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# The year in review: key research in 2020 - 2021

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# Presentation Outline

*A summary of research 2020 – 2021 which includes:*

- *Feeding* – a broad term which includes a wide range of information about supporting the development of oral feeding
- *Language and communication* – impact & outcomes of supportive communication, specifically in relation to neonatal unit care
- *Environment* – improving early environmental settings for infants and their carers, i.e. FiC
- *Improving our knowledge and understanding of infants born preterm* – specific conditions, procedures and / or new information

# Introduction

## Developments in allied health professionals' role in UK neonatal units: a speech and language therapy perspective

The recent *Getting It Right First Time* (GIRFT) survey (2019) has highlighted the significant lack of allied health professional (AHP) provision in neonatal care in the UK. Speech and language therapists (SLT) are part of the AHP workforce currently under-represented in neonatal care. This article summarises how SLTs are addressing the feeding and early communication service requirements and SLT skills needed to support newborn infants and families, and contributing to the wider multidisciplinary neonatal care team.

# Feeding

Whereas we know core attributes in relation to typical oral – motor and feeding development for preterm infants, there are few large scale studies that analyse what the specific feeding problems are

- **Pados et al (2021)** – Prevalence of feeding problems, 22 studies ( N = 4,381). Overall feeding problems = 42%. Few studies use psychometrically sound assessments of feeding
- **Edney et al (2021)** – Retrospective cohort analysis of infant feeding problems from one neonatal unit - emphasis on those who have brain injury. Brain injury increases the risk of feeding problems
- **Ramaswamy et al (2020)** – SR enteral feeding, early initiation of enteral feeding regimes can decrease risk of NEC or mortality

# Feeding

- **McGrath et al (2021)** – Infants with the weakest suck at 34 weeks PMA continue to be at risk for less effective feeding at 40 weeks PMA. **Park et al (2020)** – measured sucking pressure with healthy term infants, but the clinical application of sucking pressures are not clear
- **Shandley et al (2021)** – Abnormal sucking should be used as a marker for further investigation & evidence of ?brain injury?
- **Majoli et al (2021)** – An investigation of OF introduction and FOF achievement, N = 100 ≤32 weeks GA. PMA for OF introduction 33.6±1.1 week; FOF achieved 35.1±1.5 weeks. Earlier OF introduction = quicker transition to FOF. **Brun et al (2020)** also investigated infants born ≤32 weeks GA & found that median PMA to achieve FOF was 36 weeks PMA. Key factors which impact on oral feeding progress include need for ventilation & respiratory needs, older age when introducing OF

# Feeding

Infants with lung disease are at risk of greater feeding difficulties. Respiratory needs of infants and decisions about when or if to introduce oral feeding continue to be questioned

- **Canning et al (2021)** – SR of infants / children receiving nCPAP or HFNC. Findings insufficient to consider when or if to start OF for infants receiving respiratory support

# Feeding

- **Leibel et al (2020)** – A randomised pilot study comparing continuous positive airway pressure vs. HFNC for oral feeding preterm infants on a Level 3 unit. N = 40, (12 nCPAP, 13, HFNC, 15 unable to complete the study). 82% nCPAP group, and 76% of HFNC group achieved oral feeding



# Feeding

Implementing oral feeding for preterm and term infants with medical problems remains an area where there is still great variation in practice

- **Bakker et al (2021)** – A scoping review of oral feeding guidelines for preterm infants in NNUs. A total of 39 guidelines from UK, US, Canada & Australia considered. NNS (67%) remains the most commonly described intervention; cue-based approaches (39%); swaddling / pacing/ teat flow/ positioning (66%). There are a number of concerns which include an adequate definition of FOF, along with implementation of approaches

# Feeding

NNS dominated the Bakker et al (2021) findings, but it has also been prevalent in publications over the past year. Variable quality studies have continued to note “improvements” for participants receiving NNS as part of a programme to enable progress towards FOF, but rationales remain diverse, and environmental context and wider implementation remain concerning

