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Heart failure care and pathways in Wales

Angharad Griffiths *Lead Heart Failure Pharmacist, Hywel Dda Health Board*

Geraint Jenkins *Heart Failure Lead, Swansea Bay Health Board*

Geraint Jenkins Declarations of Interest

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- Speaker meetings
  - AstraZeneca, Boehringer-Ingelheim, Novartis, Novo-Nordisk
- Clinical research studies
  - AstraZeneca, Boehringer-Ingelheim, Novartis, Relyspa, Sanofi, Vifor Pharma
- Sponsorship for educational meetings
  - Actelion, Amicus, Boehringer-Ingelheim, Janssen, Novartis, Vifor Pharma

Angharad Griffiths Declarations of Interest

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- Honoraria for Scientific Advice
  - AstraZeneca (dapagliflozin), Boehringer-Ingelheim (empagliflozin)

Aims of Treatment for HFrEF

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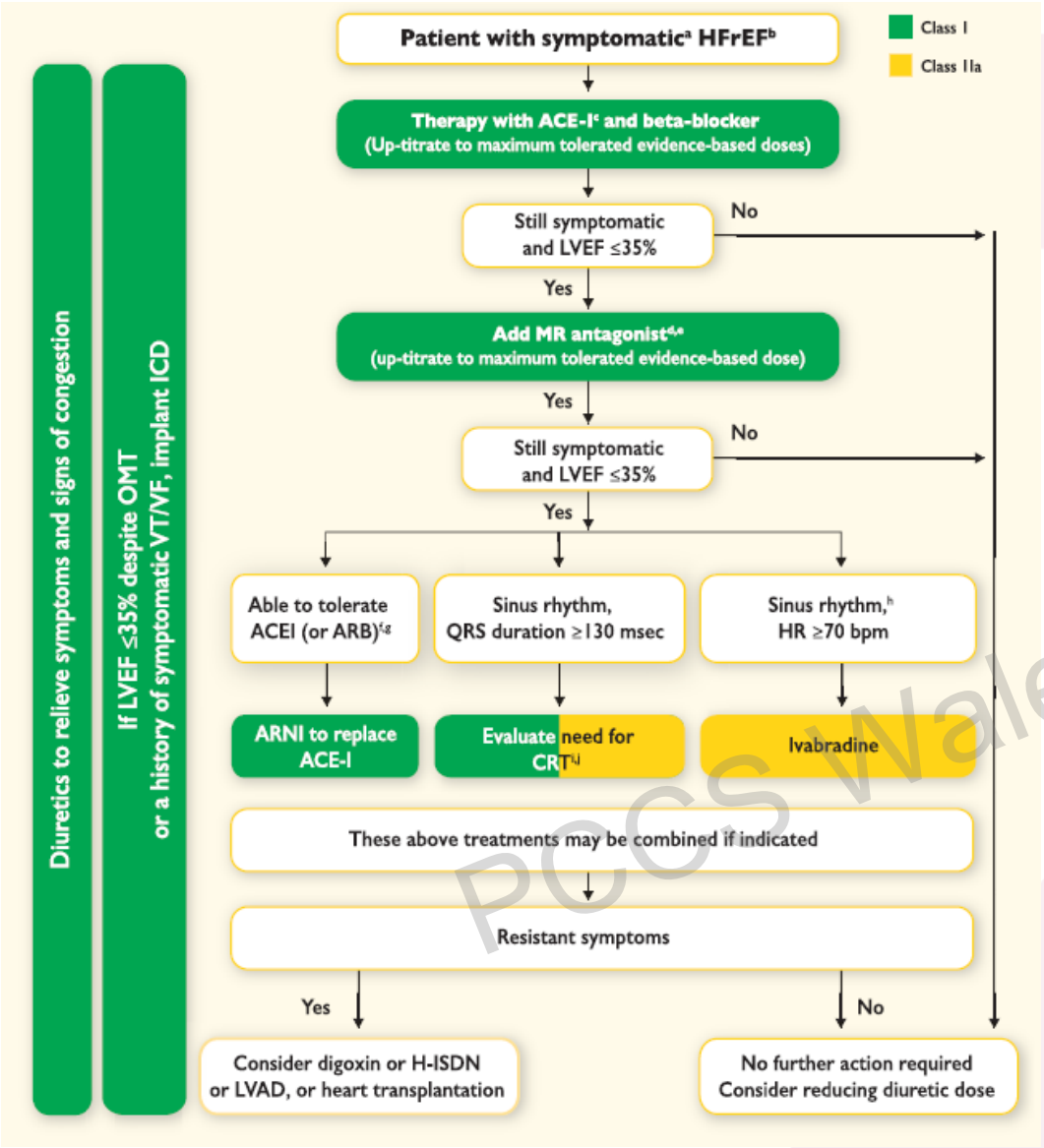
- Improve symptoms
- Improve life expectancy
- Prevent admission

- Most drugs achieve all of these

- Treat overall patient not the test
- Automated algorithmic initiation and titration of all drugs in all patients not appropriate – consider individual goals of treatment

HFrEF, heart failure with reduced ejection fraction.

Hajouli S and Ludhwani D. Heart Failure and Ejection Fraction. Updated December 2022. In: StatPearls. Available at https://www.ncbi.nlm.nih.gov/books/NBK553115/#!po=1.00000. Accessed April 2023.



Previous ESC Guidance on Management of HFrEF 2016

- Historical guidance has adopted a stepwise linear approach following the precise chronology and design of trials
- Assumes that the best drugs were developed first
- Resource and time intensive - too many steps
- Need for repeat echocardiography
- Evidence suggest that the benefits of the key drugs are independent of historical drugs being used first

ACE-I, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; ARNI, angiotensin receptor neprilysin inhibitor; CRT, cardiac resynchronisation therapy; ESC, European Society of Cardiology; HFrEF, heart failure with reduced ejection fraction; H-ISDN, hydralazine and isosorbide dinitrate; HR, heart rate; ICD, implantable cardioverter defibrillator; LVAD, left ventricular assist device; LVEF, left ventricular ejection fraction; MR, mineralocorticoid receptor; OMT, optimal medical therapy; VF, ventricular fibrillation; VT, ventricular tachycardia.

Mueller C, et al. Swiss Med Wkly 2020;150:w20159.

