Paediatric Quality of Care Standards

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Emergency Triage Assessement and Treatment plus admission

University of Nairobi

Keprecon
Kenya Paediatric Research Consortium

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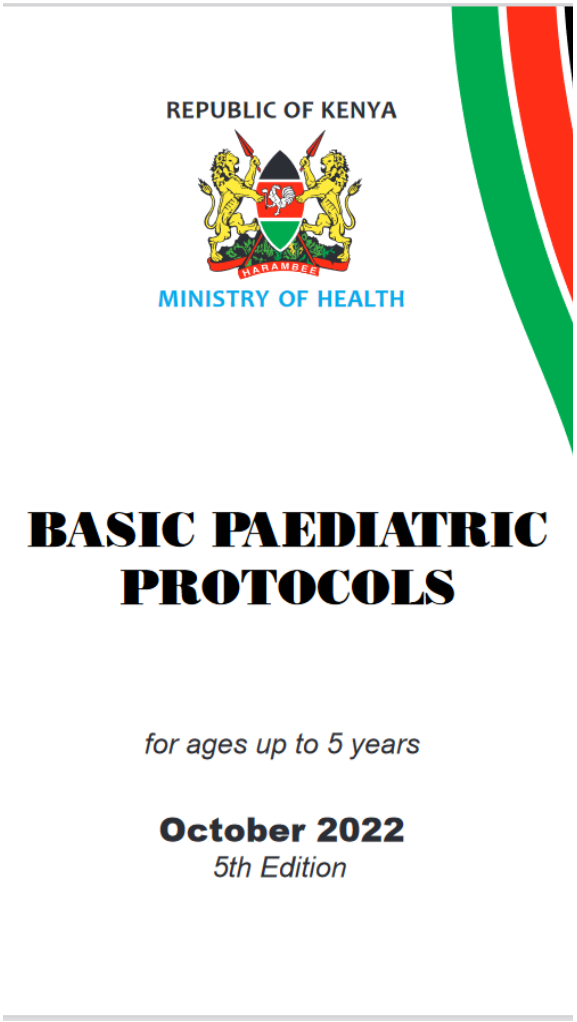
Objectives

- Introduction
- Highlight the guiding documents for paediatric quality of care
- Define quality care and standards of care
- Discuss the paediatric quality of care standards
- Application and use of these quality standards

Introduction

- Poor quality of care significantly contributes to child mortality.
- An estimated 60% of newborn deaths in LMIC can be attributed to poor quality of care
- Efforts to achieve Universal Health Coverage should include
  - Providing all women, newborns, children and adolescents **access to quality health services** throughout the continuum of their life course

Guiding documents



Key definitions

- **Quality of care**: The extent to which health care services provided to individuals and patient populations improve desired health outcomes. This requires safe, effective, timely, efficient, equitable, and people-centered healthcare.

- **Standard**: A general statement about what is expected to be provided to ensure high-quality care for children and adolescents

Scope of paediatric standards

- Cover care of children 0–14 years of age.
- Applicable to all health facilities offering child-care services
- Address children's provision and experience of care

WHO Quality of care standards (1)

Every child receives evidence-based care and management of illness according to WHO (and Kenya) guidelines

Health data is collected, analysed and used for early, appropriate actions to improve the care of every child

An appropriate, timely referral that guarantees seamless continuity of care for every child

Effective communication & meaningful participation of children and their families in decisions about their needs and preferences

WHO Quality of care standards (2)

Respect, protect, and fulfil every child's right without discrimination

Provide children and their families with educational, emotional, and psychological support that is sensitive to their needs and strengthens their capability

Staff should be competent, motivated, empathic, and available to provide care

An appropriately designed, safe, and well-stocked, child-friendly physical environment

MOH Principles of quality of care (1)

- Facilities need basic equipment, drugs, and adequate staff skilled in paediatric care.
- Sick children must be immediately triaged, assessed, and if necessary, given emergency treatment as soon as possible.
- All treatments should be clearly and carefully prescribed, usually based on a measurement of weight
- Treatment plans/doses should be checked by nurses before administration. Write dose frequency as 6hrly rather than QID
- Correct supportive care – particularly adequate feeding, and use of oxygen and fluids – is as important as disease-specific care.

MOH Principles of quality of care (2)

- Assessment of diagnosis and illness severity must be thorough, and treatment must be carefully planned.
- Review severely ill children within the first 6 hours of admission
- Initial assessment and follow-up reviews, treatment, and care should be accurately and comprehensively documented
- Laboratory tests should be used appropriately
- The use of unnecessary drugs should be avoided.

MOH Principles of quality of care (3)

- Communication with parents/caretakers should aim at helping them understand what the illness and its treatment are.
- Develop an appropriate discharge and follow-up plan before the child leaves the hospital.
- Do not discharge children against medical advice. Instead, they should be transferred to another facility to continue appropriate care.
- Good hand hygiene practices and good hygiene in the patient's environment improve outcomes for all sick children.

MOH Principles of quality of care (4)

- Admitted children and newborns should have their own IP number
- Admissions should be recorded using a standardized admission record form & inpatient registers.
- Admissions should be offered HIV testing and also screened for TB.
- Newborn admissions aged ≤14 days should receive Vitamin K unless it has already been given.
- Routine immunization status should be checked and missed vaccines given before discharge.
- All newborn infants are supported for successful breastfeeding
- All newborns and children receive care according to standard precautions for preventing hospital-acquired infections
- All infants and children should have a developmental assessment and those with special needs should be managed or referred appropriately

Application and use of Paediatric Standards for QOC

- Guidance in the organization, planning and delivery of child health service in the facility
- Preparing evidence based national standards and protocols
- Identification of components of care and resource inputs that are required
- Tracking quality improvements and monitoring performance in care or service delivery
- Providing a benchmark for national health facility assessments, audits, accreditation and performance rewards

Questions?

Summary

- Health care systems should strive to provide high-quality paediatric health care at all levels
- Hospitals should continuously monitor the care being provided against the set standards
- Healthcare providers should institute quality improvement measures where it falls below the standards

Management of HYPOGLYCAEMIA <u>after</u> the <u>neonatal period</u>

Objectives

- Define hypoglycaemia after the neonatal period
- Treatment of hypoglycaemia

Laboratory definitions of hypoglycaemia

BG less than 2.5 mmol/l (~45mg/dl)

BG less than 3.0 mmol/l (~54mg/dl), in children with severe acute malnutrition.

When do we treat hypoglycaemia ?

When do we treat hypoglycaemia ?

- There are **no reliable** signs of hypoglycaemia
- Blood glucose should be measured in all severely ill newborns and children
- If rapid measurement is not possible it is appropriate to **treat with a dextrose bolus** if :
  - Altered consciousness AVPU < A
  - Inability to drink / breastfeed

If the blood glucose result is rapidly available in a sick child

Infants and children	*if glucose <2.5mmol/L*	Treat with iv 10% dextrose 5mls/kg if unable to drink
Severe Acute Malnutrition	*if glucose <3.0mmol/L*	Treat with iv 10% dextrose 5ml/kg if AVPU = P or U Treat with immediate feed if AVPU = V or A

Correction of hypoglycaemia in a sick child

- 10% dextrose at 5mls/kg given over 2 – 3 mins.

- To make 10% from 50% and water for injection

4 parts water for injection | 1 part 50% glucose

9 parts 5% Dextrose | 1 part 50% Glucose

- To make 10% Dextrose from 50%D and 5%D

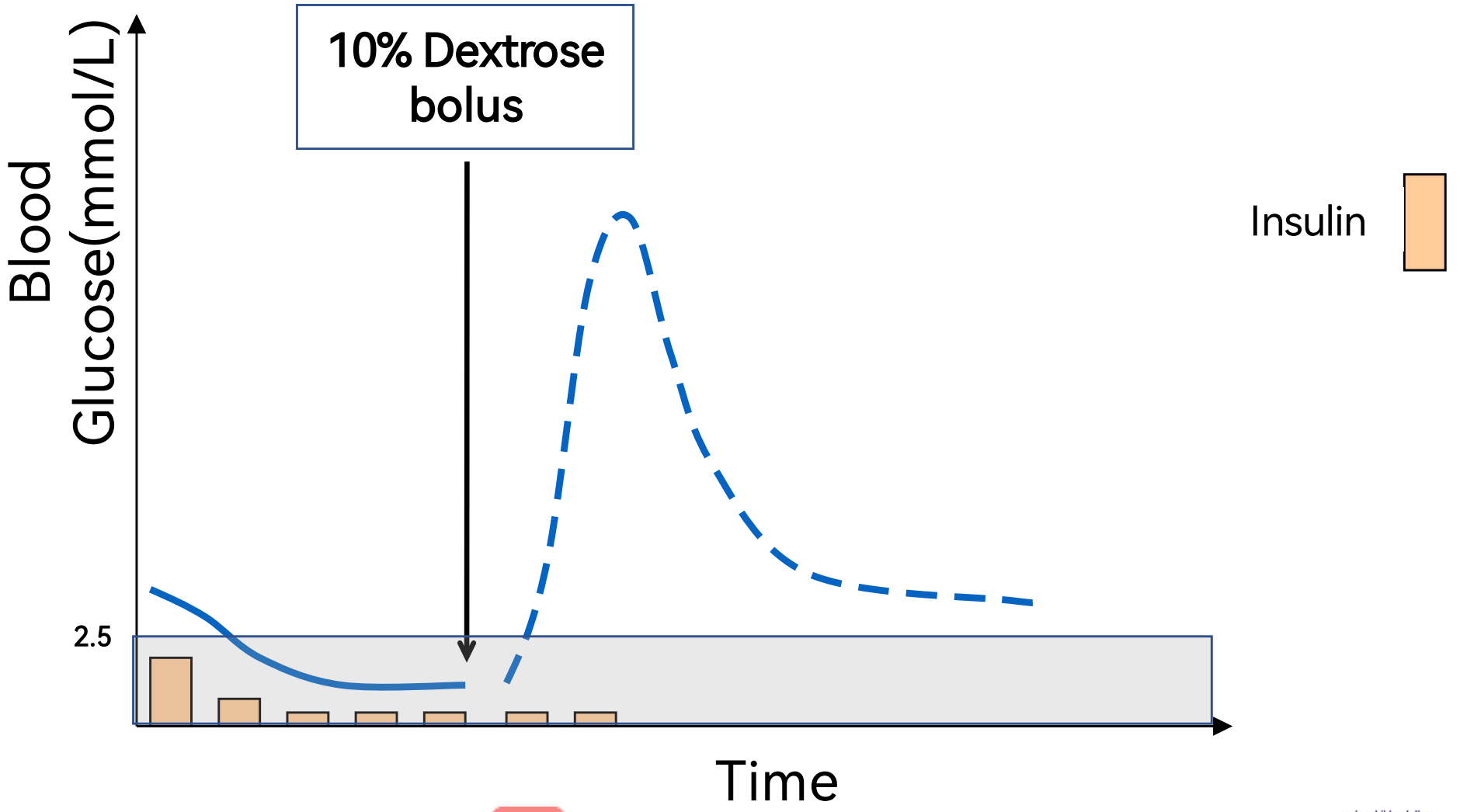
Giving 50% glucose is NO LONGER recommended

- Dextrose overdosing may result in convulsions and death (*hyperosmolar brain injury*)
- 10%D solutions work just as well and are thought to be safer.

