CVD/CHF and Cardio-Renal Links

The CKD Symposium

Dr. Nadia Zalunardo

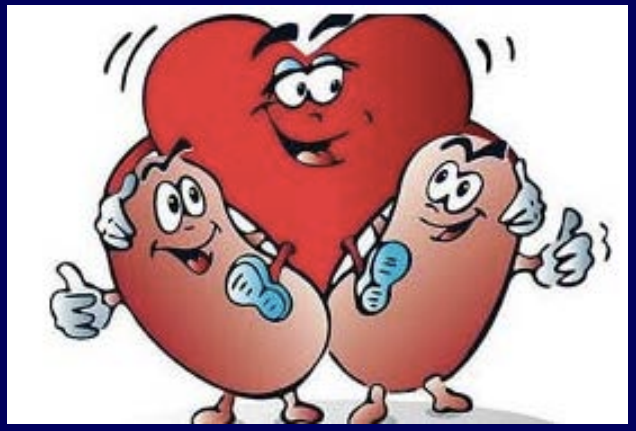
November 30, 2013

No disclosures

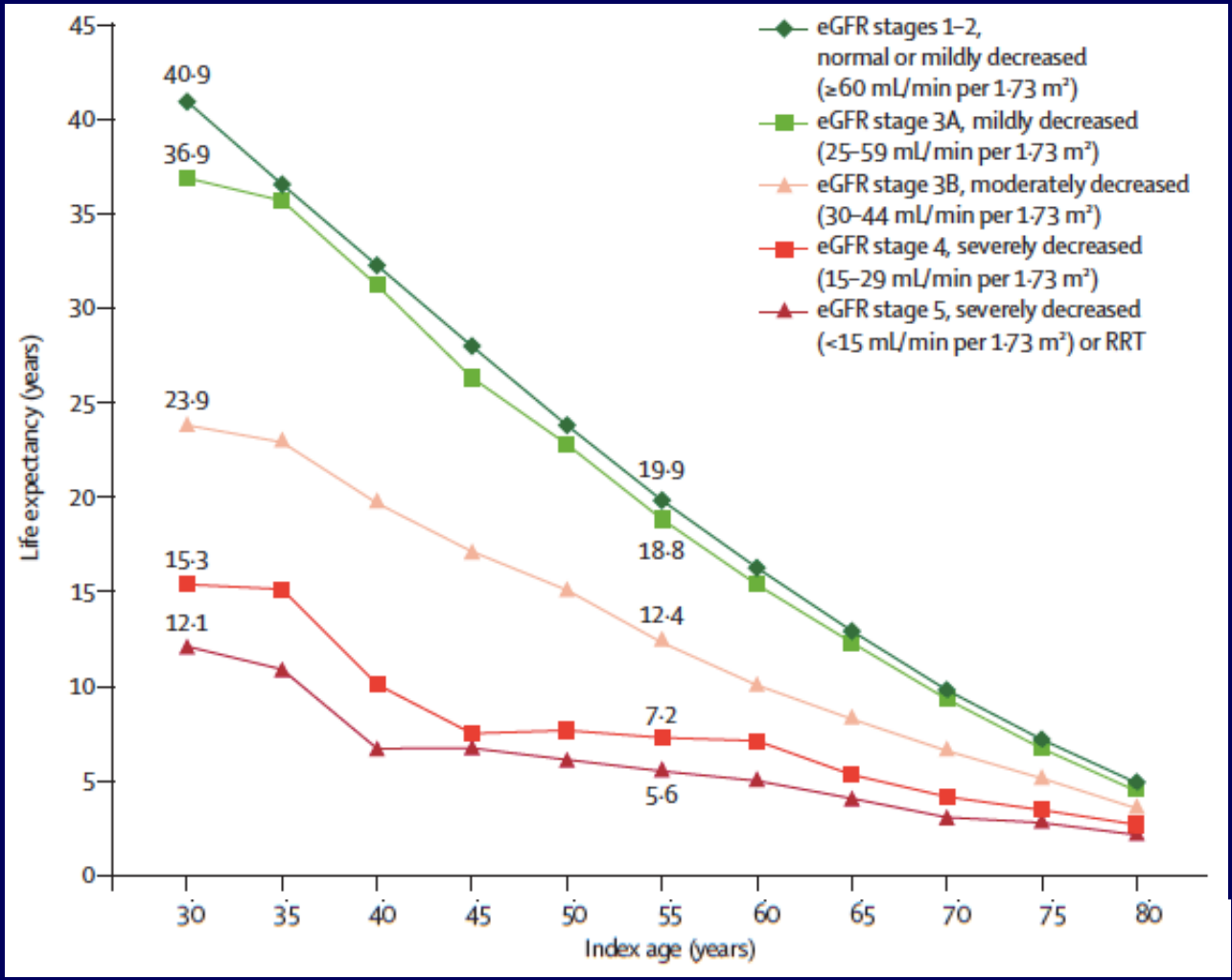
After attending this session, the participant will be able to:

- Understand the link between cardiovascular disease and renal disease
- Understand how to treat patients with CVD/CHF and CKD

The link between CVD and CKD

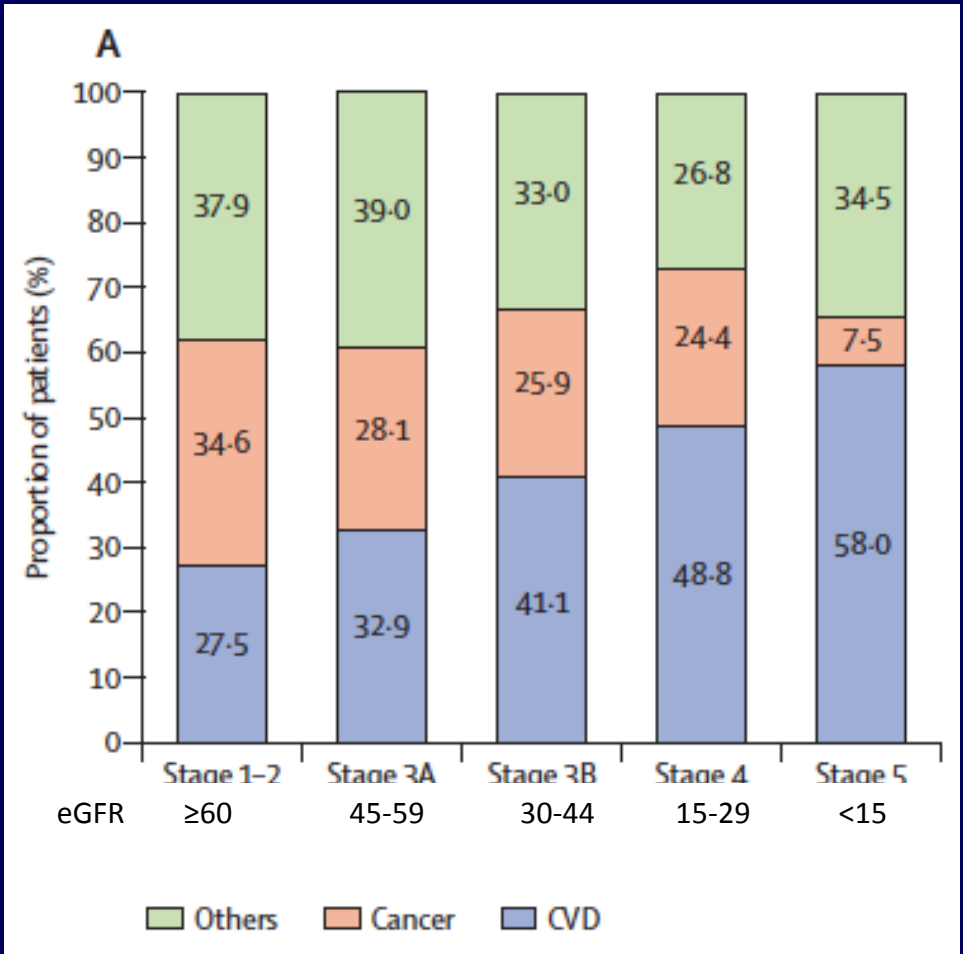


CKD Reduces Life Expectancy



Gansevoort et al, Lancet 2013;382:339-52

Proportion of death from CVD increases as kidney disease gets worse



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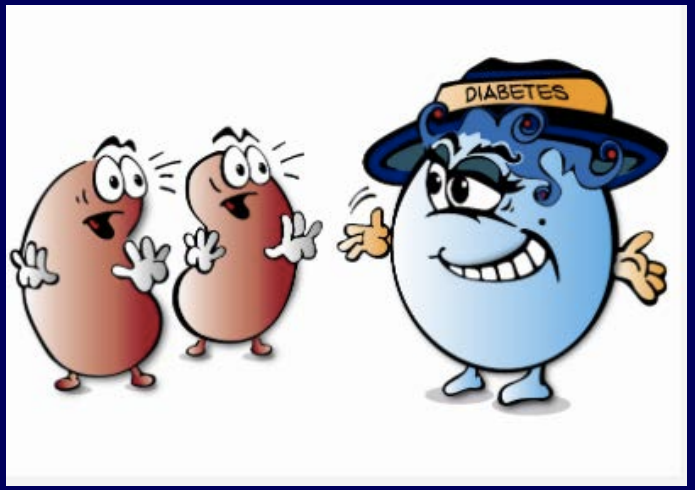
