Immunisations on the Neonatal Unit

Background:

Preterm and low birth weight infants are at a greater risk of infections, therefore timely vaccination is important. However, vaccination is often delayed in preterm infants compared to term infants. This may occur either as a result of poor underlying clinical condition at the time when vaccination is due; or immunisation may be deliberately delayed due to misplaced concerns that immunologic immaturity may impair vaccine responses.

The evidence base for immunisation in the preterm is limited, although, it is well recognised that many aspects of the immune system are more immature in preterms than in terms. At 8 weeks of age, (chronological age, the age at first immunisation); preterms have lower absolute counts of lymphocytes, T cells, and B cells. Despite this, there is some evidence that preterms are able to mount a B cell response quicker than term infants. The relative lower concentration of maternal IgG in preterms is probably advantageous in response to vaccination.

Iatrogenic factors such as corticosteroids are known to interfere with the immune response. Preterm infants are exposed to corticosteroids: antenatally via maternal administration if threatened with preterm labour; and/or postnatally to treat chronic lung disease. Evidence is limited; however, antenatal steroids do not seem to reduce the response to vaccination in preterms. Studies, looking at preterms given postnatal steroids for chronic lung disease, have shown varying outcomes for different vaccines. Further studies show that, even if the antibody response is attenuated post steroids, this effect does not seem to be long lasting.

Overall, despite preterms mounting probably lower absolute antibody responses post vaccination compared to term infants, the majority achieve concentrations that correlate with adequate protection.

The green book advises:

**It is important that premature infants have their immunisations at the appropriate chronological age, according to the schedule.**

Therefore delaying immunisation because of prematurity alone is not advisable.

Please look at the Childhood Immunisation schedule at the end of this document.

Immunisation post steroids:

Steroids affect the immune system in many different ways, and at high doses, can cause immunosupression. Live vaccines can cause severe infections in the immunosuppressed due to extensive replication of the vaccine strain. The Green Book suggests delaying live vaccines in patients receiving high dose steroids until at least 3 months after the treatment has stopped.

The definition of High dose steroids = Prednisolone 2mg/Kg/day for at least one week or Prednisolone 1mg/Kg/day for one month.

### Equivalent anti-inflammatory dose of corticosteroids

- **Prednisolone 1mg = Hydrocortisone 4mg**
- Dexamethasone 150 micrograms

**Hydrocortisone regime:**

5 mg/kg/day for 7 days,
3.75 mg/kg/day for 5 days,
2.5 mg/kg/day for 5 days,
1.25 mg/kg/day for 5 days.

Total = 72.5 mg/kg of hydrocortisone over 22 days.

When administered, the hydrocortisone regime is 0.82 mg/kg/day of Prednisolone equivalent dose of steroid, and is therefore not high dose steroids.

**DART regime:**

150 micrograms/kg/day for 3 days.
100 micrograms/kg/day for 3 days.
50 micrograms/kg/day for 2 days.
20 micrograms/kg/day for 2 days.

Total = 890 mcg/kg over 10 days. This equates to 89mcg/kg/day.

When administered, the DART regime is 0.59 mg/kg/day of Prednisolone equivalent dose of steroid, and is therefore not high dose steroids.

Using an unmodified Hydrocortisone or DART regime does not qualify as high dose steroids: Immunisations should not be delayed following these treatments.
Rotavirus immunisation:

Rotavirus is a highly infectious virus which commonly causes gastroenteritis among young children. Infections are recurrent and most children will experience at least one infection by 5 years of age. Rotavirus immunisation (Rotarix) was introduced into the UK immunisation schedule in June 2013. Rotarix is a live oral vaccine; 1.5ml given twice, at least four weeks apart, the first dose at 8 weeks and the second at 12 weeks. Administer the vaccine first before the IM vaccines as these may distress the baby. Rotarix is a live vaccine; there is a potential for transmission of attenuated live virus through faecal material for up to 14 days post immunisation. This is a worry on a NICU with many vulnerable babies, side by side. However, adverse events (including gastroenteritis) in preterm neonates of 25-36 weeks gestation administered either Rotarix or placebo were the same. Therefore, if giving Rotarix directly does not increase the risk of adverse events; this provides reassurance that infections following transmission of attenuated virus from shedding in a NICU also would not increase the risk of adverse events in exposed neonates of the same age and disease profile. Additionally, in UHW there is a very low background rate of rotavirus infection (one case in the last 5 years), suggesting that the current health and safety procedures are adequate.

Research form some countries suggest a very small increase (2 cases per 100,000 doses of vaccine) in the incidence of intussusception following administration of the first dose. The background rate of intussusception rises to a peak at around 5 months of age. Because of this potential risk, and to reduce the likelihood of a temporal association with the rotavirus vaccine; the first dose of the vaccine is not recommended beyond 15 weeks of age and a second dose is not recommended after 24 weeks of age. As the benefit of immunisation is high for hospitalised premature infants, it’s important that they receive the immunisation at the appropriate chronological age. Aprons and gloves should be worn for nappy changes and standard infection control precautions followed at other times to reduce the risk of transmission until 14 days post vaccine or discharge, whichever comes first.

**Contraindications to Rotarix include:**

- confirmed anaphylactic reaction to a previous dose of rotavirus vaccine or confirmed anaphylactic reaction to any components of the vaccine.
- previous history of intussusception
- infants age 24 weeks and over and/or infants presenting for first dose of vaccine over 15 weeks of age.
- infants with SCID
- malformation of the gastrointestinal tract that may predispose to intussusceptions—following consultation with the surgeons this would include meconium ileus and post inversion appendectomy for malrotation.
- infants with rare hereditary metabolic problems

**Monitoring post vaccination:**

Monitor very premature infants (born ≤ 28 weeks of gestation) for 48-72 following their first immunisation, particularly those with a previous history of respiratory immaturity. If apnoea, bradycardia or desaturations occurs after the first immunisation, administer the second immunisation in hospital and monitor for 48-72 hrs.

**References:**

- The Green Book December 2013 Chapter 6 page 43, Chapter 7 page 49 and Chapter 27b (updated November 2013)
- Rotavirus vaccination programme for Infants. Public health England July 2013 infection
- Prevention of Rotavirus Gastroenteritis among infants and Children. Recommendations of the Advisory Committee on Immunisation practises (ACIP) February 2009/58 RR02

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