NICE Guidance for Initiation and Titration of Common Drugs

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	Visits	Blood tests	Up-titration	Echocardiography
Diuretic	1+	1+	1+	Baseline
Ramipril	5	5	4+	
Bisoprolol	6		6	
Spironolactone	2	2	1	? Repeat
Sacubitril Valsartan	2+	2+	1+	? Repeat
Dapagliflozin	1	1	0	
CRT, Ivabradine	3	1	1	Repeat
TOTAL	20+	12+	14+	4

CRT, cardiac resynchronisation therapy; NICE, National Institute for Health and Care Excellence.

Simultaneous or Rapid Sequence Initiation of Quadruple Medical Therapy for Heart Failure - Optimising Therapy With the Need for Speed

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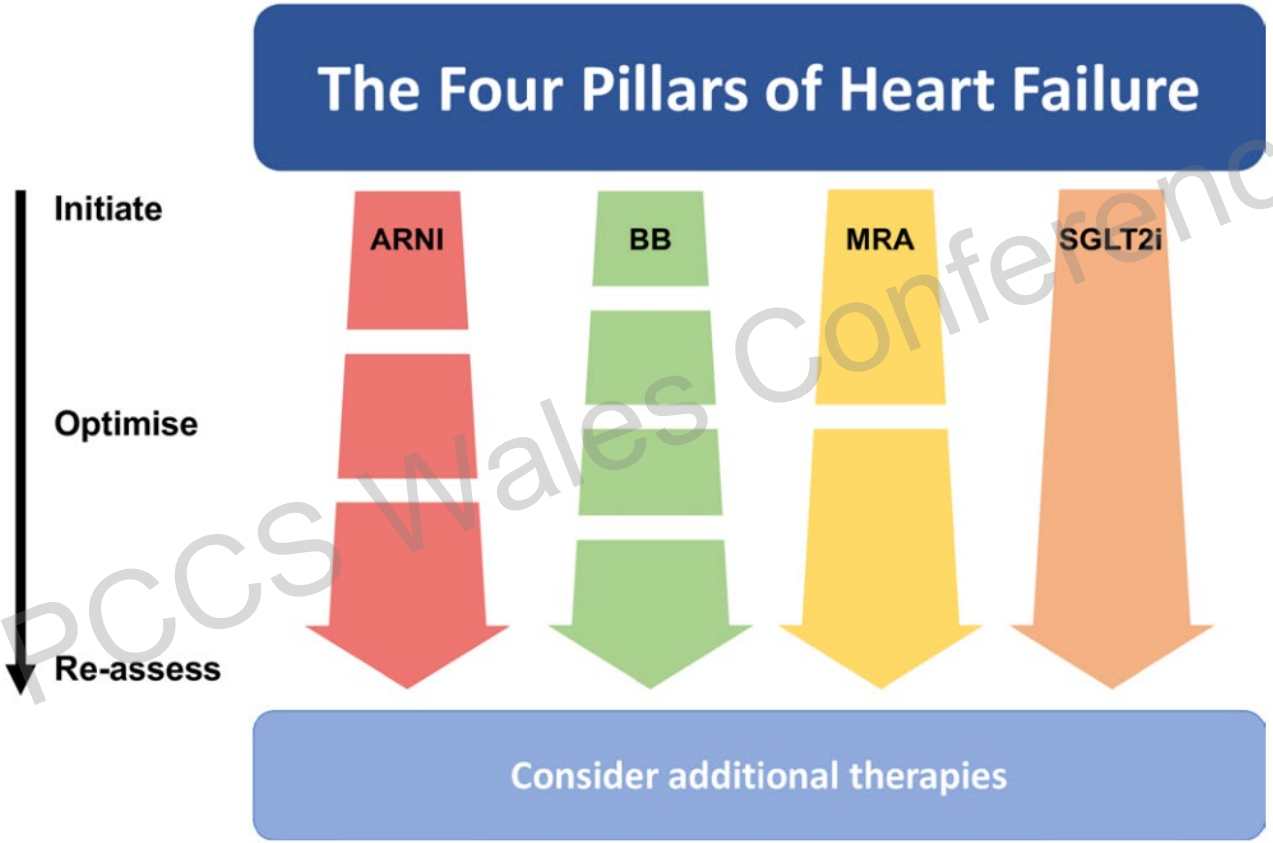
Early relative risk reduction			Initiation and optimization of medication dosing				
Outcomes	Change, %	CDMMT	Day 1	Days 7-14	Days 14-28	Days 21-42	After day 42
CV death or HF hospitalization	-42	ARNI	Initiate at low dose	Continue	Titrate, as tolerated	Titrate, as tolerated	Maintenance or additional titration of the 4 foundational therapies
Death	-25	β-Blocker	Initiate at low dose	Titrate, as tolerated	Titrate, as tolerated	Titrate, as tolerated	Consideration of EP device therapies or transcatheter mitral valve repair
CV death or HF hospitalization	-37	MRA	Initiate at low dose	Continue	Titrate, as tolerated	Continue	Consideration of add-on medications or advanced therapies, if refractory
Death, HF hospitalization,or emergency/ urgent visit for worsening HF	-58	SGLT2i	Initiate	Continue	Continue	Continue	Manage comorbidities

ARNI, angiotensin receptor neprilysin inhibitor; β, beta; CDMMT, comprehensive disease-modifying medical therapy; CV, cardiovascular; EP, electrophysiological; HF, heart failure; MRA, mineralocorticoid receptor antagonist; SGLT2i, sodium-glucose co-transporter 2 inhibitor.

Greene SJ, et al. JAMA Cardiol 2021;6:743-744.

Four Pillars of Heart failure



ARNI, angiotensin receptor neprilysin inhibitor; BB, beta blocker; MRA, mineralocorticoid receptor antagonist; SGLT2i, sodium-glucose co-transporter 2 inhibitor.
Straw S, et al. Open Heart 2021;8:e001585.

