Humber APC LVSD medicines management pathway—these 4 pillars can be introduced in parallel early in the patient pathway

Manage symptoms: use loop diuretics to offload fluid with a view to reduce later if possible, once established on all HF medicines.

- The evidence is very good that low doses of all 4 agents are much better than high doses of one or two. The benefits from each new introduction, even at low dose, appear very early.
- ACEi or beta-blocker should be initiated first and up-titrated to target dose or maximum tolerated dose.
- For most patients who are treatment naïve, dual initiation is usually best. The exact order of initiation is likely to be unimportant, as long as quadruple therapy is achieved.

Initiate **beta-blocker**

Initiate **carvedilol** 3.125mg bd

Check HR, BP, side effects at 2-4 weeks. If HR>50bpm & systolic BP >100mmhg

Double the dose after 2-4 weeks. Increase daily dose by 3.125mg every 2-4 weeks until max 25mg bd (50mg bd if >85kg) or HR consistently <60bpm

Check HR, BP, side effects at 2-4 weeks. Ensure HR>50bpm & systolic BP >100mmhg

If HR not controlled - aim resting **HR ≤65bpm (SR) ≤85 bpm (AF)** - or having side effects, refer to cardiology for consideration of ivabradine or digoxin.

Ivabradine (NICE TA267)

If in sinus rhythm and heart rate remains >75bpm, initiate **ivabradine** 5mg bd and up-titrate as tolerated to 7.5mg bd.

If issues with hypotension, fatigue or sensitivity with carvedilol: then reduce/stop carvedilol and combine/replace with ivabradine titrated up to 7.5mg bd determined by heart rate.

Ivabradine cannot be used in AF

Initiate **ACEi** then on to **sacubitril/valsartan**

Initiate **enalapril** 2.5mg bd

*Check U&Es & BP at 2 weeks, if patient has LVEF <35% plan switch to sacubitril/valsartan (Entresto) (with heart failure service, NICE TA388); otherwise continue increasing enalapril towards target of 20mg bd by doubling dose every 2-4 weeks

If switching to sacubitril/valsartan, then stop enalapril for 48hrs, then switch enalapril 10mg bd to sacubitril/valsartan 49/51mg bd

*Check U&Es & BP at 2 weeks

If BP & U&Es acceptable increase sacubitril/valsartan towards target of 97mg/103mg bd

Initiate **MRA**

If Cr <200 µmol, K^+<5.0mmol
Initiate **spironolactone** (or **eplerenone** if previous anterior MI) at 25mg od (12.5mg if frail)

*Check U&Es & BP at 1 week

If Cr <200 µmol, K^+<5.0 mmol, increase **spironolactone/eplerenone** to 50mg (25mg if frail) at 2—4 weeks

*Check bloods at 1 & 4 weeks after starting/increasing dose

Depending on U&Es, some patients may only be on small doses (e.g. 12.5mg on alternate days)

*Continue dose increase of ACEi, sacubitril/valsartan and MRA if:

Cr <200µmol or NO increase >30% from baseline	K^+<5.0mmol If K^+ 5.5-5.9 - ↑ biochemical monitoring, ↓ RAAS inhibitors (e.g. halving dose) If K^+ ≥ 6 stop RAAS inhibitors
Euvolaemic; no diarrhoea / vomiting	BP stable; systolic BP>100mmHg
No symptoms of orthostatic hypotension	

Continue treatment and monitor U&Es at:
2w→4w→8w→12w→6m →
Thereafter 6 monthly U&Es

Initiate **SGLT2 inhibitor**

Check baseline U&Es and BP, HbA_1c (delay initiation if volume depleted, systolic BP <95mmHg; do not initiate in dialysis patients)

Initiate **dapagliflozin** 10mg od (NICE TA679) or **empagliflozin** 10mg od (NICE TA773)

Dapagliflozin is not recommended in eGFR <15mL/min/1.73m^2.
Empagliflozin is not recommended in eGFR <20mL/min/1.73m^2.

For type 1 diabetes patients, **do not use**
For type 2 diabetes patients: consider dose reduction of insulin and sulfonylureas.
Refer to diabetes team for advice if:
- There is a history of previous/frequent hypoglycemia.
- Impaired renal function: The glycaemic effect is dependent on renal function. Additional glucose-lowering treatment may need to be considered if eGFR falls persistently below 45mL/min/1.73m^2.

Highlight indication as HF to ensure it's not stopped as part of a routine diabetes review.

Check U&Es and BP at 4 weeks. If eGFR is <60mL/min/1.73m^2, repeat every 3-6 months. Monitor for fluid depletion; may need to reduce dose of loop diuretic.

DKA if patient has type 2 diabetes: inform patients of the signs and symptoms of DKA and advise them to stop SGLT2 inhibitor and seek immediate medical advice if they develop any of these.
Sick day rules: Temporarily withhold SGLT2 inhibitor in patients who: are unwell and not eating/drinking normally; are hospitalised for major surgery or acute serious illness; have inter-current conditions that may lead to volume depletion (e.g. vomiting/diarrhoea); have major infection. Treatment may be restarted once the patient's condition has stabilised and are able to eat and drink normally for at least 24 hours. These rules do not apply if their heart failure symptoms have deteriorated, but they are still eating and drinking normally.
Good genital hygiene: reduce risk of UTIs. Fournier's gangrene, a rare but serious and potentially life-threatening infection has been associated with SGLT2 inhibitors; if suspected, stop and seek immediate medical advice.

ACUTE USE OF LOOP DIURETICS FOR EXACERBATIONS

Sudden increase in weight (>1kg above dry weight sustained over 2 days) +/- increasing oedema +/- breathlessness
Bumetanide 1mg has pharmacokinetic advantages over furosemide 40mg and should be preferred. Increase following U&Es.
Maintain dose change for 3 days and arrange repeat U&Es and review of weight/symptoms.

Check with patient if:

- Return to dry weight : return to previous dose to avoid AKI
- No change: maintain for further 3 days
- Ongoing deterioration: then consider alternative intervention – increased dose of loop or addition of thiazide or referral to HF Specialist Nurse.
- If patient deteriorates again within 2-3 weeks, then consider making the dose increase in loop diuretic permanent

AKI

Suspend ACEi/sacubitril valsartan and MRA if creatinine increases by 30% and restart once resolved.

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