

Hypoglycaemia And Convulsions



KEMRI | Wellcome Trust



University of Nairobi



**KENYA
PAEDIATRIC
ASSOCIATION**

Objectives

- Define hypoglycaemia
- Consider hypoglycaemia treatment
- To review the properties of commonly available anticonvulsants
 - Diazepam
 - Phenobarbitone
- To understand the need for appropriate supportive care during a convulsion

Laboratory Definitions?

- Less than 2.5 mmol/l (~45mg/dl) is the commonest definition,
- < 3.0 mmol/l (~54mg/dl), in children with severe acute malnutrition.

Why do we worry about hypoglycaemia?

Why do we worry about hypoglycaemia?

- Associations with increased mortality
- Associations with convulsions
- Associations with permanent brain injury

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 bolus** if :
 - Altered consciousness AVPU < A
 - Inability to drink / breastfeed



Hypoglycaemia in the Neonatal period

- Babies who can breast feed do not need iv treatment – they need continued, improved feeding if the blood glucose is low ($<2.2\text{mmol/L}$) – if necessary with an ngt.
- Use 2mls/kg 10% dextrose for the neonates
- They do NOT need oral glucose powder

Note: the management of babies of diabetic mothers is not covered here

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

Neonatal period	<i>if glucose <1.1mmol/L</i>	Treat with iv 10% dextrose 2mls/kg
	<i>if glucose 1.1 – 2.2 mmol/L</i>	Consider immediate ngt feed with EBM
Infants and children	<i>if glucose <2.5mmol/L</i>	Treat with iv 10% dextrose 5mls/kg if unable to drink
Severe Acute Malnutrition	<i>if glucose <3.0mmol/L</i>	Treat with iv 10% dextrose 5ml/kg if AVPU = P or U Treat with immediate feed if AVPU = V or A

Correction of hypoglycaemia

- 10% dextrose at 5mls/kg (child) 2mls/kg (neonate) given over 2 - 3 mins.
- To make 10% from 50% and water for injection

4 parts water for injection

1 part 50% glucose

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

9 parts 5% Dextrose

1 part 50% Glucose

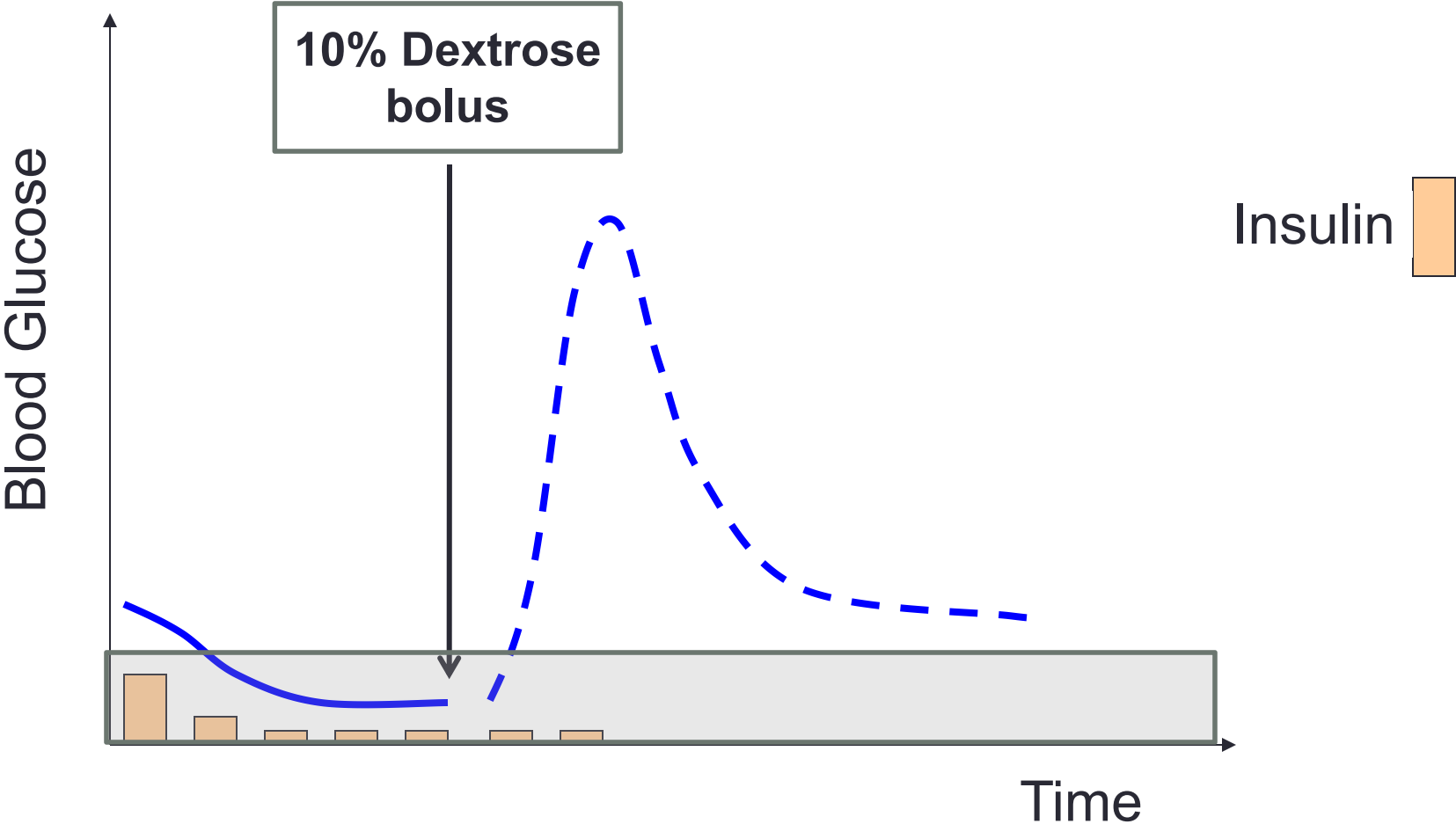
Giving 50% glucose is NO LONGER recommended

