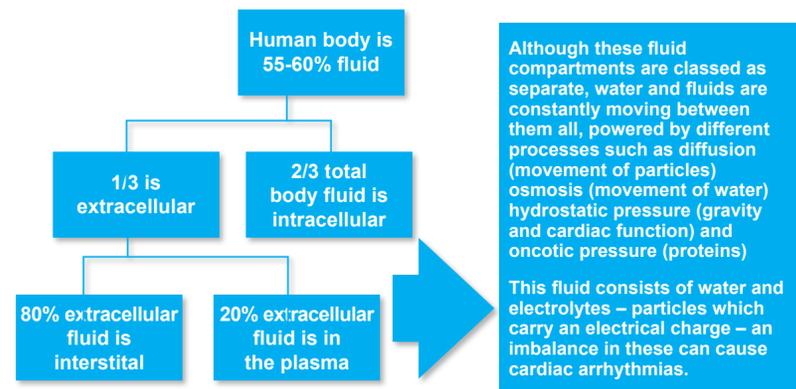


Fluid Balance Monitoring



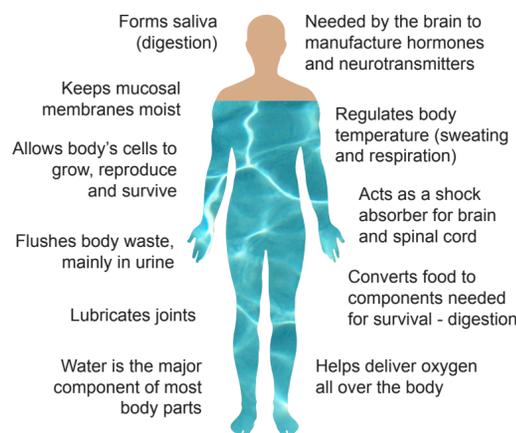
WHAT IS FLUID BALANCE?

Fluid balance is a term used to describe the balance of input and output of fluids in the body, to allow metabolic processes to function properly.



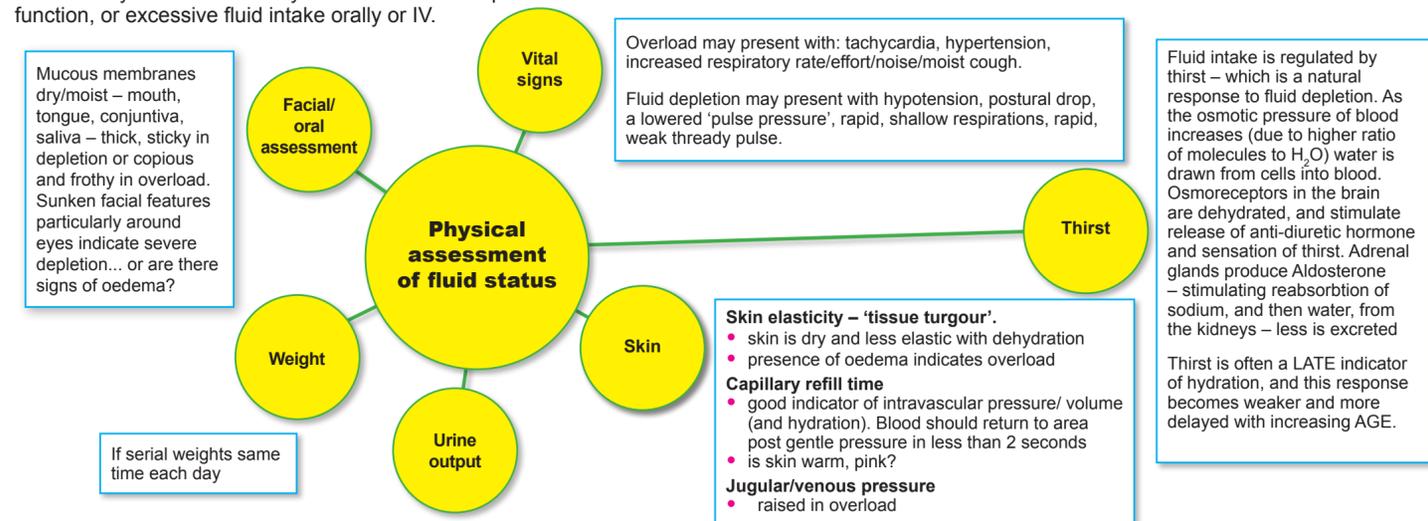
In order to maintain homeostasis, the adult human body needs a fluid intake of 2-3 litres (25-30ml / kg per day), allowing it to keep a balance of the nutrients, oxygen and water, which are necessary to preserve a stable healthy internal environment. Output should be roughly equal, though 'insensible losses' may give a slightly positive balance on charts.

