Current Use of the Apgar Score in the Labour Ward for Resuscitation and Referral of Newborn Babies

Ehigha J. Enabudoso and Etedafe P. Gharoro,
Dept. of Obstetrics and Gynaecology, University of Benin Teaching Hospital, PMB 1111, Benin City. Edo State

Abstract

Context: The Apgar score is a practical method of evaluating the newborn and there is a need to appraise how effectively it is used in clinical practice.

Objectives: To evaluate the knowledge of the current users of the Apgar score in the labour ward.

Study Design, Setting and Subjects: The study was a cross-sectional survey using semi-structured self-administered questionnaires. The setting was the labour ward of a Nigerian Teaching Hospital in July and August 2004. The subjects studied were all current users of the Apgar score, labour ward personnel. The participants were presented with a hypothetical clinical scenario of a newborn baby and requested to score the baby and answer a question on the use of intubation.

Results: A majority, 36 (64.3%), of the 56 study subjects missed the Apgar score. The Paediatric residents were more accurate in scoring the scenario baby. $[\chi^2 = 14.48, p<0.002]$. Accurate scoring (correct knowledge) of the Apgar score increased sharply from those with 2 to 5 years' experience to those with 10 years' experience. All users, except the Paediatric residents, wrongly prescribed intubation as intervention for the baby. Almost all the users 53/56 (94.64%) responded that Apgar score was a useful tool in the evaluation of the newborn.

Conclusion: There is a high level of inaccurate use of the Apgar score amongst labour ward personnel, with a high inter-observer and subspecialty variation in assigning the Apgar score. An unrelenting training of users is necessary for the correct use of the Apgar score

Introduction

In contemporary obstetric practice the death of the newborn is an emotional event both to the mother and obstetrician alike. Research effort to reduce perinatal mortality rates worldwide were intensified in the middle of the last century by correctly identifying babies that were born distressed and needed help to survive. A significant breakthrough was the achievement by Virginia Apgar (an obstetric anaesthetist) in 1952 when she established the one minute Apgar score as a simple practical method of evaluating the physical condition of the newborn infant[1,2]. Her scoring system rapidly gained widespread acceptance. Table 1 is a reproduction of the 10-point Apgar scoring system obtained by objective observation of the newborn.

Over the years however, various reviews and modifications have come to the fore[3-7]. Most notable of these are the report on the collaborative study on cerebral palsy[3], and the review by Casey and colleagues in their epoch making paper in the New England Journal of Medicine[4], which proved almost conclusively that the 5 minutes Apgar score had a significant correlation with neonatal survival. Yet, other researches have suggested refinement on the cut of point of 7 to improve the sensitivity of scoring system[7].

Working in the labour ward one of the authors observed that scoring babies after birth was not entirely objective, bearing in mind the original concept of Apgar. As a follow up, and using the departmental obstetric databank (OPEMS), we decided to filter out for analysis the 5 minutes Apgar score of all live births weighing more than 1500 gm and those babies admitted to the special care baby unit (SCBU). The result was illuminating, with 3402 babies delivered between January 2000 and October 2003, weighing more than 1.5kg. More than twenty percent (20.8 %) of the babies were admitted to the SCBU, and 7.5% had a 5-minutes Apgar score less than 7. There was a significant negative correlation between the 5 minutes Apgar score and admission into the SCBU (Pearson correlation = -0.447, P<0.000).

Empowered with this information the decision was taken to study the practical aspects of assigning Apgar score by the current users of this method of neonatal evaluation. The use of the Apgar score has never been audited in our labour ward since inception in 1973.

Correspondence: Dr. E. P. Gharoro, Dept. of Obstetrics and Gynaecology, University of Benin Teaching Hospital, PMB 1111, Benin City. Edo State.
E-mail: gharoro@uniben.edu

Subjects, Materials and Methods

The study was a cross-sectional survey using semi-structured self administered questionnaires. The setting was the labour ward of the department of obstetrics and gynaecology, UBTH and the study took place in the months of July and August 2004.

The subjects studied were all active and current users of the Apgar score, who attend to newborn in the labour ward (labourward personnel), these included mid-wives, O & G residents, paediatrics, general practice and anaesthetistic residents. The participants were presented with a hypothetical clinical scenario of a newborn baby (Text Box 1) and requested to score the baby and provide an answer for the question on intubation. The study questionnaire was designed to collect, in addition information on age and sex of participant, years of use of the Apgar score, usefulness

of the scoring method and to make recommendation for improvement if necessary.

Data Analysis- The scenario baby Apgar score was computed (Apgar score = 7, as shown in Table 2). Next, the score provide by the participant was marked as true (correct) if the participant gave the baby the correct score of 7 or else false (wrong). All collated information was fed into the computer and analyzed using SPSS 11 statistical software to calculate mean age and years of use, Chi square tests for trends, Pearson correlation, Spearman coefficient, Fishers exact test, and perform tests of significance (P values from two-side tests). Graphs were also generated using the same software.

