London Acute Kidney Injury Network

STOP AKI in Malawi

Fluid assessment, monitoring and therapy for the acute nurse

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Aims and objectives

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Aims and objectives

- Why do we worry about volume assessment?
- Completing a fluid/volume assessment
- Treatment for hypo/hypervolaemia
- Fluid balance documentation

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Why is fluid assessment so important?

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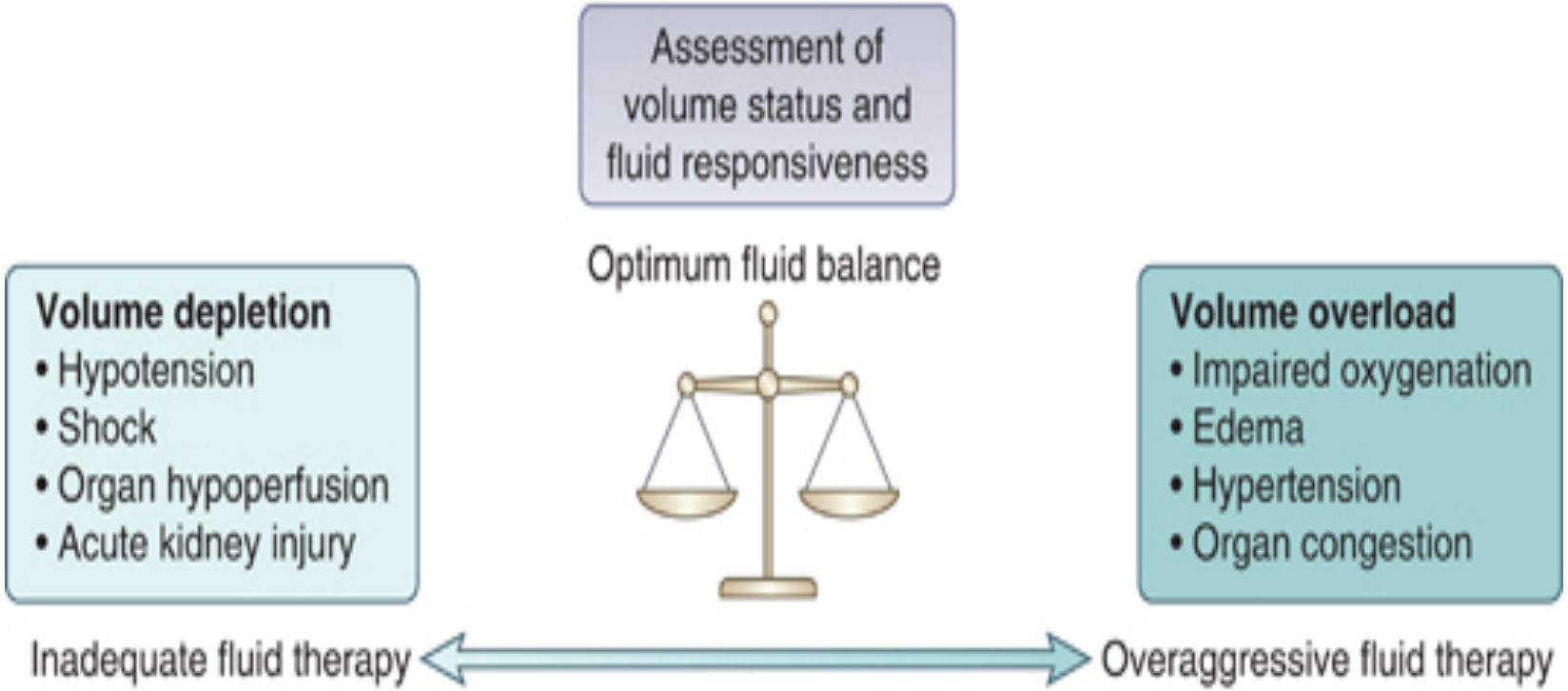

Assessment of intravascular volume status and volume responsiveness in critically ill patients
Kambiz Kalantari, Jamison N Chang, Claudio Ronco and Mitchell H Rosner

Hypovolaemia- what happens in the kidneys?

