Update on Heart Failure

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Outline

- A wicked problem
- Diagnosing and classifying heart failure
- Approach to management of CHF
  - Drug therapy (ACE-I, ARB, betablockers, aldosterone blockade, digoxin)
  - Device therapy- ICD, CRTP, CRTD
- Future directions

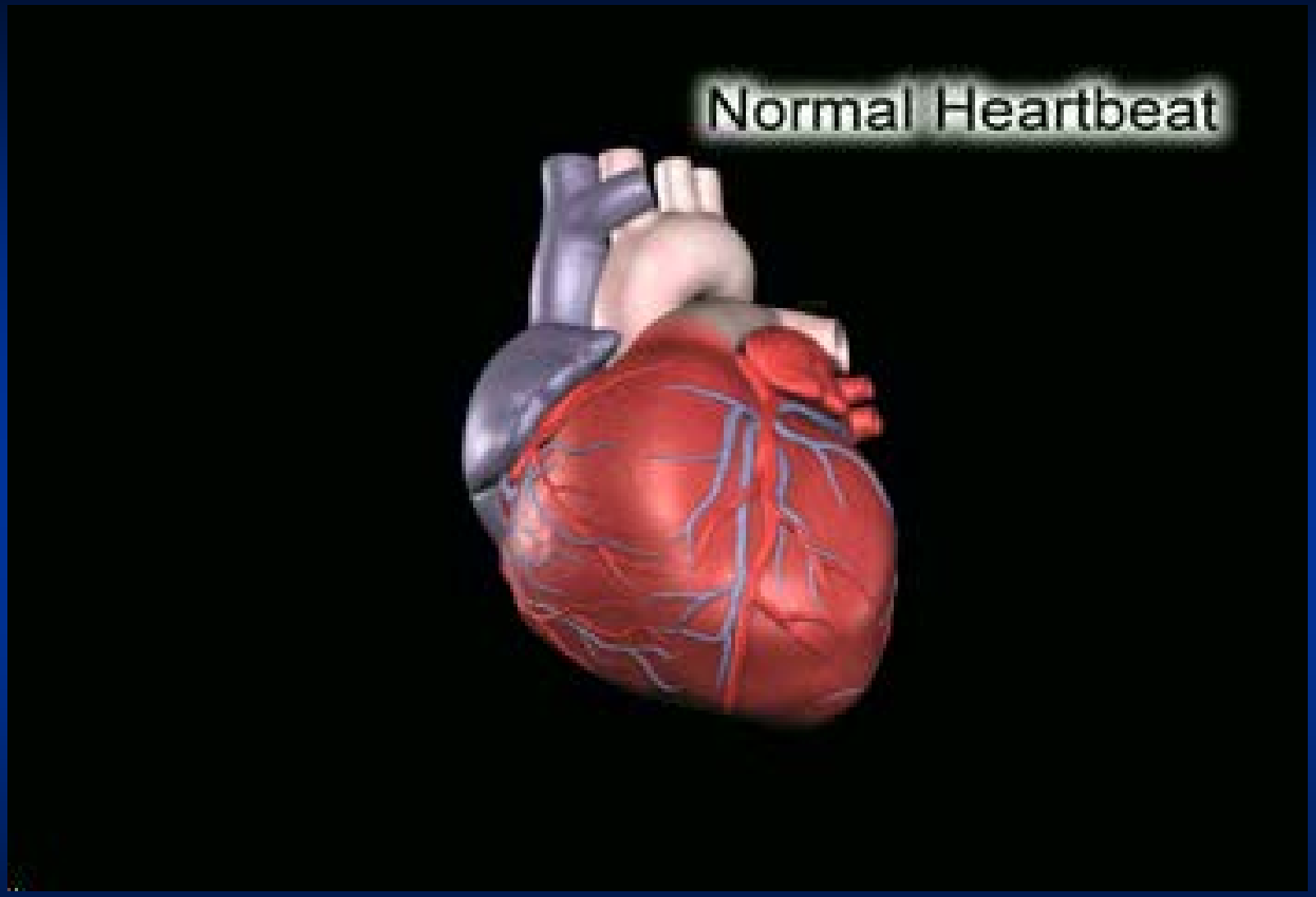
Congestive Heart Failure

- **Heart (or cardiac) failure** is the state in which the heart is unable to pump blood at a rate commensurate with the requirements of the tissues or can do so only from high pressures

