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Maternal booking status as a criterion for admission for neonatal intensive care

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Objective. To evaluate maternal booking status as an admission criterion for neonatal intensive care.

Design. Retrospective analysis to relate maternal booking status to short-term outcome.

Setting. Johannesburg Hospital neonatal intensive care unit (NICU).

Subjects. All neonates admitted for ventilation to the NICU. Exclusions were neonates with surgical problems and/or admission age over 48 hours.

Outcome measures. Death before discharge, duration of stay in the NICU, ventilation and hospitalisation.

Results. Significantly more babies of unbooked mothers were admitted to the NICU; however, the duration of ventilation and mortality rate were similar for the booked and unbooked groups. Hospital stay was longer in the unbooked group, but this reflected lower birth weight and gestational age rather than severity of disease. Maternal booking status was not an independent predictor of any outcome variable.

Conclusion. Maternal booking status is not a valid criterion for admission to an NICU.

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Limited availability of neonatal intensive care facilities resulted in the University of the Witwatersrand academic hospitals adopting a policy of only ventilating neonates with a birth weight above 1 000 g, as suggested at the 10th Conference on Priorities in Perinatal Care in 1991. Since then, owing to rapid urbanisation and desegregation of the hospitals, an additional patient load has further increased the demand for neonatal intensive care facilities. Given this strain on resources, neonatal intensive care unit (NICU) staff are under pressure to admit only those patients with the best prognosis or, conversely, to deny access to those with a worse prognosis. Because neonates born to unbooked mothers who have received inadequate or no antenatal care are at increased risk for perinatal morbidity and mortality,^{1,2} staff members often ask whether NICU access should be restricted for such neonates. The aim of this study was to determine whether maternal booking status should be included in the criteria for admission to an NICU.

Subjects and methods

All ventilated neonates admitted to the Johannesburg Hospital NICU between July 1992 and March 1993 were included in the study. Exclusion criteria were an age at admission over 48 hours and/or surgical problems. Data were retrieved from the computer database of the NICU. The following information was collected for each patient: maternal age at delivery, parity, marital status (married or single), race (white/coloured/black/Asian), gestational age (weeks), birth weight (grams), age at admission to the NICU (hours), and duration of NICU stay (days), ventilation (days) and hospitalisation (days). Outcome variables included death before discharge and the duration of stay in the NICU, ventilation and hospitalisation.

Mothers were classified as having received inadequate antenatal care if they had had fewer than 3 visits. While this definition may be inappropriate, because many mothers tend to book late,³ it was in common use at Johannesburg Hospital during the study period and was therefore used in this study. Furthermore, in a study by Kirtley *et al.*,⁴ infants of mothers who had had no antenatal care or 1, 2 or 3 visits had similar outcomes when compared with those who had had more than 3 visits.

Statistical analysis, including multivariate analysis, descriptive statistics, correlation *t*-tests and χ^2 -square analysis, was done on a personal computer using STATPAK version 4.1 (Northwest Analytical, Portland, Oregon).

Results

A total of 155 records was reviewed. The majority of patients were black (127 of 155; 82%). The mean gestational age (\pm SD) was 34,4 \pm 3,9 weeks and the mean birth weight 2 018 \pm 807 g. The mean age at admission to the NICU was 5,1 \pm 10,2 hours, the duration of ventilation 5,2 \pm 5,9 days and the duration of hospitalisation 18,7 \pm 16,8 days. The overall mortality rate was 17%.

The booking status of 4 mothers was not available, so these patients were excluded from the subsequent analysis. Mothers who had inadequate antenatal care were more

likely to be black and single than their adequately booked counterparts, and on average were younger (Table I). Significantly more babies of unbooked mothers were admitted to the NICU (72 of 628 v. 79 of 3 373; $P < 0,0001$; odds ratio (OR) 12,29; 95% confidence interval (CI) 7,79 - 19,05).

Table I. Comparison of booked and unbooked subgroups

	Booked		Unbooked		P-value
No.	79	52%	72	48%	
Black	57	72%	66	92%	0,0034
Married	22	28%	6	8%	0,0000
Neonatal mortality	10	13%	13	18%	NS
Maternal age at delivery (yrs)	27,7 ± 6,6		24,7 ± 5,9		0,0044
Parity	1,4 ± 1,2		1,4 ± 1,3		NS
Gestational age (wks)	35,3 ± 3,9		33,2 ± 3,7		0,0005
Birth weight (g)	2 282,6 ± 868,6		1 714,5 ± 628,2		0,0000
Admission age (h)	6,3 ± 12,5		3,44 ± 6,7		NS
Ventilation (d)	4,6 ± 5,5		6,0 ± 6,6		NS
NICU stay (d)	6,1 ± 5,8		8,0 ± 7,2		NS
Hospital stay (d)	15,8 ± 17,1		22,9 ± 15,8		0,012
5-min Apgar score	7,7 ± 2,1		7,4 ± 2,1		NS

The mean duration of ventilation was similar in the two groups; however, significantly more babies born to unbooked mothers needed to stay in the NICU for over 1 week (29/72 v. 19/79; $P < 0,05$; OR 2,10; 95% CI 1,06 - 4,16), and the duration of hospitalisation was significantly longer for the unbooked group (Table I). These results are probably related to the fact that both mean birth weight and mean gestational age of babies born to unbooked mothers were significantly lower than those of babies in the booked group (Table I). In multivariate and frequency analysis, booking status was not an independent predictor of any of the above outcome variables. The mortality rates for the booked and unbooked groups were comparable (Table I).

Discussion

Identification of neonates likely to have a poor outcome and/or require a prolonged stay in the NICU is necessary to maximise the benefit of this scarce resource. In this study, although unbooked status increased the likelihood of requiring admission to the NICU, once in the unit the outcome for the unbooked group was comparable to that of the booked group. Although more babies born to unbooked than to booked mothers had an NICU stay longer than 1 week, and on average the unbooked group spent longer in hospital, this reflects their lower birth weight and gestational age and not more complicated disease or greater morbidity. Maternal booking status alone was not predictive of death or duration of ventilation or hospital stay. We therefore conclude in the context of this particular sample that maternal booking status should not be factored into the criteria for admission to an NICU. It might be important for other units to evaluate this aspect of neonatal care, since the previously acknowledged association between unbooked status and perinatal morbidity in South Africa⁸ could influence the nature and quality of care given to such infants.

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