

Awareness of preterm infants' behavioural cues: a survey of neonatal nurses in three Scottish neonatal units

Since the early 1980s, in neonatal practice, there has been an increasing awareness of the need to balance medical interventions against the need to provide individualised, holistic, family-centred care for preterm infants. In the neonatal intensive care unit infants can be subjected to repeated disturbance and often unpleasant procedures. It is becoming good practice to recognise the needs of preterm infants by interpreting their communication signals. This can only be achieved when caregivers are able to recognise these signals and are willing to act on them. This paper reports on a study to investigate staff awareness of these signals.

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As part of their care, infants in the neonatal unit are frequently subjected to repeated disturbance and unpleasant or painful procedures, often observed by their parents^{1,2}. Both infants and their parents may suffer long-term adverse consequences from the experience of unrecognised repeated trauma and this can interrupt the normal attachment and bonding process^{3,5}. Enabling preterm infants to have their needs met relies on the ability and willingness of observers to recognise and act on their behavioural cue signals^{6,7}. This paper reports on a study to investigate staff awareness of these signals and how this knowledge impacts on practice.

Background

Dr Als undertook seminal work proposing a synactive model of development specific to preterm infants, that provides a framework for understanding their behaviours³. These behaviours are grouped according to five physiological and behavioural subsystems of functioning and include an integrated set of autonomic (respirations, colour, tremors/startles), motor (tone, movement and postures), state (ranges of state and patterns of transitional states), and interaction-attention (range and transition into and out of alertness) behaviours⁴. The development of one subsystem is dependent on the stability and the emergence of one of the others; all are interdependent and interrelated⁴. In

healthy full-term infants these systems generally work smoothly promoting and supporting each other⁸, enabling the infant to mount a defence against inappropriately timed or inappropriately intense care interventions⁴. However, in the preterm infant these systems are not fully developed, leading to behaviours characterised by disorganisation and signs of stress⁴. Preterm infants are more dependent on their immediate environment to help support and maintain their equilibrium.

Developmental supportive care is a philosophy of care that includes a variety of activities that manage the environment and individualise the care of the preterm infant based on behavioural observations, with the goal of promoting as stable, well organised and competent an infant as possible^{4,7}.

Overview of existing research

There is good evidence for developmental supportive care in neonatal practice based on numerous research studies^{4,5,9,10}.

Developmental supportive care strategies include the following element:

- Management of the environment
 - Flexed positioning
 - Provision of positive touch experiences
 - Non-nutritive sucking
 - Activities that promote self-regulation and state regulation based on the infant's behavioural and physiological cue signs.

Keywords

developmental supportive care; cue-based care; routine-based care; behavioural cue signs; training; improvement in knowledge and skills

Key points

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1. Neonatal nurses play a vital role in recognising and responding to cue signs.
2. All caregivers should be taught how to respond appropriately to infants' cue signs.
3. Developmental supportive care interventions can help infants to respond positively to caregivers and their environment.

- Close collaboration with parents in all aspects of care interventions

While there is no robust cause and effect evidence for the benefits of developmental supportive care, by incorporating the above elements in caregiving interventions, trends have emerged toward improved infant growth, decreased respiratory support, decreased length of stay and decreased hospitalisation costs^{7,11,12}.

Researchers do caution that the positive trends may be affected by many other variables over time, eg improved use of antenatal steroids, use of artificial surfactant, improved ventilatory techniques¹⁰. No negative outcomes have been reported when developmental supportive care strategies are used¹⁰.

The most recent Cochrane review suggests that there is a need for well conducted, controlled studies into the benefits of single or multiple developmental care intervention¹³. However, for studies to be undertaken caregivers require the knowledge and skills to identify infants' cue signs and intervene appropriately.

Along with Als, Barnard and Brazleton were among the earliest researchers to identify infant communication signals and to determine the importance of appropriate interactions by caregivers^{3,8,14}. As a result, frameworks have evolved to aid in the assessment of infant behaviour. Many originated in the assessment of term infants' behaviour, with several elements being extrapolated to the preterm population with relative success^{5,6}. Barnard developed a framework to support the interactions between infant and caregiver based on the assumption that infants and caregivers respond and react to each other, adapting behaviour to accommodate or modify the other's behaviour in a positive way¹⁴. This framework has proved valuable in supporting and promoting positive parent-infant relationships¹⁴. Brazleton and colleagues devised a similar framework, the Neonatal Behavioural Assessment Scale⁸ that was concerned with the behavioural evaluation of term babies and their interaction with their caregivers. Again, this type of behavioural assessment proved valuable in promoting positive relationships between infant and parent¹⁵.