Braunwald 8th Edition, 2001

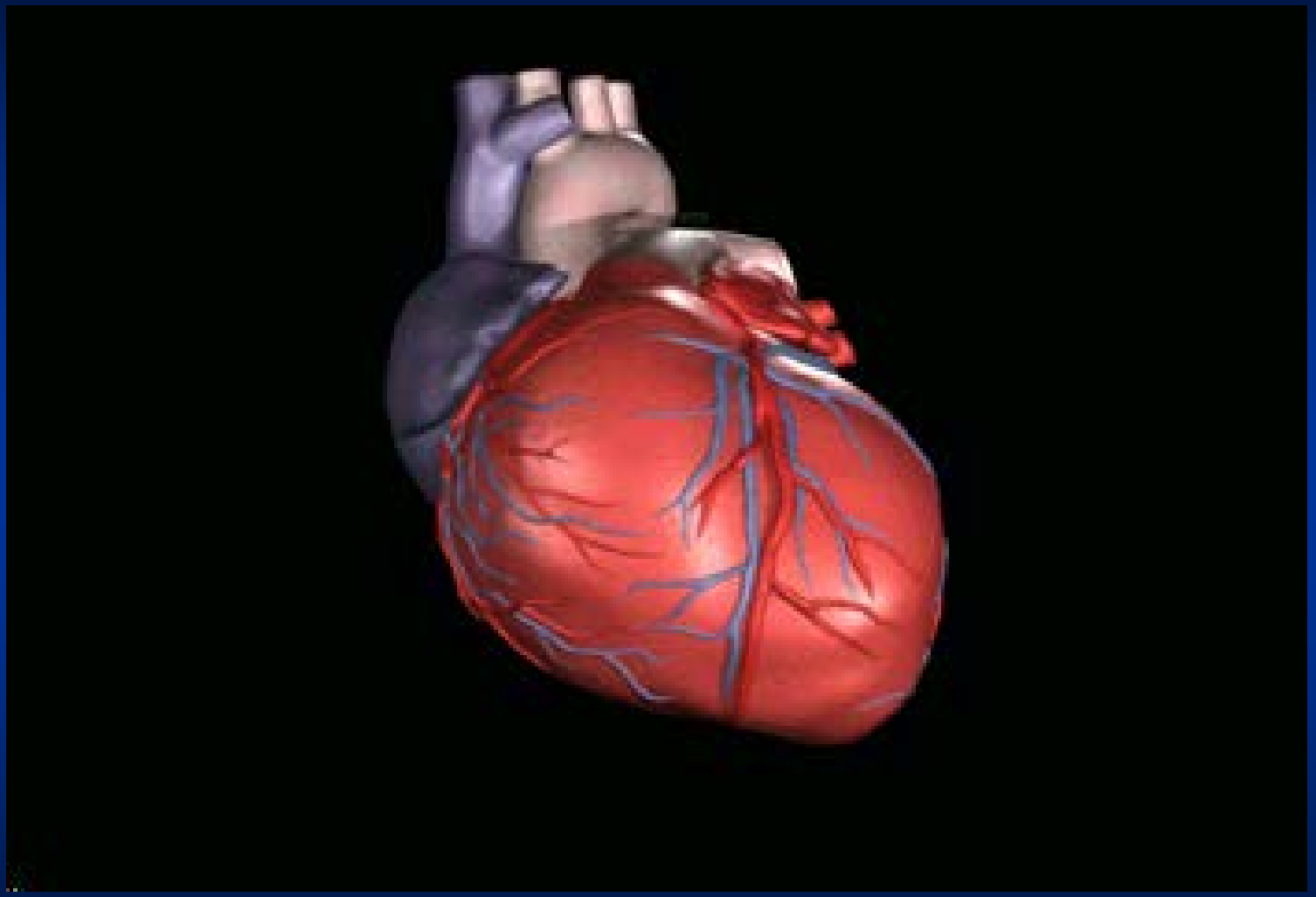
Congestive Heart Failure

- Symptoms:
  - Shortness of breath
  - oedema
  - orthopnea
  - Fatigue



A normal heart pumps blood in a smooth and synchronized way.

Heart Failure Heart



A heart failure heart has a reduced ability to pump blood.

Types of Heart Failure

- Systolic heart failure (HFREF)
  - Decreased EF
- Diastolic heart failure (HFPEF)
  - Involves a thickened and stiff heart muscle
  - Heart does not fill with blood properly
  - This results in fluid backup in the lungs and heart failure

Risk Factors for Heart Failure

- Coronary artery disease
- Hypertension (LVH)
- Valvular heart disease
- Alcoholism
- Infection (viral)
- Diabetes
- Congenital heart defects
- Other:
  - Obesity
  - Age
  - High or low hematocrit level
  - Obstructive Sleep Apnea

