

Current Neonatal and Paediatric Dilemmas

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Received: November 08, 2018; **Published:** March 21, 2019

Disclaimer

This is an article written in a leisurely way to stir up thoughts among the medical community about concomitant issues regarding children. It is not evidence based and I have not provided references to any of the statements given and is open to criticism and corrections. However, these are logical thoughts hovering in the minds of most senior Paediatricians and citizens in the community and a scientifically backed up answer to these is long overdue. It is intended as a light reading for the least and a food for thought at the most and is not an invitation/challenge to change any evidence based current practice.

Science and Technology has advanced significantly over the last decade or so to the extent that caring for a premature baby (not extremely premature baby!) is not an onerous task. However, let me point out some dilemmas that neonatologists and paediatricians all over the world face while care is being planned or delivered.

Respiratory dilemmas

One of the most common problems that premature neonates face is respiratory distress due to surfactant deficiency, particularly in the ones around 30 weeks of gestation and below. Discovery of surfactant has revolutionized the care for such babies but the issue is do we administer one dose of surfactant and put these babies on Continuous Positive Airway Pressure (CPAP) or do we ventilate these babies at least for the first 12 hours, determine their oxygenation index at that stage and decide on the need or otherwise for the second dose of surfactant or otherwise? And if we are to ventilate these babies for short term of at least 12 hours, what is the best mode of ventilation - Conventional ventilation, Volume ventilation or High Frequency Oscillatory Ventilation (HFOV)? Seemingly, the answer is simple - look at the evidence in literature!

There is increasing body of conclusive evidence that surfactant reduces the surface tension at the air-alveolar interface, helping the alveoli to expand more without significantly high respiratory effort from the child. Hence some form of positive end expiratory pressure to keep alveoli open should be fine and that is what CPAP does exactly. This is the most advocated form of support as per best evidence practice of neonatal care in premature babies over 30 weeks. However in those babies under 30 weeks, the practice is to keep them ventilated for at least the first 12 hours and here comes the issue. Conventional ventilation (pressure-time cycled) could lead to over distension of some alveoli, leading to alveolar damage, which could initiate the cascade of reactions for development of chronic lung disease. Hence Volume ventilation, which does not have the propensity to produce significant alveolar damage may appear more attractive. However, the optimal tidal volume for various gestational ages has not been defined and one would need to go for flow volume loop measurements (not available in most centres) to individualise the therapy. What about HFOV then? Evidence suggests that simple oscillatory movements of alveoli help in gaseous exchange effectively when surfactant is used in premature babies and may be one with least chance of alveolar damage. However, the catch with this is that the process does not recruit alveoli equally and the inequality in gaseous distribution could trigger false feedback through the respiratory chemoreceptors, leading to chaotic neural control of respiration.

So, what is the compromise? Large scale studies for preterm babies with and without use of surfactant, use of conventional vs volume vs oscillatory ventilation and long term follow up to determine chronic lung damage, disordered neural control of breathing etc. is needed to recommend designer therapies in such babies.

Antenatal steroids

These have been the time tested tools of obstetricians to hasten lung maturity in babies expected to be delivered prematurely but are they without any harm to mothers and babies? The jury is not out on whether this is safe for babies as high dose steroids can have a detrimental effect on cerebral blood flow as per recent studies and there has been no quantification of the amount of steroids that pass from mother to baby and researchers say that this too could be individualistic. This is particularly so when mums receive multiple doses of dexamethasone at different stages of going into preterm labour and there is currently one school of thought that we would be better off limiting the number of doses given to mothers to a maximum of four during the entire pregnancy as a consideration to their tiny little progeny! Also, the effects of repeated steroids on maternal glucose levels and their effects on developing neonatal brain have been poorly understood.

Antibiotics

The conventional belief in age old neonatal practice has been that if mums go into spontaneous onset of premature labour, there could be an element of chorioamnionitis that could be triggering it off! This, together with zero risk infection policy when dealing with premature babies is the basis of administration of antibiotics to the tiny little premies for the first 48 hours till such time their own blood cultures come back with a definite answer about the presence of infection or otherwise. The coverage recommended used to be broad spectrum with Ampicillin and Gentamicin at the minimum and there is increasing debate about the safety of this practice in the long run for these babies. In earlier years, we used to be concerned only about the safety of the Gentamicin doses for hearing and the kidneys and there has been huge debates on what is a safe dose for these tiny premies. There was little concern in olden days about the impact of these broad spectrum antibiotics which change the signature gut flora, which could eventually lead to problems like inflammatory bowel disease etc. in the long run! Current knowledge tells that the signature microbial flora in the intestine is a cushion against future bowel diseases. So what do we do? Avoid antibiotics and risk infection for premies or give antibiotics and worry about long term issues that they may develop in future? I am sure that Paediatricians cannot escape from such parental queries in future as more cases emerge and is it not time for us to rethink our strategies?