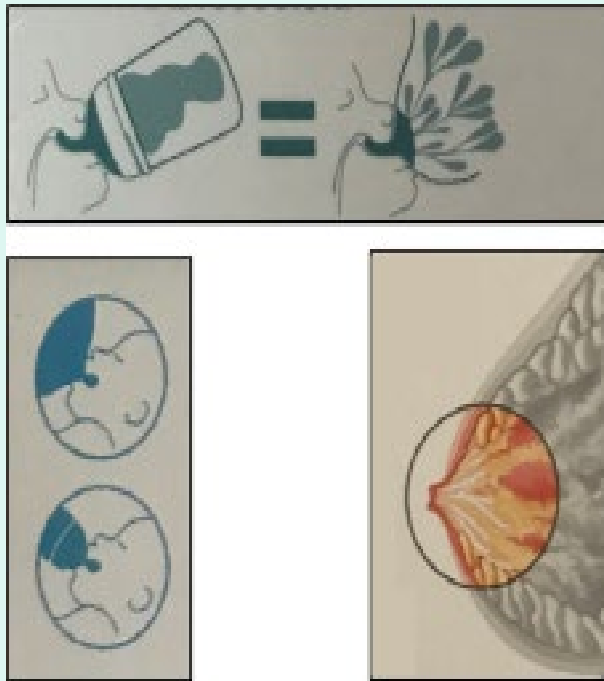
# Feeding

- **Da Rosa Pereira et al (2020)** – N = 74, 2 groups (Control, OS). No significant differences at 7 days. Heart & respiration measures
- **Dur & Gozen, (2021)** - N = 72, 2 groups (Control, OS). Significant differences with lower heart rate and O2 saturation, & better feeding performance with Intervention group
- **Govindarajan et al (2020)** – N = 60, 2 groups (Control, OS +S2S), Intervention, shorter hospital stay, but not feeding efficiency
- **Heo et al (2021)** - N = 186,3 groups (**Control, DST, DST + OS**). Significant differences for DST + OSM
- **Ostandi et al (2021)** – N = 145, 3 groups (**Control, OS, OS + DST**). Feeding readiness significantly better in OS + DST group
- \*\*\***Sasmal et al (2020)** - SR of pre-feeding OM stimulation. 12 eligible studies. What is feeding “progress?”
- \*\*\***Wilson et al (2021)** – There is a lack of consensus for sensory – motor interventions ( including for chewing function) across the age range. Wide variety of OM therapies used

# Feeding

- **Badran et al (2020)** – Transcutaneous auricular vagus nerve stimulation – a rehabilitation programme for infants with specific oro – motor problems
- Problems included HIE – N = 14; 11 preterm, 3 HIE (1,2 & 3, HIE)
- Stimulation x 1 daily during bottle feeds – 2 week programme
- 8/14 achieved “adequate” feeding volumes (16±6 days)

# Feeding



Alcaire et al (2021) –  
Content analysis used to  
critique marketing for  
bottles /teats – 197  
bottles / 71 teats. All  
included information re:  
how to use & clean  
equipment, & MOST  
INCLUDED = bottle feeding  
is equivalent to breast  
feeding

# Feeding

Improving practice through developing neonatal feeding tools or by training yield positive outcomes

- **Kamran et al (2021)** – OFRS / OFQS validation on 30 infants. Good reliability for all sections except maintenance of physiological stability & ability to co-ordinate swallowing
- **Girgin & Gozen (2021)** – NNU nurse training about transitioning infants to FOF. Pre – questionnaire ( $66.8 \pm 6.9$ ); post – questionnaire ( $81.6 \pm 6.8$ ) – 1wk, ( $79.5 \pm 6.5$ ) – 1 month. Least known items were cue based feeding, when to implement OM interventions & how they should be done, & how and when to use side-lying

# Feeding

- **Girgin et al (2021)** – Evaluation of Early Feeding Skills Assessment tool – Turkish validation. N = 107 preterm infants (24 – 36 birth GA; 32 – 43 PMA). Overall content validity = 0.97. Some content variation, e.g. 0.69 – 0.83 for oral – motor function; 0.68 – 0.82 for swallowing co-ordination & 0.84 – 0.93 for physiologic stability
- **Lyu et al (2020)** – Management of OF in Chinese NNUs – a national survey analysing 88 responses. NONE had structured approaches to manage transition from tube to FOF. 61% reported joint medical team decision re: oral feeding. Minimal access to AHPs