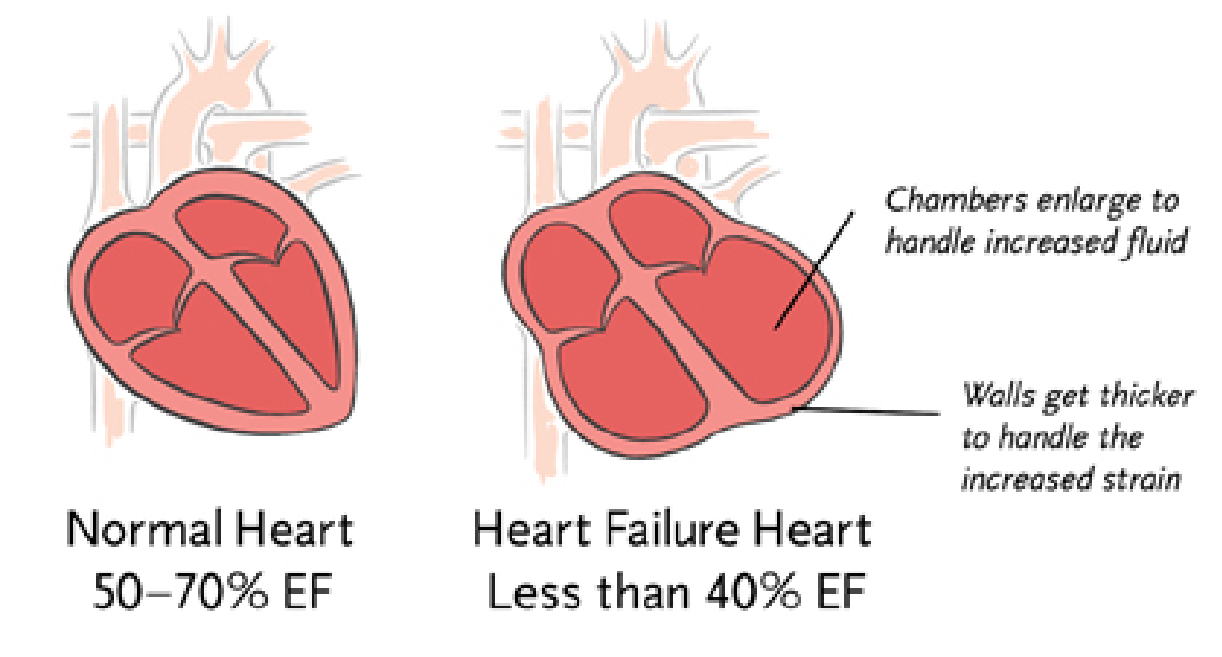
CAD=coronary artery disease; LVH=left ventricular hypertrophy.

Classifying Heart Failure: Terminology and Staging

A Key Indicator for Diagnosing Heart Failure

Ejection Fraction (EF)

- Ejection Fraction (EF) is the percentage of blood that is pumped out of your heart during each beat



Classification of HF: NYHA Functional Class

NYHA Functional Class[2]	
None	
I	Asymptomatic
II	Symptomatic with moderate exertion
III	Symptomatic with minimal exertion
IV	Symptomatic at rest

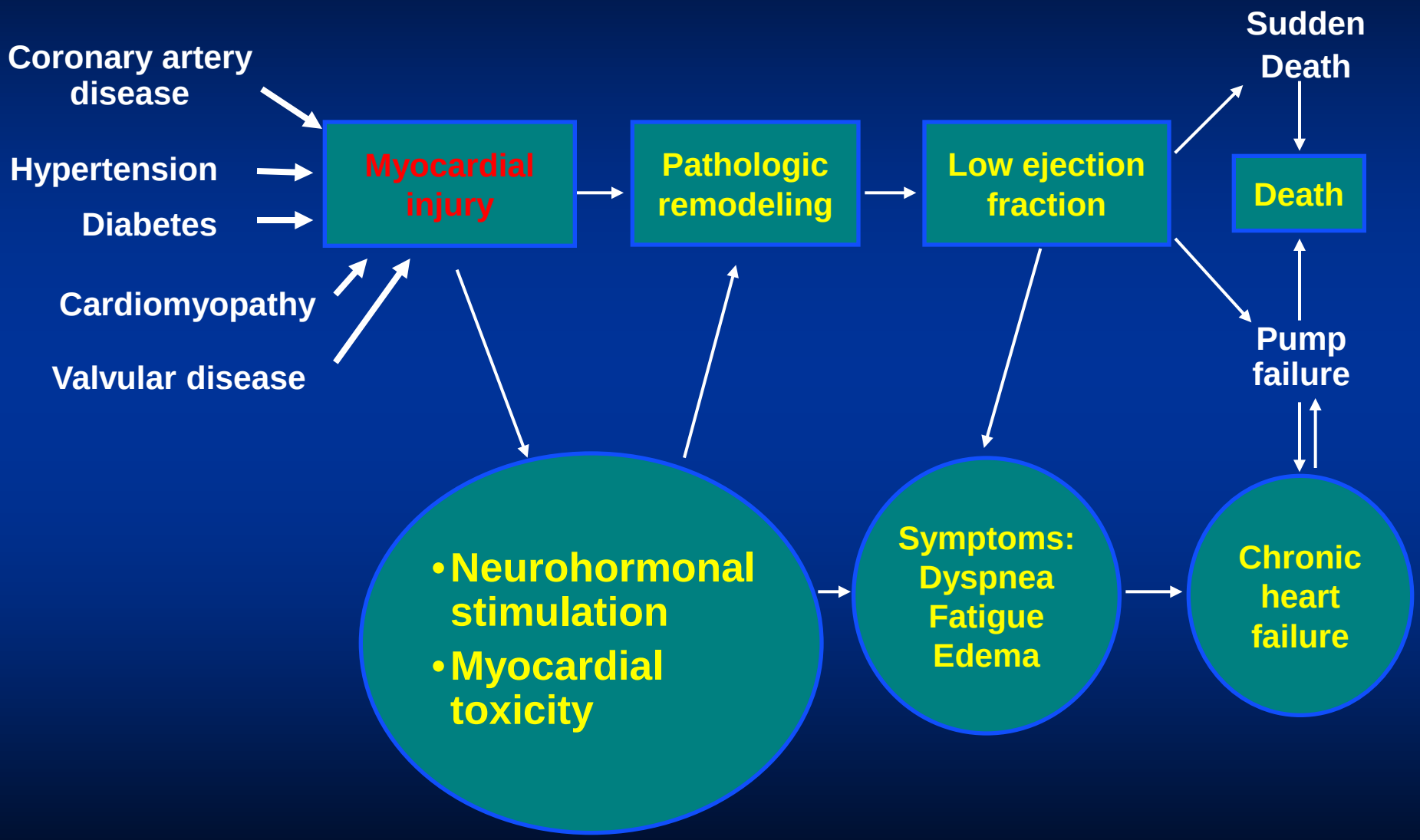
New York Heart Association/Little Brown and Company, 1964. Adapted from: Farrell MH et al. *JAMA.* 2002;287:890–897.

