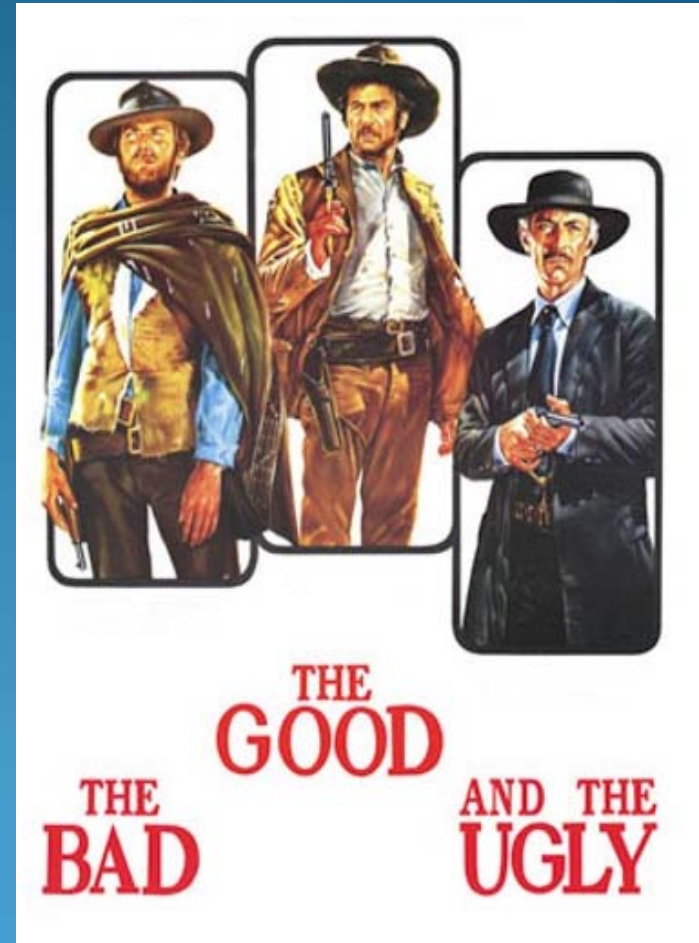


Challenges Faced Using Furosemide in the Community

Helen Williams
Consultant Pharmacist for CV Disease
South London

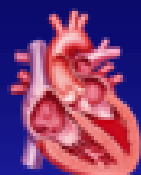
Overview

- Furosemide
 - The Good
 - The Bad
 - The Ugly
- Place in Therapy
 - Other Options
- An evidence base for Community Use?
- S/c furosemide

