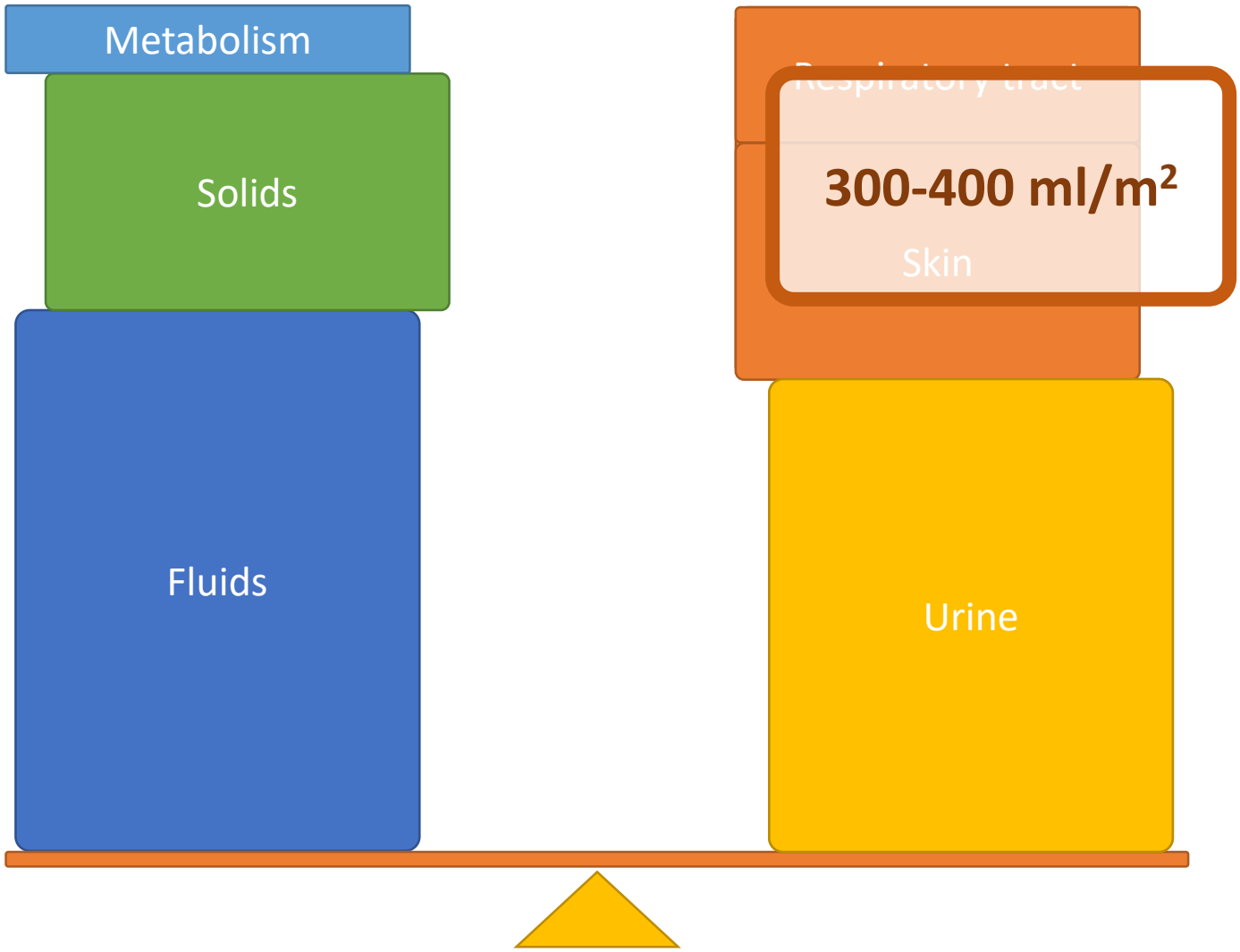