Diagnosis

- History & Physical exam
- Tests
  - Chest X-ray
  - FBC, Renal function, BNP
  - ECG
  - Echocardiogram
  - Lung Function Test

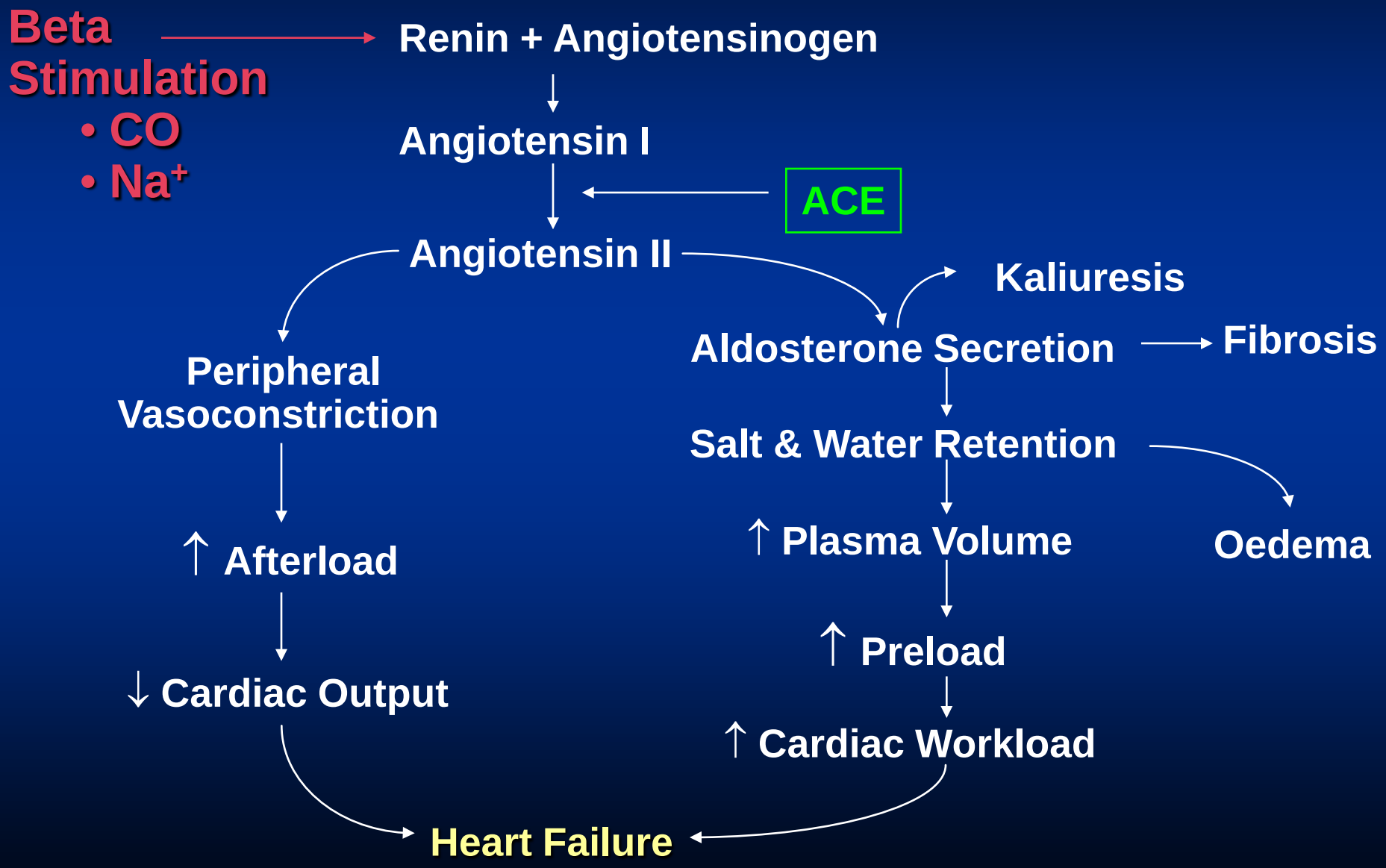
Pathophysiology

Pathophysiology



Adapted from Cohn JN. *N Engl J Med*. 1996;335:490–498.