- Dextrose overdosing may result in convulsions and death (*hyperosmolar brain injury*)
- Use of 50% dextrose in newborns with asphyxia may increase the risk of brain damage.
- 10% solutions work just as well and are thought to be safer.

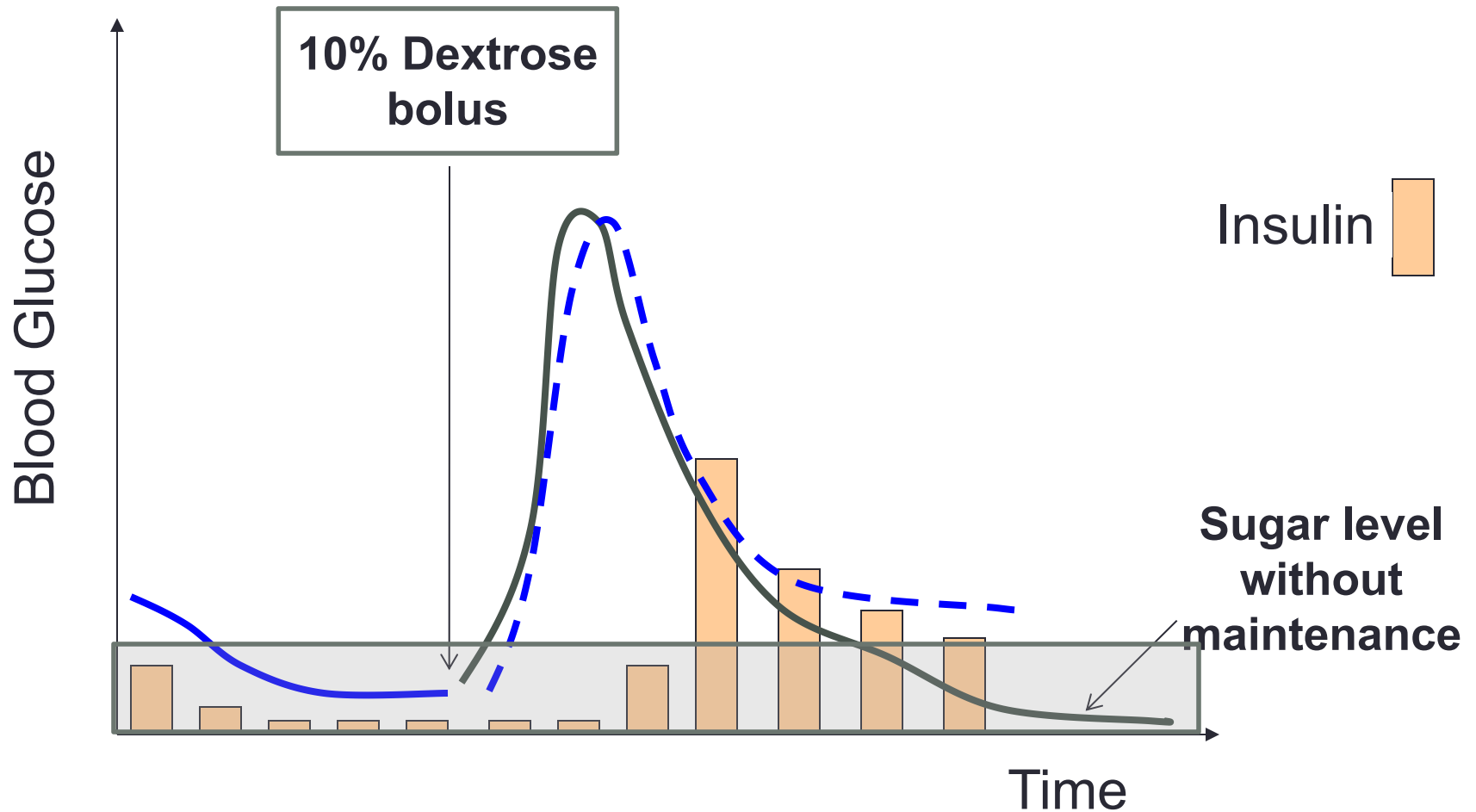
Use of sublingual sugar

- 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 every 20 min or start oral or NGT feeds to prevent rebound hypoglycaemia.

What happens after dextrose bolus?



Rebound hypoglycaemia



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

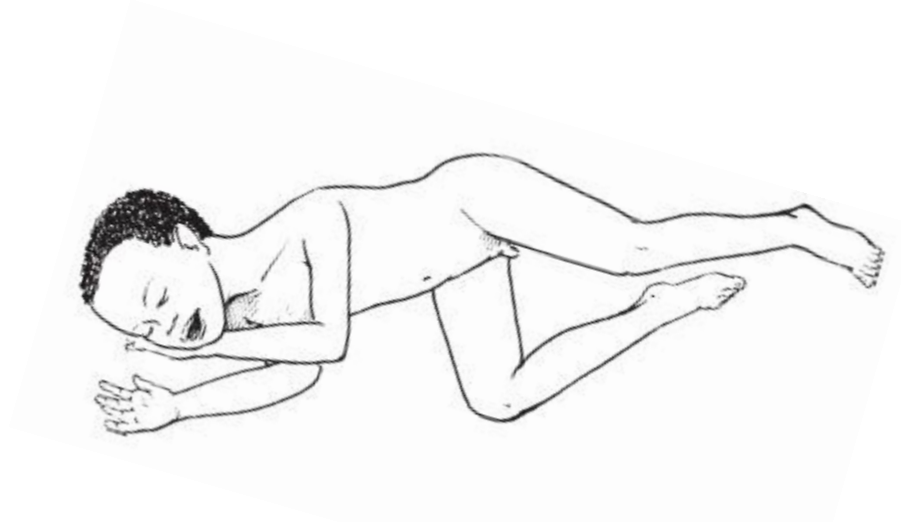
Management Of Convulsions After The Neonatal Period

Clinical Dilemma?



Managing the risks of seizures and their treatment

- Airway
 - Positioning
 - Suction
 - Support after seizure
- Breathing
 - Start on Oxygen
 - Check after seizure
- Circulation
 - Temperature gradient?
 - Severe Pallor?
- Disability
 - What drugs have been used?
 - Glucose?
- Need for anticonvulsants?