Most patients with CKD are more likely to DIE from CVD than get kidney failure

Why is CVD so common in CKD?

- High prevalence of traditional CVD risk factors in individuals with CKD
  - Diabetes
  - Hypertension



Why is CVD so common in CKD?

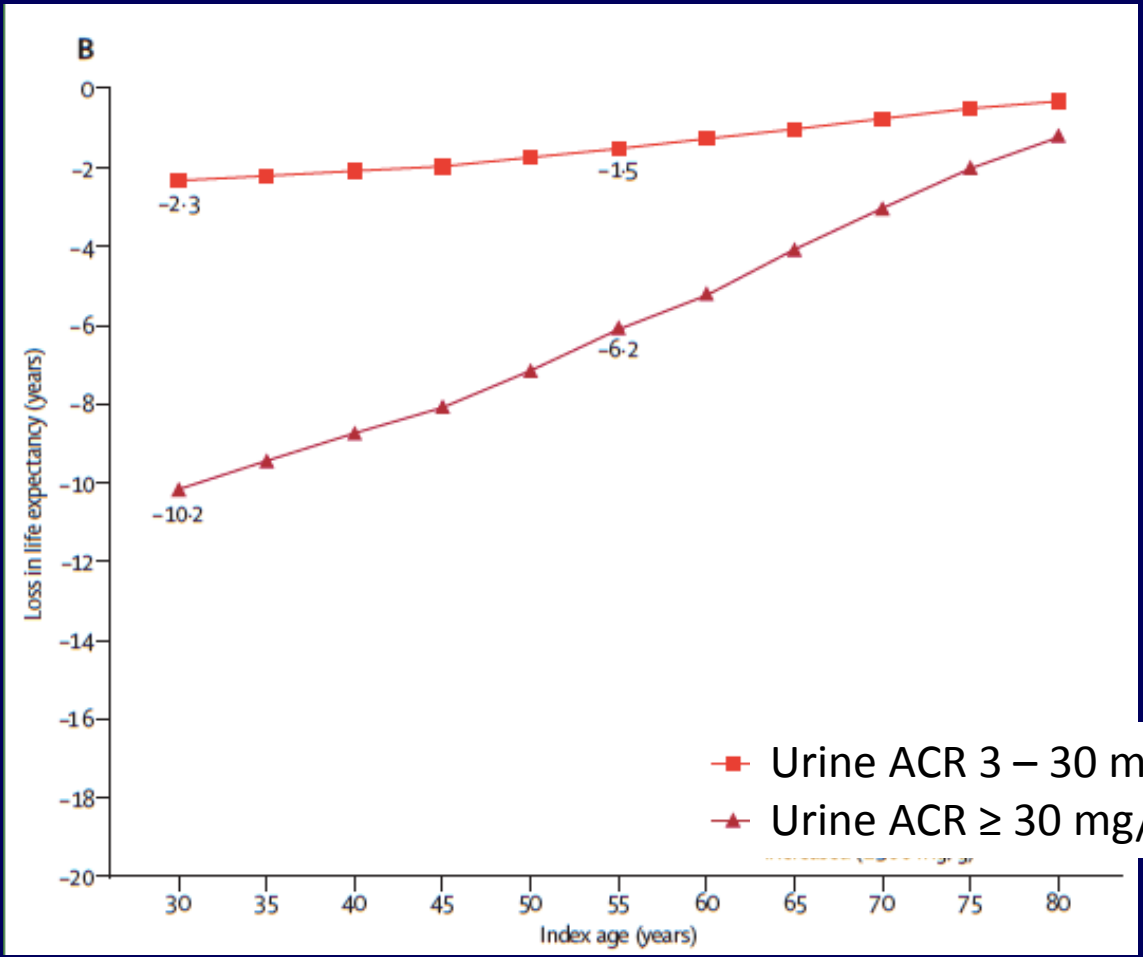
- High prevalence of traditional CVD risk factors in individuals with CKD
  - Diabetes
  - Hypertension