Compensatory Mechanisms:
Renin-Angiotensin-Aldosterone System



Drug Therapy

Heart Failure Treatments: Medication Types

Type	What it does
•ACE inhibitor (angiotensin-converting enzyme)	•Expands blood vessels which lowers blood pressure, neurohormonal blockade
•ARB (angiotensin receptor blockers)	•Similar to ACE inhibitor—lowers blood pressure
•Beta-blocker	•Reduces the action of stress hormones and slows the heart rate
•Digoxin	•Slows the heart rate and improves the heart's pumping function (EF)
•Diuretic	•Filters sodium and excess fluid from the blood to reduce the heart's workload
•Aldosterone blockade	•Blocks neurohormal activation and controls volume

Rationale for Medications

- Improve Symptoms
  - Diuretics (water pills)
  - digoxin

- Improve Survival
  - Betablockers
  - ACE-inhibitors
  - Aldosterone blockers
  - Angiotensin receptor blockers (ARB's)

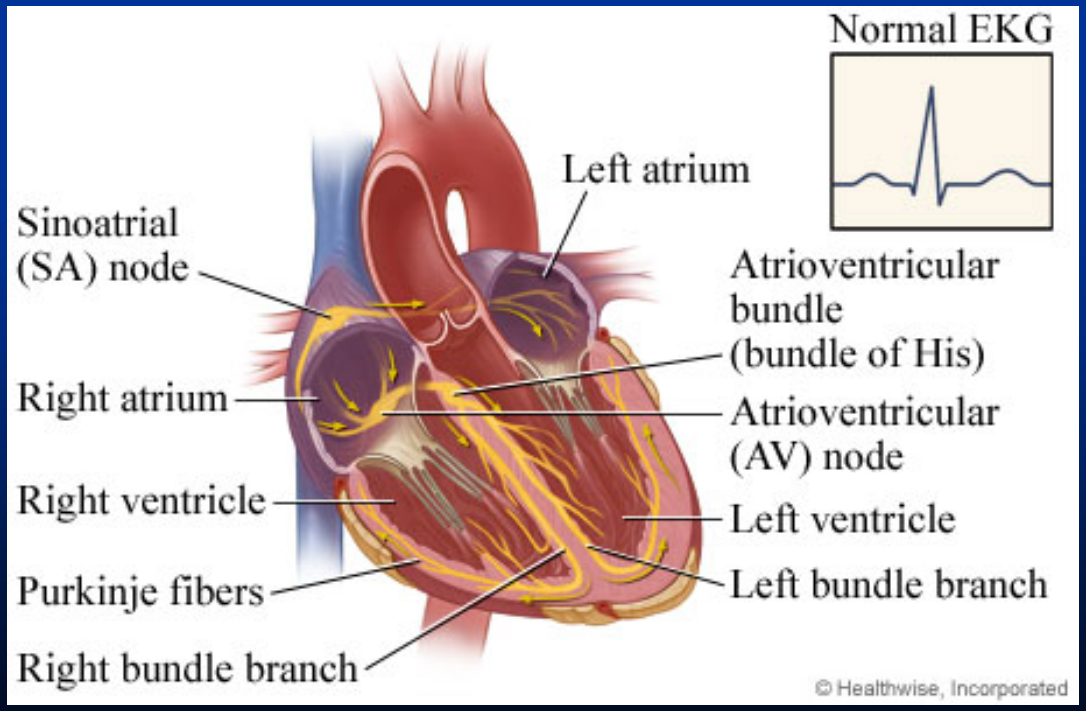
Lifestyle Changes

What	Why
•Eat a low-sodium, low-fat diet	•Sodium is bad for high blood pressure, causes fluid retention
•Lose weight	•Extra weight can put a strain on the heart
•Stay physically active	•Exercise can help reduce stress and blood pressure
•Reduce or eliminate alcohol and caffeine	•Alcohol and caffeine can weaken an already damaged heart
•Quit Smoking	•Smoking can damage blood vessels and make the heart beat faster, increases risk of coronary artery disease

