MMed and DCH Lectures

Weekly by Zoom

Prof Trevor Duke

MMed and DCH Lectures

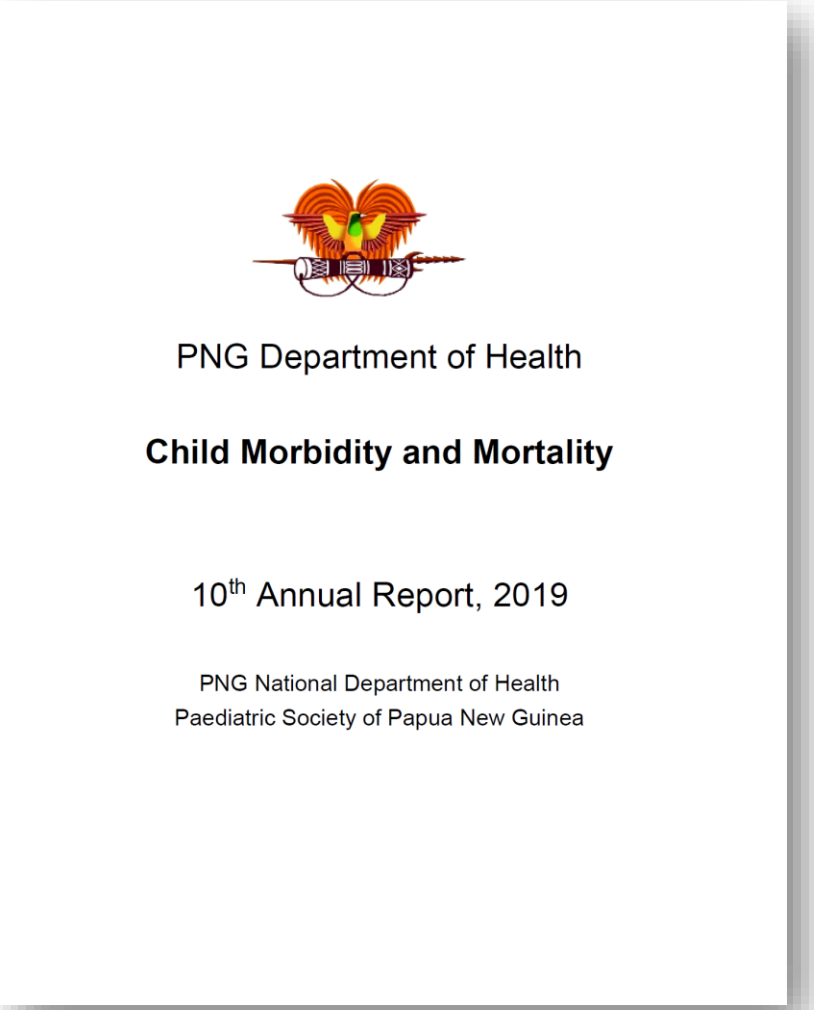
Neonatal infections

September 28th, 2020

Prof Trevor Duke

Neonatal infections in hospitals

- 58% of neonatal admissions are infections (4624 / 7971), CFR 6%



PNG Department of Health

Child Morbidity and Mortality

10th Annual Report, 2019

PNG National Department of Health
Paediatric Society of Papua New Guinea

Neonatal infections

- Not feeding well
- Convulsions
- Drowsy or unconscious
- Fast breathing
- Grunting
- Severe chest indrawing
- Fever >38
- Hypothermia <35.5
- Central cyanosis
- Apnoea
- Severe jaundice
- Severe abdominal distension