The Assessment of Preterm Infant Behaviour (APIB) and The Neonatal Individualised Developmental Care and Assessment Program (NIDCAP) were devised by Als^{3,4}. These frameworks were intended to provide the caregiver with



FIGURE 1 A positive touch experience.

information regarding the behaviour of preterm infants in response to their environment. Ways of adapting and providing a more supportive environment for preterm infants to grow and develop were also suggested.

A meta-analysis of the studies of the NIDCAP assessment tool suggests an improvement in developmental outcomes¹⁰. Although there are studies supporting the practice of developmental care, there are few, which question whether behaviourally supportive care is actually being provided in clinical practice¹⁶⁻¹⁸.

These studies were undertaken in South East Asia – interestingly the findings were similar to the findings from the Scottish sample group. In all studies the respondents recognised the importance of cue-based care, but were inhibited from incorporating this concept into daily practice for various reasons.

No studies could be located in the UK that explored caregivers' awareness of infant cues, whether their awareness affected the care the infant received, or whether staff taught parents about infant cues. To explore these aspects, the following study was undertaken.

Research study methodology

Research questions

The following questions emerged from the literature review and were identified as being worthy of further investigation.

- Are caregivers aware of infant cue signs?
- If cue signs are known, is this knowledge applied to the way care giving interven-

tions are performed?

- If staff recognise cue signs but do not provide behaviourally sensitive care, what factors inhibit them from doing so?
- Are parents taught how to recognise and respond to their baby's cue signs?

Research design and methods

Quantitative approaches have been used to measure competence, knowledge and understanding in the evaluation of interventions, as well as providing data on the delivery and efficacy of nursing interventions¹⁸.

The population comprised all the nursing staff from three NICUs in the Central-Eastern area of Scotland, for which one ethics committee has ethical responsibility. The whole population was invited to participate allowing self-selection of volunteers, thus providing a non-probability sample.

To effectively recruit as many of the target population as possible, e-mail was used. Advantages of this strategy included ease of contact between researcher and the participants and reduced costs of paper and postage. A disadvantage was that participants would require a reasonable level of computing skills. However, paper copies of the questionnaire could be sent if requested.

The unit manager was contacted first through an introductory email. That included general information regarding the study and a request that managers forward a participant information sheet and questionnaire to each of their nursing staff

email system. All managers consented.

Potential participants were given a three week period in which to return the questionnaire to the researcher. After this a reminder email was sent via the managers to the staff reiterating the importance and value of their participation. Only one reminder was sent after which data collection closed, the managers were informed and asked to forward thanks from the researcher to the participants.

Data analysis

With some technical assistance quantitative data were analysed descriptively using Microsoft Office Excel 2007. There was manual content analysis for the responses to the open-ended questions.

Demographic results

Eleven out of 45 staff (11/45) in Unit 1 participated, 18/44 in Unit 2 and 14/45 in Unit 3, giving an overall response rate of 31%. All respondents were female. Their nursing experience varied (TABLE 1) but overall, the majority of staff from the three units had greater than ten years of neonatal nursing experience (73%).

Neonatal nursing experience	Unit 1	Unit 2	Unit 3
0-5 years	27%	33%	0%
6-10 years	18%	0%	2%
>10 years	54%	66%	92%

TABLE 1 Participant's neonatal nursing experience.

Demographic data

The majority of respondents were very experienced in neonatal care and this could be one of the reasons that knowledge of cue-based care was so evident. This finding reflects the fact that developmental supportive care has been gaining momentum in clinical practice for the past twenty years^{3,11}. Although some of the respondents had less than ten years experience, they too displayed a relatively high level of knowledge regarding cue-based care. It is unclear if this group of respondents gained knowledge from neonatal training programmes or from experienced staff. There is potential to improve interest and knowledge among staff by implementing more formal training programmes. This was highlighted in a study by Liaw et al¹⁸ where staff knowledge and awareness of cue-based care was tested before and after the

implementation of a training programme. The findings suggested that knowledge improved following the training programme. Future studies to determine how long knowledge is retained by nursing staff and if this sustained knowledge impacts on the provision of cue-based care in clinical practice, may be helpful.