Heart Failure in Wales

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Heart Failure in Wales in 2021– a Parallel Approach

Produced by the Welsh Heart Failure Expert Reference Group

"If you want your Heart Failure patients to do well get them on these four medications as quickly as possible and to the highest doses possible"

Symptomatic Heart Failure with Reduced Ejection Fraction

1) For patients with fluid overload consider loop diuretic
2) Consider **B-blocker**. Delay if pulmonary oedema, ascites or marked oedema. Consider Digoxin to rate control in AF.
3) Consider **Sacubitril Valsartan** (NICE EF<35%, ACC EF<=40%). If hypotensive consider low dose ARB as a bridge to an ARNI. For EF 35-50% consider ACE/ARB
4) Consider **SGLT2i** in non diabetics and in Type II diabetes
5) Consider **MRA** (eGFR>30 and K<5.0)

ACC, American College of Cardiology; ACE, angiotensin-converting enzyme; AF, atrial fibrillation; ARB, angiotensin receptor blocker; ARNI, angiotensin receptor neprilysin inhibitor; B, beta; EF, ejection fraction; eGFR, estimated glomerular filtration rate; K, potassium; MRA, mineralocorticoid receptor antagonist; NICE, National Institute for Health and Care Excellence; SGLT2i, sodium-glucose co-transporter 2 inhibitor.

Welsh Heart Failure Expert Reference Group. Heart Failure in Wales – A Parallel Approach. March 2021.

Principles of All Wales Consensus Guideline

- B-blockers, ARNI, SGLT2i and MRA act as disease-modifying agents and should be considered foundation therapy
- The magnitude of treatment benefit of each drug class is independent of that of the others
- There is early morbidity and mortality benefit of each foundation drug within 30 days
- Delay in initiation results in preventable death, harm and hospitalisation
- Start and titrate drugs in parallel as far as possible
- Initiation of a new drug at low dose is probably better than titrating an existing drug to maximum dose
- Adapt to each patient depending on heart rate, blood pressure, renal function, fluid status and weight
- Review frequently with appropriate information; at least daily as inpatients, 1-2 weekly as outpatient
- Minimise the total number of visits and echocardiograms
- Aim for optimal therapy as soon as clinically possible

ARNI, angiotensin receptor neprilysin inhibitor; β, beta; MRA, mineralocorticoid receptor antagonist; SGLT2i, sodium-glucose co-transporter 2 inhibitor.

Example Case

An extreme example of rapid titration during COVID pandemic

- 52 male, smoker
- Acute heart failure with peripheral and pulmonary oedema. Breathless at rest, NYHA IV, FH IHD
- P100, BP 150/90, eGFR 94, EF 10%, SR, LBBB, NT-proBNP 28000ng/l, HbA1c 34, Cholesterol 6.6
- Day 1 - When can I go home doctor?

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Furosemide	80 mg iv bd	80 mg iv bd	80 mg po	80 mg po	40 mg po	40 mg po
Bisoprolol		1.25 mg	2.5 mg	5 mg	7.5 mg	10 mg
Sacubitril Valsartan	24/26 mg	24/26 mg	49/51 mg	49/51 mg	97/103 mg	97/103 mg
Eplerenone		25 mg	25 mg	50 mg	50 mg	50 mg
Dapagliflozin	10 mg	10 mg	10 mg	10 mg	10 mg	10 mg

- Monitored throughout - single episode AF during sleep 40mins – rivaroxaban
- “Normal” coronary angiogram
- Education by inpatient heart failure nurse
- Day 6 eGFR 66, P65, BP 125/70, Euvolaemic, NYHA II
- Discharged Day 7, U&E Day 14, 21, heart failure nurse clinic Day 21
- Review in HF OPD in 3-6/12 with MRI & Echo - ?CRTP/D

AF, atrial fibrillation; bd, twice daily; BP, blood pressure; CRTP/D; cardiac resynchronisation therapy pacemaker/defibrillator; eGFR, estimated glomerular filtration rate; FH, familial hypercholesterolaemia; HbA1c, haemoglobin A1c; HF, heart failure; IHD, ischaemic heart disease; LBBB, left bundle branch block; MRI, magnetic resonance imaging; NT-proBNP, N-terminal pro B-type natriuretic peptide; NYHA, New York Heart Association, OPD, outpatient department; P, pulse; po, orally; SR, sinus rhythm; U&E, urea and electrolytes.

Speaker’s experience.

Patient Profiling

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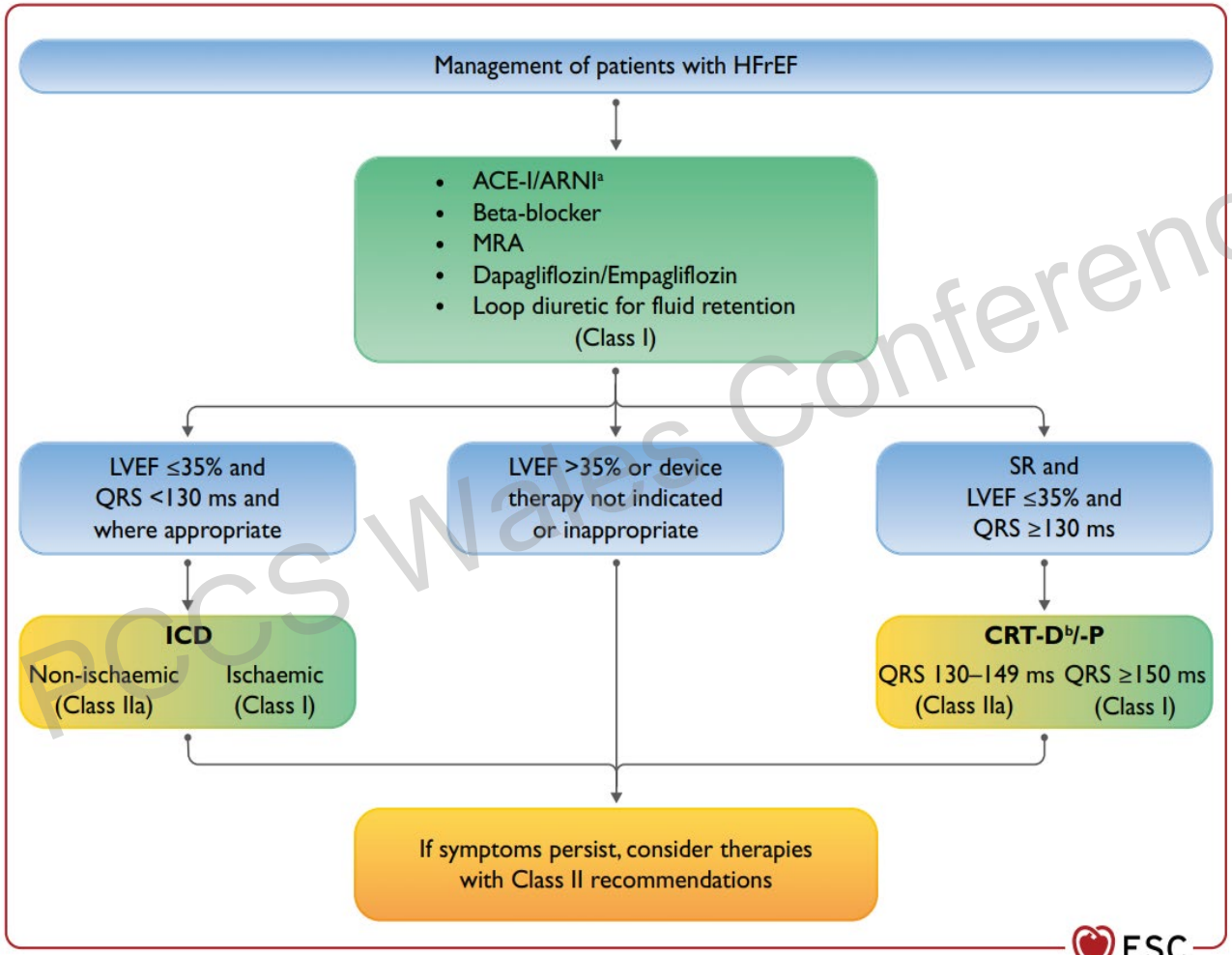
Consider
Congestion