Main outcome measured: Correct Apgar scoring of the scenario baby

Table 1:
Apgar Scoring chart

Characteristics	Score 0	Score 1	Score 2
Appearance	Blue/Pale	Body Pink, Blue extremities	Completely pink
Heart Rate	Absent	<100 beats /min	>100 beats /min
Grimace	No response	Grimace	Vigorous cry
Activity	Flaccid	Some flexion	Active motion
Respiration	Absent	Slow irregular	Good cry

Table 2:
Scenario Baby Apgar score

Observed Characteristics	Score
Pink with Blue extremities	1
Heart rate 120 beats / min	2
Cry to stimulation	2
Some flexion of extremities	1
Irregular breathing	1
Apgar Score	7

Table 3

Apgar Scoring and prescribed intervention stratified by subspecialty

Profession			Intervention Wrong	Correct	Total
Midwives	Apgar Score	Wrong	0	3	3
		Correct	0	1	1
	Total		0	4	4
ObsGynae	Apgar Score	Wrong	2	12	14
		Correct	0	9	9
	Total		2	21	23
Paediatrics'	Apgar Score	Wrong	0	0	0
		Correct	0	6	6
	Total		0	6	6
'Others group'	Apgar Score	Wrong	6	13	19
		Correct	1	3	4
	Total		7	16	23

Results:

Fifty six current users of the Apgar score were interviewed. There were 18 (31.1%) female service personnel compared to Male (67.9%). A majority of 36 (64.3%) of the study population missed the Apgar score compared to 20 (35.7%) with the correct score as depicted in Figure 1.

Figure 2 is a pictorial display of Apgar scores provided by the participants. The pediatricians were more accurate in scoring the scenario baby in this study *[Pearson Chi-Square tests = 14.48, P value <0.002]*, next were the midwives. The 'others group' (anesthetists and general practice residents) scored the baby poorly.

Table 4
Tests for Homogeneity of the Odds Ratio

	Statistics	Chi-Squared	df	P-value (2-sided Sig. Test)
Conditional Independence	Cochran's	0.881	1	0.348
	Mantel-Haenszel	0.211	1	0.646
Homogeneity	Breslow-Day	0.847	1	0.358
	Tarone's	0.846	1	0.358

Figure 3 depicts correct Apgar scoring with the years of use by the service providers. Accurate scoring (correct knowledge) of the Apgar score increased sharply from the 2 years to 5 years bracket to the 10 years bracket made up of the senior registrar's cadre of active users of the Apgar score.

Table 3 is a cross tabulation of the Apgar score and prescribed intervention (intubation) by the various users of the Apgar score. All users, except the paediatrics residents who were generally correct, both wrongly and correctly identified cases requiring intubation. However, further symmetric measure analysis for correlation between the groups for score and intubation revealed no significant difference. Spearman correlation $= 0.247$-$0.054, p > 0.806$;

Table 4 shows the conditional independence statistics tests for relationship between Apgar score given to the scenario baby and the response variable of intubation for the different categories of the respondents. These tests for relationship between score and intubation were not significant, Cochran's ($\chi^2 = 0.0881, p = 0.348$) and Mantel-Haenszel ($\chi^2 = 0.211, p = 0.646$). Also the Breslow-Day and Tarone's homogeneity test of odd ratios, across the different categories of respondents, was not significantly different ($p = 0.358$) between the groups. Almost all the users 53/56 (94.64%) responded that Apgar score was a useful tool in the evaluation of the newborn in the Labour ward.

Discussion
The principal study finding of the majority of current users missing the correct Apgar score of the scenario baby is disturbing as the Apgar score is very fundamental to our current obstetrics practice of evaluation of the newborn. It tells us that most of our newborn infants are poorly evaluated for resuscitation. This has implications on infant survival and future development [8]-[10]. However, this finding was significantly different statistically across the categories of respondents. The paediatrics' residents assigned better score. Technically this is expected as the
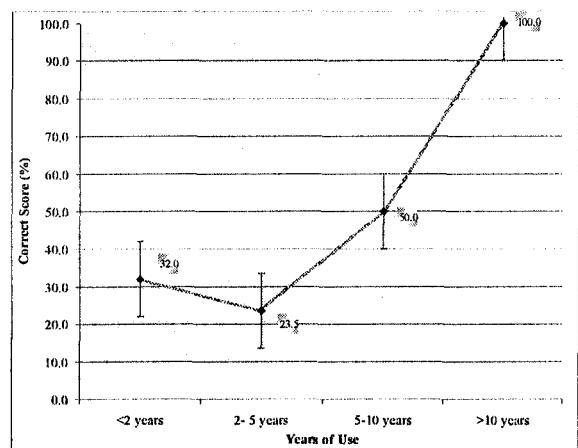