Growth

The most interesting aspect of Paediatrics is that you see children in different sizes, right from neonate to adolescent age child! Growth is a unique feature of paediatric age and both physicians and parents get worried when children do not grow along expected trajectories! Issues of growth start from intrauterine period, resulting in babies with intrauterine growth retardation (IUGR), while babies born prematurely, even though they may be appropriately grown for age, could be small in size. We all are aware that term babies are expected to double their birthweight in 5 months and become three times their birthweight in one year and become four times their birth weight by 2 years of age. This equation flies through the roof when we make calculations regarding IUGR and preterm babies. We expect them to catch up with their peers by 2 years of age, which means that a 1.5 kg baby will need to grow 8 times the birth weight in 2 years- double that of a term baby! Ok, agree with this age old observation and plan for extra calorie feeds and vitamins and minerals supplements etc, but I am getting puzzled when scientific literature says that accelerated growth in early childhood paves the way for metabolic syndrome in later life! I believe there are already studies of ex premies and IUGR babies who develop hypertension, dyslipidemias and diabetes early in their middle age!

Hence, what is the compromise? Leave them to grow slow at their pace, trying not to accelerate that or push them on fast track to equalize with their peers by 2 years and later be victims of metabolic syndrome in later life? Unfortunately, there are no clear answers to this dilemma yet and time alone is going to be the answer!

Vaccinations

There are no doubts in the minds of paediatricians that vaccinations have been the most effective healthcare interventions of the last century. In our zeal to protect our children as early as possible, we try to give them as many vaccines, as early as possible without fully knowing the long term effects of overburdening the immune system! True that vaccines exhibit a good antibody response and provide a protective effect even when started early, but if there are too many vaccines trying to get a share of the attention of the immune system at the same time, could it lead to debacles? There is no proof of such an issue yet and this thought might be a bombshell against vaccinations, but we need to be aware of this and design long term studies to exclude associations of chronic illnesses to simultaneous vaccinations! Paediatricians have been tried to educate parents that they need to adopt a risk vs safety approach while deciding on vaccinating their children. We have a community out there, who think that children lived in the past just with basic immunisations and got immunity against many infections, 'the natural way'! In the current era, by the time the child is 2 years of age, there are about 40 vaccines that are routinely administered to children and even though the benefit is proven through decrease in infection rates etc. there need to be studies to establish long term safety to boost up public confidence. Do you think that we are asking for more here? We pride in saying that we have a vaccine adversities register, vaccine safety datalink, reporting system etc. but the need of the hour is transparent research on long term safety of simultaneous multiple vaccine administrations but for which, vaccination coverage is likely to drop leading to reemergence of formidable diseases!

Formula feeding

Paediatricians and neonatologists need no further education to augment their faith on benefits of breast feeding to new born babies, irrespective of their gestation. It is the time old belief that the smaller the baby, the better is the beneficial effect of breast feeding the baby. Studies on composition of breast milk, the human milk oligosaccharides, bifidus bacteria and designer breast milk made by mothers to suit babies of different gestations etc. is getting known day by day. However, universally, breast feeding rates are on the decline for various reasons, beyond description in this small write up! Formula feeding as a direct contributor to necrotizing enterocolitis in premature babies has been proven beyond doubt. The high pressure advertisements of milk formulas, their penetration into the medical and social community and publication of funded research into the benefits of formula as the second best to breast milk is changing the perception of young mothers and time alone will answer the perils of these changes in the long run.

Electronic gadgets

We are currently living in a fast pace world with electronic gadgets and artificial intelligence helping us to do some of our day to day tasks effortlessly and this is indeed a laudable progress. But when it comes to managing little children with their meal times, quietening them when parents need to be engaged in some important home or home based office work, the usual parental choice now falls on ipads and smart phones or cartoon programs in television. How many times have you seen children sitting absorbingly interested in the 'blue screens' in front of them? Has anyone thought of the impact of the 'screen time' on developing brain and developing neural connections? Exposure to screens is becoming commoner in babies as young as even 9 months and we are seeing increasing number of children now-a-days who lack social interactive skills, have speech delays and who do not understand the boundaries of social behaviours. The effect of electromagnetic radiation emission from mobile communicative devices on developing brain is increasingly recognized through increased reported incidence of brain tumours!

To sum up, we are about to face an era of children with issues resulting from our own actions in using/misusing antibiotics, infant formulas, electronic gadgets etc. and let us be prepared to answer them!

Volume 8 Issue 4 April 2019

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