- But the CVD risk is elevated beyond that expected based on these risk factors

Why is CVD so common in CKD?
"Nontraditional" Risk Factors

- Other factors play a role:
  - High albuminuria

Albuminuria reduces life expectancy due to CVD deaths



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Why is CVD so common in CKD?
"Nontraditional" Risk Factors

- Other factors play a role:
  - High albuminuria
  - Anemia
  - Vitamin D deficiency
  - Low grade inflammation
  - Increased activity of RAAS and sympathetic nervous system
  - Other pathways

Treatment of CVD in patients with CKD

An ounce of prevention… Lifestyle intervention

- Smoking cessation
- Weight management
  - Target BMI 20 – 25 kg/m^2
- Physical activity
  - At least 30 min 5 days per week

Sodium Restriction

- Sodium < 2 g/day (salt < 5 g/day)
- This is <1 tsp of salt

Pharmacological Interventions

- Blood glucose control in diabetes
- Blood pressure control
- Lipid lowering therapy

Blood Pressure Targets in CKD
KDIGO Guidelines 2012

- CKD with urine ACR <3 mg/mmol: Target ≤140 /≤90
- CKD with urine ACR ≥ 3 mg/mmol: Target ≤130/≤80
- Tailor BP treatment regimens in elderly patients by considering age, co-morbidities and pay close attention to adverse events related to BP treatment

www.kdigo.org

Blood Pressure Targets in CKD
KDIGO Guidelines 2012

- CKD with urine ACR <3 mg/mmol: Target ≤140 /≤90
- CKD with urine ACR ≥ 3 mg/mmol: Target ≤130/≤80
- CHEP Guidelines 2013 recommend <130/<80 mmHg for all diabetics (regardless of urine ACR)

www.kdigo.org
www.hypertension.ca/chep

Blood Pressure Targets in CKD

KDIGO Guidelines 2012

- CKD with … et ≤140 /≤90
- CKD with … et ≤130/≤80
- CHEP Gu… mmHg for all di… R)

Lipid Lowering Therapy
KDIGO Guidelines 2013

- Check lipid profile and rule out remediable causes of secondary hyperlipidemia
- In adults ≥ 50 years with CKD not on dialysis, treatment with statin or statin/ezetimibe is recommended
- In younger adults, statin treatment is suggested when any of the following are present:
  - CAD
  - DM
  - Ischemic stroke
  - Estimated 10 yr incidence of mi/CHD death >10%

Strategy for Lipid Lowering in CKD

- Treat according to the "fire and forget" strategy: do not measure LDL unless it would alter management

- There is no specific LDL "target" in CKD

Strategy for Lipid Lowering in CKD

- Treat acc forget" strategy: less it would alter man
- There is n in CKD

What dose of statin in CKD?

