

Practice Sting Medication-related fluid overload

This Practice Sting is particularly relevant for hospital prescribers, pharmacists and nurses.

In patients with a prescribed fluid restriction, include the volume used for medication administration in the total daily fluid intake.

Incident

A patient has a prescribed maximum fluid intake of 1.5 litres per day. He receives 1 litre of total parenteral nutrition (TPN) daily. In addition, intravenous paracetamol is administered four times daily and intravenous erythromycin three times daily. Because of hypokalaemia, the patient also requires potassium supplementation. This is administered as a separate infusion for logistical reasons. This results in an additional 750 mL of fluid per day and increases the total daily fluid intake to 2,450 mL. The patient subsequently develops dyspnoea and peripheral oedema affecting the arms and legs.

Recommendations

For prescribers

- Document prescribed fluid restrictions clearly in the patient record.
- In patients with a fluid restriction, include the volume used for intravenous medication administration in the total daily fluid balance.
- Assess whether medicines can be administered in a smaller volume, as a bolus injection or via an alternative route. Consult the local guidelines or seek advice from a pharmacist.

For nurses

- Maintain an accurate fluid balance. Record all fluid intake, including fluid used for medication administration, promptly and in millilitres.
- In patients with a fluid restriction, review the total daily fluid intake and immediately discuss any intake above the prescribed limit with the treating clinician.
- Consult the local guidelines for guidance on alternative methods of administration, such as bolus injection. If necessary, seek advice from a pharmacist.
- Immediately report signs of fluid overload, such as dyspnoea, oedema or rapid weight gain, to the treating clinician.
- Provide the patient with clear information and appropriate counselling.

For hospital medication safety committees

- Establish local agreements specifying where prescribed fluid restrictions must be documented in the patient record.

Analysis

Dutch hospitals regularly report incidents regarding fluid overload in patients. Contributing factors include the fluid volume provided by total parenteral nutrition (TPN) and the additional fluid required for medication administration.

A fluid restriction may be indicated in patients with severe heart failure, severe renal failure requiring dialysis, or liver failure. Meticulous monitoring of fluid balance is essential in these patients and should account for both urine output and total fluid intake. Calculations of fluid intake should include oral fluids, enteral or parenteral nutrition, and all fluid used for medication administration. In this case, paracetamol administration required 400 mL per day, erythromycin 300 mL and potassium supplementation 750 mL. The volume of fluid administered with medicines is not routinely included in medication surveillance. Prescribers and nurses must therefore remain alert and document these volumes in the electronic patient record. Volumes associated with oral medicines and nutrition should likewise be recorded as accurately as possible, in millilitres and immediately after administration.

Early recognition of fluid overload is also essential. Clinical signs include worsening dyspnoea, oedema of the legs, arms or sacral region, and rapid weight gain of more than 1 kg.

To prevent fluid overload, the method of administration may need to be modified. Some medicines can be administered in a smaller volume or via an alternative route, although this may not always be appropriate because of the risk of local irritation or other adverse effects. Dutch local guidelines often specify the minimum fluid volume required for preparation and administration. Options may include replacing a standard infusion with a lower-volume syringe-pump infusion or administering the medicine as a bolus injection. In this case, adding potassium supplementation to the TPN could have avoided the need for additional intravenous fluid. If there is uncertainty, consult a pharmacist about strategies to reduce the total fluid volume. As a last resort, the prescriber may decide to withhold a medicine temporarily.

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