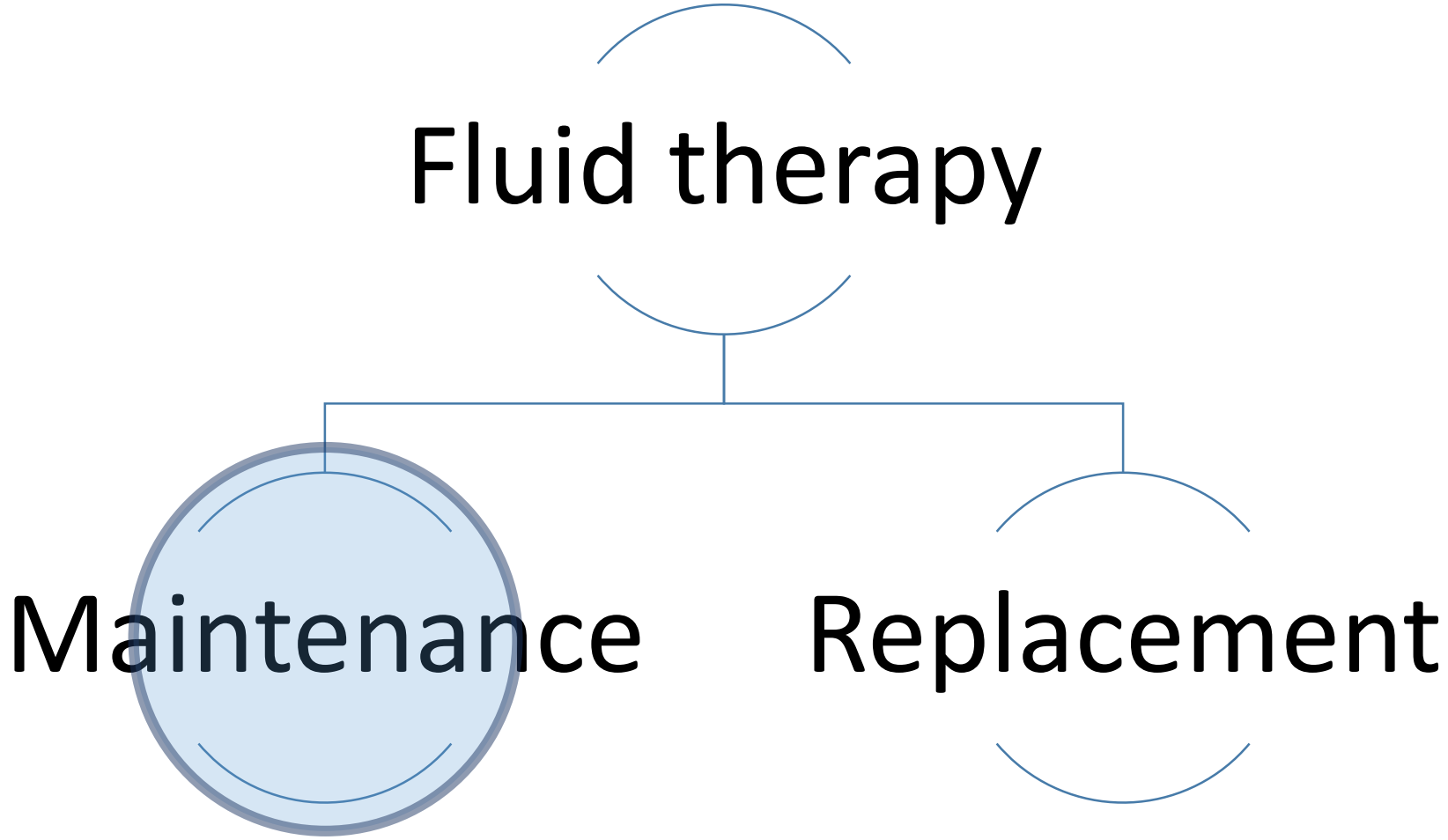
Fluid therapy in children