Main findings

Recognition of infant cue signs

All but one of the participants from the three NICUs stated they recognised infant cue signs. This is important information for the day-to-day management of the preterm infant in relation to appropriate timing of care provision and assessment of responses of the infant to care giving interventions. This response was reinforced with the answers to the subsequent question where the participants described a wide range of physiological and behavioural cue signs. The description participants provided of infant cues correlates well with the literature base.

There is an abundance of clinical studies and review papers describing infant cue signs predominantly in the term infant^{8,14,19} however, data have been emerging from the literature suggesting that preterm infants also have the ability to communicate and interact with their caregivers^{4,6,20}.

Als postulates that each infant has his own story to tell, a story that directly communicates his needs and wants⁶. Based on the results of the study reported here, there is evidence to suggest that some nursing staff are able to interpret this story, by recognising infants' cue signs. However, the questionnaire format enabled the participants to think about their answers and consult the relevant literature¹⁷, suggested by the formal language and listing under headings used by a minority of the participants. Therefore the extent of staff recognition of cue signs remains unclear. A more valid understanding of staff recognition of cue signs might have been achieved using a one-to-one interview²¹.

Knowledge of a wide range of infant cue signs

The majority of participants described a wide range of infant cue signs, ranging from the easily recognisable to the more complex. The cue signs described within this study correlate well with the

literature^{4,8,15,19,22}. Respondents appeared to recognise more disorganised signs than organised. This is useful for developing clinical practice, as staff should provide behaviourally supportive care to preterm infants by intervening whenever infants are displaying signs that they are in discomfort. However, it would be more useful for staff to work towards providing care interventions that avoided babies becoming distressed in the first instance. Findings suggest that some but not all nursing staff provide such interventions. Further study is required to ascertain the reasons why this is the case.

Provision of cue-based care

Respondents described various ways of responding to infants' cues, adapting their caregiving interventions to suit each individual baby. This included 'cluster care' practices and providing 'time out' for infants who displayed disorganised cues. If this occurred when medical staff were performing non-urgent interventions, nursing staff would request that the procedure be stopped and re-commenced once the baby became more settled. Alternatively, when the baby was displaying signs of readiness for interaction then parents were encouraged to interact with their baby and oral feeding was supported at this time. The findings suggest that routine-based care is being abandoned for a more behaviourally supportive method of providing care.

Although 33% of staff stated the care provided was always influenced by recognition of cue signs, the remainder of the participants stated care provision was only influenced some of the time. There appears to be a number of staff who do not recognise infant cue signs and therefore do not provide behaviourally supportive care. Unfortunately there are no data available to explain why this is the situation in clinical practice. It would have been useful to have incorporated a secondary section to this question, that if the answer was 'sometimes', the participants would be asked to explain why they did not recognise cue signs all of the time. This is an area of practice that requires further investigation and development.

Teaching and supporting parents

The findings suggest that some staff are teaching and supporting parents in getting to know their baby and to respond appropriately to their baby's communication



FIGURE 2 Wrap bathing: promoting state regulation.

signals. Browne and Talmi²³ suggest that improving this early relationship makes a positive contribution to the enhancement of future infant-parent relationships. Researchers suggest that the birth of a preterm infant and subsequent stay in a neonatal unit disrupts the expected development of interactive skill for both the parent and infant^{6,24,25}. Other researchers assert that supportive interactions with parents involve availability to the infant, ability to focus on the baby's cues, recognition of organised and disorganised behaviours and being aware of the impact the environment has on the infant^{3,6,23}.

Symington and Pinelli¹⁰ and Als et al¹⁸ suggest that supporting appropriate interaction may increase neurobehavioral organisation and improve long-term developmental outcomes. However, findings from this study indicate that 19% of participating staff do not respond to parents who recognise their infant's cue signs. Based on the literature available suggesting the benefits of improved interaction between parents and infants, this is a disappointing unexplained finding. Understanding preterm infant behaviour is essential in the promotion of a good relationship between parent and child^{15,23}. Further research is required to determine the reasons why some staff do not always respond to parents when they recognise their own infant's communication signals and in what way this can be improved.