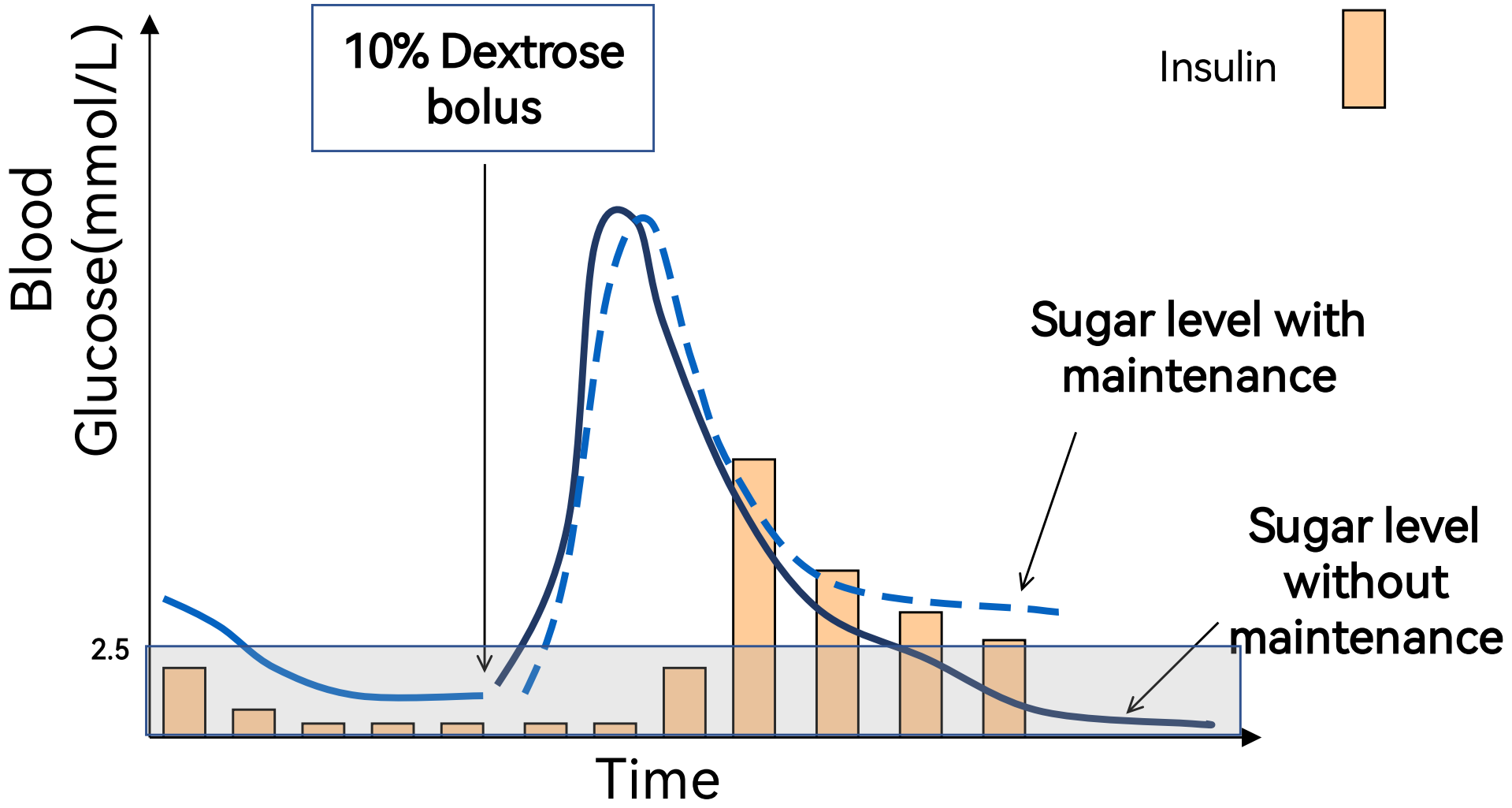
Use of sublingual sugar

- If iv access is not possible or delayed
  - Give one teaspoon of sugar moistened with one or two drops of water sublingually, if swallowing occurs, repeat the sugar dose.
  - Repeat the sugar dose every 20 min or start oral or NGT feeds to prevent rebound hypoglycemia.

What happens after a dextrose bolus?



Rebound hypoglycaemia



A plan must be made for continuous glucose supply after a bolus

Maintenance therapy

- After a bolus of glucose a plan must be made to continue glucose supply:
  - Nasogastric or oral feed
  - If not able to use nasogastric feeding use Ringers Lactate 5%Dextrose (contains electrolytes and dextrose)

Questions?

Summary

- Check glucose in all seriously ill neonates and children
- Use 10% glucose/dextrose for treatment
- Provide maintenance glucose or feed

Management Of Convulsions After The Neonatal Period

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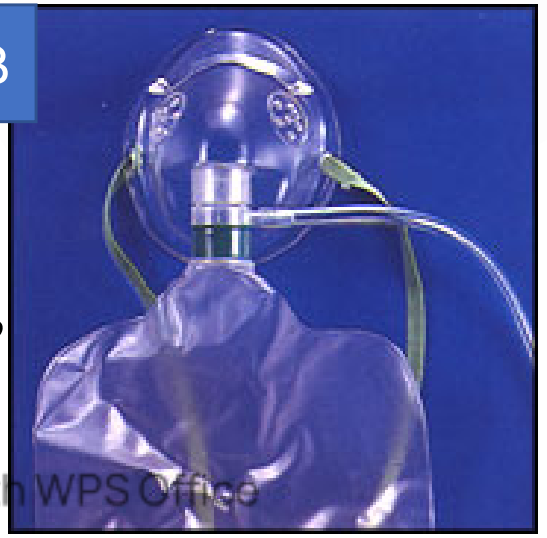
Objectives

- To understand the management of seizures after the neonatal period
- To review the properties of commonly available anticonvulsants
  - Diazepam
  - Phenobarbitone
- To understand the need for appropriate supportive care during a convulsion

Clinical Dilemma?

Managing the risks of seizures and their treatment

- Airway
  - *Left lateral positioning*
  - *Suction if indicated*
  - *Support after seizure*
- Breathing
  - *Start Oxygen via NRM*
- Circulation
  - *Temperature gradient?*
  - *Severe Pallor?*
- Disability
  - *Check Rbs, give glucose?*
  - *What drugs have been used?*
- *Need for anticonvulsants?*