# Feeding

## Instrumental assessments :

- **Lagarde et al (2021)** – Use of UC, tongue movements & tongue compression
- **Dharmarathna et al (2020)** –VF analysis of swallowing in 146 bottle fed infants, 0-9 months. 49% at least 1 penetration or aspiration event. Infants with more than 3 sucks per swallow had increased TPT & increased risk aspiration
- **Zang et al (2021)** – Critical analysis of FEES , N = 152, age range 21 days – 18 years. Limited standardized protocol available
- **De Groot et al (2021)** – Response to Armstrong’s work last year – who is feeding the infant?
- **Patel et al (2020)** – Standardized VF procedures to minimize risks for poor feeders



# Feeding

- **Crossley et al (2021)**
  - Five teats examined. Results identified differing flow rates as well as individual variation of flow rates for all teats used on an Australian NICU. Data confirmed variability of flow rates both within and between teats used. Flow rate and variability are important factors to consider when selecting supportive feeding equipment for preterm infants



# Feeding

- **Marshall et al (2021)** – Assessing flow rates of 27 different bottles and teats for neonates. Also in Australia – moderate to high variability between teats & brands
- **Pados & Mellon (2021)** – Effect of thickening on flow rates through bottle teat nipples. Ultra-preemie; Preemie; New Born. IDDSI levels 1,2,3 & 4. Variation was less than 1mL/min up to 82.29mL/min across the range. Increased thickness = decreased flow and increased variability

# Feeding

There is still more to understand & learn about breastfeeding

- **Grace et al (2021)** – SR of safety & efficacy of human based milk fortifier in enterally fed preterm / LBW infants. Human based formula reduces the risk of NEC (RR 0.47, 95% CI 0.22 – 0.98)
- **Williams et al (2020)** –WHO statement in support of BF during COVID -19. BM includes important antimicrobial substances & anti-inflammatory components that can improve an infant's immune system

# Feeding

- **Wener et al (2021)** – An assessment of the impact of BF on length of hospital stay, N = 101. Three groups, BF, BF + bottle, bottle. GA was inversely associated with length of hospital stay. BF does NOT lengthen hospital stay & other factors cause delay
- **Suganuma et al (2021)** – SR & MA of human milk feeding & short term growth in BF prems vs. formula fed. Some possible effect of benefits for head circumference, but overall outcomes unclear due to variable methodologies
- **Mensah et al (2021)** – Infants with NAS are three times likely to have feeding problems and less likely to be encouraged to experience BF & receive lactation support

# Feeding

Can we improve QoL within the daily feeding and communication experiences for infants & their families?

- **Tan et al (2021)** – Mothers want clear knowledge re: child's condition and a unified service
- **Scott et al (2021)** – Identification of TOF, a single case study. Frequent choking, poor feeding, poor weight gain, inability to pass OG – NG
- **Hill et al (2020)** – Bottle feeding can present with challenges for preterms in first 7 months of life
- **Wiechers et al (2021)** – Cranio-facial malformations – a discussion of techniques i.e. lip seal, nasal regurgitation, upper airway problems, SSB / poor feeding initiation, fatigue, etc.
- **Lagatta et al (2021)** – Home TUBE FEEDING programme . Single centre study, N =180. Parents QoL for NG feeders not significantly different to other infants, but GT feeders had increased need for help post discharge

# Feeding

The yearly insertion of an animal study (pigs) continues!