Table 4 | Recommended doses (mg/d) of statins in adults with CKD

Statin	eGFR G1-G2	eGFR G3a-G5, including patients on dialysis or with a kidney transplant
Lovastatin	GP	nd
Fluvastatin	GP	80[1]
Atorvastatin	GP	20[2]
Rosuvastatin	GP	10[3]
Simvastatin/Ezetmibe	GP	20/10[4]
Pravastatin	GP	40
Simvastatin	GP	40
Pitavastatin	GP	2

All statins may not be available in all countries. Lower doses than those used in major trials of statins in CKD populations may be appropriate in Asian countries. Note that rosuvastatin 40 mg daily is not recommended for use in CKD 1-2 non-transplant patients, as it may increase the risk of adverse renal events. Cyclosporin inhibits the metabolism of certain statins resulting in higher blood levels. Data based on [1]ALERT, [2]4D, [3]AURORA, [4]SHARP. Abbreviations: eGFR, estimated glomerular filtration rate; GP, general population; nd, not done or not studied.

Management of Patients with CHF and CKD

HF Guidelines Published Oct 2013

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PRACTICE GUIDELINE

2013 ACCF/AHA Guideline for the Management of Heart Failure: Executive Summary

A Report of the American College of Cardiology Foundation/
American Heart Association Task Force on Practice Guidelines

Developed in Collaboration With the American College of Chest Physicians, Heart Rhythm Society, and International Society for Heart and Lung Transplantation

Endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation

About 40% of US Medicare Beneficiaries with CHF also have CKD

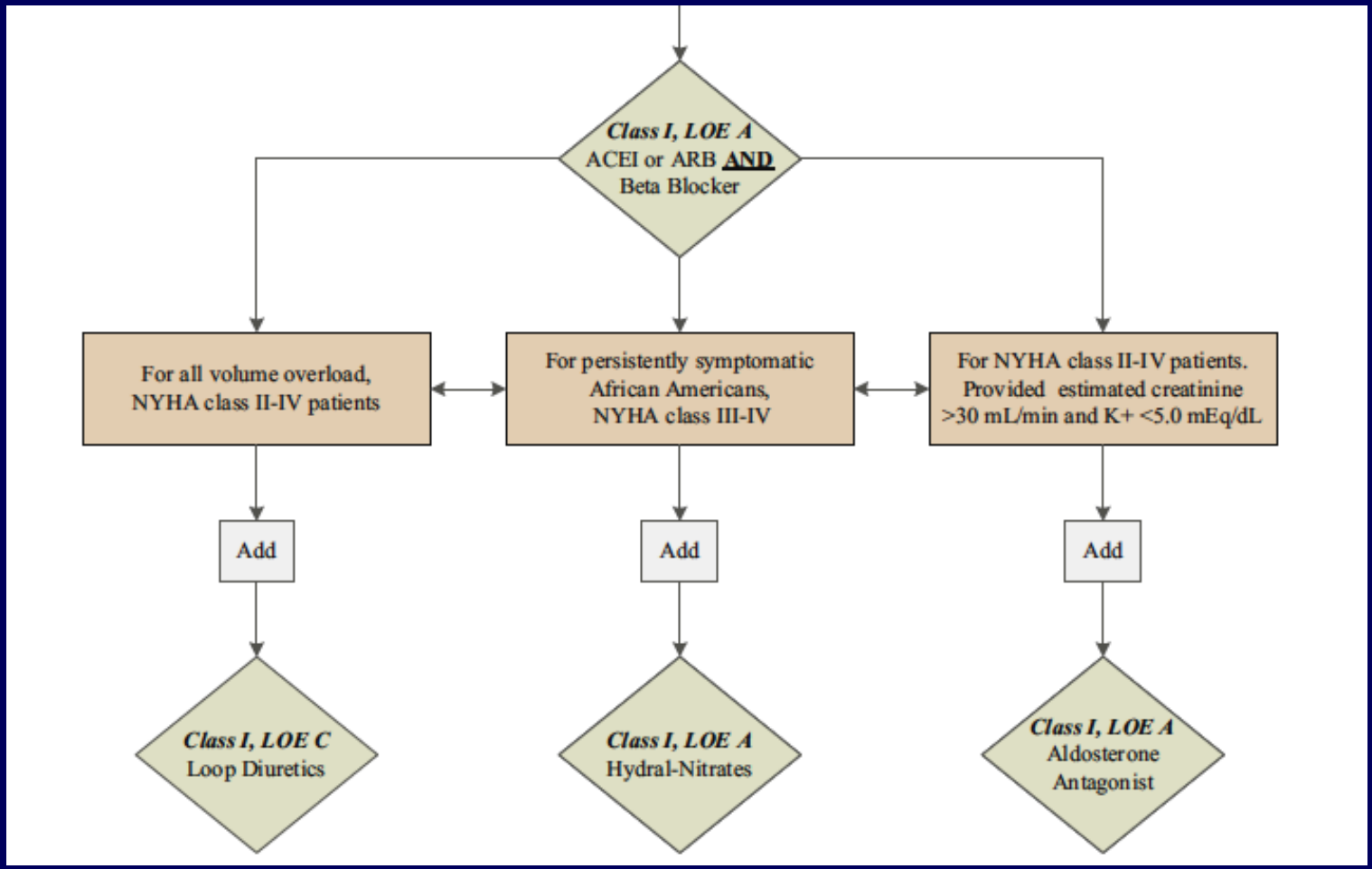
Table 24. Ten Most Common Co-Occurring Chronic Conditions Among Medicare Beneficiaries With Heart Failure (N=4,947,918), 2011