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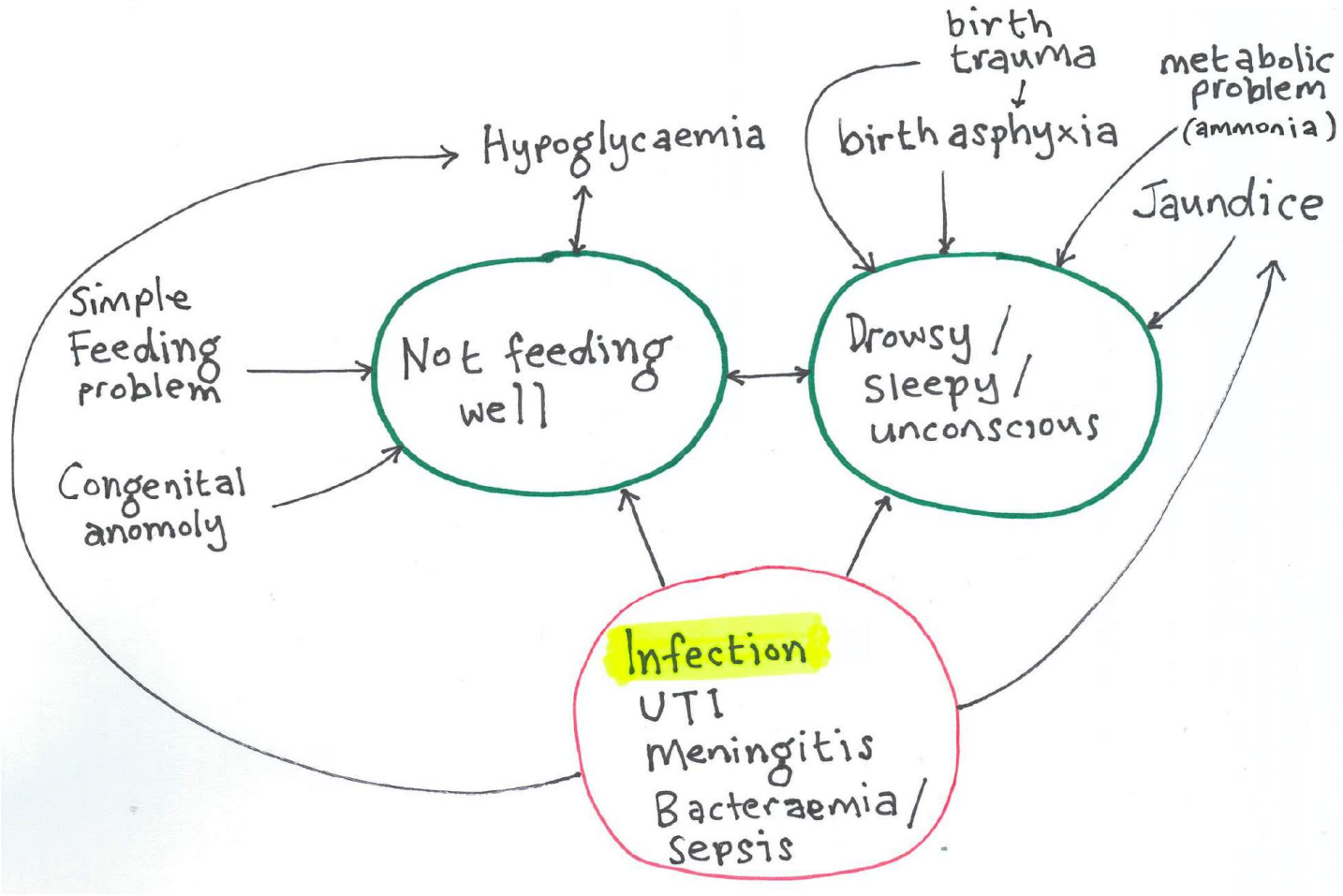


Definition of neonatal *pneumonia*

- Respiratory distress (rapid, noisy or difficult breathing, RR>60/min, chest retractions, cough, grunting) who has:
- A positive blood culture, or
- Any 2 or more of the following:
- **Predisposing factors (any of the following)**
  - Maternal fever (>38 C)
  - Foul smelling liquor
  - Prolonged rupture of membranes (>24 hours)
- **Clinical picture of sepsis (any of the following)**
  - Poor feeding
  - Lethargy, poor reflexes
  - Hypothermia or hyperthermia
  - Abdominal distension
- **X-ray picture suggestive of pneumonia.** Radiological changes not resolved within 48 hours.
- **Positive sepsis screen (any of the following)**
  - Bands >20% of leucocytes
  - Leucocyte count out of reference range
  - Elevated CRP

