during which the fetus grows and develops in the uterus.[1] Gestational age is the time measurement from the first day of the mother's last regular menstrual period to the current date or date of delivery.[1] This time interval is commonly expressed in completed weeks rather than as mixed numbers or in days.[1] A pregnancy of normal gestation is approximately forty weeks, with a normal range of thirty-seven to forty-two weeks.[1] Before thirty-seven completed weeks, neonates are considered preterm, while at forty-two completed weeks or more, they are considered post-term.[1]

The date of the last menstruation period is not known to a significant minority of mothers who do not recall it exactly.[1] In others, irregularity of the menstrual cycle and pregnancy on contraceptive pills interfere with correct gestational age assessment.[1] There is clearly a need in clinical practice for a reliable method of estimating gestational age.[1] Assessing gestational age is helpful in meeting the needs of the newborn when the dates of pregnancy are uncertain.[1] For example, a low birth weight baby may require a different approach to management depending on whether it is small for gestational age, preterm, or both.[1]

Prenatal Assessment Methods

Prenatally, gestational age estimation can be conducted through several clinical and laboratory methods.[1] Apart from LMP, other clinical data useful in assessing gestational age include first felt fetal movement—quickening—the appearance of fetal heart sounds, and symphysio-fundal height measurement.[1] Quickening normally occurs around the 18th to 20th week of gestation in primigravida, while it occurs around the 15th to 17th week in multipara women.[1] This is because the stretched-out muscle of the uterus is more sensitive to fetal motion, and the past experience of a woman helps her appreciate these movements earlier.[1]

Fetal heart sounds can be detected with a Doppler at 9-12 weeks and with a fetoscope at about 20 weeks.[1] Symphysio-fundal height (SFH), or McDonald's rule, is a measure of the size of the uterus used to assess fetal growth.[1] The uterus remains a pelvic organ until approximately 12 weeks of gestation, when it becomes large enough to palpate abdominally just above the symphysis pubis.[1] At 20 weeks, it is palpable at the umbilicus, and after 20 weeks, the SFH in centimeters should correlate with the week of gestation.[1]

Week of Gestation	Fundal Height Location
12 Weeks	At symphysis pubis
16 Weeks	Midway between symphysis and umbilicus
20 Weeks	At umbilicus
36 Weeks	At xiphoid
38-40 Weeks	2 cm below xiphoid (due to fetal descent)

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Antenatal ultrasonography (USG) has become a primary diagnostic tool.[1] USG estimates of gestational age are based on the assumption that gestational sac size, embryo size, and the size of fetal parts correlate with age.[1] First-trimester assessment of crown-rump length (CRL) is widely considered the most accurate method for estimating gestational age.[1] The accuracy of USG diminishes as pregnancy progresses, with the mean accuracy in the first trimester being 3 to 8 days, compared to 18 to 35 days in the third trimester.[1]

Laboratory tests also provide biochemical parameters for GA estimation, usually through analysis of amniotic fluid contents.[1] These include amniotic fluid creatinine concentration, Lecithin/Sphingomyelin (L/S) ratio, bilirubin, fat cells, and total protein.[1] Amniotic fluid creatinine levels reflect the maturity of fetal kidneys, while the L/S ratio reflects lung maturity.[1] By 35 weeks, the L/S ratio is typically about 2:1, indicating lung maturity.[1] However, maternal conditions like hypertension or diabetes can accelerate or delay these maturation markers, potentially undermining their accuracy in complicated pregnancies.[1]

Evolution of Postnatal Assessment
Historically, many clinical scores have been proposed for postnatal GA assessment.[1] Interest in these methods began over 30 years ago, stimulated by the awareness that gestational age was as important as birth weight in determining the hazards faced by the neonate.[1] Clinical problems encountered by infants who were small-for-dates differed from those who were truly premature.[1] Neonatal problems such as patent ductus arteriosus, intraventricular hemorrhage, and retinopathy of prematurity are also influenced more by gestation than by birth weight.[1]

Farr developed an objective formulation using 11 physical characteristics, including skin texture, color, opacity, edema, lanugo, ear form, ear firmness, genitalia, breast size, nipple formation, and plantar skin creases.[1] Amiel-Tison described the neurological evaluation of maturity, focusing on muscle tone (passive and active tone) and reflexes.[1] Passive tone is appreciated by applying certain movements to the infant, such as measuring joint angles which diminish as muscle tone increases with maturity.[1] Active tone is evaluated through righting reactions.[1]

