Shaping the Brain with Developmental Care? (Symposium Organised by the European Association for Developmental Care (EADCare))

Understanding Haemodynamic Transition at Birth: From Bench to Bedside

Nursing Education

REFERENCES


The newborn human infant particularly the preterm infant was previously regarded as a sensory-motor organism without consciousness. By the introduction of developmental care neonatal nurses and doctors commenced to regard the preterm patient as an autonomous person with consciousness although at a minimal level. The thalamocortical connections from the sense organs are established from about the 23rd gestational week, indicating that the neuronal global workspace can function (see ref 1). From about 25 weeks cortical responses in the somatosensory area have been recorded by near-infrared spectroscopy (NIRS) and facial expressions similar to adults sustaining pain have been observed in preterm infants after 25 weeks. The preterm infant is aware of its body, itself and to some extent of the outside world. It recognises faces, vowels and smells it has been exposed to. Recent NIRS studies have shown that the preterm brain reacts differently to female versus male voices. It expresses emotions like joy. By functional MR it has been demonstrated that there is a spontaneous resting activity encompassing the somatosensory, auditory and visual cortex, although there is less activity in association area and the prefrontal cortex as compared with adults. There is an incomplete default mode network which is assumed to be related to consciousness.

More than 900 RDs are already indexed and 650 more will be freely available in 7 languages. The European Association for Developmental Care is a network of RDs, families, patients, nurses and doctors. It has created the Orphanet Functioning Database. This project is funded by the French Caisse Nationale de Solidarité pour l’Autonomie. It assesses the social burden of RDs.

There are many parameters that influence the haemodynamic situation, including heart rate, stroke volume, cardiac output, and blood pressure. As transition of the newborn is a very dynamic situation, studies have to follow a timeline in order to cover all changes over time. Furthermore, it has been shown that the main driving force for establishing lung perfusion is aeration of the lungs. A further important aspect is that it has been shown in experimental animal experiments that clamping the cord results in no impact on the haemodynamic situation, as by clamping the cord there is a loss of blood volume of the placenta resulting in a significant drop in venous return to the right atrium. A quick switch of the shunt flow direction via the open ductus arteriosus from right-to-left to left-to-right is able to compensate for that. If there is no left-to-right shunt via the duct in this situation this may impair blood flow to organs, as for instance the brain (Urlesberger et al, Neonatology 2013). All these data have resulted in a more profound discussion of the possible benefits of delayed cord clamping.

At the moment we have data to different aspects of the haemodynamic situation in human studies, including ductal shunting (van Vonderen et al, Arch Dis Child Fetal Neonatal Ed 2014) behaviour of stroke volume and cardiac output (van Vonderen et al, Pediatric Res 2014, Noori et al Pediatr 2013). The presentation will give an overview of all these publications, adding data that are about to be published.

There is increasing evidence highlighting that missed deterioration in hospitalised children is a significant problem with increased risk of mortality and morbidity (Odetola et al 2007). Currently Paediatric Early Warning scoring systems (PEWs) are advocated by (CEMACH 2008, DOH 2012) for use as a safety measure to assist in the identification of seriously ill or deteriorating children, in hospital, so that targeted care can be delivered to prevent serious adverse events. However there is a paucity of evidence to inform the development of such scores, with ad hoc score development based on local consensus opinion or inadequately validated scores.

This session will explore the challenges of studying this complex intervention, review evolving evidence, identify gaps in the literature, and make recommendations for future research.