ACEi, angiotensin-converting enzyme inhibitor; AF, atrial fibrillation; ARB, angiotensin receptor blocker; ARNI, angiotensin receptor neprilysin inhibitor; BP, blood pressure, bpm, beats per minute; CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; HK, hyperkalaemia; HR, heart rate; K, potassium; MRA, mineralocorticoid receptor antagonist; SGLT2i, sodium-glucose co-transporter 2 inhibitor.
Rosano GMC, et al. European Journal of Heart Failure 2021;23:872-881.

Algorithm of Class I Therapy Indications for Patients with HFrEF



ACE-I, angiotensin-converting enzyme inhibitor; ARNI, angiotensin receptor neprilysin inhibitor; CRT-D, cardiac resynchronisation therapy with defibrillator; CRT-P, cardiac resynchronisation therapy pacemaker; HFrEF, heart failure with reduced ejection fraction; ICD, implantable cardioverter defibrillator; LVEF, left ventricular ejection fraction; MRA, mineralocorticoid receptor antagonist; SR, sinus rhythm.

McDonagh TA, et al. European Heart Journal 2021;42:3599-3726.

Community Heart Failure Clinic

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Community Heart Failure Clinic
Gorseinon Hospital, Swansea

3 Heart failure cardiologists
Dr Carey Edwards
Dr Ben Dicken
Dr Parin Shah

2 GPwSI
Dr Gwyn Jones
Dr Chandra Murugesan

Echocardiographer
1 Specialist heart failure pharmacist
13 Specialist heart failure nurses
Secretary

6 New suspected HF cases per day
NT-proBNP gatekeeper

All patients seen
HFrEF
HFpEF
Inoperable valvular disease
Pulmonary arterial hypertension
Cor Pulmonale
CTEPH

Outpatient Referral
NT-proBNP Mandatory

1-2 weeks

Post
Heart Failure
Admission

1-2 weeks

Twice weekly
Heart Failure MDT

One stop Specialist Heart Failure Clinic
Consultant / GPwSI
Clinical Assessment
ECG, Echo, Bloods
Arrange other investigation –
CTCA, CTPA, MRI, lung function, RHC etc.

Confirmed Heart Failure

Heart Failure Nurse Assessment
Education
Up-titration ideally 1-2 weekly
Link with Community

Clinical review with Consultant
At 3-6 months
Consider Devices
Coronary angiography
Valvular intervention
Transplant assessment
Long term plan

CTCA, computed tomography coronary angiography; CTEPH, chronic thromboembolic pulmonary hypertension; CTPA, computed tomography pulmonary angiography; ECG, electrocardiogram; Echo, echocardiogram; GPwSI, general practitioner with a specialist interest; HF, heart failure; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; MDT, multidisciplinary team; MRI, magnetic resonance imaging; NT-proBNP, N-terminal pro B-type natriuretic peptide; RHC, right heart catheterisation.

Emergency Department Attendance
NT-proBNP Mandatory
Early Echo

↓

Medical or direct Cardiology Referral

↓

Heart Failure Nurses screen NT-proBNPs
Assess if appropriate

↓

Heart Failure Consultant review

↓

Daily HF Nurse review
Education, titration

↓

Discharge planning

↓

Post discharge HF nurse review 2 weeks
Ongoing optimisation

↓

Consultant review 3-6 months
Other investigation / Devices
Plan long term care

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Morriston Cardiac Centre, Swansea