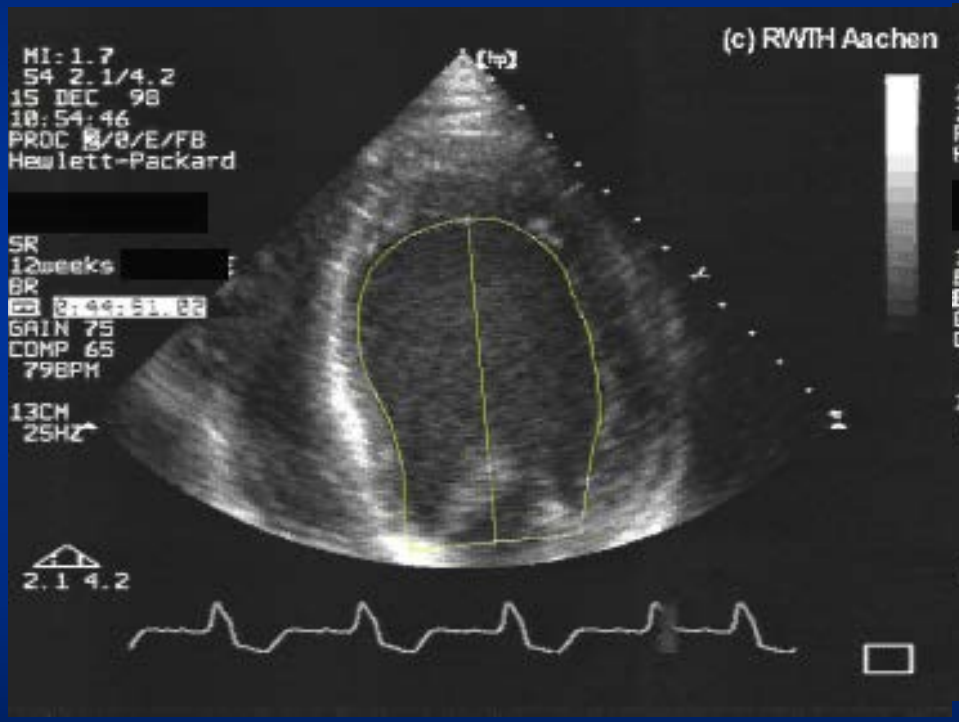
Device Therapy: Biventricular Pacing

Biventricular Pacing
Ventricular Dysynchrony

- Abnormal ventricular conduction resulting in a mechanical delay and dysynchronous contraction



BiV Pacing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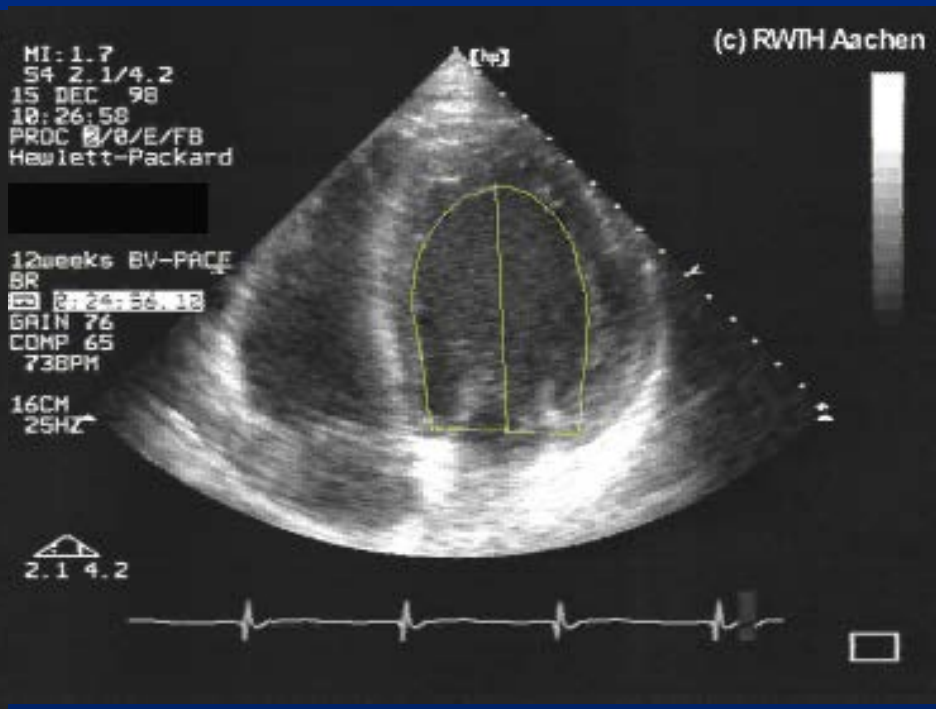
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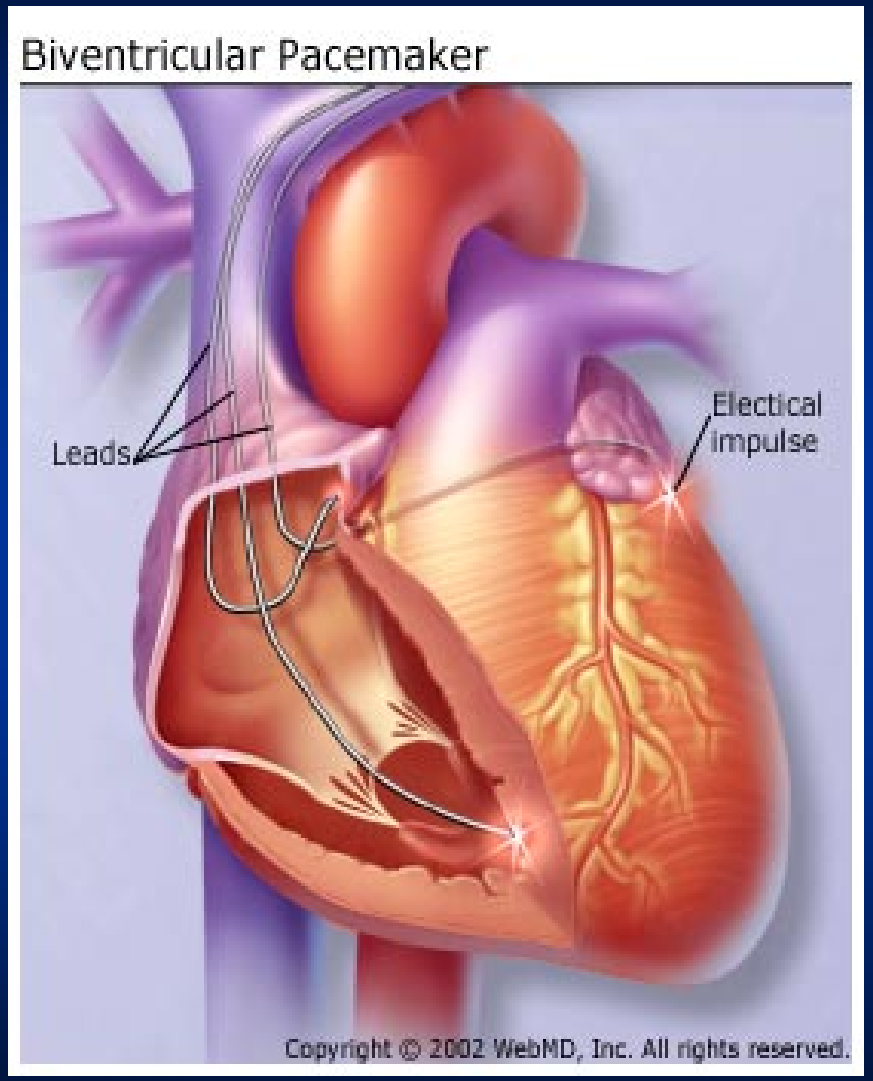
Biventricular Pacemaker
Leads
Electical impulse
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Cardiac Resynchronization Therapy Key Points