The Dubowitz score, introduced in 1970, combined the physical characteristics of Farr and Mitchell with the neurological criteria of Amiel-Tison.[1] The revised Dubowitz system incorporates 34 physical and neurological assessments.[1] While comprehensive, it has two major disadvantages: it tends to overestimate gestational age in preterm infants and is difficult to perform on sick infants due to the large number of criteria.[1]

Parkin's Scoring System
Parkin observed that neurological assessment in the Dubowitz and Amiel-Tison scoring was difficult and that physical characteristics alone were often sufficient for GA estimation.[1] The Parkin's Score utilizes four physical characters: skin texture, skin color, ear firmness, and breast size.[1]

Parkin's Score	Gestational Age (Weeks)
1	27
2	30
3	33
4	34.5
5	36
6	37
7	38.5
8	39.5
9	40
10	41
11	41.5
12	42

The advantages of the Parkin's Score include its simplicity, the absence of subjective neurological criteria, and lesser interpersonal variation.[1] However, it is not considered useful before 27 weeks or after 42 weeks, and skin color can be difficult to assess in certain populations after 48 hours of life.[1]

New Ballard's Score
The Ballard system, originally published in 1979, shortened the Dubowitz method to include six physical and six neurological criteria.[1] In 1991, the New Ballard Score was introduced, adding negative scoring to account for extremely premature neonates down to 20 weeks.[1] The NBS is reliable across racial groups but can be influenced by the intrauterine environment and is often difficult to perform on sick neonates.[1]

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The neurological criteria of the NBS include posture, scarf sign, square window, arm recoil, popliteal angle, and heel to ear.[1] As maturation progresses, the fetus assumes increasing flexor tone, moving in a caudal-rostral direction.[1] Physical criteria include skin, lanugo, plantar surface, breast, eye/ear, and genitalia.[1] The breast bud tissue, for instance, typically measures between 0.5 and 1 cm at term, but may be smaller in SGA neonates due to poor nutritional status.[1]

MATERIALS AND METHODOLOGY

The study was conducted at the Neonatal Care Unit (Pediatric Department) and postnatal wards of the Obstetrics and Gynecology Department at a tertiary care hospital in Rajkot.[1] The study period ran from June 2021 to June 2022.[1] Study was conducted after approval from ethical committee at pharmacology department at PDU Medical college ,Rajkot.A hospital-based prospective design was employed, with a sample size of 500 neonates initially selected based on the fulfillment of inclusion criteria.[1]

Eligibility and Assessment

The inclusion criteria were neonates aged less than 7 days in the NICU or postnatal care wards, provided the mother had an accurate LMP and/or first-trimester USG history.[1] Exclusion criteria included any dilemma in the LMP when USG was unavailable, neonates with gross congenital anomalies, and sick newborns suffering from birth asphyxia or other vitally unstable conditions.[1] Of the initial sample, 14 neonates were disqualified due to congenital malformations or failure to meet the strict inclusion parameters, leaving 486 neonates for final analysis.[1]

Gestational age was assessed independently by Ballard's score and Parkin's score, and these were compared with the gestational age derived from LMP using Naegele's rule.[1] In cases of uncertain LMP, first-trimester USG scans (specifically CRL) were considered the standard.[1] Assessments were performed within 24 hours of admission by resident doctors working in the neonatal unit to minimize observational bias.[1] A goniometer was used for precise measurement of angles required for the Ballard score (e.g., square window, popliteal angle).[1] Detailed maternal history was taken, including parity, gravidity, and delivery mode.[1]

Physical Parameter Assessment Technique

For the Parkin's Score, skin texture was tested by picking up a fold of abdominal skin and by visual inspection.[1] Skin color was estimated when the baby was quiet.[1] Breast size was measured by palpating tissue between the thumb and finger, and ear firmness was tested by palpating and folding the pinna.[1] Statistical analysis was conducted using Epi Info 7 and SPSS trial versions, with a focus on Pearson correlation and Bland-Altman plots to evaluate agreement between methods.[1]