Beneficiaries Age ≥65 y (N=4,376,150)*			Beneficiaries Age <65 y (N=5,71,768)†		
	N	%		N	%
Hypertension	3,685,373	84.2	Hypertension	461,235	80.7
Ischemic heart disease	3,145,718	71.9	Ischemic heart disease	365,889	64.0
Hyperlipidemia	2,623,601	60.0	Diabetes	338,687	59.2
Anemia	2,200,674	50.3	Hyperlipidemia	325,498	56.9
Diabetes	2,027,875	46.3	Anemia	284,102	49.7
Arthritis	1,901,447	43.5	Chronic kidney disease	257,015	45.0
Chronic kidney disease	1,851,812	42.3	Depression	207,082	36.2
COPD	1,311,118	30.0	Arthritis	201,964	35.3
Atrial fibrillation	1,247,748	28.5	COPD	191,016	33.4
Alzheimer's disease/dementia	1,207,704	27.6	Asthma	888,16	15.5

Mr. GW

- Frail 76 year old man
- PMH: HTN, CAD with LVEF 35%, atrial fibrillation, AAA repair, PVD surgery both legs
- Meds: ramipril 10, spironolactone 25, metoprolol 25 bid, furosemide 40, atorvastatin 40, warfarin
- Baseline creatinine is 150 - 175 (eGFR ~35), ACR < 3

Heart Failure with Reduced EF
Stage C (Current, Prior Symptoms)



Patients with CKD benefit from standard CHF therapies

- They are at higher risk of adverse effects (e.g. hyperkalemia, acute kidney injury)
  - Need close monitoring - more frequent office visits and bloodwork
  - Check potassium and creatinine before starting, after about 1 week of treatment, AND after titrating ACEi, ARB, loop diuretics, spironolactone
  - Then send for periodic monitoring

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Over the initial 2 years of follow-up

- Cardiac status stable
- Creatinine slowly creeping up to 200 range (eGFR ~27)
- Intermittent hyperkalemia: 5.3 - 6.1 mmol/L

Hyperkalemia should be anticipated…

- Frail 76 year old man
- PMH: HTN, ex-smoker, CAD with LVEF 35%, atrial fibrillation with pacemaker, AAA repair, PVD surgery both legs, BPH
- Meds: ramipril 10, spironolactone 25, metoprolol 25 bid, furosemide 40, atorvastatin 40, tamsulosin 0.4, warfarin
- Baseline creatinine is 150 - 175 (eGFR ~35)

When to stop an ACE inhibitor or ARB

- Creatinine rises >30% (or eGFR falls >25%) within first few weeks of initiation
- During episodes of acute kidney injury
  - May be able to restart when patient stabilizes
- K >5.5 mmol/L
  - May be able to restart if other contributors identified: diet, medications (e.g. NSAIDS, Septra)

Aldosterone Antagonists (e.g. spironolactone)