- **Mayerl et al (2020)** – Increasing the viscosity of milk during piglet feeding improves swallow safety. The tongue, soft palate & hyoid respond to changes in viscosity. Specifically, the tongue has substantive changes in its movements when fluids are thickened, but pharyngeal transit time, soft –palate movements & hyoid movements were unaffected

# Language & Communication

Letters to journals highlighting early communication & language:

- **Harding et al (2021)** – CEN letter raising concerns about mask wearing during the pandemic and the potential impact on developing a positive synactive communication environment
- Core strategies listed to highlight how to mitigate both impact of mask use and neonatal unit noise: use of gesture; intonation; masks with windows; discuss clearly the value of early bonding strategies & the role of these in early language and communication

# Language & Communication

- **Harding et al (2021)** – A response to nurse Almahmoud’s letter **“Do newborns really don't talk, or are we just not skillful enough to understand them?”**
- An opportunity to highlight the differences between infant behaviours, early nurturing and early communication
- A recognition that stress and trauma can impair infant – parent interaction



# Language & Communication

- **McMahon et al (2020)** – OT / SLT/ National Literacy Trust collaboration to set up a neonatal library in a Level 2 NNU
- Encouraging early interaction through use of appropriate strategies to enrich a communication environment (listening to voices / gesture / gaze / vocabulary / facial expression ) & supporting this through the occupation of reading is a low cost approach that improves infant physiological signs as well as benefitting infant brain plasticity

# Language & Communication

Exploring & analysing the maternal – infant dyadic relationship reveals important factors

- **Gondwe et al, (2020)** – Observational study using 20 minute video recordings in the first 24 – 72 hours of life involving mothers and EPT (N = 27), LPT (N = 29) and term infants (N = 27) in Malawi
- Mothers of EPT looked at and rocked their infants less, & the infants looked at their mothers less

# Language & Communication

## Neugebauer (2021)

- A paper which discusses mother – infant dyadic synchrony in NICU, with reference to Feldman’s Bio-behavioural Model of Synchrony (\*\* No linguistic theory references)
- Important to consider contextual factors that inhibit & facilitate ontogenesis of dyadic synchrony in NICU
- Stresses that good communication patterns facilitated on a unit can have **LONG LASTING EFFECTS**
- Despite environmental and individual challenges in developing a positive mother – infant relationship, high quality interactions are possible

# Language & Communication

Filippa et al (2021) TRIAL REG: NCT04759573

- Publication of a protocol to investigate the effects of early vocal contact in NICU
- Researchers will be observing to see if early vocal contact has a positive impact on infant physiology, neuro-behaviour and development
- Seeking to recruit 80 infants, born 25 – 32 (+6) without specific difficulties
- Mothers will sing and talk to their infants for 10 minutes x 3 week for 2 weeks

# Language & Communication

# A WARNING TO SLTs

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# Environment

The neonatal unit remains a challenging setting in relation to both noise management, and in providing sufficient support for parents of preterm and medically unstable term infants

- **Vitale et al (2021)** – Explored literature related to noise in the NNU and strategies to minimize the impact, i.e. use of music, mother's voice, etc. The authors argue that currently there is limited data re: impact
- **Richard et al (2020)** – Comparison of standard nasal CPAP\* and bubble CPAP sound generation. Both types increased noise levels above the background noise of the NNU

# Environment

- **Faal et al (2020)** – Training to reduce excess noise through use of visual prompts and cues. Noise survey completed – 43.5dB – 79.2dB (recommended peak sound level = 45dB). Conversation, most notably during night shifts created the most noise
- **Hong et al (2021)** –Evaluating white noise devices used to help infants sleep. 14 devices investigated – loudest = 85dB. White noise levels therefore above recommended sound threshold

# Environment

Providing adequate support for parents so that stress is minimized & parents feel able to care for their infant remains a topic of investigation

- **Labrie et al (2021)** – Systematic review investigating parent – provider communication on NNUs. Total of 300 NNU papers considered. How staff communicate with parents remains impactful – reducing stress / being transparent / non –judgmental / time to listen / self management