RESULTS AND OBSERVATIONS

The demographic and clinical profile of the 486 neonates revealed a high prevalence of high-risk cases.[1] The mean birth weight was $2.41 \text{ kg} \pm 0.69 \text{ kg}$, with weights ranging from 0.60 kg to 4.1 kg.[1] Analysis via the Kolmogorov-Smirnov test confirmed that birth weight was not normally distributed ($p < 0.001$), likely due to the high volume of preterm and low birth weight referrals to the tertiary center.[1]

Birth Weight and Growth Status

Low birth weight (LBW) neonates (less than 2500g) comprised 46.5% of the study population.[1] This included 10.1% very low birth weight (VLBW) infants (less than 1500g) and 3.7% extremely low birth weight (ELBW) infants (less than 1000g).[1]

Birth Weight Category	Neonates (N)	Percentage (%)
< 1.0 kg	18	3.7
1.0 - 1.5 kg	31	6.4
1.5 - 2.0 kg	79	16.3
2.0 - 2.5 kg	98	20.2
>= 2.5 kg	260	53.5

Regarding intrauterine growth status, 33.3% of the neonates were Small for Gestational Age (SGA), 65.6% were Appropriate for Gestational Age (AGA), and 1.0% were Large for Gestational Age (LGA).[1] The proportion of SGA neonates showed a subtle but consistent relationship with maternal parity: 30.7% in primigravida mothers, increasing to 37.3% in mothers with three or more pregnancies.[1] This suggests that increasing maternal parity may be associated with a higher likelihood of intrauterine growth restriction in this population.[1]

Delivery Characteristics

The mode of delivery also varied across the cohort, with LSCS accounting for 41.6% of deliveries.[1] Spontaneous vaginal deliveries accounted for 34.6%, while 23.9% were induced.[1] Interestingly, the rate of LSCS was highest in the extremely preterm category (48.8% for GA less than 32 weeks) and decreased slightly as gestational age increased.[1]

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Parity	Spontaneous (%)	Induced (%)	LSCS (%)
Primigravida	30.2	28.4	41.3
Second Gravida	40.9	19.5	39.6
Third + Gravida	34.3	20.6	45.1

In primigravida mothers, induced deliveries were more common (28.4%) than in multigravida mothers.[1] The higher rate of LSCS in third-gravida mothers (45.1%) may reflect repeat cesarean sections or obstetric complications associated with higher parity.[1]

Gestational Age Correlation and Diagnostic Accuracy
The central aim of the study was to correlate obstetric gestational age with postnatal scoring.[1]
Both postnatal methods showed a high correlation with the obstetric standard.[1]

Correlation Method	Pearson Correlation (r)	R2 Value	p-value
Obstetric GA vs. New Ballard Score	0.939	0.88	< 0.001
Obstetric GA vs. Parkin's Score	0.811	0.66	< 0.001
New Ballard Score vs. Parkin's Score	0.842	0.71	< 0.001

The New Ballard Score displayed a superior correlation ($r = 0.939$) compared to the Parkin's Score ($r = 0.811$).[1] The scatter plots showed that NBS results were closely arranged near the linear regression line ($y = 0.816x + 6.2647$), indicating higher precision.[1] For the Parkin's Score, the regression formula was $y = 0.7256x + 10.522$.[1]

Agreement and Bias (Bland-Altman Analysis)
Bland-Altman plots were used to identify the mean difference and limits of agreement (LoA).[1] The mean difference between obstetric GA and New Ballard Score-based GA was 0.5 weeks, with an SD of 1.1 weeks.[1] This suggests that the NBS typically underestimates gestational age by approximately half a week.[1] For the Parkin's Score, the mean difference was -0.4 weeks, indicating a slight overestimation of obstetric GA.[1]

Comparison Subgroup	NBS Mean Diff (SD)	PS Mean Diff (SD)
All Neonates	0.5 (1.1)	-0.4 (1.8)
SGA Neonates	1.0 (0.9)	0.2 (2.0)
AGA Neonates	0.3 (1.1)	-0.7 (1.8)
LBW (< 2500g)	0.3 (1.2)	-0.6 (2.0)
NBW (>= 2500g)	0.7 (1.0)	-0.3 (1.7)

Further analysis showed that the underestimation by NBS was greater in SGA neonates (1.0 week) than in AGA neonates (0.3 weeks).[1] Conversely, the overestimation by the Parkin's Score was more pronounced in AGA neonates.[1] In SGA neonates, the Parkin's Score demonstrated a very small mean difference (0.2 weeks), suggesting it may be a particularly useful estimator in growth-restricted populations.[1]