Tertiary Cardiac Centre for SW Wales 1.1m
Secondary Care for Swansea area – 390k

CCU 8, HDU 8, CITU 10, Short Stay 10, Wards 71

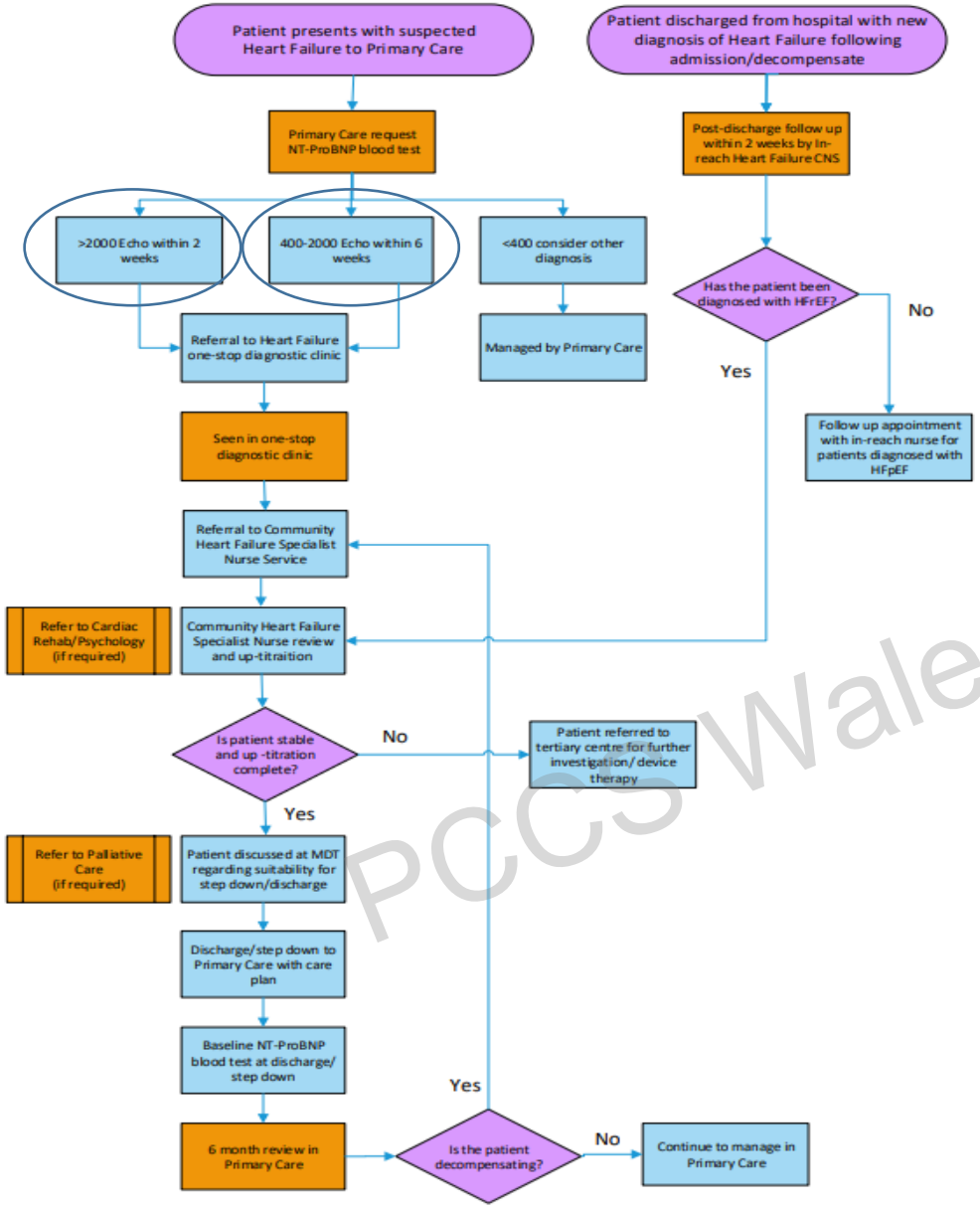
470 Heart Failure discharges annually

16 Cardiologists

5 Heart failure cardiologists
Dr Geraint Jenkins
Dr Richard Purnell
Dr Carey Edwards
Dr Ben Dicken
Dr Parin Shah

4 Inpatient heart failure nurses
Delyth Rucarean
Hannah Perera
Sarah Evans
Tirion Williams

CCU, coronary care unit; CITU, coronary intensive therapy unit; Echo, echocardiogram; HDU, high dependency unit; HF, heart failure; NT-proBNP, N-terminal pro B-type natriuretic peptide; SW, South West.



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Hywel Dda Heart Failure Pathway

- **Cardiology Transformation project**
  - Integrated HF service
  - Improve health outcomes and patient experience
  - Prevent inequalities + variations of care
- **4 recommendations**
  - Lead Health Care Practitioner for Cardiology
  - Improve access to NT-proBNP testing
  - Development of a Pharmacy-led Community One-Stop Heart failure clinic
  - Develop In-Reach HF CNS service for Carmarthenshire to replicate model in adjacent counties

CNS, community nurse specialist; Echo, echocardiogram; HF, heart failure; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; MDT, multidisciplinary team; NT-proBNP, N-terminal pro B-type natriuretic peptide.

Outcomes to Date: November 2022 - Present

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- 50% reduction in Heart Failure admissions
- 51% reduction in Heart Failure re-admissions
- 94% NICE compliant for Urgent patients
- 100% NICE compliant for Routine patients
  - Previously patients were not risk stratified – seen within 8-10 weeks + waited up to 23 weeks for a echocardiogram
- 92% reduction in time from first appointment to optimisation
  - 67 weeks to 7 weeks

NICE, National Institute for Health and Care Excellence.

Community One-Stop Clinic

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Clinics

WGH 4 x patients

GGH 4 x patients

PPH 4 x patients

BGH 3 x patients

All patients seen
HFrEF
HFpEF
Inoperable valvular disease
Pulmonary arterial hypertension
Cor Pulmonale
CTEPH

→

Clinical lead –
Consultant Cardiologist
Dr Clive Weston

Advanced Pharmacist Practitioner –
PwSI Angharad Griffiths

Heart Failure Specialist Pharmacist –
Ciara Griffiths

Heart Failure Specialist Nurses –
10

Echocardiographer
Health Care Support Worker
Administrator

→

One stop Specialist Heart Failure Clinic
Angharad Griffiths – PwSI
Overseen by Dr Clive Weston
Clinical Assessment
ECG, Echo, Bloods
Arrange other investigation –
CTCA, CTPA, MRI, lung function, etc.

↓ Confirmed Heart Failure

Heart Failure Assessment
Education
Up-titration 1-2 weekly
Link with Community

↓ Optimised

Local HF MDT Consultant Cardiologist
Decides whether further intervention required
And if follow up needed

BGH, Bronglais General Hospital; CTCA, computed tomography coronary angiography; CTEPH, chronic thromboembolic pulmonary hypertension; CTPA, computed tomography pulmonary angiography; ECG, electrocardiography; Echo, echocardiogram; GGH, Glangwili General Hospital; HF, heart failure; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; MDT, multidisciplinary team; MRI, magnetic resonance imaging; PPH, Prince Philip Hospital; PwSI, pharmacist with a specialist interest; WGH, Withybush General Hospital.