Neonatal infections

Type of infection

- Pneumonia / bronchiolitis
- Umbilical
- Skin, soft tissue, bone and joint
- Urinary tract infection
- Eye infection
- Diarrhoea
- Bacteraemia / viraemia
- Congenital systemic infection

Cause of infection

- Gram positive
  - Staphylococcus aureus
  - Group B streptococcus
- Gram negative
  - E. coli
  - Klebsiella
  - Enterobacter
  - Pseudomonas
- Viral infections
  - Intrauterine
  - Postnatally acquired (RSV, enterovirus)
- Congenital TB
- Congenital malaria

Conditions that are NOT infections

Neonatal pneumonia and sepsis

- Early onset sepsis (0-72 hours) – Gram negative bacteria predominantly

Bacteria	Number
E. coli	71
A. aerogenes	45
Streptococcus beta haemolytic	29
P. aeruginosa	27
Streptococcus viridans	21
S. aureus	17
P. vulgaris	11
Streptococcus non haemolytic (Group D)	8

Yield from cultures of lung puncture on 755 neonates who were stillborn or died in the first 72 hours of life

Late onset neonatal sepsis and pneumonia

Bacteria	Number
Total	1313
Total positive cultures	64 (4.9)
Streptococcus pyogenes	14
Staph aureus	15
S. pneumonia	8
E. coli	10
Salmonella spp	8
Group B Streptococcus	2
Klebsiella pneumoniae	2
Enterobacter	2
H. influenzae	1
Group G streptococcus	1
Acinetobacter	1
Pseudomonas	0
Enterococcus spp	0

Skin, umbilical infection with erythema

- Mostly Gram positive – Staph aureus
- Look for the full extent of the infection
  - Is it just skin?
  - Is there an abscess?
  - What compartment is involved?
    - Skin (cellulitis)
    - Fascia (fasciitis)
    - Muscle (pyomyositis)
    - Joints (septic arthritis)
    - Bone (osteomyelitis)
    - Intra-abdominal spread (peritonitis)
  - Is the infant systemically unwell (focal infection or systemic)

Treatment

- Flucloxacillin 50mg/kg Q6 (+ Gentamicin)
- Source control

Purpura (purple spots)

- Gram negative infections
  - E.g. meningococcal disease
  - Pseudomonas

- Ampicillin and gentamicin
- Ceftriaxione
- Ampicillin and Amikacin

Neonatal pneumonia treatment

- Oxygen
- Antibiotics

  First line

  - Ampicillin (Gram positive) and gentamicin (Gram negative)
  - Flucloxacillin (Gram positive) and gentamicin (Gram negative), if Staph suspected

  Second line

  - Amikacin or ciprofloxacin if ESBL suspected (hospitals acquired, proven on blood culture)
  - Ceftriaxione no better than Amp and Gent, unless you suspect meningitis

Conditions that are not infections: Miliaria

Tiny white spots due to accumulation of sweat in blocked pores.

50% of infants have milia on the face

Most resolve in the first 4 weeks of life

Not infectious

Conditions that are not infections
“Toxic erythema of newborn”

Pustule surrounded by an erythematous halo: lesions usually appear on the second day of life and disappear 5-14 days. Not infectious