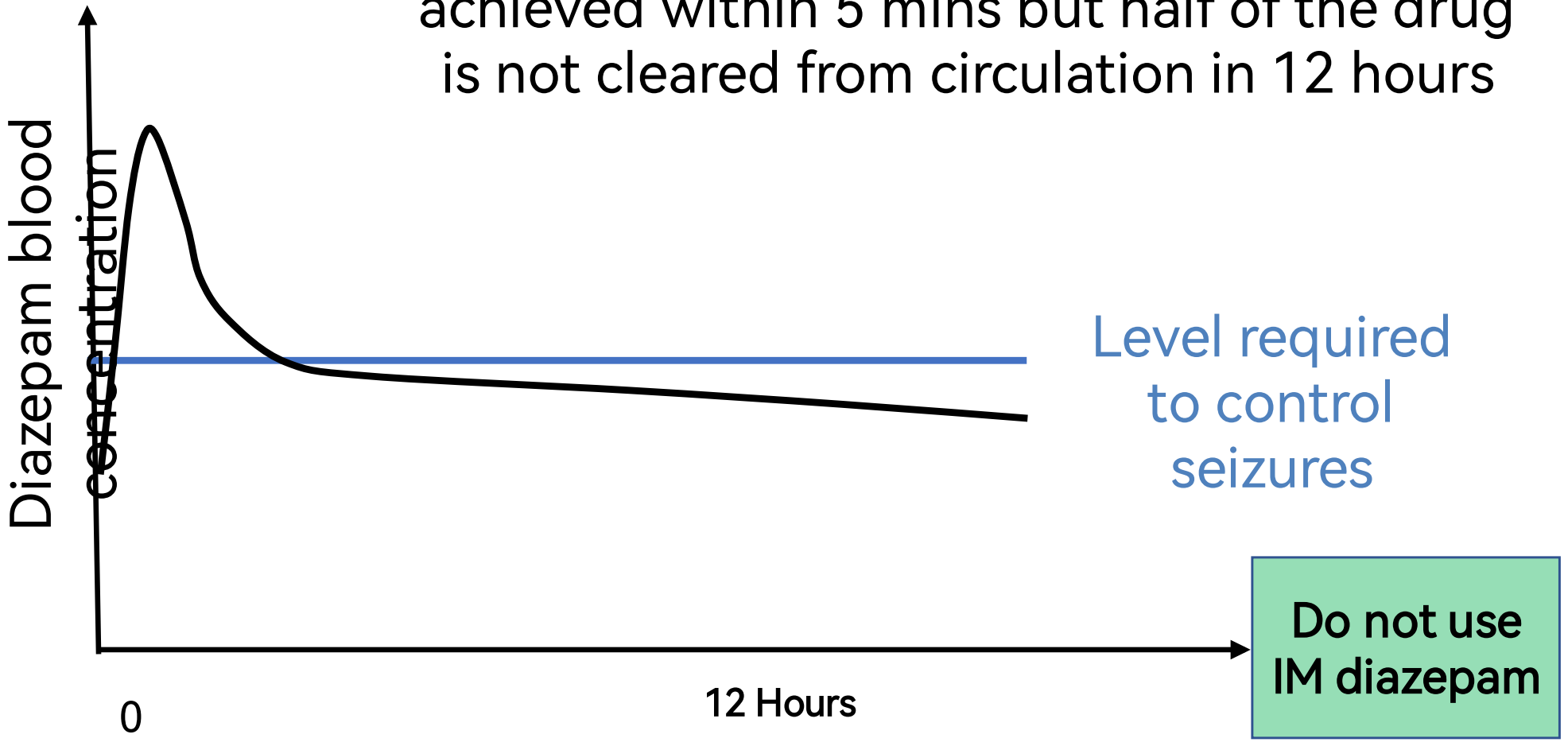


Diazepam

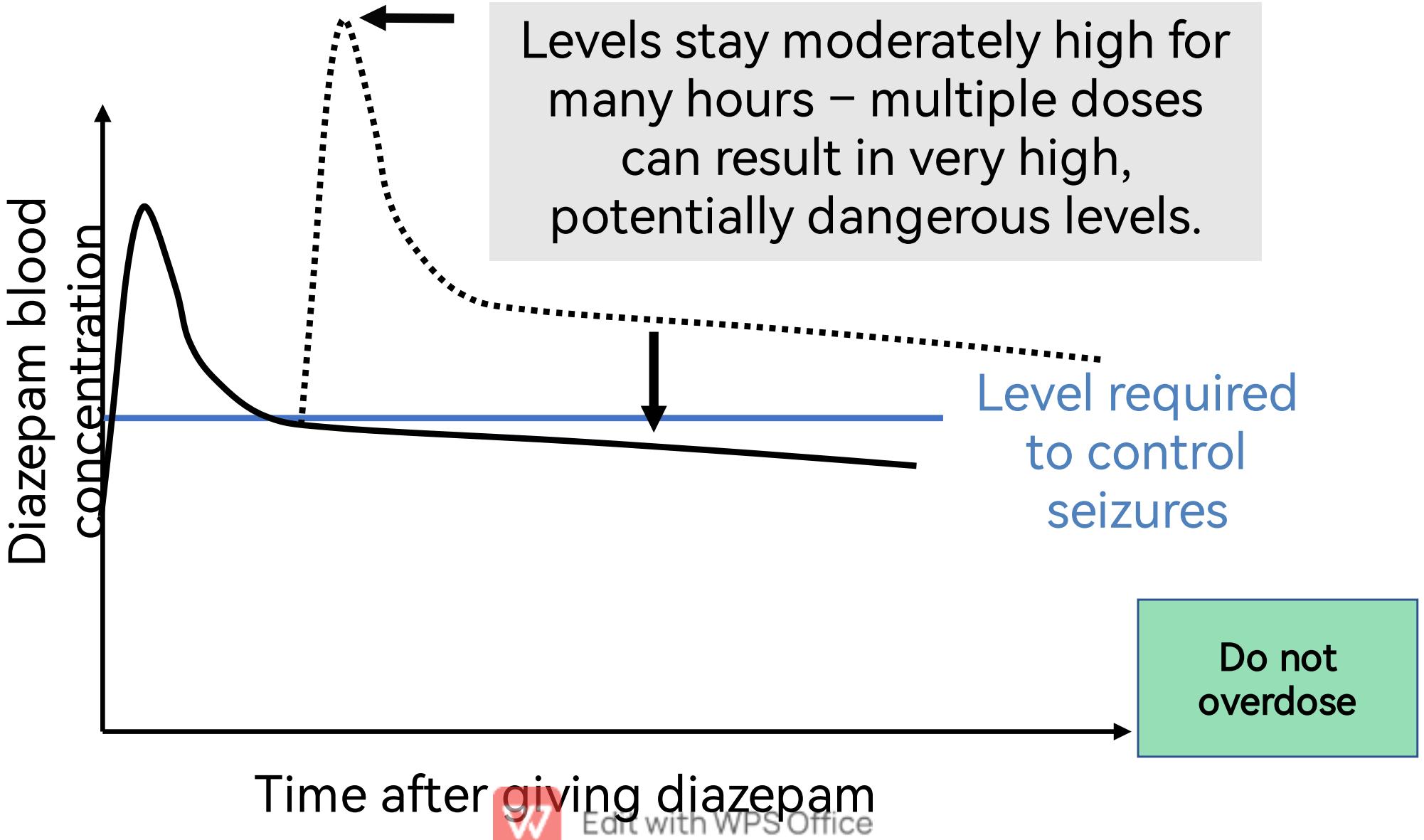
- Half-life, 10-20 hours, longer in newborns.
  - Danger of accumulation
- Predominantly inactivated in the liver
- Can be given by iv or rectal routes
- Lorazepam and midazolam are alternatives

Diazepam

After iv (0.3mg/kg) or pr(0.5mg/kg) administration adequate levels are reliably achieved within 5 mins but half of the drug is not cleared from circulation in 12 hours



Diazepam (2 clinical implications)

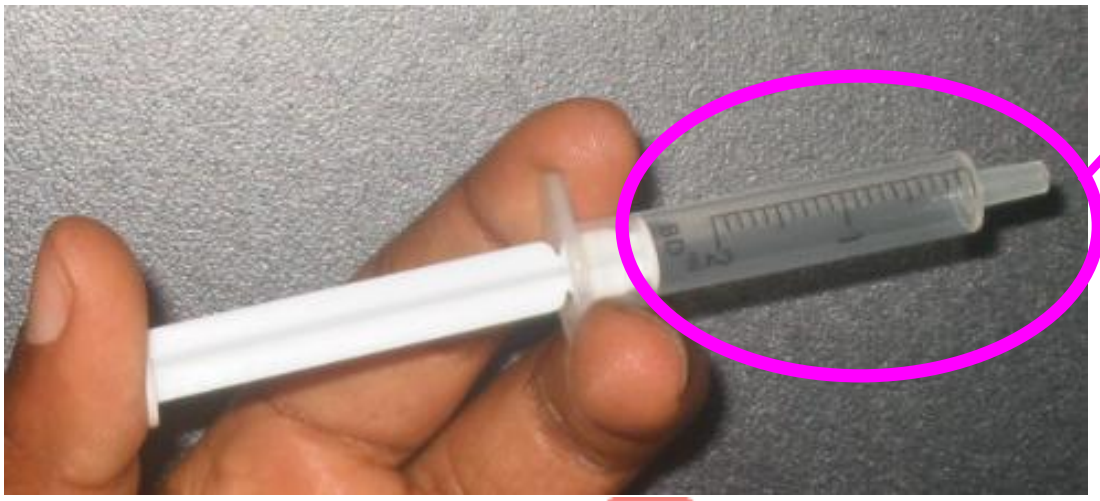


Diazepam – side effects

- Respiratory depression

- After a single (correct) dose of diazepam up to 10% of children have discernible respiratory depression
- Give the correct dose 0.3mg/kg iv or 0.5mg/kg pr

Giving rectal diazepam

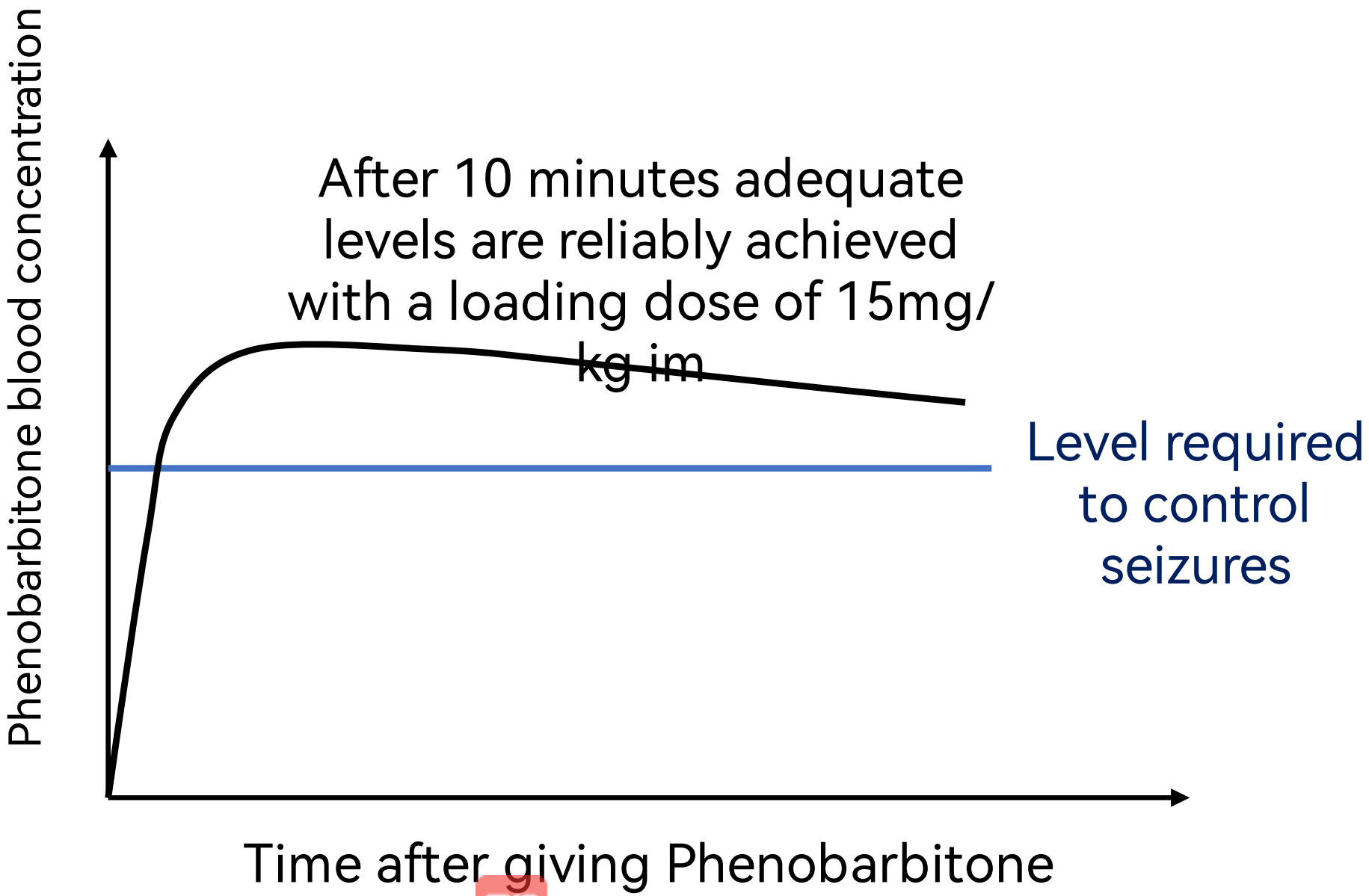


4 – 5 cm inside the anal margin
All of the barrel of a 2mls syringe and nearly all of a 1ml syringe