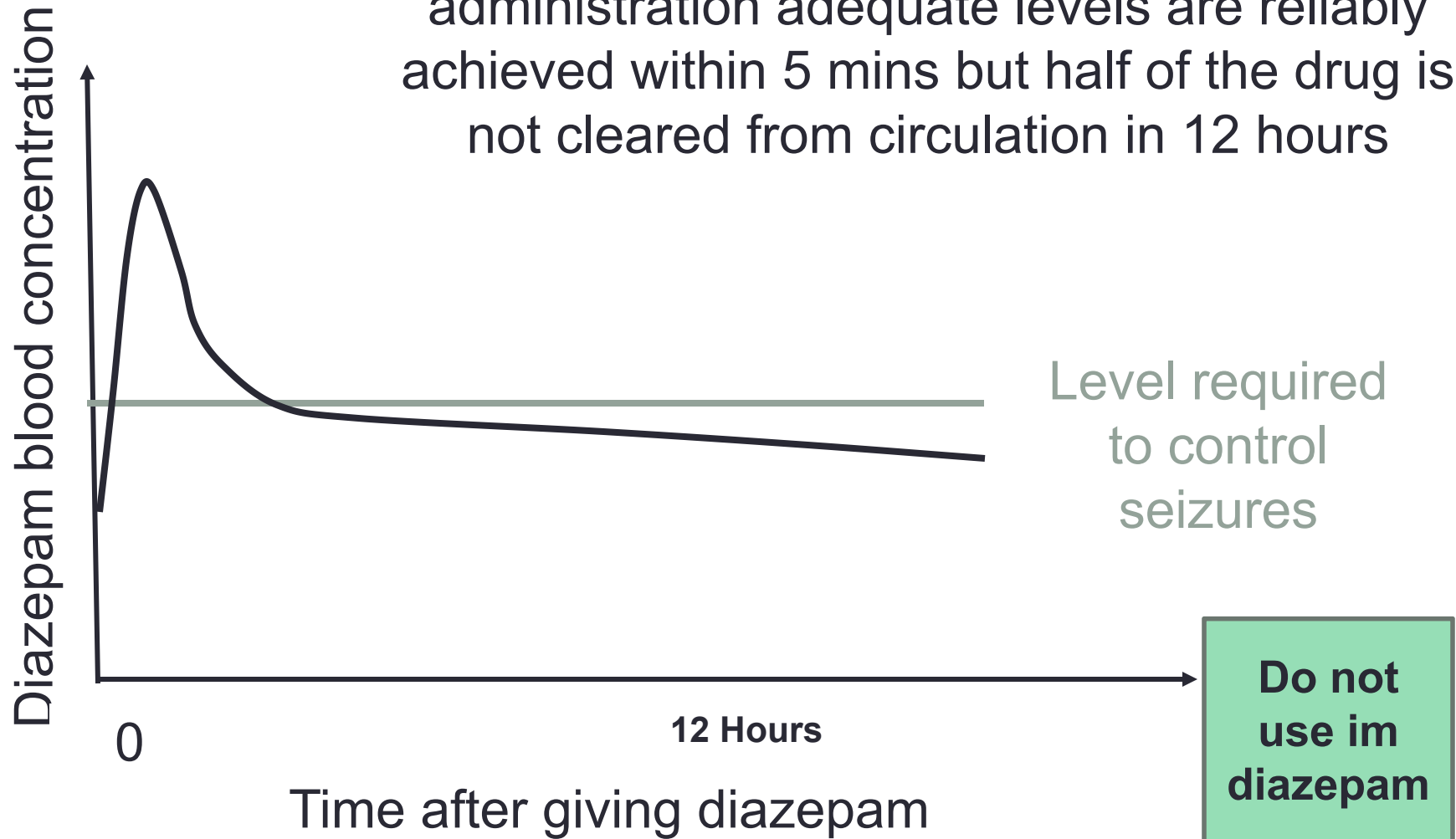
Diazepam

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