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The Telehealth Package

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Virtual Clinics

- Various models across Wales
- Cwm Taf Morgannwg – Huma
  - Royal Glamorgan Hospital
- Hywel Dda – Tunstall – Heart Failure package
  - Ceredigion Community Heart Failure
    - Patient inputs data on weekly basis
  - One – Stop Heart Failure
    - Patient inputs data on daily basis

Outcomes – Hywel Dda

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Across both the standard and one-stop Heart Failure clinics, a total of **96 patients** have used the service with **62 patients** currently monitoring

Telehealth has allowed the service to evolve to monitor symptom management as well as medication titration

Average time for Heart Failure Therapy optimization prior to One Stop was **63 weeks**, compared to **7.4 weeks through the use of telehealth**

Case example, 53 year old male

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History
Referred due to 6/52 hx - SOB on exertion, bilateral peripheral oedema following viral illness.

Past medical History
T2DM
HTN

Social History
Usually fit and well, active, never smoked, rarely drinks alcohol, denies use of recreational drugs

Medication History
Bisoprolol 1.25 mg od
Ramipril 2.5 mg od
Furosemide 20 mg od
Atorvastatin 20 mg od
Metformin 500 mg bd
NKDAs

Bloods:

Na 139	eGFR 77	Hb 148g/l	HbA1C 43
K 3.9	Urea 5.4	LFTs normal	LDL 2.5
Cr 90	TC 4	TFTs normal	NT-pro BNP 7193

ECG: Sinus rhythm, normal axis, rate 87, poor R wave progression, small QRS complexes, Q waves V1-V3. QRS 82ms

Clinical Observations: NYHA class III. Fatigue 3/4. Blood pressure sitting 158/90mmHg. Nil dizziness on standing. Pulse 95 bpm. Weight 148 kilos. BMI 36.6kg/m^2. Height 201cm.
Oxygen sats 98%. Respiratory rate 14/min.

Clinical examination: Chest clear on auscultation, Heart sounds S1 & S2, JVP raised 6/7cm, peripheral oedema to hips, sacral oedema.

Transthoracic echocardiogram: dilated left and right ventricular cavity size. Severely impaired left ventricular systolic function. LVEF visually 15%. Impaired right ventricular systolic function. Severe tricuspid regurgitation. Estimated PAPs 34mmHg plus RA pressure

Refer: C-MRI

bd, twice daily; BMI, body mass index; bpm, beats per minute; C-MRI, cardiac magnetic resonance imaging; Cr, creatinine; ECG, electrocardiogram; eGFR, estimated glomerular filtration rate; Hb, haemoglobin; HbA1c, haemoglobin A1c; HTN, hypertension; hx, history; JVP, jugular venous pressure; K, potassium; LDL, low-density lipoprotein; LFTs, liver function tests; LVEF, left ventricular ejection fraction; Na, sodium; NKDAs, no known drug allergies; NT-proBNP, N-terminal pro B-type natriuretic peptide; NYHA, New York Heart Association; od, once daily; PAPs, pulmonary artery pressures; RA, right atrial; SOB, shortness of breath; TC, total cholesterol; TFTs, thyroid function tests; T2DM, type 2 diabetes mellitus. Speaker's experience.

What did I do and why?

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Option 1
Hospital Admission for IV diuretics

Option 2
Closely monitor in the Community

IV, intravenous.
Speaker's experience.

Option 2

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- Increased dose loop diuretic – furosemide 40 mg twice daily
- Initiated spironolactone 25 mg once daily
- Initiated dapagliflozin 10 mg once daily
- Repeat U+E in 5 days
- Follow up appointment in 7 days

U+E, urea and electrolytes.
Speaker's experience.

Initiating a SGLT2i

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- Check baseline bloods: U+Es, eGFR, LFTs + HbA1c
- Dose: dapagliflozin 10 mg once daily or empagliflozin 10 mg once daily
- Hepatic impairment: dapagliflozin 5 mg once daily
- Renal function: dapagliflozin licensed to initiate eGFR > 15 mls/min
  empagliflozin licensed to initiate eGFR > 20 mls/min
- No requirement to stop if eGFR falls during treatment
- Contraindications: Type 1 DM, Pregnancy/BF
- Avoid: Previous ketoacidosis, liver impairment, high risk DKA
- Consider: Assess volume status, SBP < 95mmHg, age >85 years
  Refer to diabetic team if insulin dependent

BF, breastfeeding; DKA, diabetic ketoacidosis; eGFR, estimated glomerular filtration rate; DM, diabetes mellitus; HbA1c, haemoglobin A1c; LFTs, liver function tests; SBP, systolic blood pressure; SGLT2i, sodium-glucose co-transporter 2 inhibitor; U+Es, urea and electrolytes.

1. Dapagliflozin SmPC; 2. Empagliflozin SmPC.

Initiating an MRA

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- Check baseline bloods U+Es, eGFR

Drug	Starting dose	Target dose
Spironolactone	25 mg once daily (consider 12.5 mg)	50 mg once daily
Eplerenone	25 mg once daily	50 mg once daily

- Renal function – caution eGFR <30ml/min
- Monitoring:

BOX 3: MONITORING FOR HYPERKALAEMIA
There is a higher risk of hyperkalaemia in HF due to concomitant treatment with ACE-I/ARB and MRA/AA.

Serum potassium (mmol/L)	Action	Dose adjustment
5.0 - 5.4	Maintain dose	• No dose adjustment
5.5 – 5.9	Decrease dose	• 50mg daily to 25mg daily • 25mg daily to 25mg every other day • 25mg every other day to withhold drug
≥ 6.0	Withhold drug and seek specialist advice	• Not applicable

AA, aldosterone antagonist; ACE-I, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; eGFR, estimated glomerular filtration rate; HF, heart failure; MRA, mineralocorticoid receptor antagonist; U+Es, urea and electrolytes.

McDonagh TA, et al. European Heart Journal 2021;00:1-42.

1st Follow Up Appointment

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Bloods & Observations:

Test results	Baseline	Date: 19/12/22
Cr (µmol/L)	90	94
eGFR (ml/min/1.73m^2)	77	73
Ur (mmol/L)	5.4	6.9
K+ (mmol/L)	3.9	4.3
Na+ (mmol/L)	139	

Observations	Date: 1st appt	Date: 19/12/22
Sitting blood pressure (mmHg)	158/90	126/84
Standing blood pressure (mmHg)		
Heart rate (bpm) Regular/irregular	95	102 SR
O_2 saturations (%)	98	99
Resps/min	14	14
Weight (kg)	148	136.45

Clinical findings: Peripheral oedema to mid thighs, JVP 4/5cm, chest clear, heart sounds - S1+ S2. NYHA class II.