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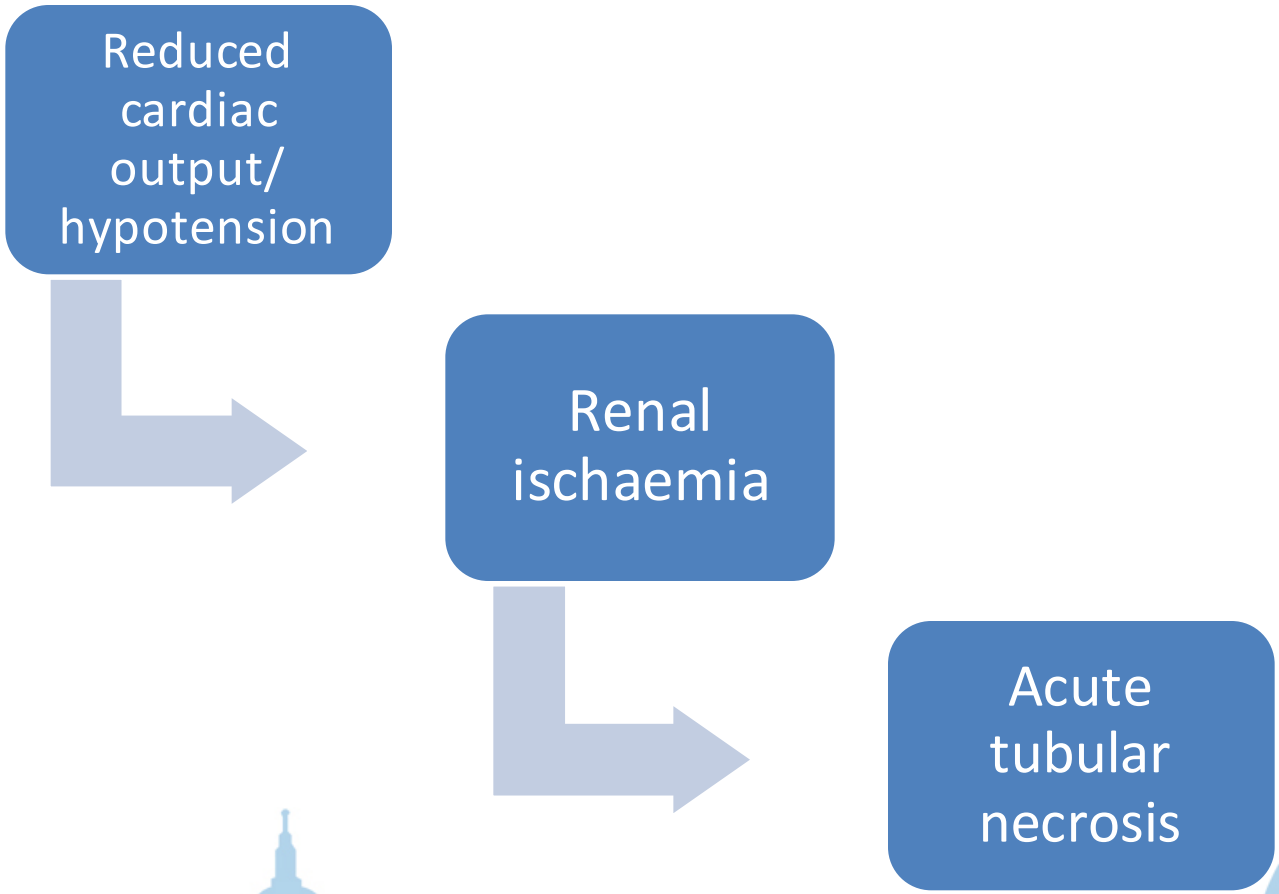

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It is reversible- patients recover!

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STOP AKI in Malawi

It is reversible- patients recover!

But we want to avoid it in the first place!

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Assess for hypovolaemia

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Assess for hypovolaemia

Physical examination

- **Vital signs**

- **Bloods:**

Assess for hypovolaemia

Physical examination

- Thirst
- Acute loss in body weight of >0.9kg over a few days
- Peripheral temperature
- Capillary refill time
- Headaches/lightheaded
- Confusion
- Skin turgor
- Mucous membranes
- Dry, cracked lips
- Passive leg raising

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- Pulse- rate, rhythm and strength
- Blood pressure
- Orthostatic changes in both
- Urine output/ concentrated
- **Bloods:**
- Elevated urea
- Lactate

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Most useful?

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Most useful?

Review on the value of physical examination on diagnosis of hypovolaemia found:

Only reliable for large blood losses (>1litre)

No single clinical sign is reliable…
look at whole picture!

McGee et al, (1999)

Most useful?

Review on the value of physical examination on diagnosis of hypovolaemia found:

- Postural dizziness
- Postural pulse increment

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No single clinical sign is reliable…
look at whole picture!

McGee et al, (1999)

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If hypovolaemic…
WHAT fluid?

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If hypovolaemic… WHAT fluid?

- Normal saline 0.9%
- 5% dextrose
- Gelofusine/ Geloplasma
- Plasmolyte
- Compound sodium lactate
- Dextran
- Albumin
- Haemaccel
- Blood

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CRYSTALLOID OR COLLOID??

What fluid?

What fluid?

Group	HES	Saline	*P* RR
Mortality	18.0%	17.0%	0.26
Renal injury	34.6%	38%	0.005
Renal failure	10.4%	9.2%	0.12
RRT	7.0%	5.8%	0.004
Adverse events	5.3%	2.8%	<0.001

What fluid?

- **Hydroxyethyl Starch or Saline for Fluid Resuscitation in Intensive Care, Myburgh et al NEJM 2012 (Oct 17)**

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What fluid?

- **Hydroxyethyl Starch or Saline for Fluid Resuscitation in Intensive Care, Myburgh et al NEJM 2012 (Oct 17)**
- –7000 patients admitted to ICU randomly assigned to 6% HES (MW 130 kDa) or 0.9% sodium chloride for all fluid resuscitation

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Fluids

3.1.1: In the absence of hemorrhagic shock, we suggest using isotonic crystalloids rather than colloids (albumin or starches) as initial management for expansion of intravascular volume in patients at risk for AKI or with AKI. (2B)

KDIGO (2012)

How do we give it?