Kappa analysis for maturity classification (Pre-term vs. Term vs. Post-term) showed substantial agreement for the New Ballard Score ($\kappa = 0.742$, 95% CI: 0.680–0.803) and moderate agreement for the Parkin's Score ($\kappa = 0.572$, 95% CI: 0.496–0.648).[1]

Outcome Data
Maturity and growth status were strongly associated with clinical outcomes in the neonatal unit.[1] Mortality was higher among SGA neonates (12.3%) compared to AGA neonates (8.2%).[1]

Outcome Status	SGA (N=162)	AGA (N=319)	Total (N=486)
Discharged	76.5%	81.2%	79.8%
Expired	12.3%	8.2%	9.5%
LAMA	8.0%	6.9%	7.2%
Referred	3.1%	3.8%	3.5%

Overall, 79.8% of the neonates were discharged, while 9.5% expired.[1] The higher mortality rate in SGA neonates affirms that accurately assessing maturity is critical for determining the risk profile and necessary intensity of care in the early days of life.[1]

Narrative Discussion

The results of this study contribute significant data to the ongoing discourse regarding the most effective bedside methods for neonatal gestational age assessment.[1] In resource-constrained settings, where first-trimester USG is often unavailable, these clinical tools remain indispensable.[1]

Comparison with Regional and National Data

The prevalence of low birth weight (46.5%) and preterm (29.4%) neonates in this study is higher than that observed in several other Indian tertiary care centers.[1] For instance, studies by Rahman et al. and Bhattacharya et al. reported LBW rates of 27.1% and 23.9%, respectively.[1] The higher rates in this Rajkot-based study likely reflect its status as a high-volume referral center receiving complicated pregnancies from across the region.[1] Similarly, the proportion of SGA births (33.3%) was markedly higher than the 13% reported in Kerala by Subramanian et al..[1]

Regarding diagnostic accuracy, the strong correlation of the New Ballard Score ($r = 0.94$) found here is consistent with the findings of Jyothsana et al. ($r = 0.968$) and Shah et al. ($r = 0.95$).[1] Singhal et al. specifically analyzed accuracy in SGA neonates and found a correlation of 0.88, which is slightly lower than the overall correlation but confirms the NBS's robustness across growth categories.[1]

Bias and Underestimation Trends

The tendency of the New Ballard Score to underestimate gestational age compared to obstetric dating has been documented in various global studies.[1] Rosenberg et al. found that NBS underestimated GA by an average of 1.9 weeks in Bangladesh, while a systematic review by Lee et al. identified a mean underestimation of 0.7 weeks.[1] The current study's finding of 0.5 weeks underestimation is within this reported range.[1] This bias is often more pronounced in growth-restricted infants, as confirmed by Constantine et al., who showed that for SGA babies, the bias was 1 to 1.5 weeks lower than for non-SGA infants.[1]

The Parkin's Score, however, generally tended toward overestimation in this study (mean difference of -0.4 weeks).[1] This mirrors the findings of Mehta et al., who observed that the Parkin's score overestimated GA by 1.64 weeks.[1] Despite this slight overestimation, the Parkin's Score showed a very narrow bias (0.2 weeks) specifically for SGA neonates in this cohort.[1]

This suggests that while the New Ballard Score is more precise for the general population, the Parkin's Score may offer competitive accuracy in populations where growth restriction is common.[1]

Practical Utility and Implementation

One of the most significant takeaways from this investigation is the affirmation of the Parkin's Score as a viable clinical tool for semi-skilled medical personnel.[1] While the New Ballard Score remains the "gold standard" for bedside clinical assessment due to its substantial correlation and agreement with obstetric dating, its reliance on neurological maneuvers presents several challenges.[1] Neuromuscular signs can be suppressed by neonatal illness, maternal analgesia, or birth trauma, leading to "interpersonal observational bias".[1]

The Parkin's Score, by contrast, focuses exclusively on four physical parameters that are easily observable and require minimal manipulation of the infant.[1] This makes it particularly valuable for assessing sick neonates in the NICU who may not tolerate the extensive handling required for a full New Ballard assessment.[1] The simplicity of the Parkin's system also reduces training time, allowing it to be effectively utilized by junior residents and nursing staff.[1] Given its moderate-to-substantial agreement with more complex methods, it serves as an excellent screening tool for early identification and risk stratification of neonates.[1]