Patient reported symptoms: Feels less breathless, able to climb the stairs.

Plan:

1. Switch ramipril to sacubitril + valsartan 49/51 mg twice daily
2. Increase dose bisoprolol to 2.5 mg once daily
3. Repeat bloods in 7 days
4. Follow up appointment in 14 days

bpm, beats per minute; Cr, creatinine; eGFR, estimated glomerular filtration rate; JVP, jugular venous pressure; K+, potassium; Na+, sodium; NYHA, New York Heart Association; O_2, oxygen; SR, sinus rhythm; Ur, urea.
Speaker's experience.

Initiating ARNI
Sacubitril + Valsartan (Entresto®)

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- Check baseline U+Es and eGFR
- Starting dose 49/51 mg up-titrated to 97/103 mg BD
  - Low starting dose 24/26 mg BD in selected patients
- 36 hour 'WASHOUT' period for patients on ACE inhibitors
  - Risk of angioedema
- Renal function: eGFR <30 mls/min
- Contraindications: severe aortic stenosis, SBP <90mmHg, K >5.0, pregnancy, bilateral renal artery stenosis

ACE, angiotensin-converting enzyme; ARNI, angiotensin receptor neprilysin inhibitor; BD, twice daily; eGFR, estimated glomerular filtration rate; K, potassium; SBP, systolic blood pressure; U+Es, urea and electrolytes.
Entresto SmPC.

2nd Follow Up Appointment

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Bloods & Observations:

Test results	Baseline	Date: 19/12/22	Date: 29/12/22
Cr (µmol/L)	90	94	94
eGFR (ml/min/1.73m^2)	77	73	73
Ur (mmol/L)	5.4	6.9	6.9
K+ (mmol/L)	3.9	4.3	4.2
Na+ (mmol/L)	139		139
Observations	**Date: 1st appt**	**Date: 19/12/22**	**Date: 4/1/23**
Sitting blood pressure (mmHg)	158/90	126/84	117/69
Standing blood pressure (mmHg)			
Heart rate (bpm) Regular/irregular	95	102 SR	88
O_2 saturations (%)	98	99	98
Resps/min	14	14	16
Weight (kg)	148	136.45	120

Clinical findings: NYHA class II. Peripheral oedema to below knees. Chest clear. HS S1+S2. JVP mildly raised.

Patient reports symptoms: cough resolved. Improvement in symptoms of breathlessness. Able to wear tight fitting jeans. ET improved.

Plan:

1. Increase bisoprolol 3.75 mg od
2. Increase Entresto 97/103 mg bd
3. Reduced dose furosemide 40 mg od
4. Register to Telehealth monitoring – daily observations

bd, twice daily; bpm, beats per minute; Cr, creatinine; eGFR, estimated glomerular filtration rate; ET, exercise tolerance; HS, heart sounds; JVP, jugular venous pressure; K+, potassium; Na+, sodium; NYHA, New York Heart Association; O_2, oxygen; od, once daily; SR, sinus rhythm; Ur, urea.

Speaker's experience.

5th Appointment

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Bloods & Observations:

Test results	Date: Baseline	Date: 19/12/22	Date: 29/12/22	Date: 12/1/23
Cr (µmol/L)	90	94	94	95
eGFR (ml/min/1.73m^2)	77	73	73	72
Ur (mmol/L)	5.4	6.9		7.9
K+ (mmol/L)	3.9	4.3	4.2	4.6
Na+ (mmol/L)	139	139	139	140

Observations	Date: Baseline	Date: 19/12/22	Date: 4/1/23	Date: 18/1/23	Date: 25/1/23	Date: 1/2/23
Sitting blood pressure (mmHg)	158/90	126/84	117/69	93/64	112/69	101/58
Standing blood pressure (mmHg)	154/88	120/82	115/67	92/62	109/75	98/54
Heart rate (bpm) Regular/irregular	95	102 SR	88	96 (regular)	75	75
O_2 saturations (%)	98	98	98	99	99	98
Resps/min	14	14	15	-	-	-
Weight (kg)	148	136.45	120	115.7	115.40	115

Clinical observations - Patient reports nil peripheral leg oedema. Cough resolved. Returned to work. Exercise tolerance returned to baseline.
Experience some postural dizziness. NYHA class I.

Within 6 weeks:
Bisoprolol 3.75 mg bd
Entresto 103/97 bd
Spironolactone 25 mg om
Dapagliflozin 10 mg od
Metformin 500 mg bd
Atorvastatin 80 mg od

? Optimised on medicines

bd, twice daily; bpm, beats per minute; Cr, creatinine; eGFR, estimated glomerular filtration rate; K+, potassium; Na+, sodium; NYHA, New York Heart Association; O_2, oxygen; od, once daily; om, every morning; SR, sinus rhythm; Ur, urea.
Speaker's experience.

Role for Ivabradine?

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- Inhibits if channel in SA node (ineffective in AF)
- SHIFT Trial – survival in HR >75 bpm
- Add if stabilised and on maximal dose of beta blocker
- Dose: 5 mg BD increase to 7.5 mg BD
- Cautions: heart block, hypokalaemia
- Interactions: macrolides, antifungals

AF, atrial fibrillation; BD, twice daily; bpm, beats per minute; HR, heart rate; SA, sino-atrial.
Ivabradine SmPC.

Patient Outcome

Test results	Baseline	Date: 06/03/2023
Cr (µmol/L)	90	75
eGFR (ml/min/1.73m^2)	77	>90
Ur (mmol/L)	5.4	7.0
K+ (mmol/L)	3.9	5.0
Na+ (mmol/L)	139	140
NT-proBNP (ng/L)	7193	623

Observations	Date: 1st appt	Date: 16/2/23
Sitting blood pressure (mmHg)	158/90	100/58
Standing blood pressure (mmHg)	154/88	103/60
Heart rate (bpm) Regular/irregular	95	66
O_2 saturations (%)	98	99
Resps/min	14	14
Weight (kg)	148	113.8

8 weeks optimised

- Bisoprolol 3.75 mg bd
- Entresto 103/97 bd
- Spironolactone 25 mg om
- Dapagliflozin 10 mg od
- Ivabradine 7.5 mg bd
- Metformin 500 mg bd
- Atorvastatin 80 mg od

Clinical observations & Patient reported symptoms: Breathlessness resolved. Nil symptoms of dizziness. Returned to work full time. Nil peripheral leg oedema. NYHA I

C-MRI results: 5th April
LVEF 36%, RVEF 59%. Anterior infarct +/- DCM.

