SHORT REPORT

More and earlier surfactant for preterm infants

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Surfactant administration to infants born at less than 32 weeks gestation was compared between two time periods (1 April 1994 to 31 March 1996 and 1 April 1999 to 31 March 2001). Overall administration increased significantly from 41% to 54%, and within one hour of birth from 13% to 60%. Regional data collection and feedback helps promote quality improvement and implementation of published evidence and guidelines.

Preterm neonates are at risk of death or disability from respiratory distress syndrome (RDS) due to surfactant deficiency. Prophylactic administration of intratracheal natural surfactant can reduce the development of pneumothoraces, pulmonary interstitial emphysema, and bronchopulmonary dysplasia as well as decrease the risk of mortality.[1] The effect of surfactant administration is maximised by administration immediately after birth, in that seven more lives are saved for every 100 treated with rescue surfactant—that is, surfactant given once RDS has become established.[2] In 1998 the British Association of Perinatal Medicine produced guidelines for the management of neonatal RDS. These recommended that ''all infants born at less than 32 weeks gestation should be given surfactant at birth if they need intubation … Many neonatologists choose to intubate all infants less then 29 weeks gestation at birth in order to administer surfactant, and this is reasonable practice''.[2]

The objective of this study was to document the changes in surfactant administration by comparing two cohorts that consisted of all the infants who received neonatal intensive care (NIC) in Northern Ireland during the two year periods 1994–1996 and 1999–2001. We hypothesised that a collaborative quality improvement initiative would result in improvement in the timely administration of surfactant.

METHODS

The Neonatal Intensive Care Outcomes Research & Evaluation (NICORE) group was established in 1993.[3] All NIC units in Northern Ireland prospectively collected data using a NICORE proforma completed for each infant who received NIC within the first 28 days of life. These were analysed using the Statistical Package for Social Sciences for Windows version 10 (SPSS Inc, Chicago, Illinois, USA). Surfactant administration was compared between the two time periods using the χ^2 test.

RESULTS

In Northern Ireland, 419 and 427 infants were born at less than 32 weeks gestation and received NIC during the two study time periods (1 April 1994 to 31 March 1996 and 1 April 1999 to 31 March 2001 respectively) (table 1). There were significant increases from 41% to 54% in overall surfactant administration and from 13% to 60% in administration by age 1 hour ($p<0.05$). Table 1 also shows the numbers of infants who were intubated for resuscitation at birth and received surfactant. There were significant increases from 55% to 91% in overall surfactant administration to these infants, and from 17% to 82% in administration by age 1 hour ($p<0.05$).

During the first study period, 187 of these infants were born at less than 29 weeks gestation compared with 212 infants during the second period (table 2). There were significant increases from 65% to 94% in intubated infants who received surfactant, and from 16% to 83% in those receiving the first dose by age 1 hour ($p<0.05$).

DISCUSSION

This study of all infants who received NIC in a geographically defined regional population shows significant increases in the administration of surfactant to preterm infants and in those receiving the first dose by age 1 hour. Although the BAPM guidelines were published in 1998, one year before the second study period,[2] it is not possible to directly link these changes to the quality improvement work undertaken by NICORE. However, feedback from the participating units has confirmed that the regional approach to data collection and quality improvement led by a representative multiprofessional steering group, with annual feedback of results to each unit, has helped encourage local attention to and implementation of published evidence and guidelines. Audit results were provided confidentially to each participating unit as standardised reports, together with individual unit summaries and anonymised comparisons with other similar sized units. As the Vermont-Oxford network group has already shown, there are significant barriers to the widespread introduction of optimal use strategies.[4] However, multifaceted interventions to promote evidence based surfactant administration have the potential to change the behaviour of health professionals and promote evidence based clinical practice.[5] Recent data published from this group indicate considerable opportunity for improvement in the timing of initial surfactant treatment with the recommendation that ''each NIC unit create a multidisciplinary team to review the available evidence and assess their own unit's practices''.[6]

Although these results are encouraging, the published report of the results of the CESDI project 27/28 was critical of the timing of surfactant administration to infants born at 27–28 weeks gestation. It recommended that national guidance be developed on the timing and gestation at which prophylactic surfactant should be given and the indications for repeated doses.[7] We have analysed our results using a cut off at 1 hour after birth, but it is recognised that the earlier surfactant is administered after birth, the greater the potential benefits in preventing the development of RDS. The importance of administration of antenatal corticosteroids to mothers at risk of delivery of a preterm infant should not be forgotten.

Abbreviations: RDS, respiratory distress syndrome; NIC, neonatal intensive care

Table 1 Intubation and surfactant administration for infants born at less than 32 weeks gestation

	Period 1	Period 2	% increase (95% CI)
Born <32 weeks gestation	419	427	
Received surfactant	171 of 419 (41%)	223 of 414 (54%) missing = 13	13% (6 to 20)
Received surfactant within 1 h of birth	22 of 171 (13%)	115 of 192 (60%) missing = 31	47% (38 to 56)
Intubated for resuscitation	151	148	
Intubated and received surfactant	83 of 151 (55%)	133 of 147 (91%) missing = 1	36% (26 to 45)
Intubated and received surfactant within 1 h of birth	14 of 83 (17%)	93 of 113 (82%) missing = 20	65% (55 to 76)

Table 2 Intubation and surfactant administration for infants born at less than 29 weeks gestation

	Period 1	Period 2	% increase (95% CI)
Born <29 weeks gestation	187	212	
Intubated at birth	104 of 186 (56%) missing = 1	130 of 212 (61%)	
Intubated and received surfactant	68 of 104 (65%)	121 of 129 (94%) missing = 1	29% (18 to 39)
Intubated and received surfactant within 1 h of birth	11 of 68 (16%)	86 of 104 (83%) missing = 17	67% (55 to 78)

In summary, the completion of the centralised NICORE data collection has been accepted as a routine task by neonatal teams throughout Northern Ireland. It is fundamental to the compilation of the comprehensive regional database which facilitates research and the ongoing promotion of quality improvement for the high risk population of infants requiring intensive care in the neonatal period.

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