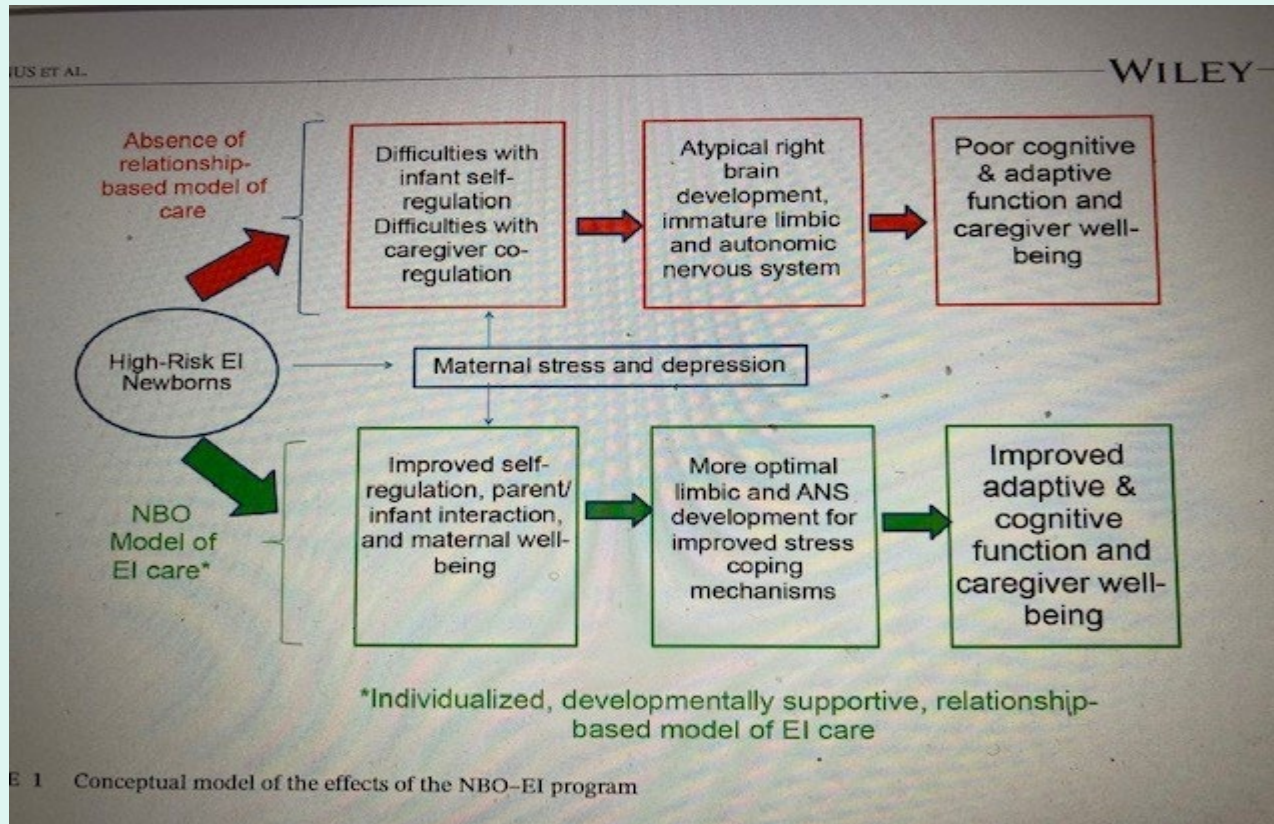
# Environment

- **Leahy-Warren et al (2020)** – A follow – up study of 140 infants and mothers one year post discharge from NICU. On – line survey aiming to understand social support, parent mental well-being & feelings of attachment. Risk factors for MH difficulties include age at giving birth, SES, educational attainment, social support mechanisms & family history of MH problems. Mothers who experience preterm birth and have a history of depression are at high risk of poor attachment

# Environment

- **Gates et al (2020)** – Human milk composition, both macro- and micro- nutrient elements influenced by maternal factors including BMI
- **Yahya et al (2020)** – Diet can be a factor with post – partum depression amongst NICU mothers
- **Furtak et al (2021)** – Longitudinal descriptive study. N = 148, infants  $\leq$  33 GA. Parents highlight the environment as being challenging ; they have major concerns about the medical needs of their infant & feeding development

# Environment : McManus et al, 2020



# Knowledge

Familiar methods of supporting parent – infant attachment such as skin-to-skin continue to be studied

- **Broge et al (2021)** – Descriptive study involving 25 neonates on a paediatric cardiac intensive care unit participating in 60 sessions of skin-to-skin care. N = 25 (mean GA = 38.5 (1.1 SD). Benefits of physiological stability recognised for this population