Magdalena Okarska-Napierała


Why do we drink water?
Because we lose it…

Bilans płynów



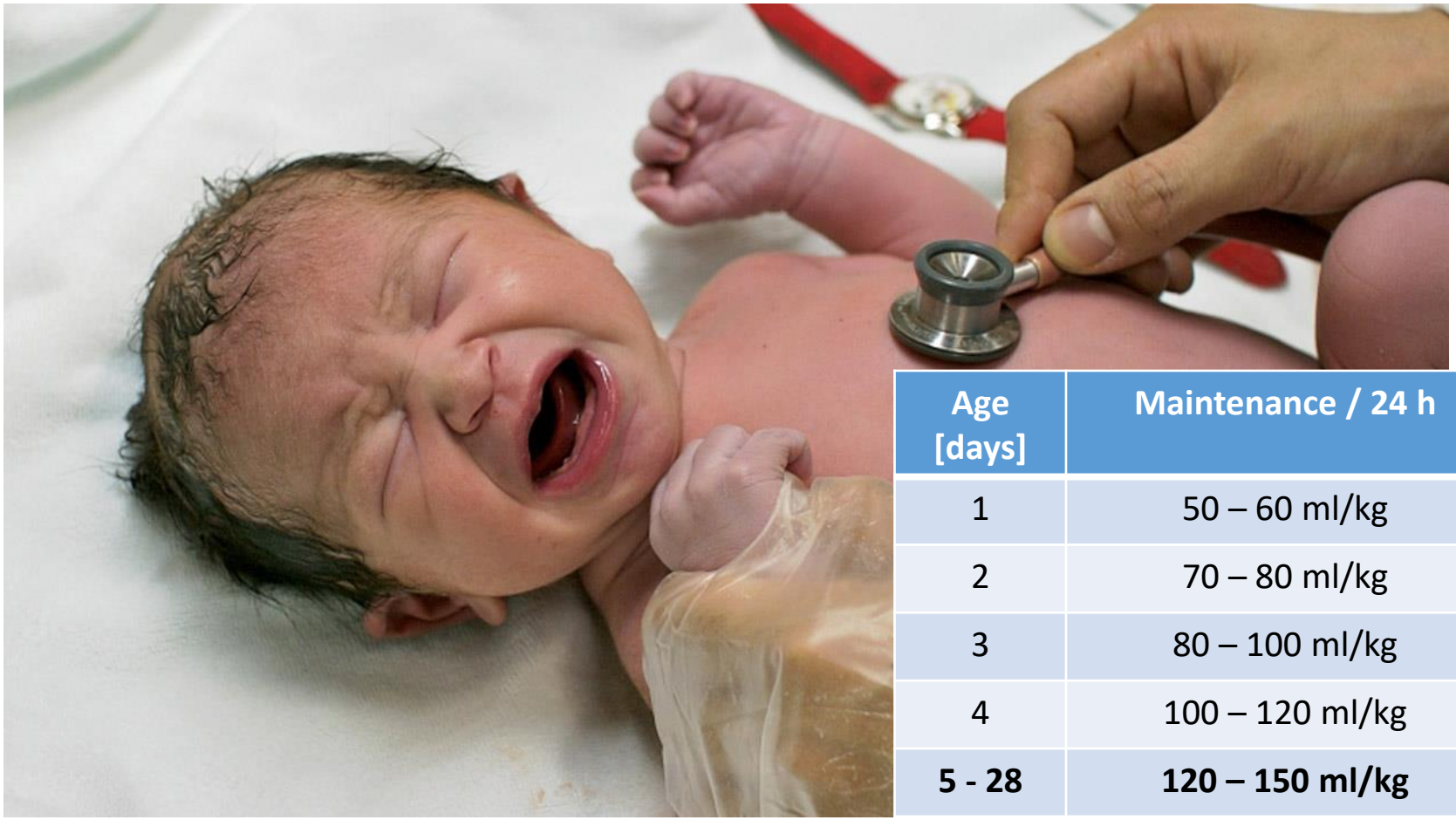

Fluid therapy
Maintenance
Replacement

Maintenance needs

	Maintenance / 24 h
< 10 kg	100 ml/kg
10 – 20 kg	1000 ml + 50 ml/(kg > 10 kg)
> 20 kg	1500 ml + 20 ml/(kg > 20 kg) Max 2400 ml/24 h

Holliday MA, Segar WE. The maintenance need for water in parenteral fluid therapy. Pediatrics 1957; 19:823-32

Maintenance neeeds - neonates



Age [days]	Maintenance / 24 h
1	50 – 60 ml/kg
2	70 – 80 ml/kg
3	80 – 100 ml/kg
4	100 – 120 ml/kg
5 - 28	**120 – 150 ml/kg**

National Clinical Guideline Centre. London: National Institute for Health and Care Excellence (UK); 2015 Dec. **National Institute for Health and Care Excellence**: Clinical Guidelines. IV Fluids in Children: Intravenous Fluid Therapy in Children and Young People in Hospital.