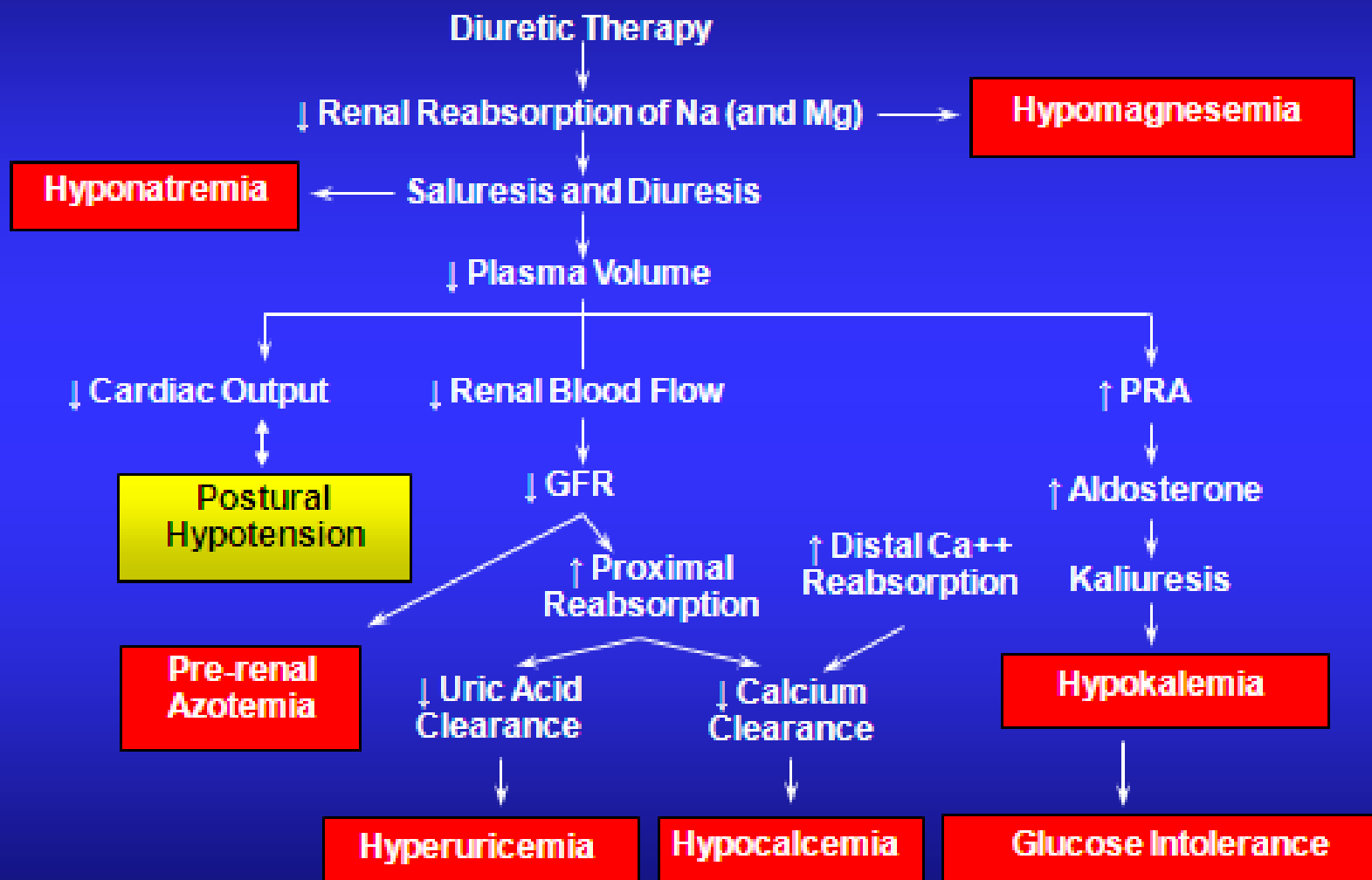


Furosemide

- Introduced over 4 decades ago
- Revolutionised management of patients with acute pulmonary oedema
- Mainstay of modern CHF management for symptom relief
- There have been no long-term studies of diuretic therapy for the treatment of heart failure and, thus, its effects on morbidity and mortality are not known