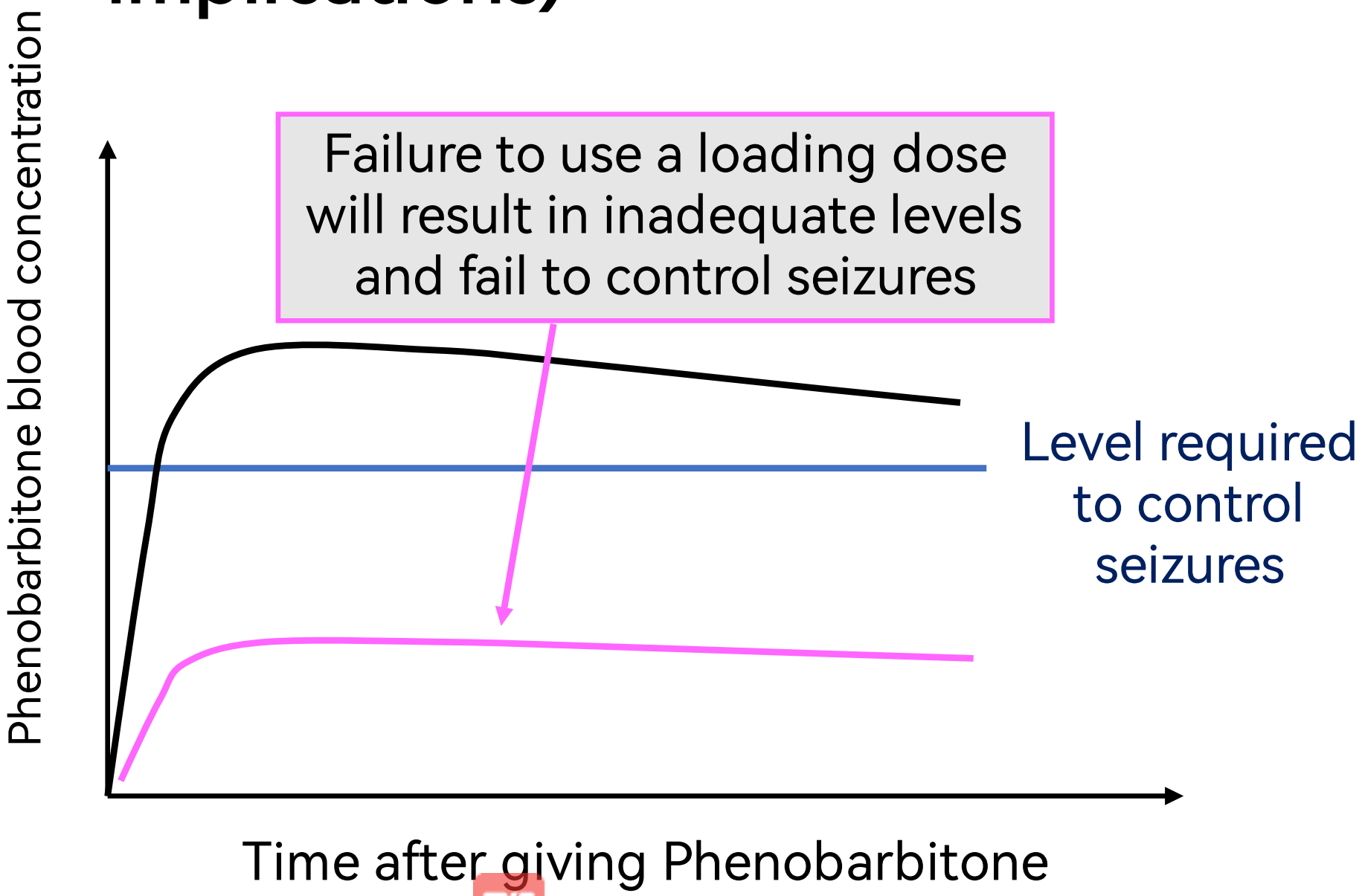
Phenobarbitone

- Half life, ≥ 2 days
  - Danger of accumulation
- Eliminated by the liver
- Can be given:
  - Deep im injection
  - Slow iv infusion (max 1mg/kg/min – 15min for loading dose!)
  - ***iv bolus doses are contraindicated.***

Phenobarbitone (2)

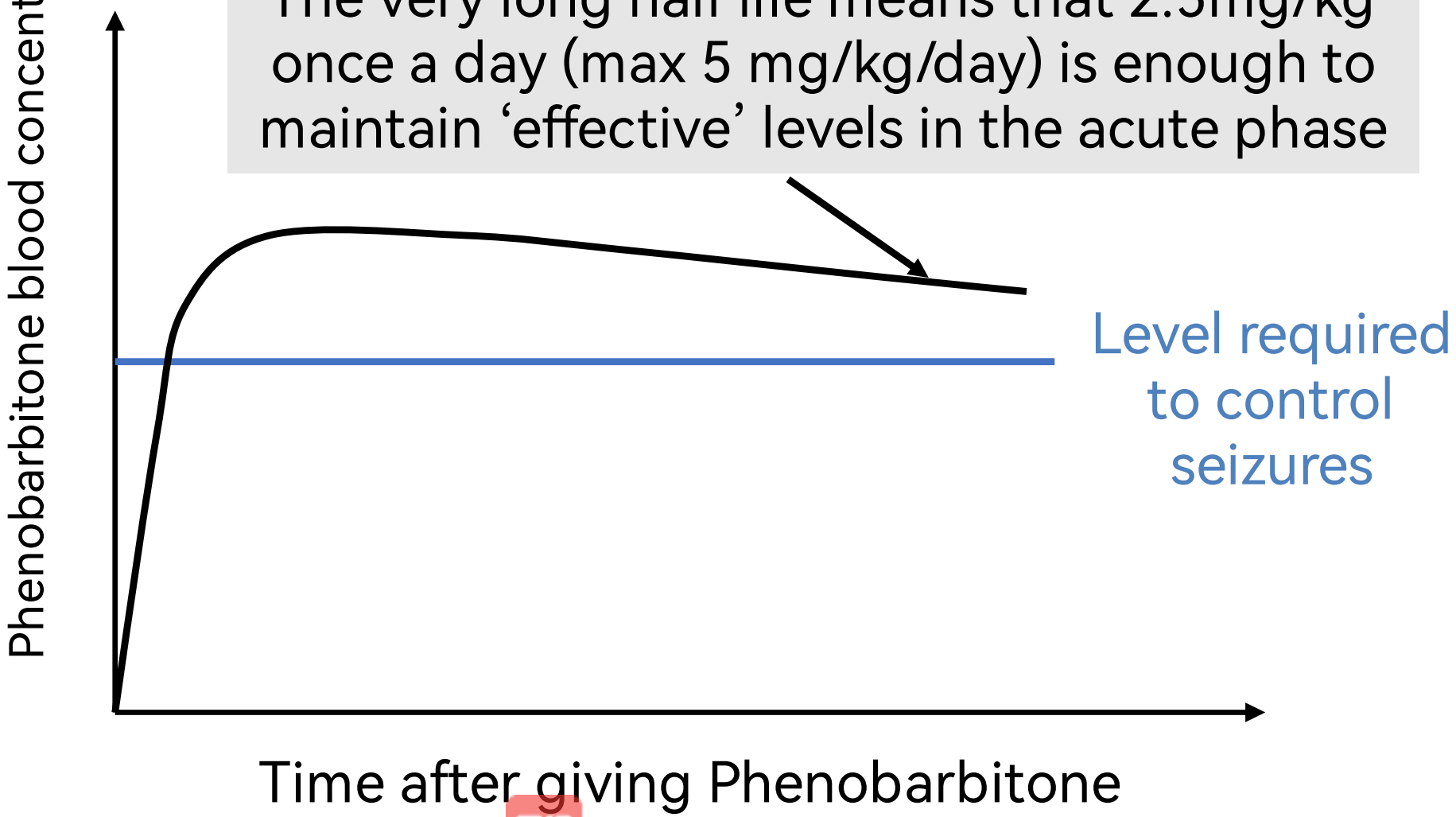


Phenobarbitone (2 clinical implications)



Phenobarbitone (2 clinical implications)