Maintenance needs

- Alternative method:

$$300\text{-}400\ ml/m^2 + diuresis$$

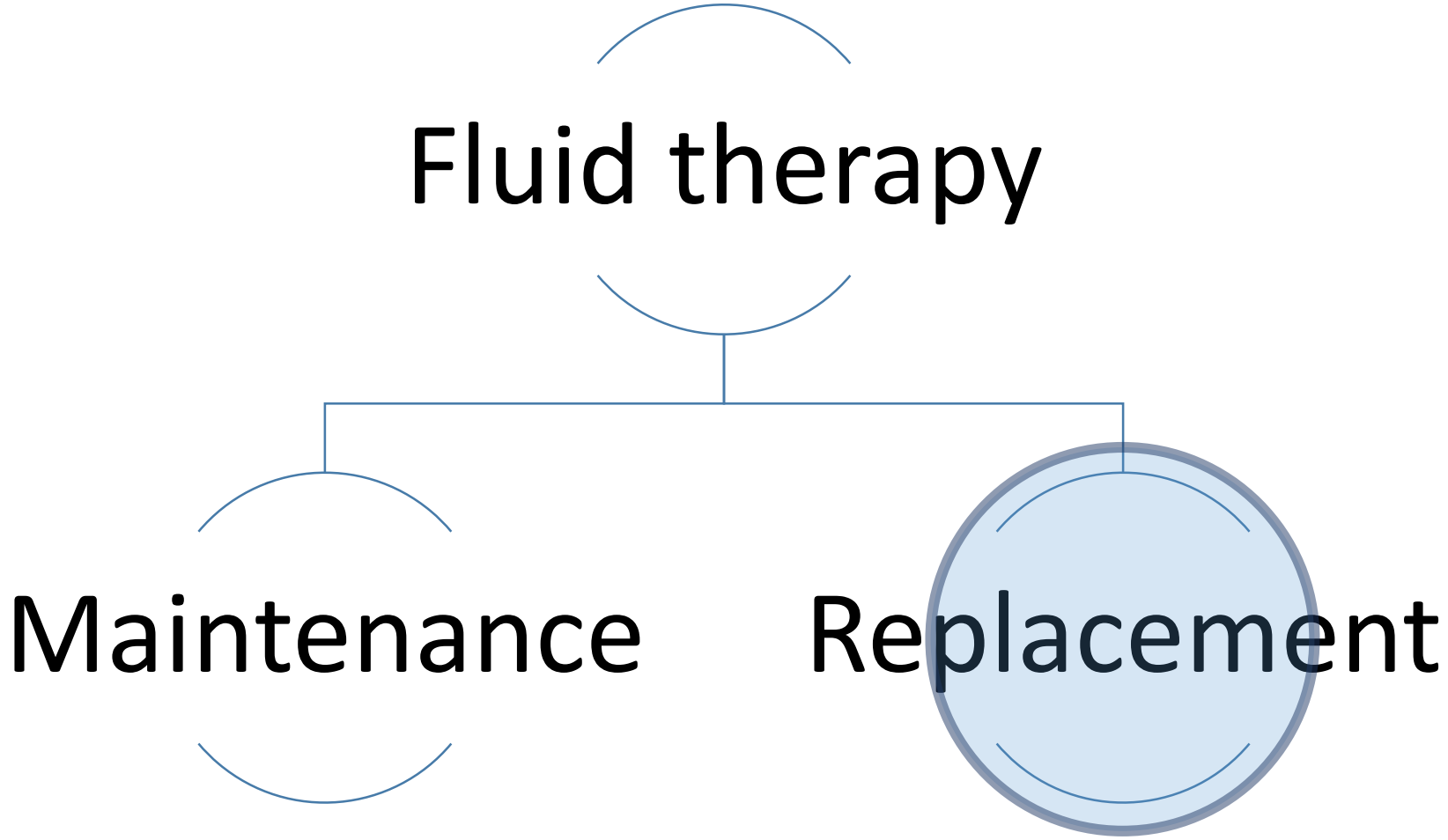
- Obese patients, kidney failure

Which fluid to choose?