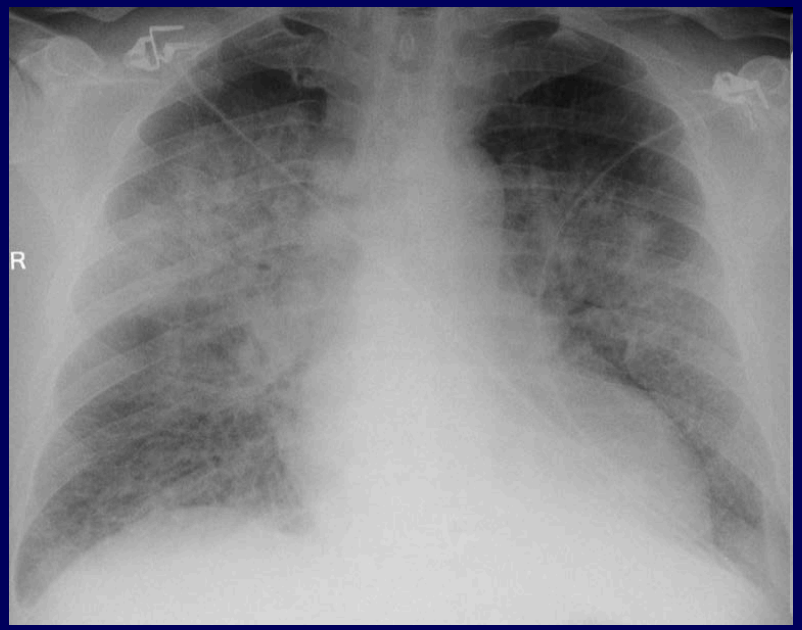
- Increased risk of hyperkalemia in CKD
  - Starting dose 12.5 mg daily
  - Do not start if K ≥ 5.0 mmol/L
  - Contraindicated if eGFR < 30
    (or if Cr >220 in men, > 180 in women)

- Follow potassium levels closely

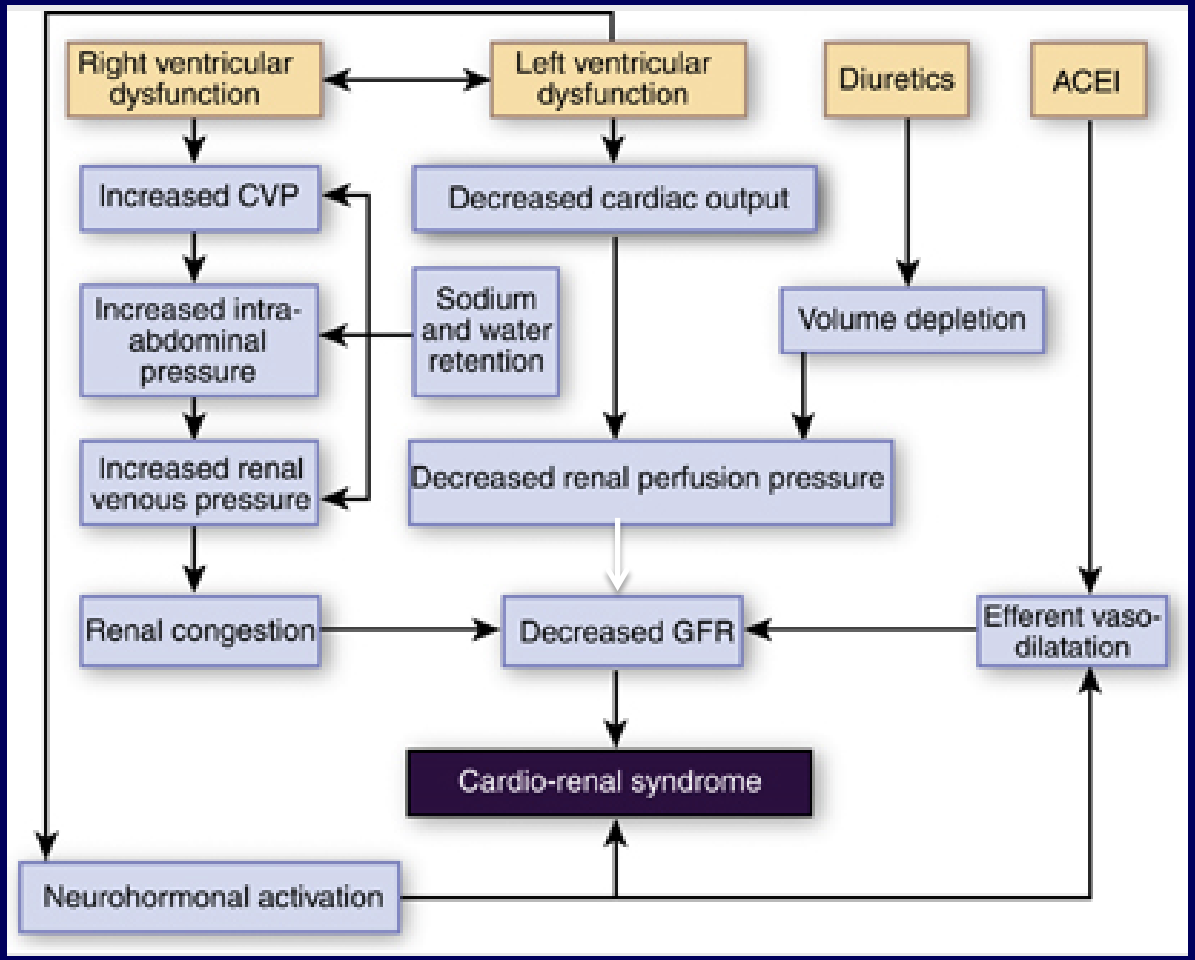
Mr. GW: Acute Decompensated Heart Failure (ADHF)