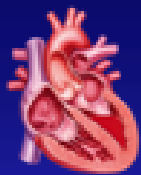


Complications of Diuretic Therapy for Heart Failure

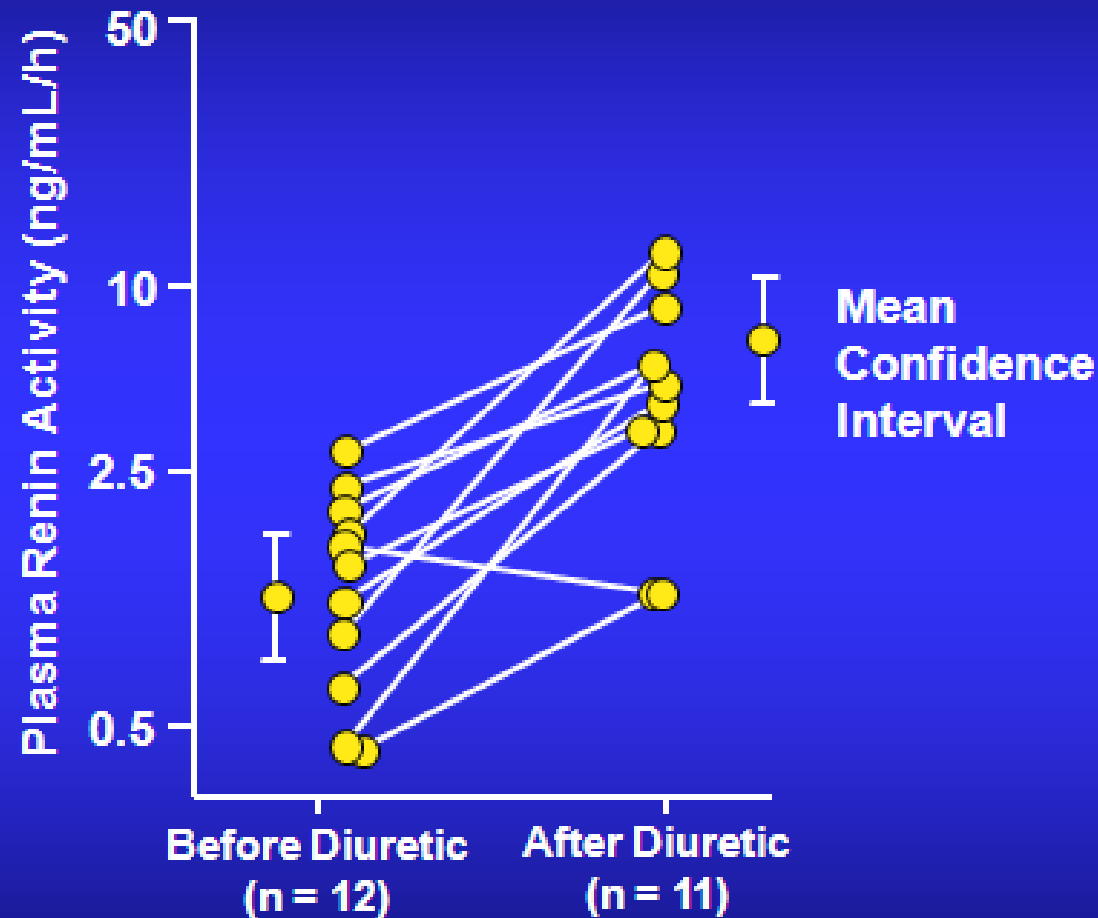


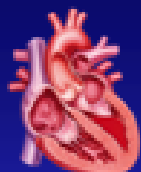
GFR = glomerular filtration rate; PRA = plasma renin activity.

Kaplan NM. Treatment of hypertension: drug therapy in clinical hypertension. In: Kaplan NM, Lieberman E, Neal WW, eds. *Clinical Hypertension*. 1994:203.