What does water do for you?



WHY MONITOR FLUID BALANCE?

Injury or illness can alter fluid balance. Hypoperfusion of vital organs may occur with lower circulating volumes caused by dehydration, or redistribution of within the body during an inflammatory response post trauma, in Cancer or during Sepsis, requiring fluid replacement. Alternatively an 'overload' may occur as a result of poor cardiac or renal function, or excessive fluid intake orally or IV.



HOW DO WE MONITOR FLUID BALANCE?

Knowing the signs and symptoms of Fluid Imbalance in the body is a crucial aspect of hospital care and assessment. It is assessed in 3 ways: **fluid balance charts, physical assessment of fluid balance and monitoring of blood results.**

An imbalance of electrolytes in the blood can lead to fluid imbalance. Laboratory blood tests such as urea and electrolytes, glucose, magnesium, calcium will determine discrepancies and lead to the right treatment.

LABORATORY RESULTS ASSOCIATED WITH FLUID IMBALANCE

Fluid loss	Fluid gain
<ul style="list-style-type: none"> Increased serum osmolality High urine osmolality and specific gravity Raised haematocrit Increased plasma-urea concentration 	<ul style="list-style-type: none"> Reduced plasma urea Reduced haematocrit

FLUID BALANCE CHARTS

Identifying a positive (↑input) or negative (↓ output) balance is essential, as redressing any imbalance is vitally important. As well as aiding assessment, together with other vital signs it allows us to evaluate and adapt our care, replacing and restricting fluids appropriately to achieve stability. Maintaining an accurate fluid chart can present challenges:

Communication with Patient

- Aware of plan, and any restriction to intake?
- Able to use equipment independently?
- Compliant, possibly able to self document?

Communication with MDT?

- MDT aware of monitoring? (SALT, Physio, volunteers)
- Use whiteboard behind bed to convey any specific instructions

Accuracy

- Volumes measured specifically, awareness of volumes of different drinking vessels
- If patient is using pads these can be weighed with mg converted to ml

WHO IS RESPONSIBLE: MONITORING AND ESCALATION

Trained Nurses

- Identify** patients who need fluid balance monitoring and communicate via whiteboard behind bed, handover
- Clarify** up-to-date plan with medical team and **communicate** to patient and visitors, wider MDT including HCAs: SALT, housekeeping, physio and any colleague who may assist with, provide or remove fluids
- Ensure accuracy** using charts and **calculating cumulative** measurements 6 hourly
- Escalate** promptly to medical team in case of developing imbalance, deterioration or concern

HCA's and Student Nurses

- Teamwork, Communicating** with MDT to ensure accurate measurements - eg SALT, housekeeping, physio
- Ensure** chart is complete and **accurate** - use of appropriate equipment e.g. scales, urometers etc
- Inform** trained staff or NIC with changes deterioration or concerns

Doctors

- Daily review:**
Indication for monitoring, is it still necessary?
Goal - document with special instructions such as restrictions or frequency of monitoring
Charts - current balance
Escalation plan or the need for it

Patients

- Must demonstrate capacity** (understand information, retain and recall when asked) concerning their fluid balance monitoring if they are to complete charts independently.
- Trained nurses to calculate cumulative measurements



WHEN: INDICATIONS FOR FLUID BALANCE MONITORING

Increased fluid output

Diarrhoea and vomiting - risk of dehydration, malnutrition and significant electrolyte disturbances including hyperkalaemia

