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Original Article

Identification of premature infant states in relation to introducing oral feeding

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ABSTRACT

Background: Recognizing oral readiness signs in infants is vital when planning the introduction of oral feeding. However, with premature infants, this can be difficult to gauge accurately because of immature development.

Methods: Twenty three staff from a level 2 neonatal unit participated. A questionnaire elicited knowledge about oral readiness and other factors related to oral feeding with premature infants. Participant knowledge of the written Als (1986) infant state descriptors was completed. A comparison was made of the skills in identification of the various infant states on video without and with written descriptors (Als, 1986). Correlations investigated if years of experience and grade had any relation to accurate infant state identification.

Results: There was wide variation in the type of training about premature infant feeding participants had received. Participants (65%) recognized the importance of oral readiness signs in relation to feeding development. A Wilcoxon signed ranks test revealed no significant differences in ability to identify infant states without and with the written Als (1986) descriptors when observing infant video materials. When not using the written descriptors, there was a strong negative correlation between grade and the identification of the [Active sleep] state, ($p < 0.01$), and a strong positive correlation between grade and the identification of the [Drowsy] state, ($p < 0.05$). There were no strong correlations between grade and years working when using the written descriptors.

Conclusion: Oral readiness signs are important when introducing oral feeding with premature infants. However, accurate identification of oral readiness remains challenging.

1. Introduction

Premature infants are at risk of feeding difficulties, both establishing feeding, and maintaining competent feeding skills over time (Harding et al., 2015; Hawdon et al., 2000). For feeding to be successful, sucking, swallowing and breathing need to be coordinated, but is rarely established before 34 weeks gestation (Gewolb et al., 1999; Jadcherla, 2016). As premature infants develop, they begin to show oral readiness signs of either crying or becoming awake or alert before they are due their feed (Kish, 2013).

Introducing oral feeding with premature infants is influenced by a variety of factors including post menstrual age, variability with demonstration of infant behavioural states and physiologic stability (Eichenwald et al., 2001; Jadcherla, 2016; Ludwig, 2007). Premature infants with low gestational ages are more at risk of having a range of additional health needs and medical conditions (Moore et al., 2012). Significant health difficulties can delay the establishment of oral feeding with longer term implications for motor and sensory development during a period of critical brain development (Browne, 2008; Gewolb and Vice, 2006; Jadcherla, 2016; Moore et al., 2012).

1.1. Oral readiness

As an infant matures, oral readiness signs are emerging

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although these signs may initially be variable (White-Traut et al., 2005). *Alert* states are associated with being an indicator of maturity as well as supporting successful oral feeding (Howe et al., 2007; Kish, 2013; Thoman, 1990; McCain, 1992; Pickler et al., 2006). Specifically, developments with both sucking and *alert* behaviours in older premature infants lead to better oral feeding (Kirk et al., 2007; White-Traut et al., 2013). There is variation in the identification of the most appropriate oral readiness state that supports successful oral feeding. Some authors comment that *alert* states, including *quiet alert* increase feeding efficiency (Griffith et al., 2017; Harding et al., 2014; McCain and Gartside, 2002; Medoff-Cooper et al., 2000), in contrast to the *active awake* state (McCain, 1992; Pickler et al., 2006). More recently, *crying* prior to a feed has been identified as a good predictor of feeding success (Griffith et al., 2017).

Published descriptors are available that define and describe the variety of infant states. Als (1986) refers to two sleep states, *active sleep* and *deep sleep*, as well as a distinct *drowsy* state. Alert states include *active awake*, *quiet alert* and *crying*. Similarly, Brazelton and Nugent (1995) also describe awake states as *alert*, *active alert* and *crying*. In addition, they describe the sleep states as *drowsy*, *deep sleep* and *light sleep*. Other researchers have used different ways of describing infant states in reference to their own work, and although Holditch-Davis (1990) refers to similar alert and sleep states as Als (1986) and Brazelton and Nugent (1995), she also describes additional drowsy states, namely, *sleep – wake transition*; *drowsy* and *non – alert waking* activity. Although these descriptive differences appear small, it possibly suggests that different practitioners identify similar infant states in qualitatively different ways.