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- **IF hypovolaemic….**
- 250-500mls crystalloid….

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- Review response!

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- Give maintenance fluids (estimated output plus 500mls)

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Assess for hypervolaemia

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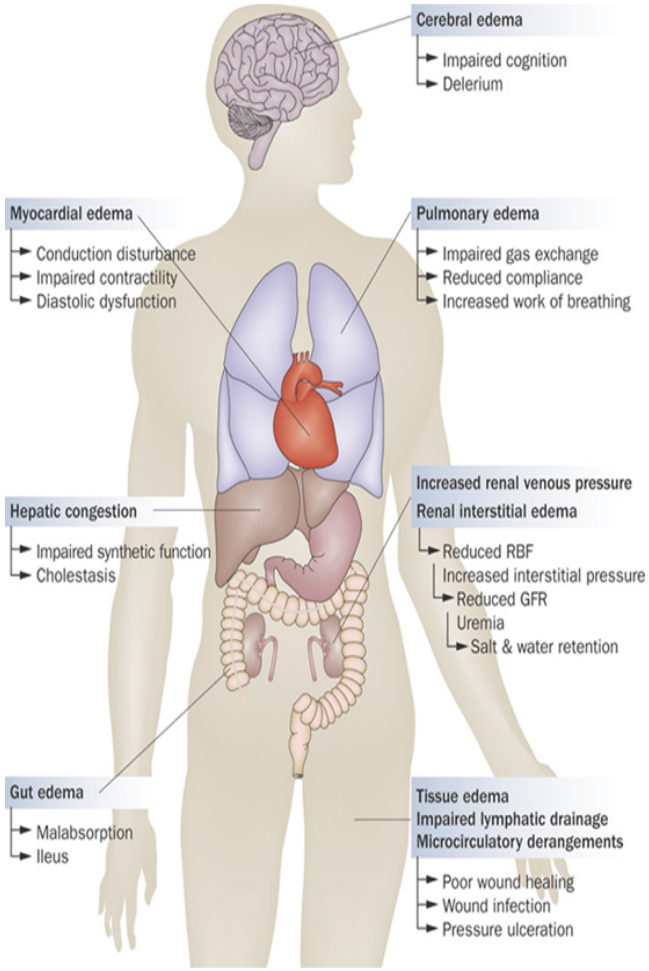

Prowle, J. R. *et al.* (2009) Fluid balance and acute kidney injury *Nat. Rev. Nephrol.* doi:10.1038/nrneph.2009.213

Symptoms

Symptoms

- Hypertension
- Peripheral oedema
- Shortness of breath
- Confusion

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Diuretics

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- 3.4.1: We recommend not using diuretics to prevent AKI. (1B)
- 3.4.2: We suggest not using diuretics to treat AKI, except in the management of volume overload. (2C)

KDIGO (2012)

Now what…

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- Oxygen

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- Furosemide

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- Daily weights
- Treat the cause
- IV access

- Anuria- exclude obstruction
- May need dialysis

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Fluid balance charts

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Fluid balance charts

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- Over 24 hours, add up totals and get 24hr balance!

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Normal input/output…

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Weight (kg)	Minimal accepted urine output (mls/hr)	Expected daily output (based on minimal expected hourly)
50	25	600
60	30	720
70	35	840
80	40	960
90	45	1080
100	50	1200
110	55	1320
120	60	1440

Input/output

Input/output

- What we put in should come out
- Perfect 24hr balance would be +500-600mls
- Cannot account for insensible losses

  - sweat, respiratory tract, faeces
- But this won't be the aim everyday

Summary

- Volume assessment is difficult but essential
- Look at whole patient picture
- Keep patients euvolaemic when they come into hospital - then you shouldn't run into trouble
- Always review response to treatment
- Encourage patients/ relatives to help with fluid charts - educate them

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References

- http://www.nhs.uk/Livewell/Goodfood/Pages/water-drinks.aspx
- Hamilton, S, (2001), Detecting dehydration and malnutrition in the elderly, Nursing, vol 31(12), www.springer.net
- Kavouras, SA, (2002), Assessing hydration status, Current Opinion in Clinical Nutrition and Metabolic Care, (5), 519-524
- Mentes, J, (2006), Oral hydration in older adults: greater awareness is needed in preventing, recognizing, and treating dehydration, American Journal of Nursing, vol 106(6), 40-9
- McMillen and Pitcher, (2010), The balancing act: Body fluids and protecting patient health, British Journal of Healthcare Assistants; vol 5 (3), 117-121.
- Scales K, Pilsworth J, (2008,) The importance of fluid balance in clinical practice. Nursing Standard, vol 22 (47), 50-57.
- Vivanti, A et al, (2008), Clinical assessment of dehydration in older people admitted to hospital
- What are the strongest indicators?, Archives of gerontology and geriatrics, vol 47 (3)