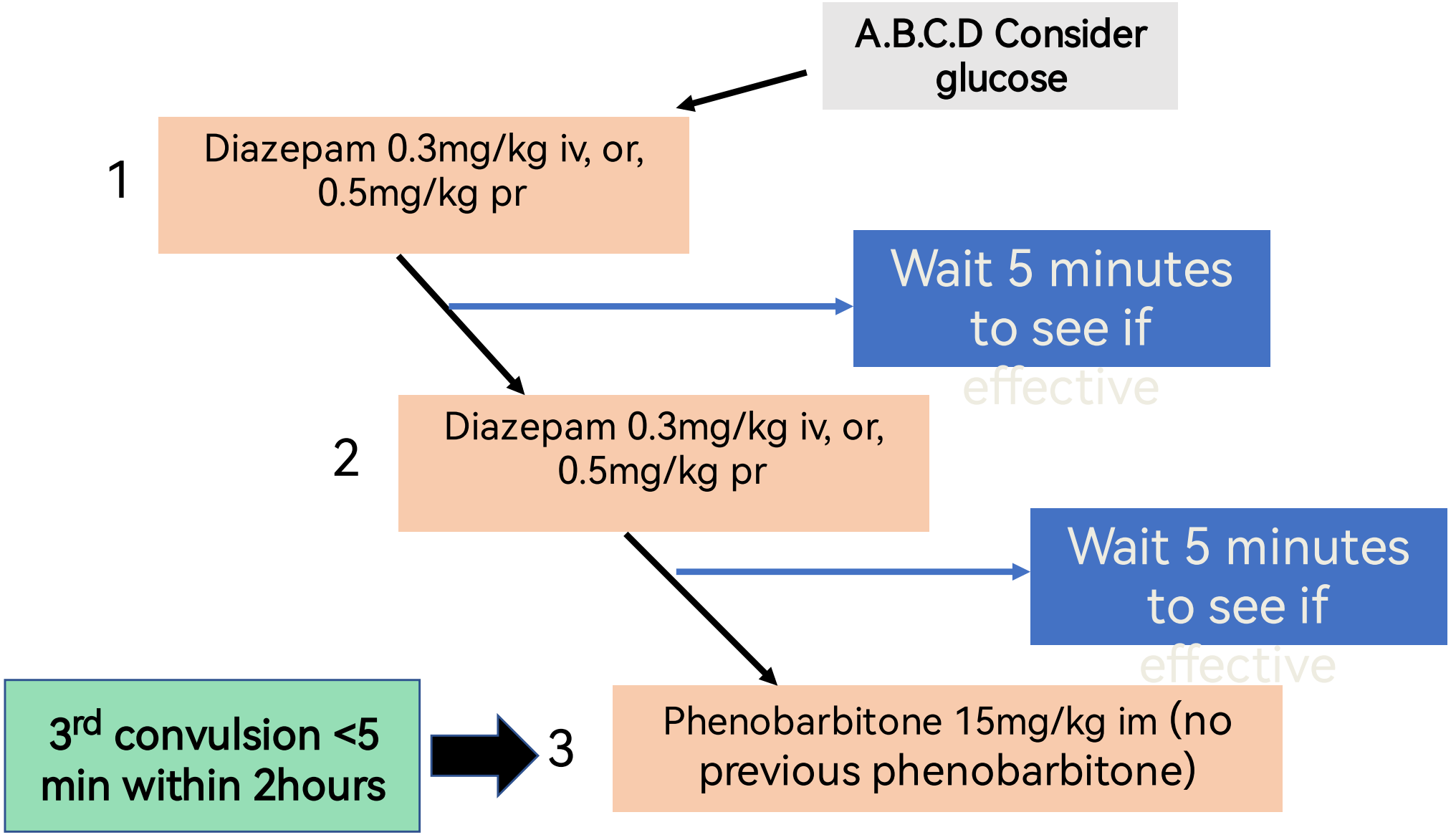
The very long half life means that 2.5mg/kg once a day (max 5 mg/kg/day) is enough to maintain ‘effective’ levels in the acute phase



Phenobarbitone – side effects

- Respiratory depression
- In overdose or rapid iv infusion – coma and hypotension.
- Monitor respirations, pulse, SpO_2 and blood pressure

A rational approach – age >1m.



Maximum safe doses within 24 hours appear to be DZ x 2 plus PB loading x 1.

Questions?

Summary

- Remember hypoglycaemia in all convulsions.
- Diazepam and phenobarbitone when used appropriately are safe and usually effective.
- When seizures continue despite basic treatment, the drugs can become as dangerous as the convulsions.
- Sufficient attention should be paid to basic airway and respiratory support to prevent death and brain damage.

An acutely ill infant/child aged 2-59 months With Respiratory Distress

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Objectives

- State childhood illnesses that present with respiratory distress
- Describe management of a child with pneumonia
- Describe management of a child with asthma

Respiratory Distress- Causes

Lung / Airway Disease

- Acute Pneumonia
- Asthma
- PTB
- HIV-PCP
- Croup (LTB)
- Bronchiolitis

Systemic Disease

- Malaria
- Severe Anaemia
- Severe dehydration
- Heart Disease
- Renal Disease

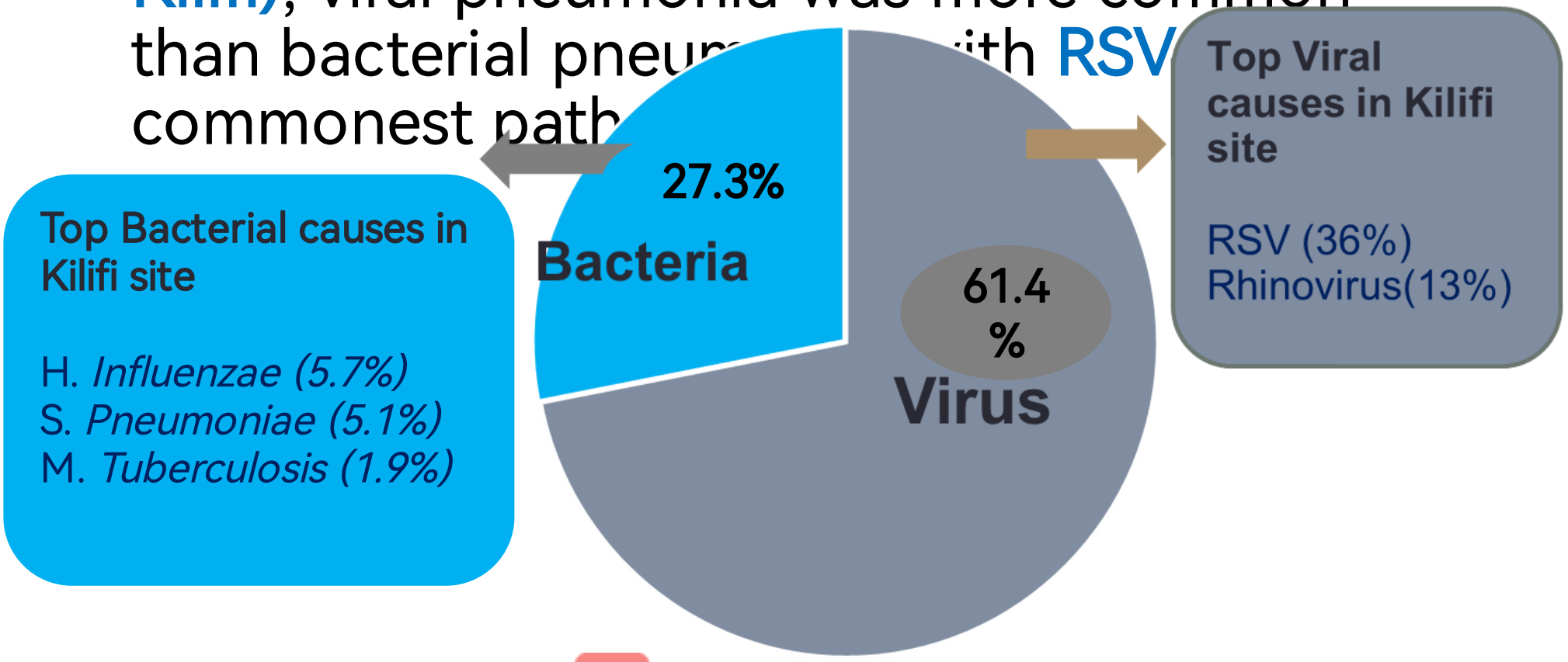
Pneumonia

- Pneumonia can be classified per the causes (Viral, bacterial, fungal) or as per severity.

- Most acute respiratory infections including pneumonia are viral

Childhood Pneumonia etiology in Kenya

- In the PERCH study (7 countries in 9 sites- Kilifi), viral pneumonia was more common than bacterial pneu[illegible]ith RSV commonest path[illegible]



Causes of severe pneumonia requiring hospital admission in children without HIV infection from Africa and Asia: the PERCH multi-country case-control study- https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)30721-4/fulltext

Pneumonia

- In this session we will concentrate on the severity of the respiratory distress.

- A few signs in a child with cough and difficulty breathing can classify severity.

- **We will reinforce the current pneumonia guidelines – all protocol books before 2016 are out of date!**

Which symptoms and signs of pneumonia are most useful?

- Best signs to guide in making **syndromic diagnosis** and assessing the **severity** of pneumonia
- Best signs are critical to **assess the risk of mortality** among pneumonia patients
- Best guide to **treatments** : choice of antibiotics & supportive care and whether inpatient or outpatient care.
- Best signs to **monitor response** to treatment.

Six signs used in classification of the severity of illness in a child with cough and difficulty breathing < 14 days

Danger signs for pneumonia

- ❑ Hypoxemia
- ❑ Lethargy or unconscious
- ❑ If alert: inability to breastfeed or drink
- ❑ Grunting

- ❑ Lower chest wall indrawing
- ❑ Respiratory rate

The four danger signs in a child with cough or difficulty in breathing

ANY of the

4

Danger signs

1. **Hypoxemia :**
   SpO_2 <90% or Central Cyanosis
2. **Altered consciousness**
   Lethargy or unconscious
3. **If alert assess ability to drink or breastfeed**
   Inability to drink or breastfeed
4. **Grunting**
   Grunting heard

Lower Chest wall Indrawing

- Lower chest wall indrawing is the **inward movement of the lower chest wall when the child breaths in.**
- It does not refer to the inward movement of the soft tissue between the ribs.
- It signifies increased work of breathing but is not a danger sign by itself alone.

Respiratory Rate

- Counted for **full 1 minute** in a **calm** child!
- Monitor **trends** rather than a single count!

- Fast breathing
  - Respiratory Rate equal to or more than (≥) 50/min (age 2–11 months)
  - Respiratory Rate equal to or more than (≥) 40/min (age 12–59 months)

Special considerations

- Cautious application of the national guideline to the following groups of patients – **applies to 2-59months**

Assessment	Possible action/ cause
Cough or fever more than 14 days	❖ Consider TB /look for other causes of fever
Exposure to TB or chronic cough	❖ Possibility of TB
Severe Acute Malnutrition	❖ Use guidelines for severe acute malnutrition
HIV infection	❖ Use guidelines for HIV infected children
Known to have heart or kidney disease	❖ Admit for senior review
Discharged from inpatient in the last 4 weeks	❖ Hospital acquired infection/TB/missed diagnosis

Current (2016 and 2022) classification – Cough or difficulty breathing

Danger signs
(SpO_2<90% or cyanosis, not alert, unable to drink, grunting)

→ **SEVERE PNEUMONIA**

→
- Penicillin & Gentamicin
- supportive treatment e. g. oxygen, feeds
- **Will require in-patient care**

NO danger signs
but has
Lower chest wall in-drawing OR fast breathing

→ **PNEUMONIA (Non-Severe Pneumonia)**

→
- High Dose Amoxicillin DT
- Does NOT require supplemental oxygen
- Can feed does NOT require NGT or IVF
- Is alert
- **May not require in-patient care.**

Reasons for change of classification in Kenya

- Change tested in Kenya with **good results in clinical trial.**
- Consistent with the WHO pneumonia guidelines (2013).
- **Risk of death** for children with lower chest wall indrawing BUT no danger signs is very low **(<1%)**
- **Risk of treatment failure at 48 hours** when using either crystalline penicillin**(8%)** or amoxicillin**(7.7%)** for pneumonia with lower chest wall in-drawing and no danger signs is low and the same.
- ***High dose oral amoxicillin is comparable to crystalline penicillin for treating pneumonia just with indrawing.***

Safe to give outpatient treatment for pneumonia with indrawing?