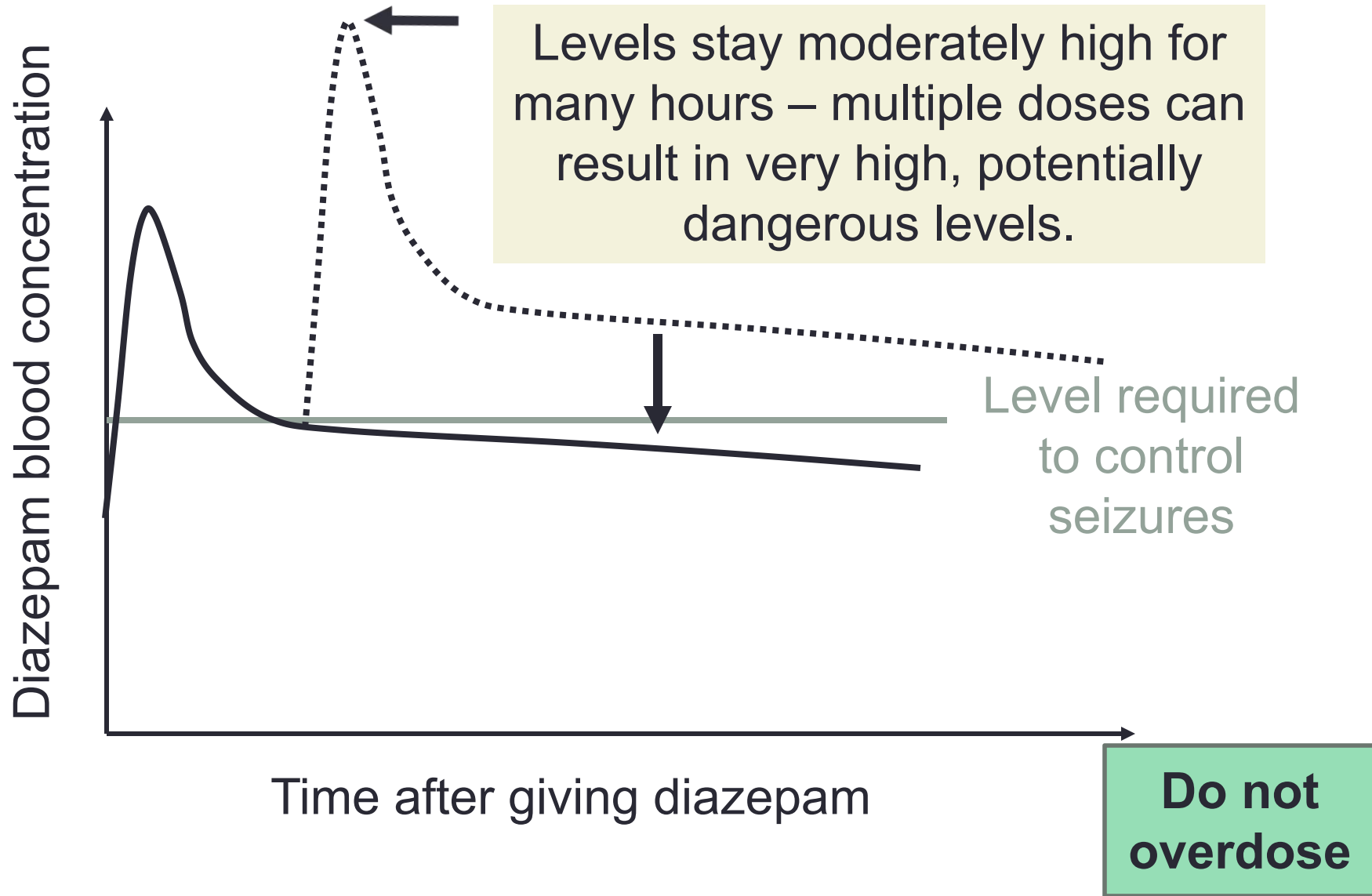
- Lorazepam will replace diazepam once available (safer than diazepam).