Patient feedback service: "I have been in the care of the Heart Failure Pharmacists at Glangwili hospital since December last year. I could not be happier with the care I have received. They are both friendly and always have time to explain things and to answer my questions."

bd, twice daily; bpm, beats per minute; C-MRI, cardiac magnetic resonance imaging; Cr, creatinine; DCM, dilated cardiomyopathy; eGFR, estimated glomerular filtration rate; K+, potassium; LVEF, left ventricular ejection fraction; Na+, sodium; NT-proBNP, N-terminal pro B-type natriuretic peptide; NYHA, New York Heart Association; O_2, oxygen; od, once daily; om, every morning; RVEF, right ventricular ejection fraction; Ur, urea.
Speaker's experience.

Medicines to avoid in HFrEF

Medicines	Effect
Glitazones and gliptins	Cause worsening HF and increase the risk of hospitalisation
Verapamil and diltiazem	Negative inotropic effect causes worsening HF
NSAIDS and COX-2 inhibitors	Avoid if possible as cause sodium and water retention and cardiotoxicity
Doxazosin	ALLHAT trial showed increased risk of HF and less favourable outcomes
ACE-I + ARB combination	Not recommended: increased risk of renal dysfunction and hyperkalaemia
Herbal medications	Caution – review for interactions

List not exhaustive:

- Lithium
- Anti-arrhythmics – flecainide, dronedarone
- Gabapentin, pregabalin
- Moxonidine

ACE-I, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; COX-2, cyclooxygenase-2; HF, heart failure; HFrEF, heart failure with reduced ejection fraction; NSAIDS, non-steroidal anti-inflammatory drugs.

Heart Failure Awareness Week

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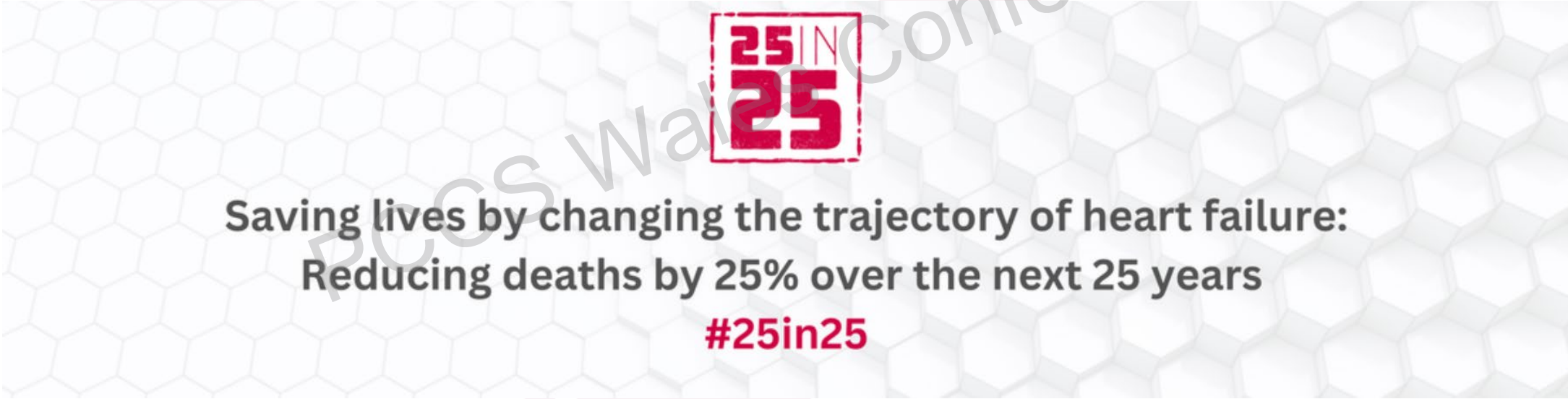

Detecting the Undetected – Heart Failure Awareness Week May 1-7th 2023

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Thank you to PCCS & Wales Cardiac Network for speaker invitation

Thank you for listening

Any Questions?

Email: Geraint.Jenkins@wales.nhs.uk
Angharad.Thomas2@wales.nhs.uk

Lifestyle Advice

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- Dietary advice and signposting
- Exercise - muscle strengthening exercises recommended, cardiac rehab sessions for eligible patients
- Smoking cessation
- Alcohol moderation (or cessation if alcoholic cardiomyopathy)
- Annual influenza vaccination
- Pneumococcal vaccination
- Covid vaccination

- Support networks and resources available to signpost patients to: British Heart Foundation, Cardiomyopathy UK, and Pumping Marvellous, a patient-led charity

NICE. Chronic heart failure in adults: diagnosis and management (NG106). Available at: https://www.nice.org.uk/guidance/ng106. Accessed April 2023.

Sick day rules for avoiding or recognising DKA[1,2]

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- There are several classes of drug that should be stopped if the patient is at risk of dehydration due to acute illness:

S	**SGLT-2 inhibitors**	Increased risk of euglycaemic DKA
A	**ACE inhibitors**	Increased risk of AKI due to reduced renal efferent vasoconstriction
D	**Diuretics**	Increased risk of AKI
M	**Metformin**	Increased risk of lactic acidosis
A	**ARBs**	Increased risk of AKI
N	**NSAIDs**	Increased risk of AKI due to reduced renal efferent vasoconstriction

Signs and symptoms of DKA

- Excessive thirst
- Polyuria
- Dehydration
- Shortness of breath and laboured breathing
- Abdominal pain
- Leg cramps
- Nausea and vomiting
- Mental confusion and drowsiness
- Ketones can be detected on the person's breath (pear-drop smell) or in the blood or urine

ACE, angiotensin converting enzyme; AKI, acute kidney injury; ARB, angiotensin receptor blocker; DKA, diabetic ketoacidosis; NSAID, nonsteroidal anti-inflammatory drug; SGLT2, sodium-glucose co-transporter 2

1. How to advise on sick day rules. Available online at https://www.diabetesonthenet.com/journals/issue/457/article-details/how-advise-sick-day-rules. Accessed March 2020 Down S, et al. Diabetes and Primary Care, 2018, 20 (1), p 15-16