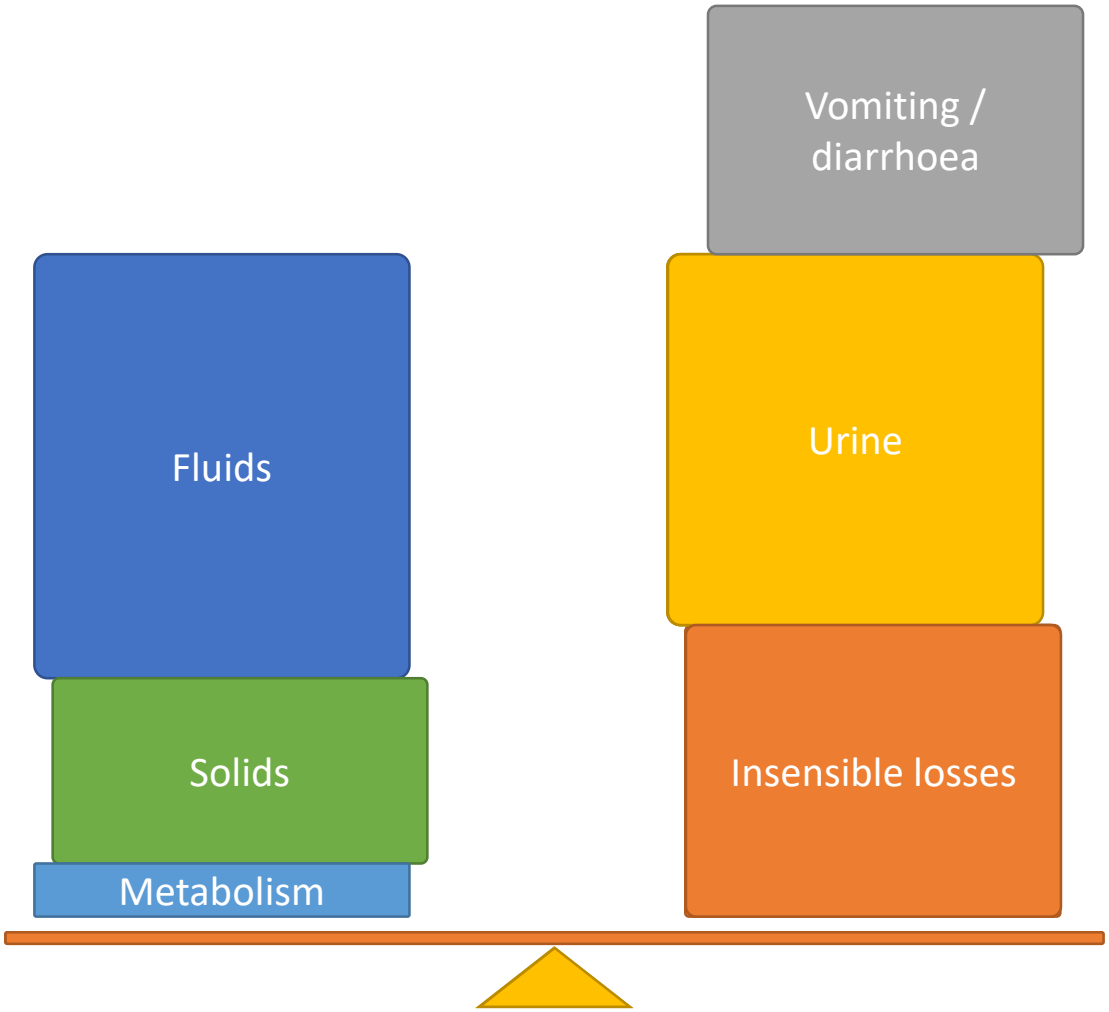
- In **children and young people** use **isotonic glucose-free crystalloids** that contain sodium in the range 131 – 154 mmol/l

- In **neonates** use **isotonic crystalloids** that contain sodium in the range 131 – 154 mmol/l **with 5-10% glucose**

National Clinical Guideline Centre. London: National Institute for Health and Care Excellence (UK); 2015 Dec. **National Institute for Health and Care Excellence**: Clinical Guidelines. IV Fluids in Children: Intravenous Fluid Therapy in Children and Young People in Hospital.