- **Indications**
  - Moderate to severe CHF who are on optimal medical therapy
  - EF<35%
  - QRSd > 120 ms

- Timing of Referral Important
  - Patients often not on optimal Medical Rx
  - Patients referred too late- Not a Bail Out

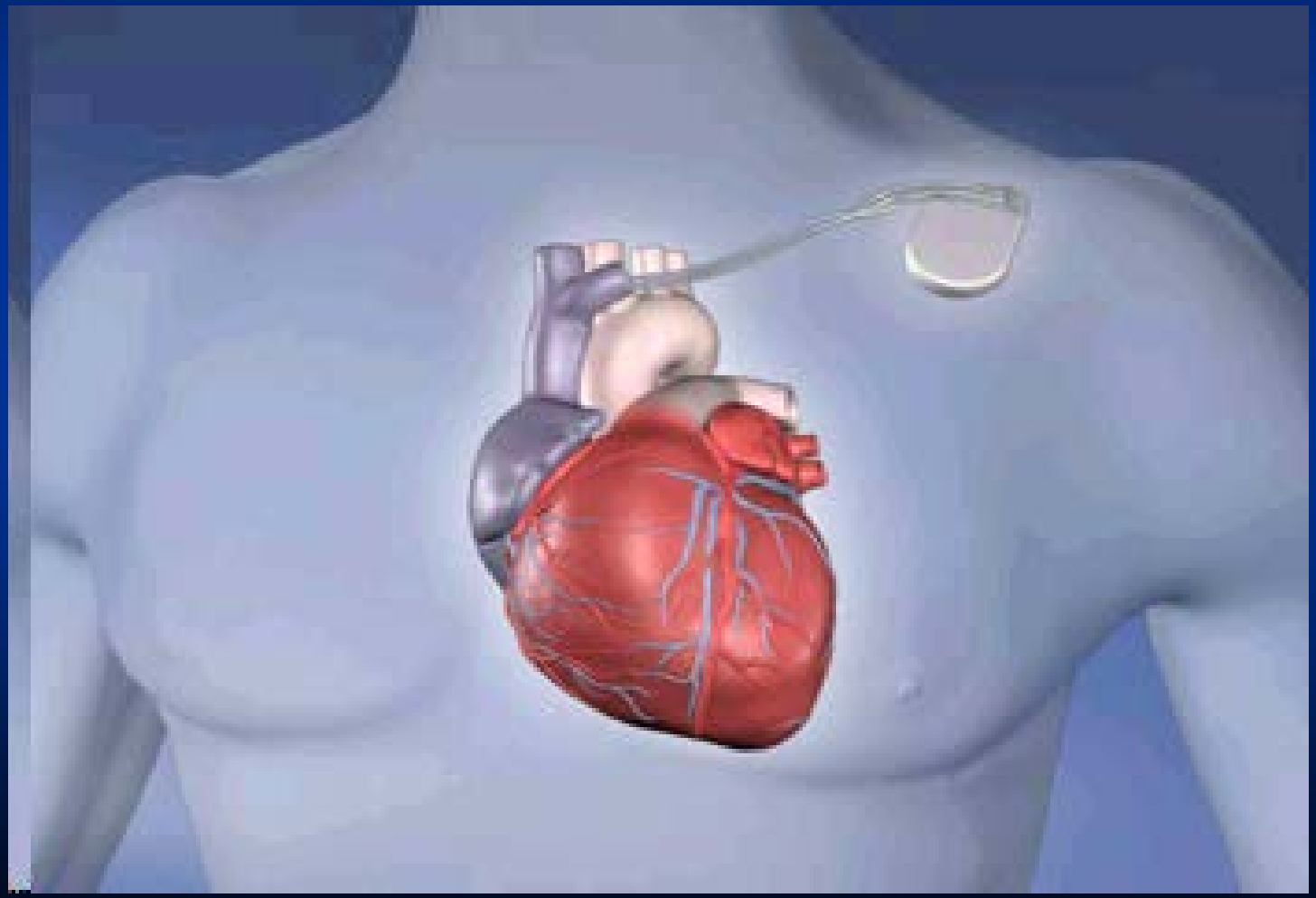
Defibrillators (ICD’s)