Staph pustules

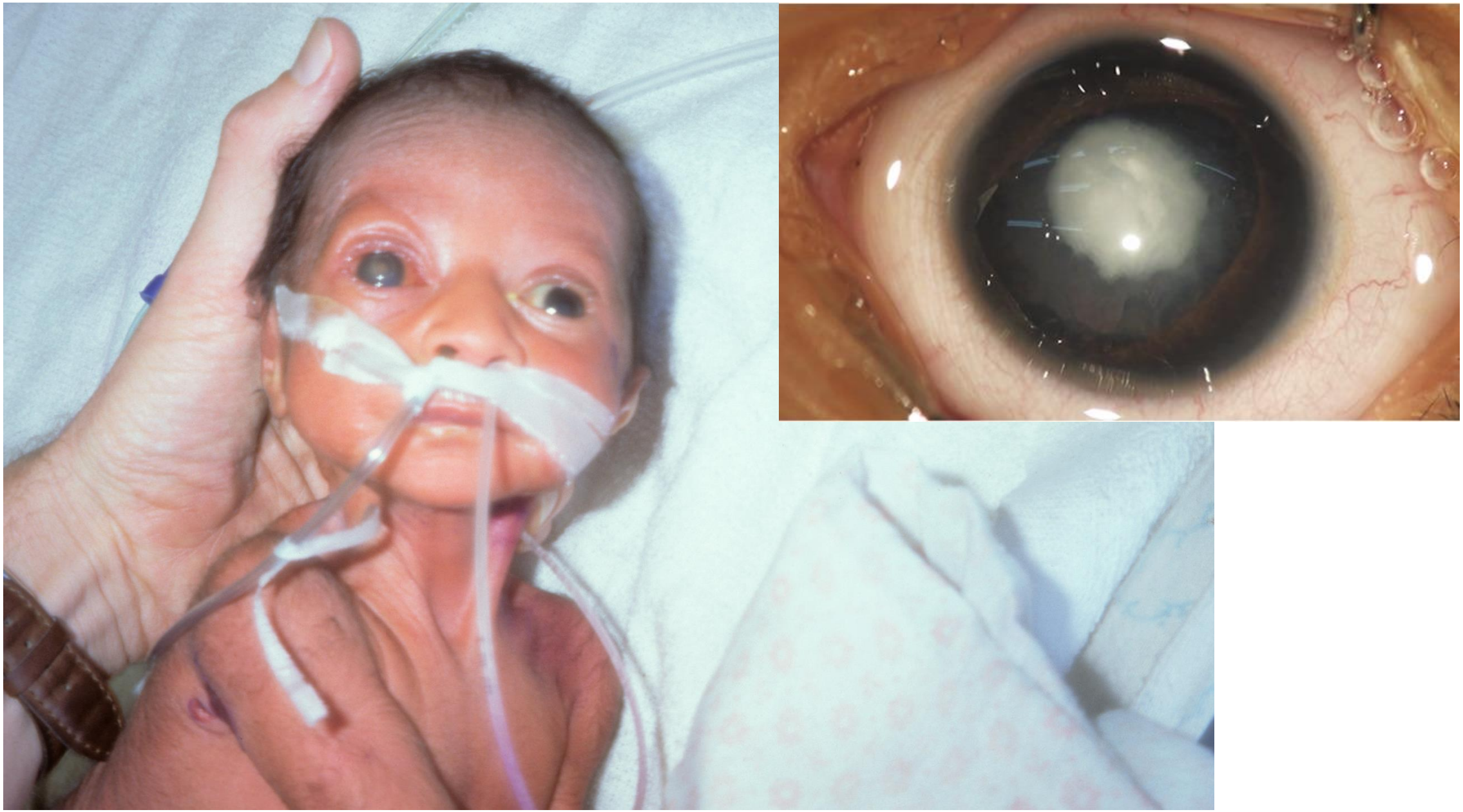
Unwell +/-
Fever +/-
Pus draining from lesions

Breast abscess - Staphylococcus

Umbilical abscess - Staph

Gonococcal opthalmitis

- Most *N. gonorrhea* resistant to penicillin
- Need ceftriaxone 50mg/kg single IM dose