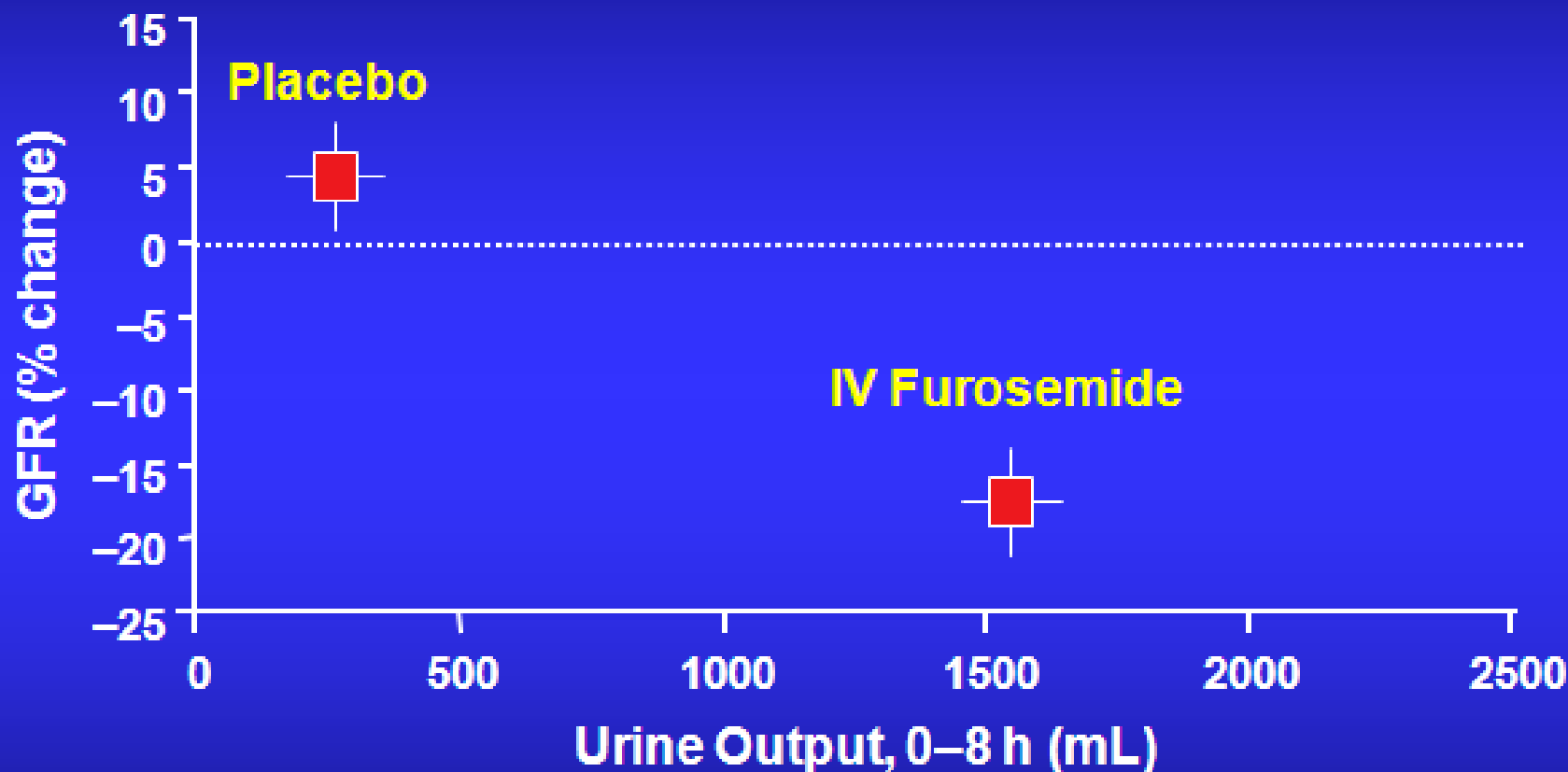


Marked Activation of the RAAS by Loop Diuretics





Diuretic Therapy Significantly Decreases Glomerular Filtration Rate*



N = 16; NYHA II (19%) and III (81%); mean baseline creatinine clearance, 108 ± 51 $\mu\text{g}/\text{mL}$.

*GFR was estimated using a 7-hour creatinine clearance.

Gottlieb SS et al. *Circulation*. 2002;105:1348-1353.