# Knowledge

- **Schinckel et al (2021)** – 20 infants, two groups (one Control group), mean GA = 33<sub>(+5)</sub> received skin-to-skin in three different positions: supine cot care / prone / prone cot care. Electrical impedance tomography measurements taken. For the infants receiving skin-to-skin, greater dorsal ventilation of lung, but no significant differences in heart rate, respiration, SP02, temperature

# Knowledge

## Can interventions to improve motor skills and positioning support development?

- **Romantsik et al (2020)** – Some clinicians believe that head position can improve blood flow and circulation in the brain, with supine and mid-line positions preventing worse outcomes for IVH. This Cochrane Review explains that there is not enough evidence to show benefits for mid-line head positioning to reduce impact of IVH
- **Raghupathy et al (2021)** – Impact of FiC interventions with a motor & neuro-behavioural development focus. A systematic review
- **Akhbari Ziegler et al (2021)** – Physiotherapy programme for infants born 35 weeks GA up to 4 months CA. N = 16 ( 8 in each group, Intervention and Control). Higher motor scores at 18 months for the Intervention group, but not at other times. No differences in family stress /empowerment scores or BSID -III

# Knowledge

## How do we create and support FiC models of care?

- **Gomez –Cantarino et al (2020)** – Systematic review highlighting four important areas in the literature: Parent participation / Health / Benefits of family training and empowerment / Humanized care
- **Bauer et al (2021)** – Investigation of parent attitudes towards consent for music intervention studies on NNUs. Highlighted as important for QoL, bonding & infant brain development
- **Knudsen et al (2021)** – How to improve neuroprotection in NICU. Team education & family engagement necessary to safe-guard a neuroprotective environment. Summary of pain & stress, touch & movement, taste & smell, hearing & vision, and sleep
- **Edney & McHugh (2021)** – Qualitative study exploring parent attitudes and beliefs about working with therapies. Nine mothers of children who had received therapy took part. Therapies perceived to be more relevant once parents had moved beyond thinking about infant survival. Frequent & flexible access valued

# Knowledge

COVID – 19 has had a significant and potentially long-lasting impact on neonatal care methods

- **Kostenzer et al (2021)** – Global survey related to parental experiences at this time. 52% parents not allowed to have another person with them when visiting their infant. 21% reported no-one was present to give a special intervention. More restrictive measure increased parent stress, with IFCDC methods severely challenged
- **Fonfe et al (2021)** – Parental access to NNUs has been inconsistent in the UK. Electronic survey to NNUs, with 17 responses. ALL units who responded had a change in policy at the height of the pandemic. 80% allowed parents to visit anytime. 60% only allowed one parent at the cot-side at a time. This paper argues that parents should NEVER have to be excluded in anyway from developing skills to support their infant



# Improving our knowledge

What are the current concerns and controversies in relation to the treatment & management of HIE?

- Therapeutic hypothermia is widely used, but authors think that consideration should be given to glycoprotein G-CSF (Dumbya et al, 2021) & stem cells from umbilical cord blood / cells (Serrenho et al, 2021; Tsuji et al, 2020)
- Umbilical cord cells have abundant immune modularity factors (Qiu et al, 2020)
- Yates et al (2021) argue for preclinical studies that consider better methods for neuroprotective treatments, e.g. therapeutic hypothermia, melatonin, human amnion epithelial cells, umbilical cord blood & vitamin D
- Leavy & Marks (2020); Prasad et al (2021) – Variation in practice & outcomes. Inflammation can be one specific signal for risk of brain injury. Drugs can activate microglial activity & cytokine signals

# Improving our knowledge

- **Hollebrandse et al (2021)** – School-age outcomes at age 8 years following infant IVH – EPT. Examining IVH 1 & 2 in particular (N = 546), matched with controls (N = 679). There is increased severity of motor dysfunction according to grade of IVH, 24% no IVH – 92% Grade 4 IVH. Children with IVH 1 & 2 are still at higher risk of developing CP than those without IVH (OR 2.24, 95% CI 1.21 – 4.16). \*\*\*Risk of learning disabilities & academic skill challenges LOWER than for Grade 4 IVH

# Improving our knowledge

Ongoing studies continue to highlight specific difficulties experienced by infants born preterm