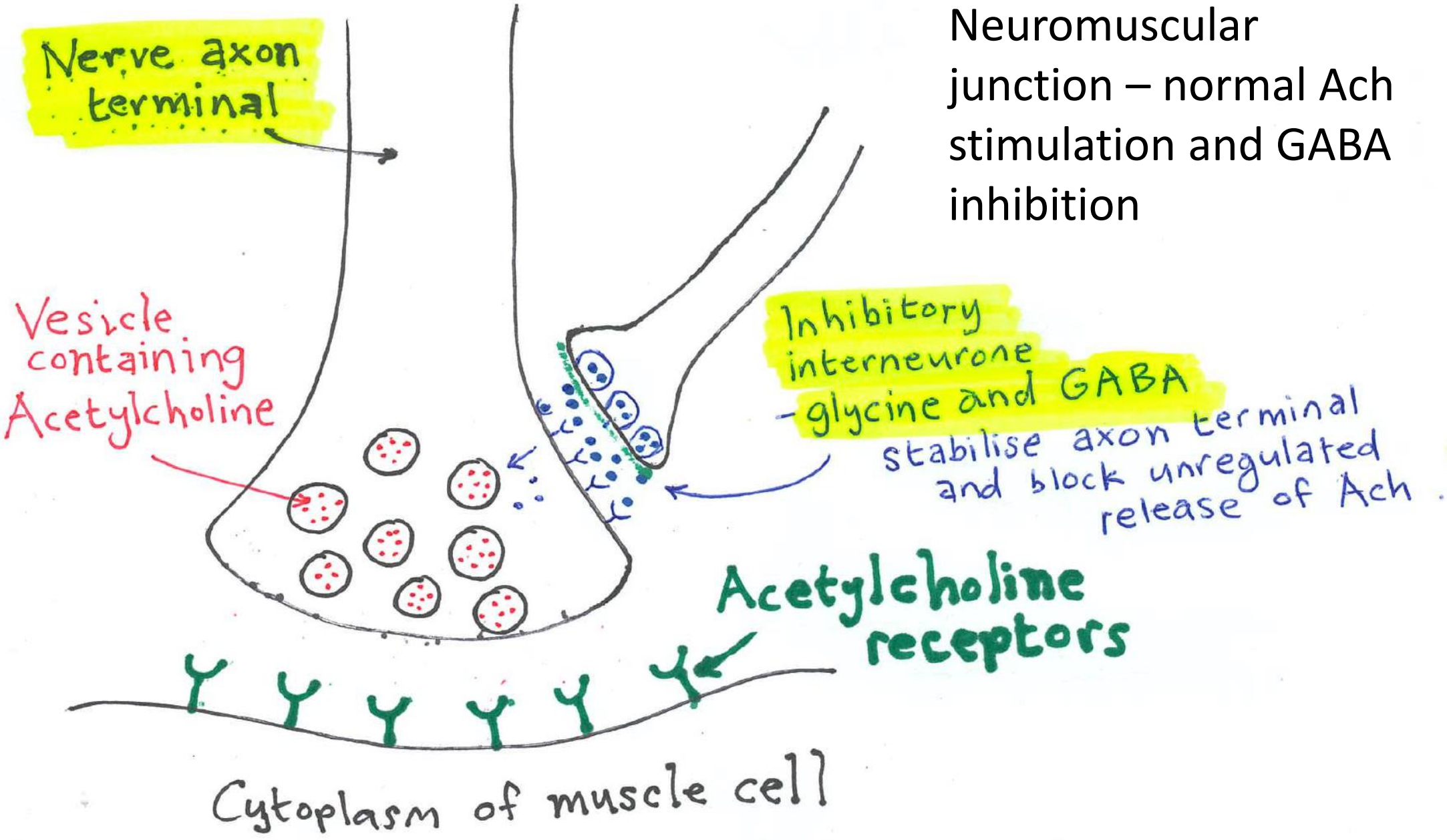


Microcephaly

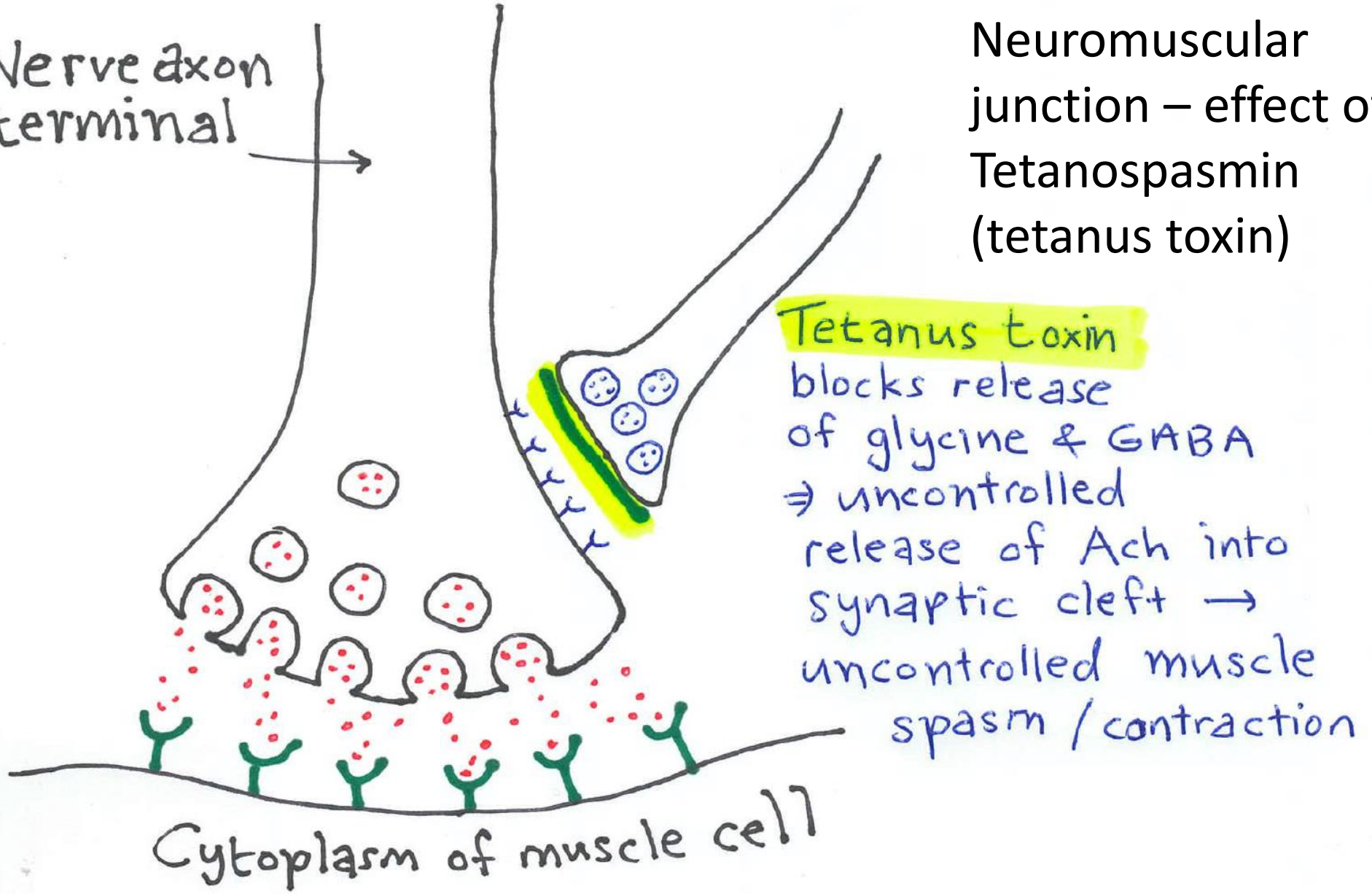
- Intrauterine virus infections
  - Rubella syndrome
    - Cardiac (coarctation of aorta), cataracts, micropthalmia, petechiae
  - Zika virus infection
  - Syphilis
  - CMV
  - Toxoplasmosis
- Genetic / chromosomal
- Toxin exposure
  - Foetal alcohol syndrome (“FASD”: Foetal alcohol spectrum disorder)
  - Drug abuse (cocaine)
  - Mercury poisoning
  - Teratogens, e.g. phenytoin