- A child with cough or difficulty breathing with lower chest wall indrawing BUT no danger signs **can safely be managed as an outpatient** :
  - If review at 48 hours can be conducted at a clinic
  - If the family can bring the child sooner for any deterioration – careful counseling on danger signs that should prompt early return must be given
- Is there another illness that makes admission necessary?
- What is the HIV status? Is there severe acute malnutrition?

How severe is respiratory distress – Cough or Difficult Breathing 1

One of the danger signs
- Central cyanosis/oxygen sat <90%?
- Unable to drink?
- Reduced level of consciousness?
- Grunting ?

Y → Severe Pneumonia

High Risk of Death

High Risk of Hypoxaemia =Give oxygen if saturations <90% or based on clinical S+S

May need fluid / feeding support

Require Broad Spectrum Antibiotics

How severe is respiratory distress – Cough or Difficult Breathing (2)

Lower chest wall indrawing?
OR Fast breathing?

(RR ≥ 50 aged 2 –11 months
RR ≥ 40 aged 12 – 59months)

Y → Non severe Pneumonia

Not severely ill = Outpatient care **if 48hr review possible**

Can feed orally, is alert & supplemental oxygen not needed

Require high dose Amoxicillin DT 40-45mg/kg/dose BD for 5 days

Review in 2 days for improvement /deterioration/unable to feed

How severe is respiratory distress – Cough or Difficult Breathing

History of cough / difficult breathing ONLY

Y →

Cough or cold, No Pneumonia

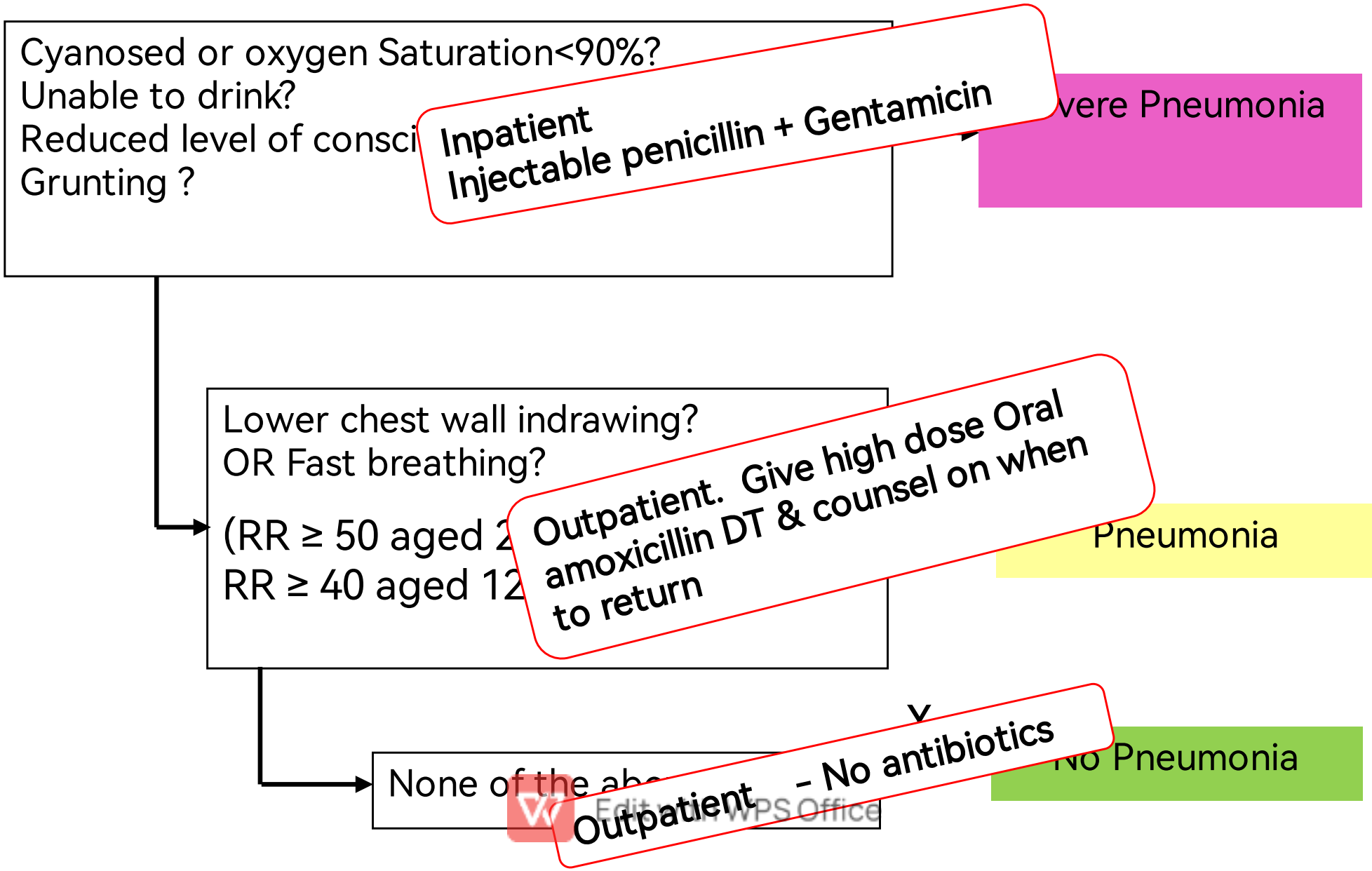
Outpatient care

Antibiotics not indicated

Reassure and counsel on danger signs

Cough syrups SHOULD NOT be prescribed.

4th (2016) & 5th (2022) Edition Pneumonia Guidelines



HIV infected/exposed

HIV infected or exposed with either

- Severe pneumonia or
- Pneumonia with in-drawing

- Admit
- Treat with crystalline Penicillin & Gentamicin
- Oxygen if required

+

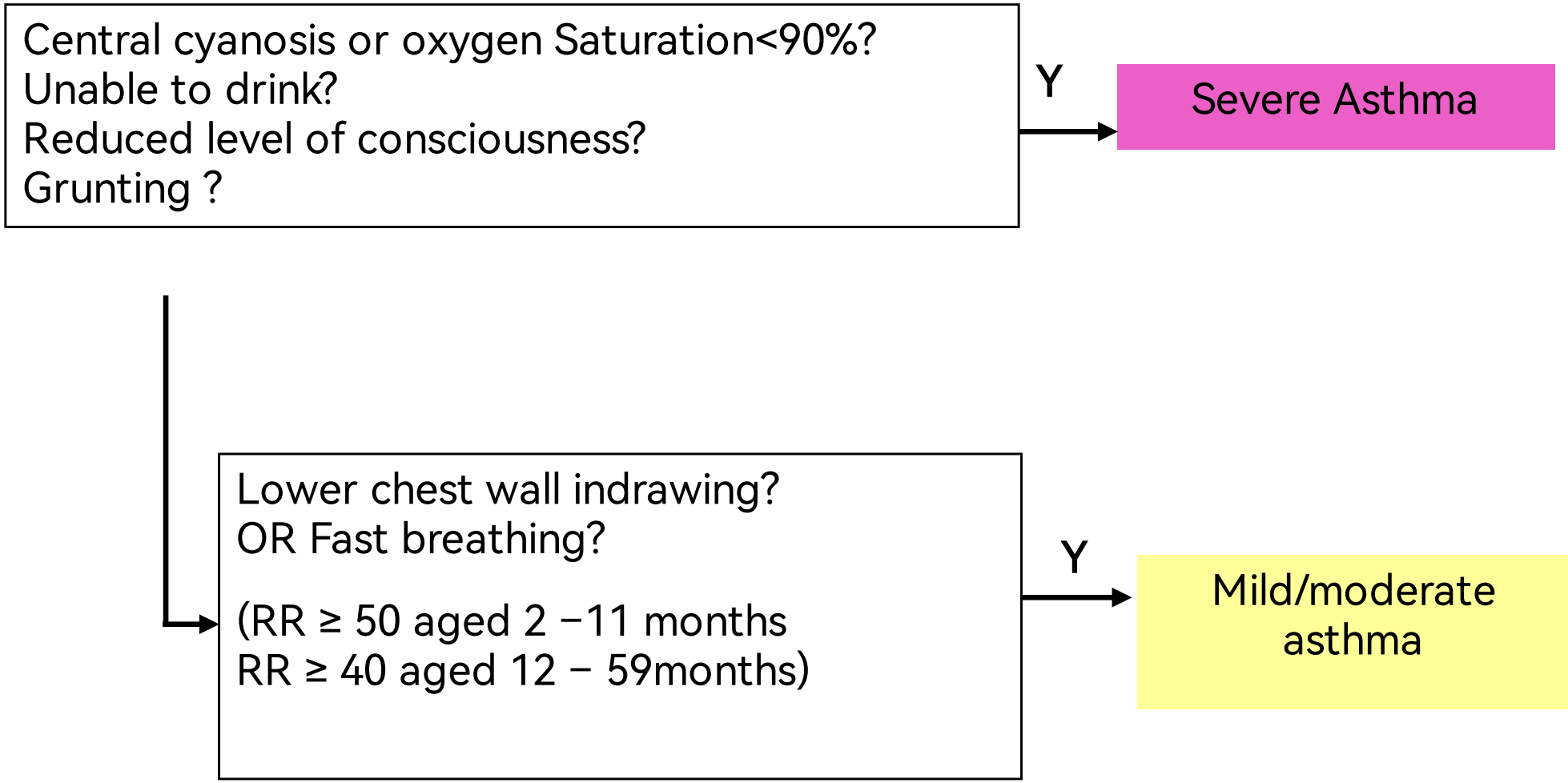
< 12months of age give empiric treatment for PCP – high dose cotrimoxazole