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 discernable respiratory depression
- Give the correct dose 0.3mg/kg iv and 0.5mg/kg pr

Giving rectal diazepam



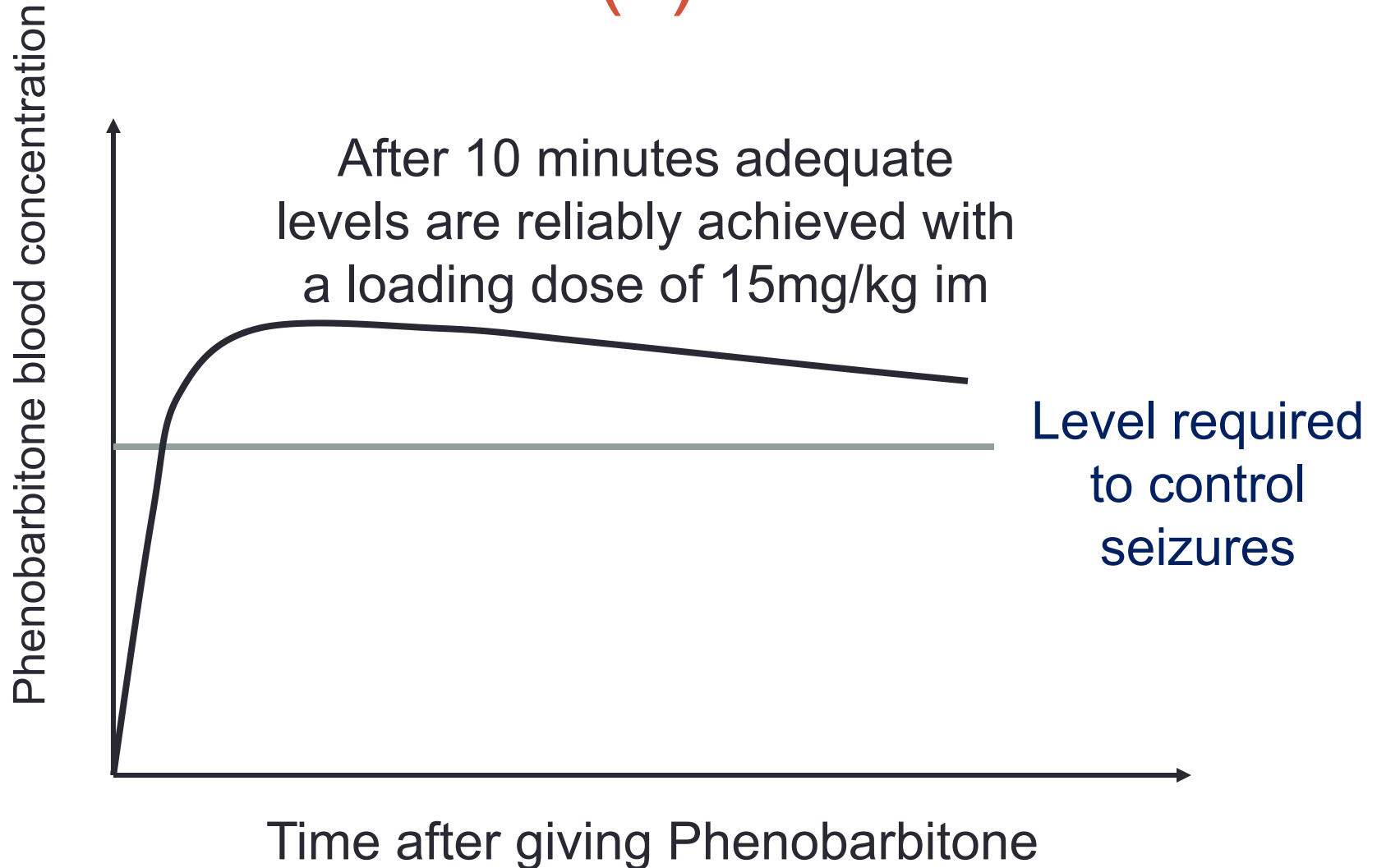
4 – 5 cm
inside the
anal margin
All of the
barrel of a
2mls syringe
and nearly
all of a 1ml
syringe