Heart Failure and Sudden Cardiac Death

Sudden Cardiac Death (SCD)

- VT/ VF
- SCD is one of the leading causes of death –
- Patients with heart failure are 6-9 times as likely to develop sudden cardiac death as the general population

How does a defibrillator for sudden cardiac death work?



Implantable Cardiac Defribrillators

EBM Therapies	Relative Risk Reduction	Mortality 2 year
ACE-I	↓ 23%	27%
B-Blockers	↓ 35%	12%
Aldosterone Antagonists	↓ 30%	19%
ICD	↓ 31%	8.5%

ICD indications

- Patients with LVEF ≤ 35% and QRS > 120ms
- Patients with EF< 35%, QRS <120 ms, but who are deemed to be high risk for sudden death by the specialist MDT

- Patients with EF > 35%, but who have survived a cardiac arrest because of VF/ VT
- Patients with EF > 35%, but who have had a haemodynamically compromising VT

ICD- points to consider

- If VT/ VF happened in the context of an acute MI, and if the culprit coronary lesion has been dealt with, further assessments would be needed before implanting ICD
- Patients with reversible causes for heart failure

Improved heart failure services

- improved use of BNP, to help in more appropriate management by the right team (ie general cardiology/ Heart failure clinic/ respiratory/ general physician)
- Review of heart failure patients at regular intervals , to check whether on appropriate meds at appropriate doses, heart failure education, assessment of psychological, social and end of life needs.

When to trigger secondary services

- If a patient with heart failure has never seen a consultant cardiologist with an interest in heart failure
- If the clinical situation of the patient is likely to be improved by a secondary level intervention (eg devices)

Borderline situations…

Which are areas to be targeted for improved service delivery as a whole, eg

- IV frusemide for fluid overloaded patients

Community IV frusemide therapy

- Issues:
- Need for an experienced nurse to assess the appropriateness, insert venflon, prescribe and administer IV frusemide, monitor bloods for renal failure

Day Case IV frusemide

- Patient inconvenience of attending the daycase ward in the morning for venflon and IV frusemide, to return in the evening, and coming in again the next day (as most patients require more than a 12 hour infusion)

What we are trying to achieve at Solihull Hospital

- All patients admitted with suspected heart failure to be reviewed by a cardiologist
- All patients with confirmed heart failure after the cardiology review, to be managed by the cardiologist
- All patients with suspected heart failure to get an inpatient echocardiogram within 24 hours if echo deemed necessary by the cardiologist (for eg if a recent echo not available)
- All etto to include the diagnosis, medications started and considered, management plan including plans for follow up if any.
- 24 hour telephone advice available from a cardiologist

My views on heart failure management

- Get the diagnosis correct (HFREF/ HFPEF/ other conditions)
- Get the initial management plan from the specialist
- Increasing need for joined up working
- We are all not just clinicians but leaders

In Summary….

- Heart failure is common and has high mortality
- Drug & device therapy improves survival
  - Betablockers, ACE-I, aldosterone antagonists
- Newer device therapies are showing promise for symptom relief and improved survival
  - Biventricular pacing, ICD's
- Heart failure is a wicked problem; we all need to work together to improve care.