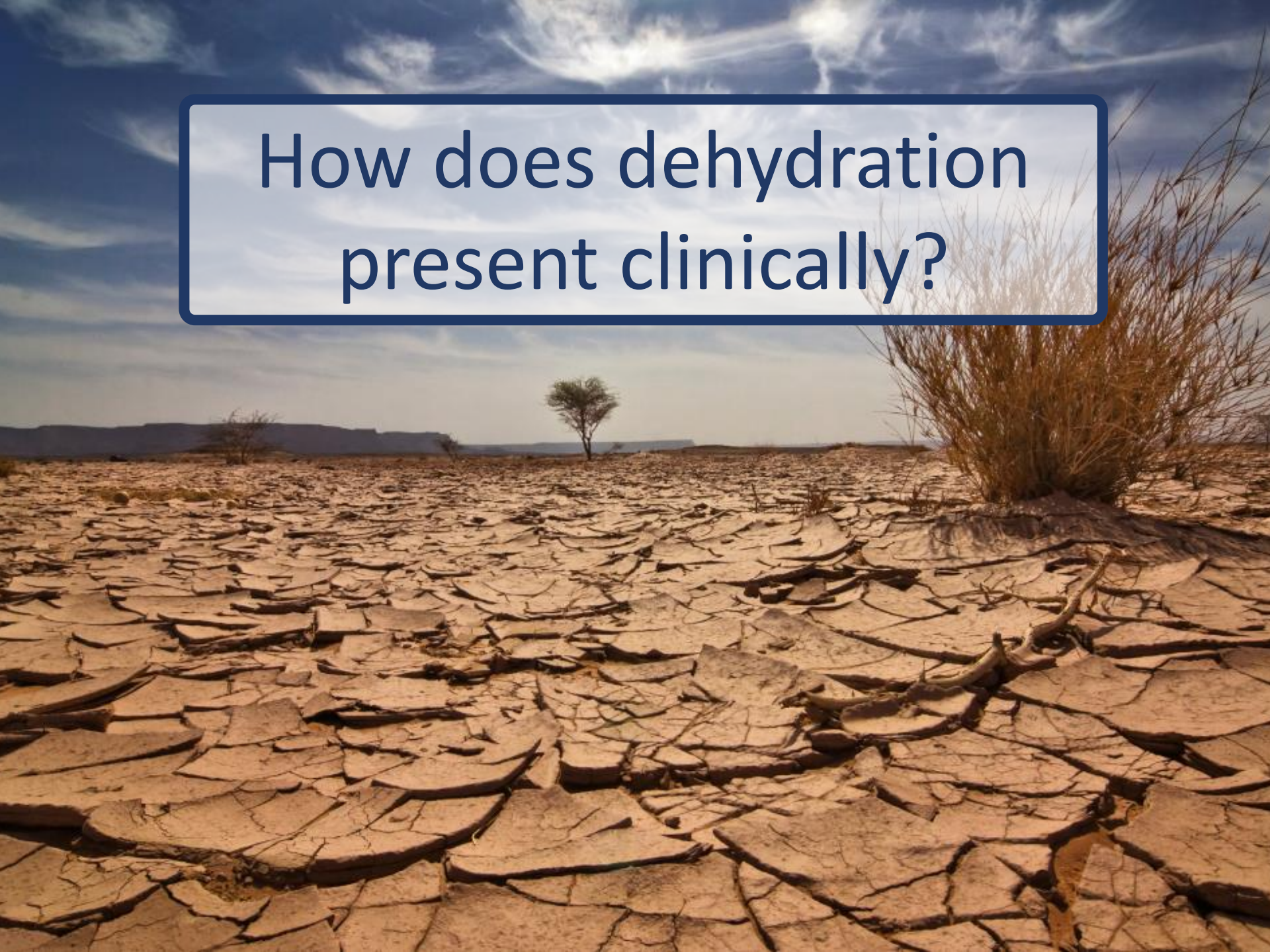

Fluid therapy
Maintenance
Replacement

Dehydration



Children:

- Frequently present with gastroenteritis
- Have higher body surface to body mass ratio
- Depend on their carers

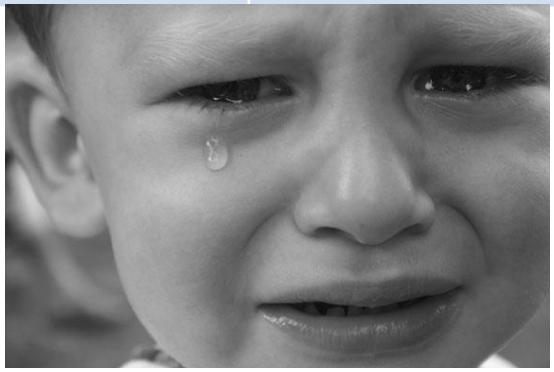

How does dehydration present clinically?

No dehydration	Clinical dehydration	Hypovolaemic shock
Alert and responsive	Altered responsiveness (eg. irritable, lethargic) 	Decreased consciousness
Appers well	Unwell or deteriorating 	-
Eyes not sunken	Sunken eyes 	-
Moist mucous membranes	Dry mucous membraned (except for „mouth breather”)	-
Normal BP	Normal BP	Hypotension
Normal breathing pattern	**Tachypnoea** 	Tachypnoea
Normal capillary refill time	Normal capillary refill time	**Prolonged capillary refill time**
Normal HR	Tachycardia 	Tachycardia
Normal peripheral pulses	Normal peripheral pulses	Weak peripheral pulses
Normal skin turgor	**Reduced skin turgor** 	Obniżone napięcie skóry
Normal urine output	Decreased urine output	-
Skin colour unchanged	Skin colour unchanged	Pale or mottled skin
Warm extremities	Warm extremities	Cold extremieties

CDS – clinical dehydration scale

	General appearance	Eyes	Tears	Mucous membranes
0	Normal	Normal	Present	Moist
1	Thirsty, restless or lethargic, but **irritable when touched**	Slightly sunken	Decreased	”Sticky”
2	Drowsy, limp, cold, sweaty and/or comatose	Very sunken	Absent	Dry

0	no dehydration
1-4	some dehydration
5-8	moderate or severe dehydration



ORT – Oral rehydration therapy

- Preferred method
- ORS – oral rehydration solution (50-60 mmol/l Na^+)

50-100 ml/kg over 3-4 hours

- Then covering maintenance needs and ongoing losses

IDSA guidelines 2017

Intravenous fluid therapy

Indications:

- Shock
- Dehydration with altered level of consciousness or severe acidosis
- Worsening of dehydration pr lack of improvement despite oral or enteral rehydration therapy
- Persistent vomiting despite appropriate fluid administration orally or via NG tube
- Severe abdominal distension and ileus

Fluid resuscitation

20 ml/kg
Balanced crystalloid
10 min

Balanced / buffered crystalloids

- Strong ion difference (SID) similar as in serum (ca. 40 mmol/l)
- Decreased mortality, acute kindey injury, vasoactive treatment needs

- **Ringer Lactate, Hartmann, Optilyte, Sterofundin**

Fluid resuscitation

- **<u>Neonates</u> – glucose-free crystalloid 10–20 ml/kg over < 10 min**

National Clinical Guideline Centre. London: National Institute for Health and Care Excellence (UK); 2015 Dec. **National Institute for Health and Care Excellence**: Clinical Guidelines. IV Fluids in Children: Intravenous Fluid Therapy in Children and Young People in Hospital.

Fluid resuscitation

- You can give up to 60 ml/kg fluid, but you must tirtrate it to clinical markers of **cardiac output** and **fluid overload**

National Clinical Guideline Centre. London: National Institute for Health and Care Excellence (UK); 2015 Dec.
National Institute for Health and Care Excellence: Clinical Guidelines. IV Fluids in Children: Intravenous Fluid Therapy in Children and Young People in Hospital.

Rehydration

- **20 ml/kg/h over 2-4 hours**, then covering maintenance need and replacing ongoing losses
- Add KCl 20 mEq/L when diuresis is present
- **1 ml 15% KCl per 100 ml fluid**

Thank you!