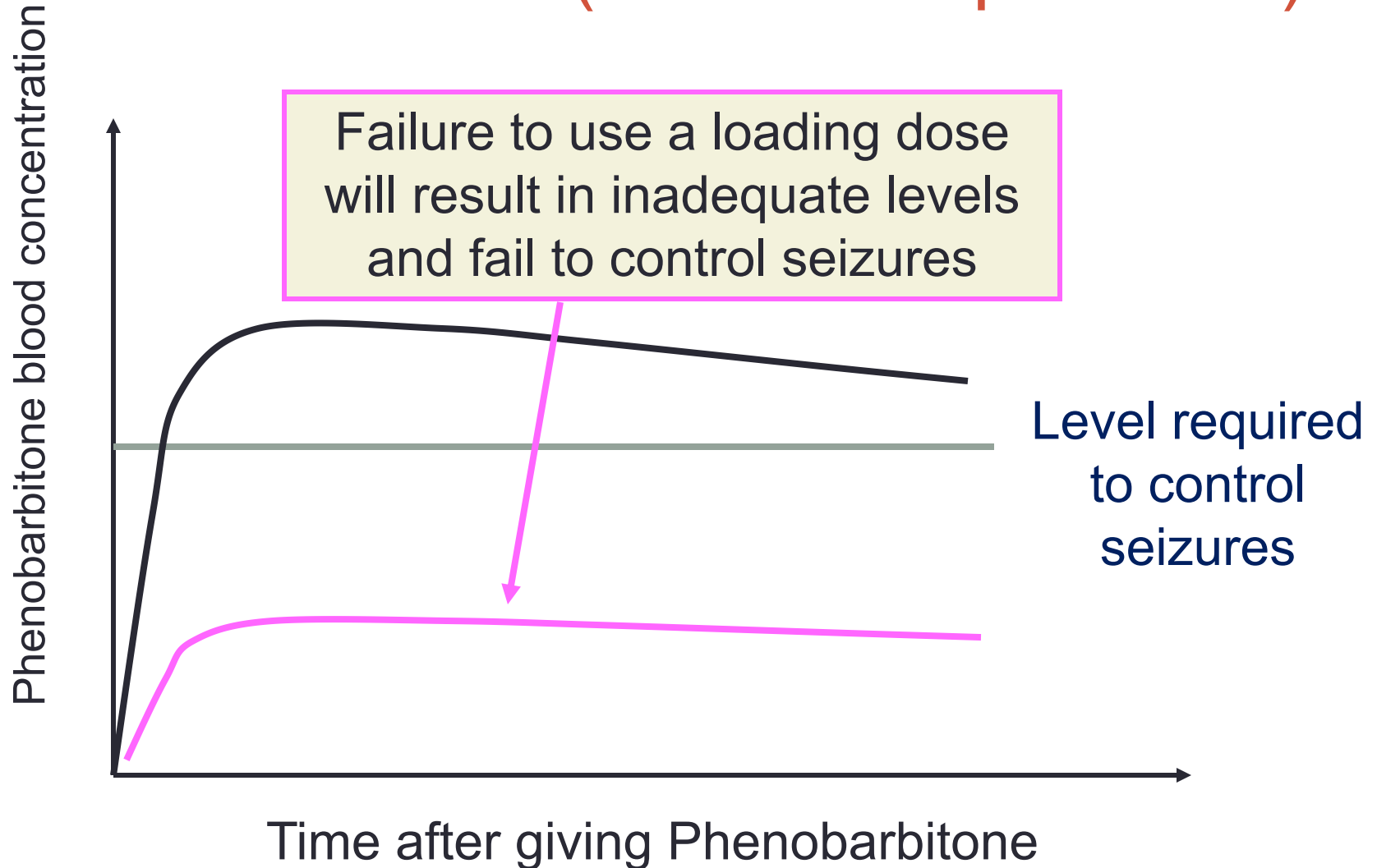
Phenobarbitone

- 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