- Increasing SOB, orthopnea and edema over a 2 week period
- ER: No acute coronary syndrome, he is in congestive heart failure
- Labs: Creatinine 270

  Potassium 5.6



Pathophysiology of AKI in the setting of ADHF



Gnanaraj et al, Kidney International (2013) **83,** 384–391

Cardiorenal Syndromes

CRS type	Name	Description
1	Acute cardiorenal	Acute cardiac dysfunction leading to acute kidney injury
2	Chronic cardiorenal	Chronic heart failure leading to renal dysfunction
3	Acute renocardiac	Acute kidney injury leading to acute cardiac dysfunction
4	Chronic renocardiac	Chronic renal failure leading to cardiac dysfunction
5	Secondary	Systemic condition causing cardiac and renal dysfunction

Patients with ADHF are at high risk of worsening kidney function

- Anticipation and prevention
  - Avoid hypotension (MAP < 60 mmHg)
  - Avoid nephrotoxins: contrast, NSAIDS
  - Avoid increasing intraabdominal pressure
    - Urinary retention, constipation

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Dosing Diuretics in ADHF

- Dose twice daily to prevent rebound sodium retention
- Give by IV route: splanchnic congestion reduces oral absorption
- Start the initial dose at least ≥ home oral dose (given via IV route)
- Escalate the dose until adequate symptom relief or renal hypoperfusion occurs (rising creatinine)
- Diuretic resistance: consider adding a thiazide like diuretic (e.g. metolazone 2.5 – 5 mg daily to start) and specialist referral

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What should I do with ACEi and ARBs in ADHF?

- Decongestion with diuresis is the priority in ADHF
- With aggressive diuresis, ACEi and ARB can contribute to worsening renal function
- Withhold ACEi, ARB temporarily in high risk patients with ADHF:
  - Pre-existing CKD or currently has AKI
  - Elderly

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Mr. GW: Acute management

- Cardiac, renal diet (Na and K restricted)
- If hyponatremic, restrict fluid < 1.5 L/day
- Furosemide 60 mg IV twice daily
- Stop ramipril
  - Replace with nitro patch 0.4 mg/hr and hydralazine 12.5 mg tid
- Stop spironolactone
- Follow weights, electrolytes, creatinine daily

Referral to Nephrology, Cardiology

- Consider specialist consultation for co-management of patients with CKD and CHF

- Multidisciplinary care team to assist with
  - Medical management
  - Renal replacement therapy planning if appropriate
  - End of life planning

Take Home Points

- Most patients with CKD are more likely to die from CVD than get kidney failure
- Treat CKD like a cardiovascular risk factor
  - Be aware of “new” blood pressure and lipid treatment recommendations
- Patients with CKD and HF are at increased risk of side effects from HF therapy (AKI, hyperkalemia)
  - More frequent monitoring is essential

Nadia.Zalunardo@vch.ca