Oral Furosemide Resistance

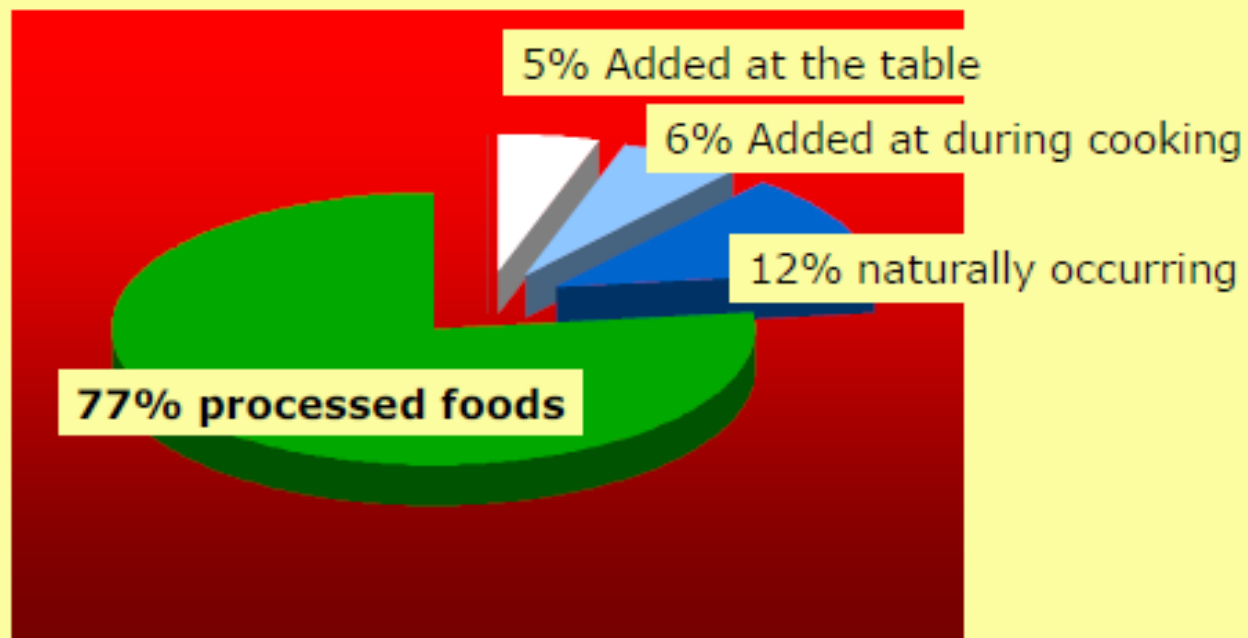
- Patients may become unresponsive to high doses of diuretic drugs if they:
 - Consume large amounts of dietary sodium
 - Are taking agents that can block the effects of diuretics (eg, NSAIDs, COX-2 inhibitors)
 - Have significant impairment of renal function or perfusion

Diuretic resistance can generally be overcome:

- By the IV administration of diuretics
- The use of two or more diuretics in combination

Getting a patient started

- Beyond the salt shaker...



Other Options.....

- Salt restriction
- Fluid restriction
- Use oral bumetanide
 - An edematous gut reduces furosemide absorption
 - 1mg bumetanide = 40mg furosemide
- Metolazone plus loop diuretic
 - 2.5mg – 10mg metolazone, plus loop diuretic dose
 - Particularly effective if given an hour before the loop diuretic
 - Careful: can induce a profound diuresis
 - Use once or twice weekly, on alternate days or daily as needed
 - Caution: need to watch electrolytes carefully

OP IV Furosemide Therapy for Acute Decompensated HF

Ryder M, Murphy NF, McGaffery D et al. European H Journal 2008 (10): 267-272

- 107 patients (mean age 71 +/- 11 years) given OP IV diuretic therapy for acute decompensated HF
- 72% of patients (77/107) did not subsequently require admission
- IV diuretic therapy:
 - Reduced wt, BP and BNP
 - Increased urea and creatinine
- Conclusion: safe, cost effective and reduces hospitalisations?