.***

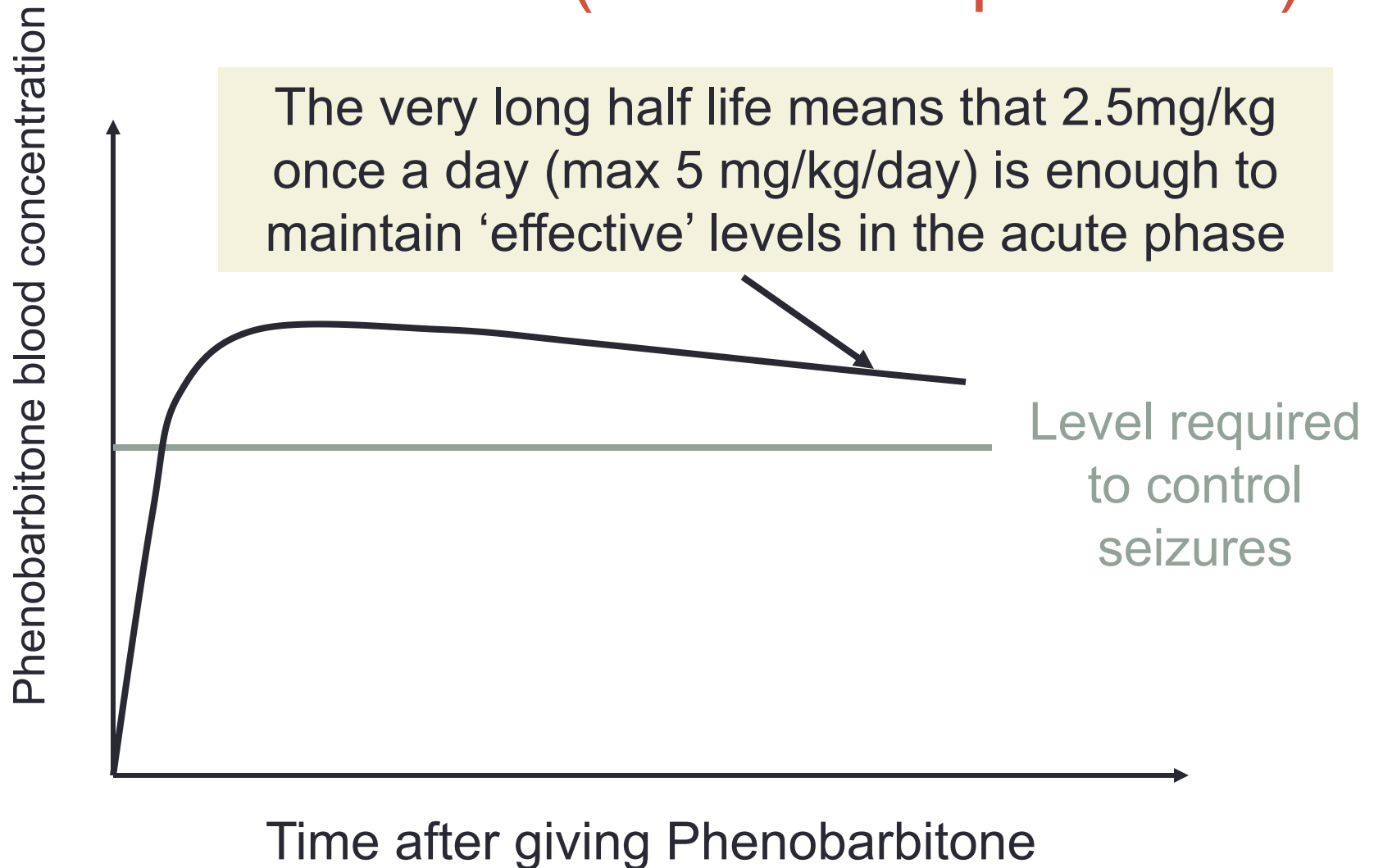
Phenobarbitone (2)