1.2. Current practice in relation to the introduction of oral feeding

Timing for the introduction of oral feeding with premature infants varies because of differing rates of maturation and the range of additional problems that the infants may experience (Griffith et al., 2017). Neonatal practitioners may focus on an infant's ability to manage oral stimulation in readiness to trial breast or bottle feeds, toleration of enteral feeding, weight gain and monitoring of infant states (Kirk et al., 2007). An important approach is cue based feeding, where the feeder is guided by the infant's responsiveness to feeding rather than volume (Ludwig and Waitzman, 2007). The cues that infants therefore produce are important for both carer interpretation and responsiveness, and can result in quicker discharge home (Chrupcala et al., 2015; Kirk et al., 2007; Wellington and Perlman, 2015).

There are some published assessment tools to support the assessment of neonatal feeding skills (Neonatal Oral Motor Assessment Schedule, NOMAS; Palmer, 1993; Early Feeding Skills Assessment; Thoyre et al., 2005; The SOFFI, Supporting Oral Feeding in Fragile Infants, Ross and Philbin, 2011). Currently, no randomized controlled trials have evaluated any of these assessment tools or those which are for determining oral readiness (Crowe et al., 2012; Da Costa et al., 2008). There are few studies which investigate healthcare practitioner and carer ability to identify infant oral readiness signs and states.

2. Objectives

The aim of this study was to assess nurses' understanding, knowledge and ability to identify infant oral readiness signs with premature infants.

It was hypothesised that nursing staff would:

1. Demonstrate knowledge of factors related to the development of oral feeding with premature infants
2. Not be aware of any standard published protocols relating to oral readiness and oral feeding
3. Be confident in identifying both written descriptors and video recordings of infant oral readiness states
4. Be able to accurately identify both written descriptors and video recordings of infant oral readiness states better compared to their peers with fewer years' experience and those on lower grades

3. Methods

3.1. Design

This study sought to investigate neonatal nursing practitioner understanding of the importance and identification of infant oral readiness signs when preparing a premature infant for oral feeding. A questionnaire was devised for the purpose of this study. The questions were formulated following discussion with the senior neonatal team about important factors to consider when introducing oral feeding with premature infants.

A total of ten questions were developed and included the following: demographic characteristics of the participants; training undertaken about feeding the premature infant; knowledge of premature infant feeding and any specific protocols; and understanding of infant states. Participants were asked to; i) match written infant states with Als (1986) written descriptors; ii) watch video clips of 5 infant states, (each state was of 1 min duration) and to identify the infant state they observed without the Als (1986) written descriptors; and iii) repetition of the video task with the Als (1986) written descriptors as an aid.

The initial questionnaire designed was piloted by three healthcare practitioners (one a nurse, a speech and language therapist and an occupational therapist) to evaluate and agree that the concepts and wording used would be relevant and meaningful to the participants. The study protocol was confirmed as being a Clinical Audit, and therefore, an application to the local NHS Research Ethics Committee was not required. However, as this was a collaborative project with City, University of London, ethics approval was sought and was approved by the Division of Language and Communication Science Ethics Committee, City, University of London. All potential participants were provided with an information sheet explaining the project rationale. They were informed that to protect confidentiality, all data collected would be allocated a code rather than including names. Participants were aware that they could withdraw from the project at any time without any risk of being penalised. In addition, if they had any concerns about the conduct of the study, they were provided with details of relevant contact personnel at City, University of London. Written consent was obtained from participants prior to data collection.

As part of the study involved observing video recordings of a variety of infant states, the investigators identified five recordings including one *quiet alert* recording of an infant breast feeding, and one *quiet alert* recording of an infant bottle feeding. The *quiet alert* state was selected as it is often described as a state that is important in relation to infant feeding (McCain and Gartside, 2002; Griffith et al., 2017). In contrast, a clip of an infant in a *deep sleep* state, another in an *active sleep* state, and a *drowsy* infant were selected. To establish agreement of the states selected, interrater reliability was established by the first researcher coding the recordings independent from the second researcher. Interrater reliability was determined using Cohen's Kappa coefficient. Interrater reliability can be interpreted as very good to excellent if the observed Kappa coefficient is 0.75 or higher. The observed Kappa between the two researchers was 0.9048, SE = 0.0657, with a 95% confidence interval

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