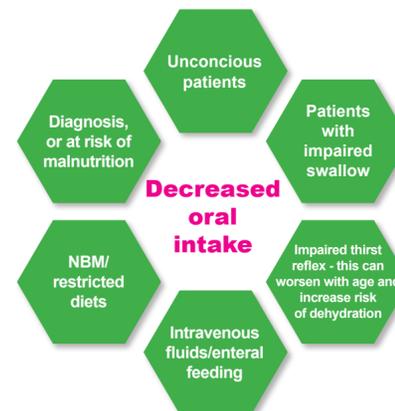
High urine output - polyuria - ↑200mls /hr - leads to dehydration if unmanaged. Common causes: diabetes, resolving AKI, excessive diuretics

High output stoma - increased frequency or ↑1 litre in 24 hrs

Urinary catheter, convene, urostomy or irrigation - volumes must be measured. Incontinent patients may self-limit input in attempt to manage problem.

Post-operative patients should be closely monitored

- Large open wounds:** output should be estimated if an accurate output is not possible
- Drains:** pleural, wound, ascitic
- Increased 'insensible losses':** sweating, sustained pyrexia of 38°C or a sustained respiratory ↑rpm. Each example can lead to a fluid loss of ↑500 mls in any 24 hour period



Acute illness

Monitoring fluid balance helps monitor acute illness or with early recognition of further deterioration. In some illnesses the fluid may move out of the vascular system and into extracellular spaces outside the bloodstream. This fluid is still in the body but no longer in a useful space and patients may develop low urine output due to hypotension and

hypovolaemia. Generally caused by altered capillary permeability (leaky blood vessels) secondary to ischaemia, trauma or inflammation, conditions include:

- Sepsis**
- Bowel obstruction**
- Acute pancreatitis (or acute on chronic)**
- Liver failure**
- Malnutrition**

Reduced urine output

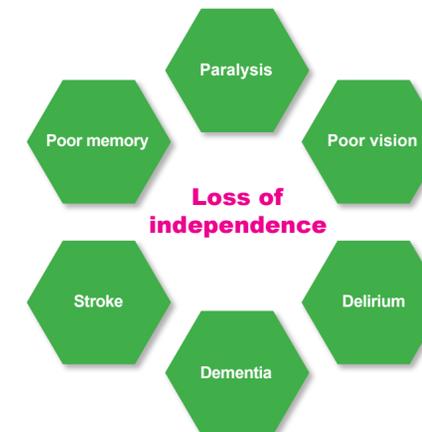
Oliguria - low urine output ↓0.5mls per kilogram per hour. Oliguria can be an early sign of poor renal perfusion. Most common causes: hypotension or hypovolaemia. **Anuria** - absence of urine: ↓100mls over 24 hours.

Acute Kidney Injury (AKI) /Chronic Kidney Disease

Patients with raised **creatinine** blood levels combined with a **low urine output** may have an AKI: the kidneys are not effectively filtering blood, reabsorbing vital elements and excreting others. Prompt identification of an AKI is crucial as it can lead to serious complications if left untreated.

Medications which increase risk of AKI (patients on these need fluid balance monitoring)

- Contrast medium** - monitor fluid balance for 24 hrs before and after procedure
- Chemotherapy** - monitor Fluid Balance during therapy
- Antibiotic therapy** - many antibiotics can cause renal impairment (Check BNF). High risk are: Gentamycin, Aciclovir and Vancomycin. Fluid balance should be monitored throughout therapy and for 24hrs post last dose
- ACE inhibitors and diuretics** - often held in acute kidney injury



Heart failure

Acute Heart Failure (HF) is most commonly caused by cardiac dysfunction due to muscle damage, valvular dysfunction, or arrhythmias. The heart does not pump enough blood to meet all the needs of the body, and it can be complex to manage fluid balance for these patients. In acute new onset HF or acute decompensation of Chronic HF, renal function, weight and Fluid Balance should be closely and accurately monitored, to ensure appropriate diuretic therapy or fluid management (NICE 2014).