Phenobarbitone (2 clinical implications)



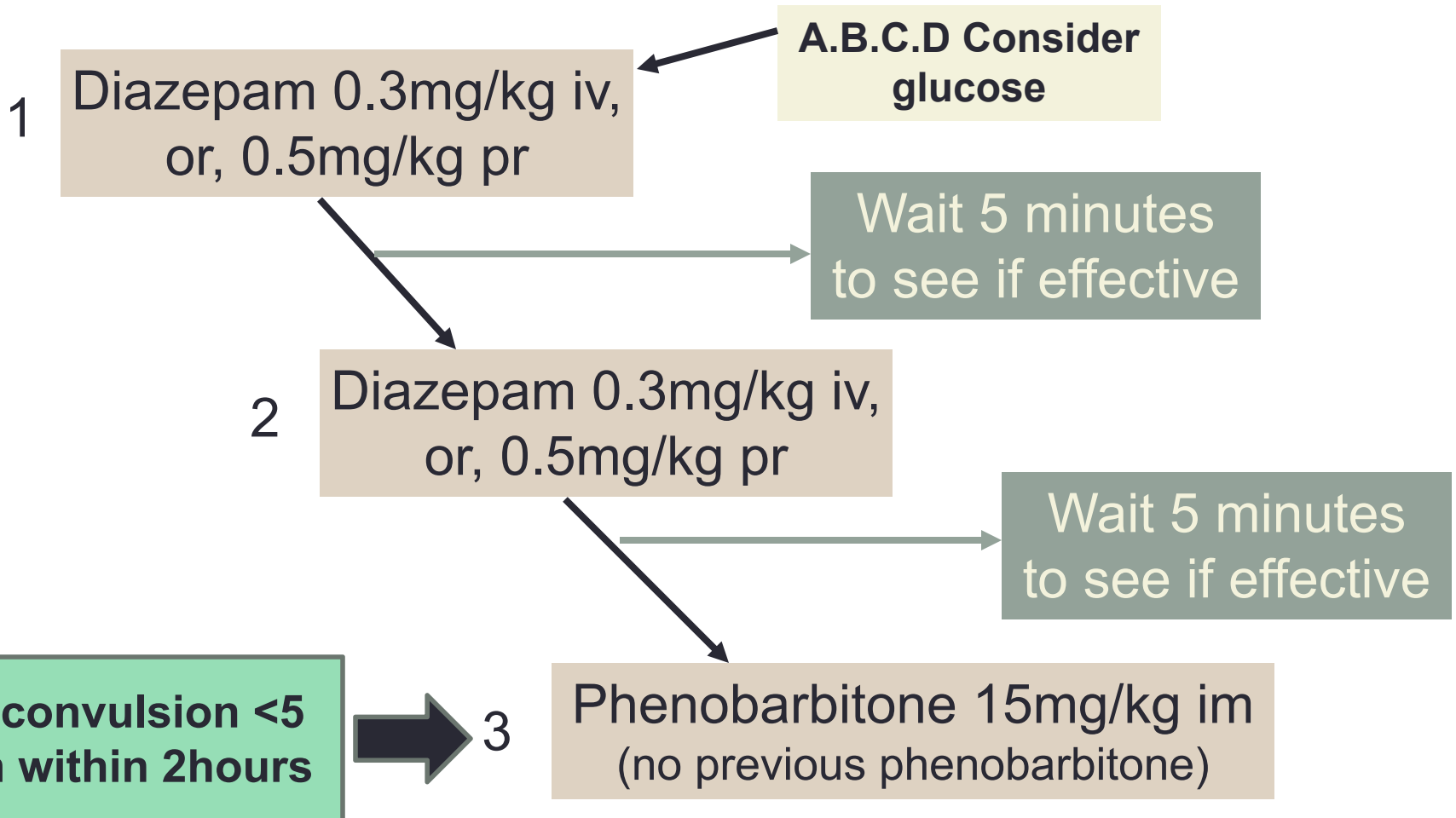
Phenobarbitone (2 clinical implications)



Phenobarbitone – side effects

- Respiratory depression
- In overdose or rapid iv infusion – coma and hypotension.
- Monitor respirations, pulse 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
- 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
- Insufficient attention is paid to basic airway and respiratory support that may prevent death and brain damage.