Inhibiting factors for nursing staff

It was important to gain an insight into the reasons why nursing staff are unable to provide cue-based care and if necessary to suggest ideas of how to overcome this problem. However, the findings have generated more questions than answers and this has highlighted one of the drawbacks of using a questionnaire as a method of data collection. Researchers have suggested that participants are unable to expand on the answers they give and also these answers have to be taken at face value^{26,27}. This is certainly the case with the following data; overall eleven members of staff selected the option of parental pressure inhibiting cue-based care.

The selection of this option appears to be slightly contradictory, as staff have described in detail how parents are taught and supported in providing cue-based care, at least some of the time. It would have been useful for staff to be able to expand on this choice and to explain in detail in what way they found parents to be a factor in inhibiting cue-based care. Another similar finding was the factor of peer pressure inhibiting the provision of cue-based care. It would have been useful to know in what way a member of staff has an influence over others in the way they provide care to their allocated baby. For example, one member of staff did explain "That it depended who was in charge of the unit".

It may be that nursing staff require more information regarding the concept and

potential advantages of providing cue-based care in order to be more confident in incorporating this care intervention into their normal practice.

Unit routine was selected eight times by participants and again it would have been useful to know in what way this affects the provision of behaviourally supportive care.

The most commonly selected inhibitory factors were babies' clinical condition and medical interventions. Both these factors go hand-in-hand in that babies who are clinically unstable are more likely to require a higher level of medical intervention. However, this is also a time when behaviourally supportive care would be useful in minimising the infant's stress^{3,4}. Again providing more detail of how these factors inhibited cue-based care would have been very helpful.

The findings of South East Asian studies¹⁶⁻¹⁸ concluded that although nursing staff appeared to be aware of cue-based care they did not actually perform this in practice and care-giving activities were predominantly routine-based. These studies cited lack of knowledge, incomplete collaboration with other team members, or insufficient support from the administrative systems as being barriers to nurses providing cue-based care. None of the above factors were highlighted as being barriers to the provision of cue-based care by the participants in this study.

Strengths and limitations of the study

The strength of this study is that the research questions have been answered. The findings have provided an insight into nursing staff knowledge and awareness of infant cue signs and the impact this has on their clinical practice. These findings may provide motivation and guidance for nursing staff to continue developing this important care giving intervention. They may also encourage nursing staff who are skilled in the provision of cue-based care to help improve the knowledge and understanding of fellow colleagues who are not providing cue-based care. Neonatal staff may also find that by implementing established training programmes, eg NIDCAP or Brazelton techniques, care provision can be enhanced.

However a few limitations were also identified. There was a relatively low response rate, with less than one third of the target population responding. Parahoo

suggests that a reason for low response rates when assessing knowledge of health professionals is that staff may feel threatened by this despite the promise of confidentiality²⁸. This may also account for a high number of partially completed questionnaires; five members of nursing staff did not answer four questions. Bowling suggests that because participants have to make use of their own time and effort to complete questionnaires, this could also be a reason for low response rates²¹. Given the small sample, the generalisability of the findings is reduced.

Participants were recruited from three similar Scottish NICUs within a defined geographical area. This in itself is a further limitation, as it is possible that nursing staff from other NICUs in Scotland and indeed the UK may have a different viewpoint of the provision of cue-based care. Therefore, it may be useful in the future to extend the sample to include all UK NICUs.

Conclusions

The study concluded that:

- Staff do recognise infant cue signs
- Staff possess knowledge of a wide range of different cue signs
- This knowledge does influence staff in providing behaviourally supportive care but only some of the time.
- Parents are taught and supported in providing cue-based care for their infants, some of the time.

This information has implications for practice regarding the concept of cue-based care and how it can be facilitated on a busy neonatal unit as opposed to routine-based care. It is likely that more resources would be needed for further training to raise awareness of the benefits for staff and parents. Nursing staff who are skilled in the provision of cue-based care should be encouraged to help to improve the knowledge and understanding of fellow

colleagues who are not providing cue-based care. The neonatal nurse is in a unique position to promote a supportive environment, enabling preterm infants to interact appropriately with their environment and care providers.

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