Neonatal tetanus

Neuromuscular junction – normal Ach stimulation and GABA inhibition



Neuromuscular junction – effect of Tetanospasmin (tetanus toxin)

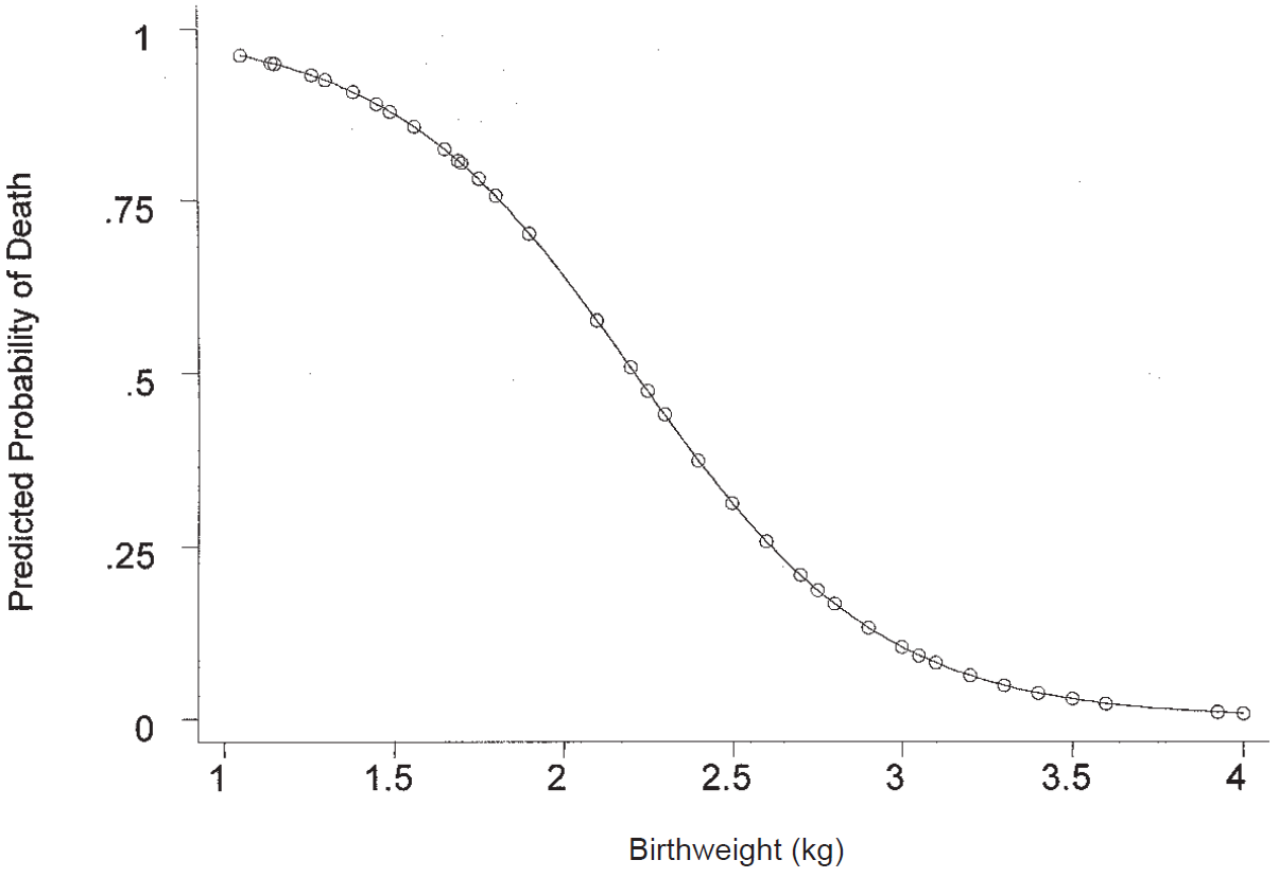


Tetanus treatment

- Avoid all unnecessary handling and noise
- Oxygen
- Paraldehyde 0.2ml/kg
- Diazepam – initially by *slow* IV injection, *not* IM, then orally 0.5mg/kg Q12
- Chlorpromazine – 5mg/kg Q12
- Benzylpenicillin IV Q6 then amoxicillin for total 10 days
- Tetanus immunoglobulin IM (or if you have the IV preparation can be given IT). Give 750 U – 3 amp on admission and 2 amp day 2 and 3
- NG tube feeding
- Autonomic dysfunction (hypertension, tachycardia → hypotension, bradycardia) – $MgSO_4$

Congenital syphilis

- Low birth weight
- Preterm
- Anaemia
- Hepatomegaly
- Splenomegaly
- Ascites
- Jaundiced
- Pneumonia
- Periostitis



Congenital syphilis at Goroka Base Hospital: incidence, clinical features and risk factors for mortality

DALE FRANK[1] AND TREVOR DUKE[1,2] PNG Med J 2000 Mar-Jun;43(1-2):121-126

Syphilis treatment

- If asymptomatic (mother VDRL positive)
  - Benzathine penicillin
    - 240,000 U if >2.5kg
    - 120,000 U if <2.5kg
- If symptomatic, preterm or LBW:
  - Benzylpenicillin 50mg/kg BD x 10 days
- Treat the mother

Paediatric Hospital Reporting V12.1

File Edit View Insert Format Records Scripts Window Help

Neonatal Hospital Reporting V12.1

Data entry

Pt List | New patient | << | < | ID | > | >>

Home
Summary data
Export data
Print data form

Patient information | Neonatal conditions

Low birth weight

- ○ >2500 grams
- ○ 1500 - 2500 grams