Empiric treatment- not recommended for children above one year

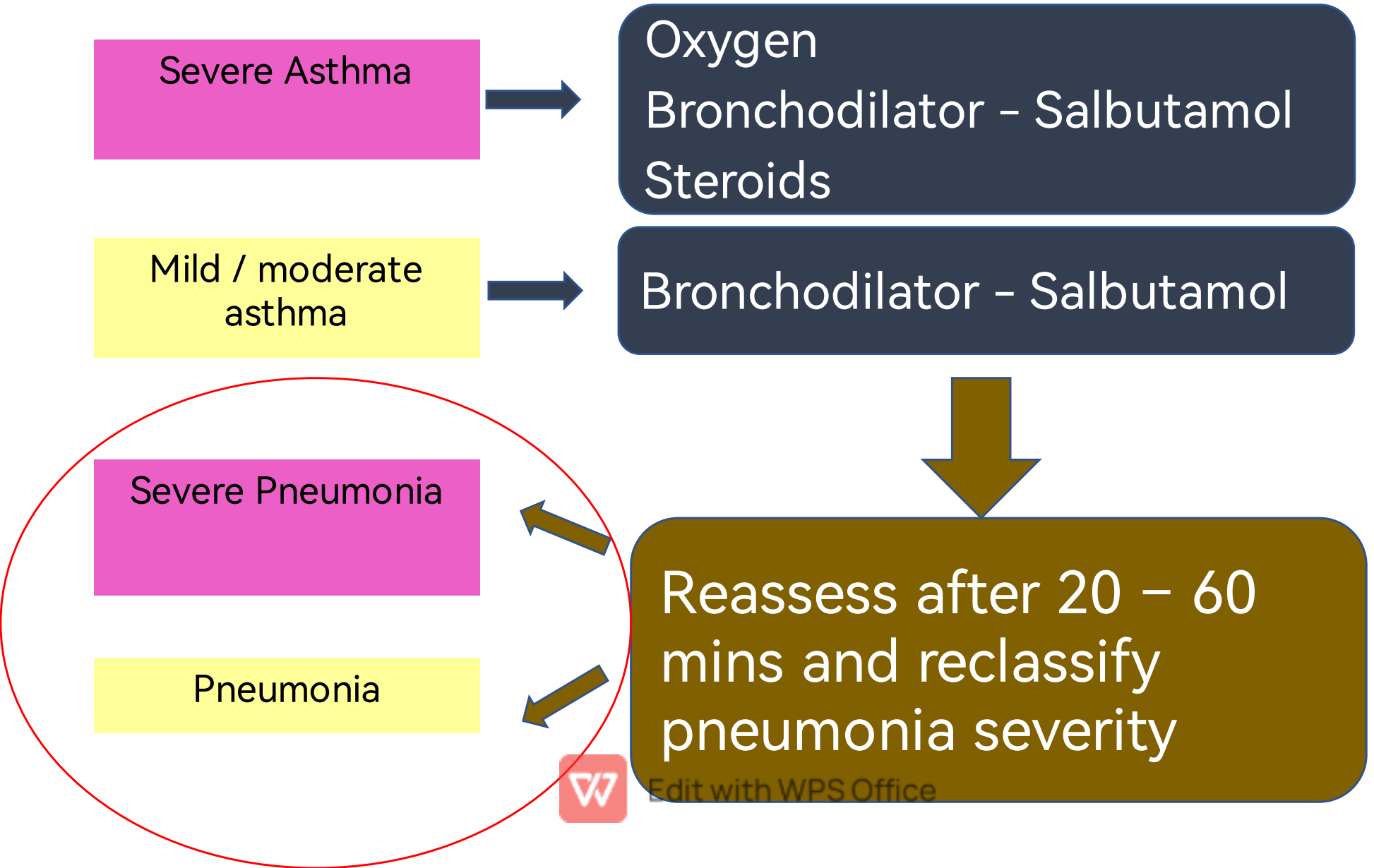
Asthma

- Most children with asthma will have a wheeze in addition to the cough or difficulties in breathing
- Severity of asthma is graded using just a few signs as for pneumonia
- Degree of severity can change after the initial dose of bronchodilators – *reassess frequently*.
- Consider other causes of wheeze for atypical presentation.

Wheeze – how severe is the asthma?

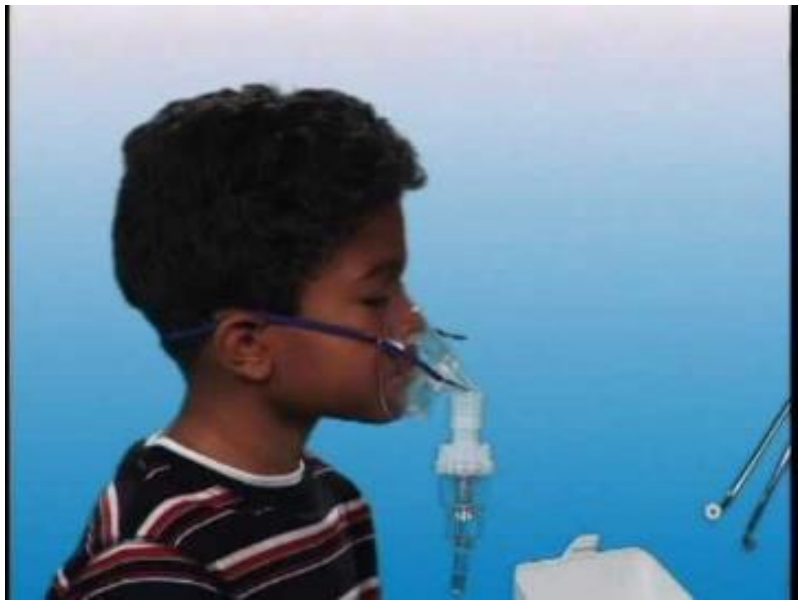


Asthma – treat and reassess and decide about antibiotics



Providing Salbutamol

Nebulisers



- 2.5 mg for ages up to 5yrs
- Check – if the nebuliser uses oxygen?
- Up to 3 doses in first 1 hour if needed
- Reassess after each dose

Providing Salbutamol

Inhaler, spacer + mask

- Mask should be used in all aged < 3 years
- 4-5yrs mouthpiece or mask
- Severe asthma – 6 puffs every 20min for one hour if needed
- Mild/moderate asthma – 2 puffs every 20minutes for one hour if needed

QUESTIONS?

Summary

1. A few signs in a child with cough or difficulty in breathing can be used to assess and classify the severity of pneumonia.

2. The new 2016 Pneumonia guidelines classify pneumonia into two classifications : **Severe pneumonia and Pneumonia (Non-severe Pneumonia).**

3. Success of treatment of pneumonia with high dose oral amoxicillin is comparable to that of crystalline penicillin.

Fluid Therapy In Dehydration Due To Diarrhoea

Objectives

1. To understand the classification of dehydration
2. To understand the link between classification and fluid plans
3. To explain fluid plans
4. To highlight additional treatments
5. To demonstrate intraosseous needle insertion and use

How severe is the dehydration due to diarrhoea?

Hypovolaemic shock
(Severely impaired circulation)

All of the four (4) below are present:

- ✔ Not alert, AVPU < A
- ✔ Weak or absent peripheral pulse
- ✔ Cold periphery & temp gradient
- ✔ Capillary refill > 3 secs

PLUS

sunken eyes and
slow skin pinch > 2secs

Y →

Ringer's 20mls/kg bolus max 2. then Plan C Step 2

Transfuse urgently if Hb <5g/dl
Treat hypoglycaemia if present

Management of diarrhoea / dehydration with severely impaired circulation = 'hypovolaemic shock'

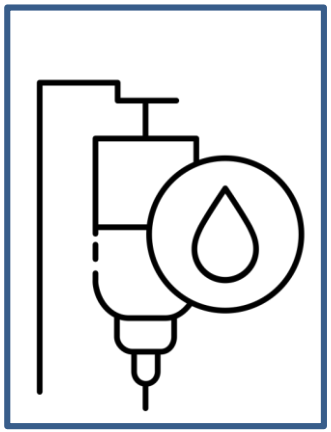
Observe, SSSS, A & B , start oxygen, then if signs of severely impaired circulation & dehydration = Hypovolaemic Shock
Exclude Severe Acute Malnutrition

↓

Establish IV /IO access.
20mls/kg Ringer's bolus (<15min)

↓

Reassess ABCD, give max 2 boluses, then
Plan C step 2



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How severe is the dehydration due to diarrhoea?

- ✔ Not alert, AVPU < A
- ✔ Weak or absent peripheral pulse
- ✔ Cold periphery and temperature gradient
- ✔ Capillary refill > 3 secs

PLUS sunken eyes and skin pinch > 2 secs

Y → Severely Impaired Circulation 'Hypovolaemic Shock'

N ↓

Severe dehydration

AVPU < A plus / unable to drink
PLUS

Sunken Eyes

Skin pinch ≥ 2 secs

Y → **Severe Dehydration Plan C**

Treatment of severe dehydration with IV Ringers lactate

Step 1*	30 mls / kg RL over 30 mins if age ≥12 months (over 60mins if age <12months)
Step 2	70 mls / kg RL over 2.5 hours if age ≥12 months (over 5 hours if age < 12 months)
NGT rehydration–120ml/kg ORS over 6hours can be used instead of steps 1 and 2 **Re-assess at least hourly and after 3-6hrs, reclassify as severe, some or no dehydration and treat accordingly**	