Figure 1- Correct Apgar Scoring of the Newborn
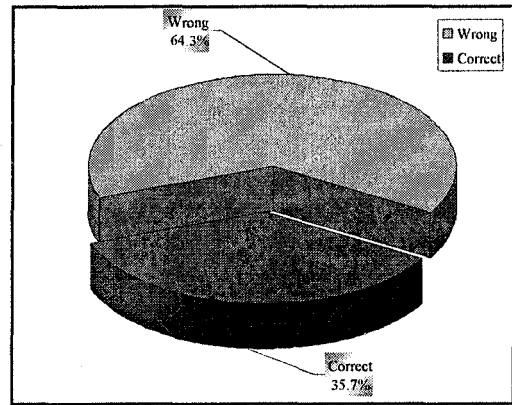
Figure 2- Apgar Score and Subspecialty of Service Providers
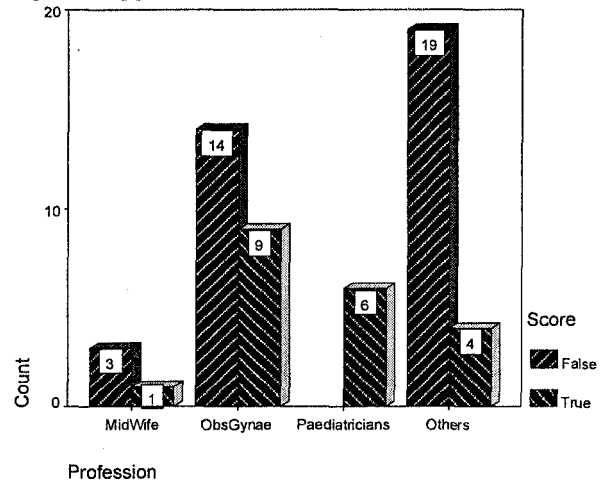
Figure 3- Apgar Score Pattern by Years of Use by Service Providers

paediatric team should be the final arbiter of the evaluation of the newborn. Though the study number was small, subjecting the data to rigorous statistical test still showed that there was a difference between the categories.

Accurate scoring (correct knowledge) of the Apgar score expectedly increased with years of active use in this study. Probably a different picture may have emerge if Consultants in these specialties or non active users were included in the study to test the effect of years since

graduating from the medical Schools and knowledge of the Apgar score. We imagine it may have followed the WHO Evidence-based Health Care (RHL) pattern of the "The Slippery slope" knowledge of current best care and years since graduation[11].

The next important study finding was the poor relationship between the assigned Apgar score and prescribed resuscitation intervention of intubation by the respondents. The baby was wrongly prescribed intubation when the Apgar score was either correctly assigned or not. Neither was there any correlation between the response variable of intubation and the dependent variable of Apgar score. The statistical tests for Spearman correlation and Pearson coefficient were not significant. This lack of correlation was also observed between categories of respondents as all the conditional independence tests (Cochran and Mantel-Haenszel) and Breslow-Day and Tarone's homogeneity test were not significant. The implication of this is that babies are arbitrarily referred for further resuscitation without a clear evaluation based on the original concept of Apgar and objectivity. Therefore, our current practice of neonatal resuscitation may not be entirely evidence based on facts but subjective clinical impressions. Other workers have found that neonatal resuscitation program instruction improves knowledge and skill among health care personnel in delivery room [12].

There was an almost unanimous response that the Apgar score was a useful tool for the evaluation of the newborn, except for two respondents (a third did not give an opinion). The views of the two respondents was that the scoring approach was not objectively undertaken and as such it was meaningless continuing the use of a system which was mainly a subjective clinical impressions. Other researches and workers tend to agree, as there have been abuses of the Apgar score and refinements suggested for better use of the scoring system. Its continued relevance has also been questioned [13-15]. The existing use of the Apgar score in our labour ward has been poorly audited to appraise its value in resuscitation and referral of the newborn babies for attention by the paediatric team. This is the time to rethink and use this simple intervention to reduce our high perinatal mortality.

Conclusion:
There is a high level of inaccurate use of the Apgar score amongst labour ward personnel, with a high inter-observer and subspecialty variation in assigning the Apgar score. An unrelenting training of users is necessary for the correct use of the Apgar score.

Recommendations:
We recommend a display of Apgar Score Charts in full view in all delivery rooms. There is need for a Neonatal resuscitation training program for Labour ward staff. In addition, practice sessions on neonatal intubation by all Resident doctors in the Obstetric/ Paediatrics / General practice/ Anaesthetic subspecialty should be include in the National postgraduate curriculums.

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