- **Sacchi et al (2021)** – Imaging of 314 infant brains, with 49 identified as having IUGR, & who were VPT. IUGR + VPT = relative volumetric decrease in grey matter in limbic regions, with differences in frontal-insular, temporal –parietal & frontal areas. More likely to have lower cognitive scores & a positive M-CHAT score

# Improving our knowledge

- **Dimitrova et al (2021)** – N = 275 healthy term infants compared with 80 preterm infants (28 – 34 GA). Magnetic imaging study of the brain. Scanned at term equivalent & at 18 months. Protocol also used on a separate cohort of 253 preterm infants (28 -31.6 GA) at 20 months CA. For both preterm cohorts, atypical cerebral features were widespread. Multiple deviations from normal brain structures. Volumetric development associated with perinatal factors such as respiratory support, nutrition & post – natal growth

# Improving our knowledge

- **Chiurazzi et al (2021)** – Brain development is supported by human milk, specifically myelination & epigenetic modifications. Bioactive components of human milk have benefits for intestinal microbiome development
- **Davidson et al (2021)** – Evolving role of MRI in diagnosis & prognostication of foetal anomalies, in particular foetal position, amniotic fluid volume & if the mother has a high body – mass index
- **Hadders –Algra (2021)** – Argues that imaging of the brain can provide important information , i.e. CP, but ASCs present more challenges for clinicians as development is still occurring. The importance of early intervention is necessary

# Improving our knowledge

- **Loureiro et al (2020)** – Spanish national protocol for follow-up VLBW / VPT infants. Survey to all Level II & III units. Inconsistent practice & inequality of services. Use of M-CHAT and BSII discussed
- **Gallini et al (2021)** – Neuro-developmental outcomes for VPT infants. Infants who had moderate –severe BPD had a significantly higher corrected odds ratio for cognitive impairment

# Improving our knowledge

- **Siffel et al (2021)** – Systematic review of incidence BPD EPT infants (< 28GA). Global incidence – 10% - 89%. Definitions & practice varies globally , adjustment to 17% -75%
- **Ni et al (2021)** – Growth outcomes for children born < 27GA in 2006(EPICURE 2). Mean scores for height & weight significantly below controls. Although improvements overall noted for weight & height, no changes in head growth identified

# Improving our knowledge

Managing immediate respiratory support post – birth for preterm infants & identifying actual risk is still a complex clinical management challenge

**Murphy et al (2021)** – Initiation of respiratory support for EPT is one aspect of care along with cord clamping & temperature control observations. Many infants have a face mask applied – CPAP or positive pressure ventilation to support breathing. Concerns that use of a mask early on may INHIBIT spontaneous breathing



# Improving our knowledge

- **Mitha et al (2021)** – Neonatal morbidities in infants born late preterm (35 – 36 weeks GA in Sweden). Higher risks for this group include the following difficulties: metabolic morbidity RR 7.79; respiratory morbidity RR 5.54; severe neonatal morbidity RR 2.42; infectious morbidity RR 1.98; neuro-morbidity RR 1.74; low APGAR RR 2.07
- **Leon et al (2021)** – Understanding of the development of the placenta remains essential to preterm outcomes
- **Molloy et al (2020)** – Impact of COVID 19 on intrauterine environment & perinatal transmission remains ambiguous. Breast milk can provide good anti-bodies if mothers have been infected

# Improving our knowledge

SLTs frequently adjust feeding programmes when managing GORD. Pharyngeal-oesophageal motility reflex mechanisms in relation to GORD continue to be examined

- **Sultana (2021)** – Changes in pharyngeal & oesophageal provocation – induced reflexes alongside maturation & the impact of pharyngeal /oesophageal stimulation on autonomic behaviours are still not fully understood
- **Pados & Basler (2020)** – N = 320 healthy term infants , first 7 months of life. Gastro problems decrease as age increases
- **Pados et al (2021)** – Infants born before 32 weeks GA have more reflux symptoms in the first 6 months of life , compared with infants born later. Descriptive, cross-sectional study, N = 582 less than 6 months old. Symptoms of GORD decrease with maturation. Problems more persistent with family history of allergy

# Questions

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