Give 5ml/kg/hr of ORS once the child can drink

** Go to step 2 if child has received bolus for shock*

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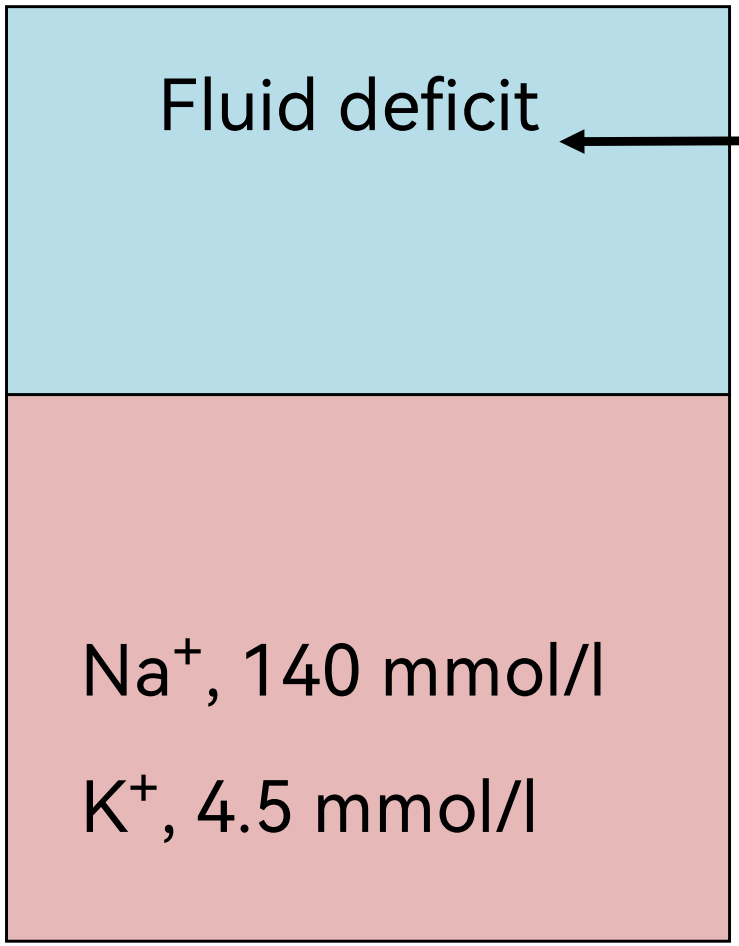
IV Fluid replacement



Replacement fluids should be similar to body fluids

All concentrations are in mmol/l	Na^+	K^+
Ringer's Lactate (Hartmann's)	130	5.4

But the iv fluids don't contain glucose....

How severe is the dehydration due to diarrhoea?

- Not alert, AVPU < A
- Weak or absent peripheral pulse
- Cold periphery and temperature gradient
- Capillary refill > 3 secs

Y → Severely Impaired Circulation 'Hypovolaemic Shock'

Unable to drink or AVPU < A plus:
- Sunken Eyes
- Skin pinch ≥ 2 secs?

Y → Severe Dehydration

Able to drink plus ≥ 2 of:
- Sunken Eyes
- Skin pinch 1 – 2 secs
- Restlessness / Irritability

Y → **Some Dehydration**

Some dehydration is **best treated** with ORS

- Oral rehydration is associated with FEWER deaths and convulsions
- ORS contains glucose and potassium
- ORS can safely be given down an NG tube if needed
- Very rarely an ileus (bowel stops working = absent sounds with distension) is a reason to stop oral fluids

Composition of low osmolality ORS

	Mmol/l	
Sodium	75	Replaces Na lost in stool
Chloride	65	
Glucose	75	Facilitates absorption of Na (and hence water) in the small intestine
Potassium	20	Replace K+ lost in stool
Citrate	10	Corrects acidosis
Total Osmolality	245	

- ORS is based on the discovery that glucose greatly increases the patient's capacity to absorb salts and water.
- More than 90% of the diarrhea diseases irrespective of the cause respond to ORS

How severe is the dehydration?

- Not alert, AVPU < A
- Weak or absent peripheral pulse
- Cold periphery and temperature gradient
- Capillary refill > 3 secs

Y → Severely Impaired Circulation 'Hypovolaemic Shock'

Unable to drink / AVPU <A **plus**
- Sunken Eyes &
- Skin pinch ≥ 2 secs?

Y → Severe Dehydration

*Able to drink **plus** 2 or more of:*
- Sunken Eyes and / or
- Skin pinch 1 – 2 secs
- Restlessness / Irritability

Y → Some Dehydration

Diarrhoea but not enough signs to classify as some dehydration

Y → **Diarrhoea with no Dehydration**

Why do we use these signs?

- Severely Impaired Circulation caused by severe diarrhoea likely indicates Hypovolaemic Shock -requires immediate management
- Ability to drink is an important indicator of severity. If they can drink then use oral or oral + ngt fluids.
- Sunken Eyes and Skin Pinch are the most reliable signs of dehydration
- Signs which work poorly include:
  - Dry mucous membranes
  - Absence of tears
  - Poor urine output

Prescribing ORS for Some Dehydration

- 75 mls / kg of ORS over 4 hours.
- Continue breastfeeding as tolerated
- After 4 hours reassess and reclassify;
  - Severe, Some or no dehydration?
- *Counselling the mother / caretaker*
  - What do you tell the mother of an 8kg child?

ORS in practice

300 mls

200 mls

Prescribing ORS

- 75 mls / kg for an 8kg child?

600 mls in 4 hours
2 large cups / 2 soda bottles in 4 hours
3 small cups in 4 hours.

Prescribing ORS to prevent dehydration (Plan

- After correction of dehydration
- Give required feeds and fluids
- In addition, ORS 10ml/kg for every loose stool

- In a child with diarrhea and NO dehydration give usual foods (appropriate for nutritional status) and fluids & breastfeeds more frequently

PLUS

10ml/kg after every loose stool

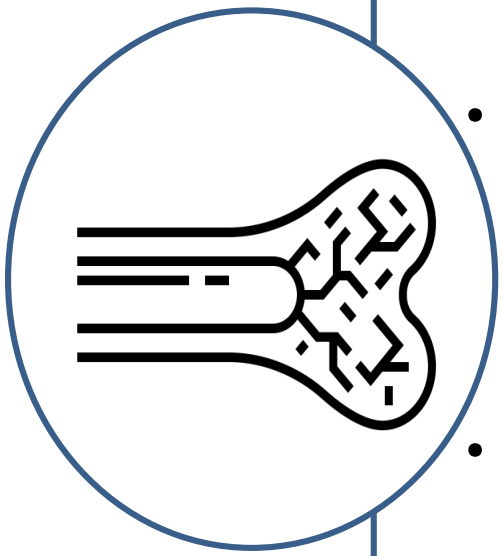
Vomiting and feeding?

- Vomiting is NOT a contra-indication oral rehydration
- Careful counseling about, slow, steady administration of ORS is helpful.
- Breast feeding and other forms of feeding can and should continue
- There is no evidence of benefit from using half-strength feeds or gradual re-introduction of feeding.

Role of antibiotics & Zinc.

- Antimicrobials only indicated for bloody diarrhoea or proven amoebiasis or giardiasis
  - Blood diarrhoea– Ciprofloxacin for 3 days
- If a child has another severe illness then treat with appropriate antibiotics eg. If has pneumonia
- Zinc should be given to <u>all children with diarrhoea</u> as it speeds resolution of symptoms:
  - 10mg od (half tab) for 14 days if age <6 months
  - 20mg od (one tab) for 14 days if age >=6 months

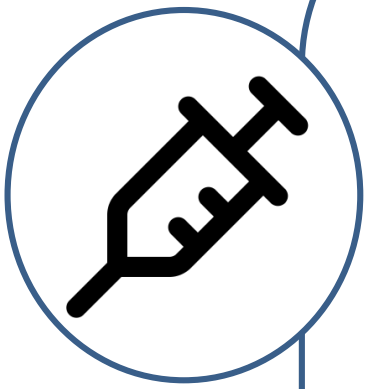
Intraosseous access



- Provides access to a non-collapsible marrow venous plexus.
- Serves as a rapid, safe, & reliable route for administration of drugs, crystalloids, colloids & blood during resuscitation
- May be used to obtain blood specimens for chemical and blood gas analysis and type and crossmatch, even during cardiac arrest

2020 Paediatric American Heart Association guidelines
Paediatric ALS. AHA journals: Originally published22 Aug 2000Circulation. 2000;102:I-253–I-290

Intraosseous access



NEEDLE USED:

Rigid needle = intraosseous cannula, Jamshidi-type bone marrow needle, 18-gauge butterfly needle

A styleted intraosseous needle is preferred to prevent obstruction of the needle with cortical bone

SITE: inserted into the anterior tibial bone marrow; alternative sites include the distal femur, medial malleolus, or anterior superior iliac spine

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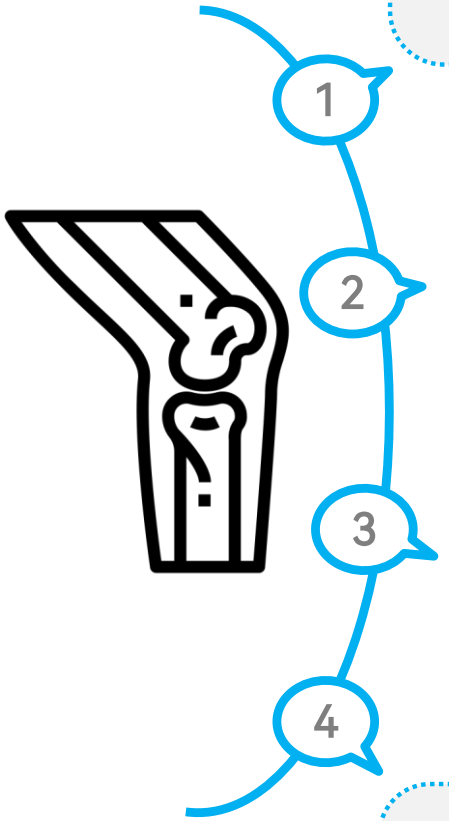
Complications of intraosseous access

Tibial fracture:

- Prevented by careful technique and avoided excessive pressure during insertion, either manual or drill associated. Feel for a give.



Lower extremity compartment syndrome:

- Severe extravasation of drugs can be prevented by ensuring line is patent. Ensure back-flow or can draw blood without resistance

Osteomyelitis:

- Prevented by not extending usage of intra-osseous line for more than 8 hours, using aseptic technique & sterile dressing.

Local effects on bone marrow & bone growth:

- Prevention: minimal handling of IO line, correct insertion technique, avoid prolonged usage & preventing other complications

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Questions?

Summary

- A small number of signs are most useful in classifying the severity of dehydration.
- IV fluids only used to treat children who cannot drink.
- ORS is often more safe and effective even in hospital.
- Give Zinc to all
- Reassess response to treatment.