- ○ 1000 - 1499 grams
- ○ <1000 grams

Prematurity < 37 weeks

○ Yes ○ No

Neonatal infections

- ○ Pneumonia
- ○ Meningitis
- ○ Cord sepsis
- ○ Skin sepsis
- ○ Congenital syphyllis
- ○ Congenital malaria
- ○ Congenital rubella syndrome
- ○ Neonatal tetanus
- ○ Diarrhoea
- ○ Neonatal infection - other
- ○ COVID-19 acute respiratory infection

Neonatal Condtions

- ○ Birth asphyxia / meconium aspiration
- ○ Respiratory distress syndrome(RDS)
- ○ Jaundice
- ○ Bowel obstruction
- ○ Necrotising enterocolitis(NEC)
- ○ Neonatal Other

Congenital Malformations

- ☐ Congenital heart disease
- ☐ Imperforate anus
- ☐ Hirschsprungs disease
- ☐ Malrotation
- ☐ Microcephaly
- ☐ Gastroscisis
- ☐ Ompalocele
- ☐ Congenital genito-urinary malformation
- ☐ Congenital diaphragmatic hernia
- ☐ Congenital lung or airway malformations
- ☐ Spina bifida
- ☐ Congenital limb malformations
- ☐ Congenital abnormalities other

Prevention

- EENC – skin-to-skin contact, early breast feeding, do not separate baby from mother
- Strict hand washing and other basic infection control measures
- Antibiotic stewardship
  - Antibiotics → colonisation of the newborns gastrointestinal tract with pathogenic bacteria that are likely to be invasive (Gram negative, Staph aureus), rather than the protective bacteria that comes from the mother (Lactobacillus, Bifidobacterium).
  - Avoid antibiotics in babies who do not have serious infections
  - Cease antibiotics after 24 or 48 hours if the baby is well will also reduce colonisation with pathogenic or highly-resistance bacteria, and reduce infections in babies