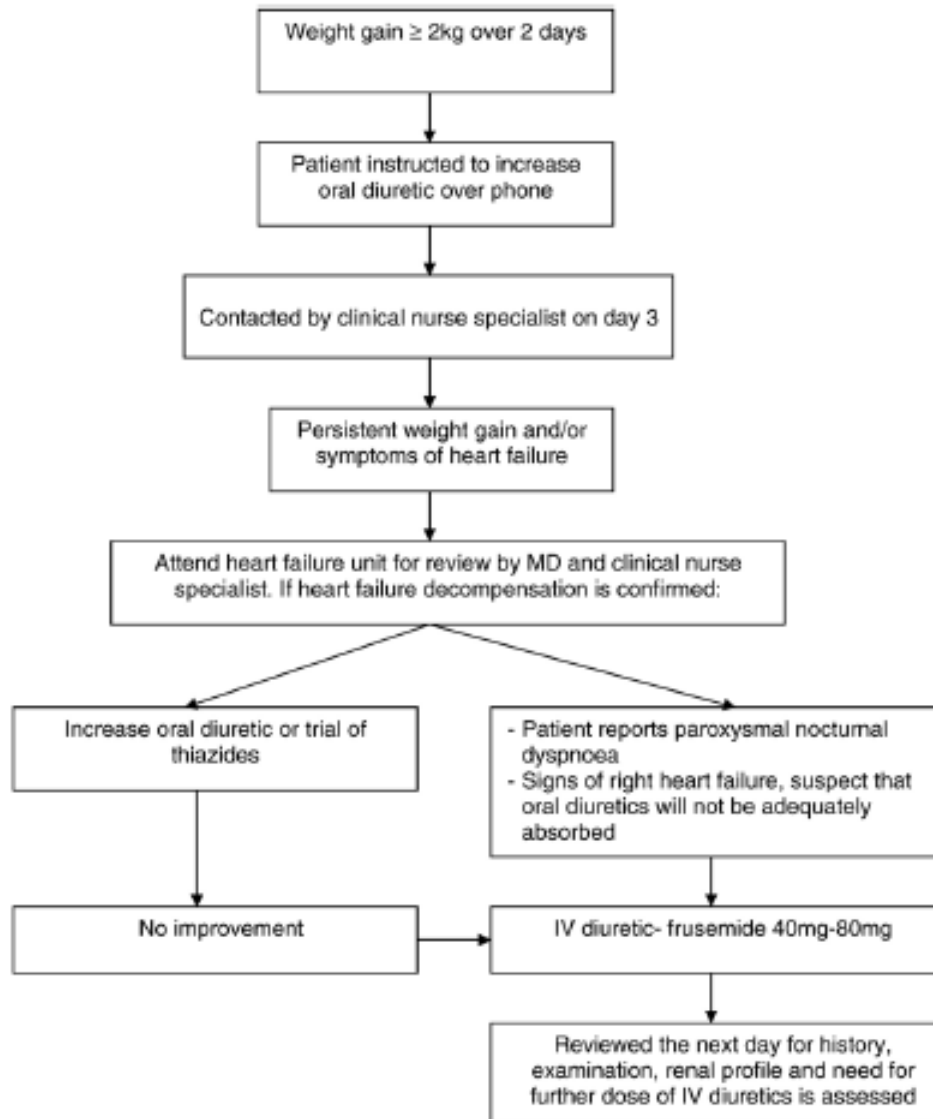


Fig. 1. Flow diagram of procedure for the administration of outpatient intravenous diuretic therapy.

1. Pts enrolled if >2kg weight gain over 2 days
2. Only 34% had increased oral diuretics prior to IV administration
3. Not randomised – how many of these patients would have been admitted?

Other Issues

- Hospital based (OP) rather than community based
- 24 hour support for patients available
- Regular monitoring of U&Es undertaken – one case of renal failure
- 28% of patients did not respond to OP IV diuretics and needed hospitalisation
 - These pts were more likely to be hypotensive, have attempted increased oral diuresis and be on BB

S/C Furosemide

- Possible alternative route of administration in the community:
 - End of life care
 - Avoid hospitalisation
 - Allow discharge for those with on-going need for parenteral diuretics
- Unlicensed route
- Well-tolerated either via bolus dose or infusion
- Can be diluted in N/saline
- Dose as for IV administration, unless there is a localised reaction at the site of injection when administration may be reduced

Other Options in End Stage HF

- Oxygen
- Low dose opiates
- GTN spray (unless C/I)
- Nebulised saline with salbutamol
- Benzodiazepines, such as S/L lorazepam
- Physiotherapy
- Breathing techniques
- Relaxation exercises

Summary

- Furosemide is an effective drug for symptom relief in heart failure
- However, it is associated with adverse effects which can contribute to HF deterioration or renal dysfunction
- Other options include salt restriction, use of an alternative loop diuretic, addition of a thiazide diuretic
- Small OP and community studies of IV furosemide have been undertaken although the methodology is poor
- S/C administration may be useful, especially in end of life care