Parity and Growth Restriction Implications

The observed increase in SGA proportion with maternal parity (from 30.7% in primigravida to 37.3% in multigravida) is an important finding for public health in the region.[1] This trend may be linked to maternal nutritional depletion through successive pregnancies.[1] Furthermore, the high rate of LSCS in multigravida mothers (45.1%) highlights the cumulative risks associated with multiple pregnancies in this population.[1] For neonatologists, this data emphasizes that maternal history is as crucial as clinical scores in predicting neonatal maturity and potential morbidity.[1]

Limitations of Clinical Scoring

It is essential to acknowledge that clinical scores are secondary to early USG and accurate LMP.[1] While the New Ballard Score is accurate within 2 weeks of gestational age for 95% of neonates, it is not without flaws.[2] It has been shown to

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overestimate GA in very preterm infants (less than 37 weeks) by an average of 0.4 weeks and underestimate it in growth-restricted babies by as much as 2.5 weeks in some series.[2] Similarly, the Parkin's score is limited by its inability to assess infants less than 27 weeks gestation effectively.[1] Because it relies on only four criteria, an error in even one parameter can significantly alter the final GA estimate.[1]

Summary and Final Synthesis

The prospective analysis of 486 neonates confirms that postnatal assessment remains a critical, albeit imperfect, surrogate for gestational age when prenatal dating is missing.[1] This investigation demonstrates a high level of reliability for both the New Ballard Score and the Parkin's Score in a tertiary care setting in India.[1]

The New Ballard Score proved to be the more accurate and precise tool, demonstrating a correlation of 0.939 and substantial agreement with obstetric dating.[1] It remains the clinical standard for comprehensive maturity assessment, particularly in AGA neonates.[1] However, the underestimation of maturity in SGA infants (mean difference of 1.0 week) highlights a systematic bias that clinicians must account for when managing growth-restricted newborns.[1]

The Parkin's Score, despite its simplicity, achieved a strong correlation (0.811) and moderate agreement.[1] Its most impressive performance was in the SGA subgroup, where the mean difference from obstetric GA was only 0.2 weeks.[1] This finding is of paramount importance for neonatal care in India, where the burden of low birth weight and growth restriction is high.[1] The simplicity of assessing only four physical criteria allows the Parkin's Score to be used as a rapid, less invasive screening tool that is accessible to medical personnel with varied levels of specialization.[1]

Conclusions and Recommendations

Postnatal gestational age assessment is a vital diagnostic component in neonatal medicine, providing the context necessary for recognizing and treating life-threatening complications. The New Ballard's Score substantially correlates with the Parkin's Score for gestational ages of 32 weeks or more, as demonstrated by this investigation. While the NBS is the superior tool for precise academic and specialized clinical use, the Parkin's Score offers a highly practical alternative that provides comparable results with reduced time and handling.

Based on the findings, the following recommendations are made for clinical practice:
1. **Hierarchy of Dating**: Prenatal USG in the first trimester remains the gold standard. In its absence, clinical postnatal scoring should be performed within the first 24 hours of life.
2. **Standardized Use of NBS**: Neonatal Intensive Care Units should continue to use the New Ballard Score for comprehensive maturational assessment, ensuring staff are appropriately trained in neurological maneuvering.
3. **Parkin's Score for Screening**: The Parkin's Score should be widely adopted as a screening tool in peripheral centers and by semi-skilled personnel to facilitate early risk identification and referral.
4. **Consideration for SGA Neonates**: Clinicians must be aware that the New Ballard Score may underestimate maturity by approximately one week in SGA infants. The Parkin's Score may provide a more accurate estimate in this specific subgroup.
5. **Integrated Triage**: Gestational age, birth weight, and growth status (SGA/AGA/LGA) should all be considered simultaneously when determining the risk profile and management plan for the newborn.

By employing these clinical scores effectively, healthcare providers can ensure more timely interventions, better management of the transition to extrauterine life, and a reduction in neonatal morbidity and mortality. For successful publication of such research, authors must strictly follow ICMJE and journal-specific formatting guidelines, ensuring ethical transparency and robust statistical reporting.

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