Management of CKD Stage 3 & 4

Andrea Kattah, MD
Objectives

• Identify causes of chronic kidney disease and strategies to prevent progression of chronic kidney disease

• Discuss management issues
  • Hypertension
  • Metabolic acidosis
  • Anemia
  • Bone mineral metabolism
What is Chronic Kidney Disease?

- Not a specific ‘disease’, final common pathway with many different causes
- Presence of kidney damage (e.g., albuminuria) or eGFR ≤ 60 mL/min/1.73m² for ≥ 3 months.
- Affects more than 26 million people in the U.S.
- Most people are asymptomatic until their kidney disease is advanced.
- Almost 0.5 million need dialysis or kidney transplant

CKD is a risk factor for CVD

- Patients with CKD at high risk for cardiovascular events
- Similar relationship seen with death from any cause and hospitalization rates

Go et al. NEJM 2004;351(13):1296-305
Who should be screened for CKD?

Clinical Factors
- DM, HTN
- Cardiovascular diseases
- Autoimmune disease
- Systemic infections
- UTIs, stones, obstruction
- Malignancy
- Family hx of CKD
- Low birth weight
- Hx of acute kidney injury
- Hx of multiple preeclamptic pregnancies
- Reduction in kidney mass
- Certain drugs, toxins

Socioeconomic Factors
- US Ethnic minorities:
  - African-American, Native American, Hispanic, Asian, Pacific Islander
- Low income
- Low educational level
How should high risk patients be screened?

• Measure blood pressure
• Check serum creatinine & estimate GFR
• Urinalysis (with microscopy)
• Urine albumin:creatinine ratio
• Consider:
  • Renal ultrasound
  • Serum electrolytes
Cystatin C

- Low molecular weight protein
- Filtered at glomerulus and reabsorbed
- Produced by all nucleated cells at a constant rate
  - Useful: low lean body mass, amputations, drugs that impair Cr secretion
  - Limitations: higher in men, older individuals, in setting of inflammation
- Combined equation using both cystatin C and creatinine is most accurate in determining GFR

Inker et al, NEJM 2012
GFR CALCULATOR

Glomerular filtration rate (GFR) is the best overall index of kidney function. Normal GFR varies according to age, sex, and body size, and declines with age. The National Kidney Foundation recommends using the CKD-EPI Creatinine Equation (2009) to estimate GFR.

Serum Creatinine: mg/dL µmol/L
Serum Cystatin C: mg/L
Age: Years
Gender: Male Female
Race: Black Other
Standardized Assays: Yes No Not Sure
Remove body surface adjustment: Yes No Not Sure

Calculate

Results

CKD-EPI creatinine equation (2009) mL/min
CKD-EPI creatinine-cystatin equation (2012) mL/min
CKD-EPI cystatin C equation (2012) mL/min
MDRD study equation mL/min

https://www.kidney.org/professionals/kdoqi/gfr_calculator
Measuring urine protein

- Spot albumin/Cr ratio
- Quantitative urinalysis with microscopy
- Spot protein/Cr ratio
- 24-hour urine protein +/- electrophoresis
- 24-hour urine albumin excretion
- Dipstick urinalysis
<table>
<thead>
<tr>
<th>GFR categories (ml/min/1.73 m²)</th>
<th>Description and range</th>
<th>Persistent albuminuria categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Normal or high</td>
<td>≥90</td>
</tr>
<tr>
<td>G2</td>
<td>Mildly decreased</td>
<td>60-89</td>
</tr>
<tr>
<td>G3a</td>
<td>Mildly to moderately decreased</td>
<td>45-59</td>
</tr>
<tr>
<td>G3b</td>
<td>Moderately to severely decreased</td>
<td>30-44</td>
</tr>
<tr>
<td>G4</td>
<td>Severely decreased</td>
<td>15-29</td>
</tr>
<tr>
<td>G5</td>
<td>Kidney failure</td>
<td>&lt;15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A1</th>
<th>A2</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal to mildly increased</td>
<td>Moderately increased</td>
<td>Severely increased</td>
</tr>
<tr>
<td>&lt;30 mg/g</td>
<td>30-300 mg/g</td>
<td>&gt;300 mg/g</td>
</tr>
</tbody>
</table>
Causes of CKD

- 44% Diabetes
- 29% High Blood Pressure
- 18.4% Other
- 7% Glomerular Disease
- 1.6% Polycystic Kidney Disease
## Management goals at each CKD stage

<table>
<thead>
<tr>
<th>Stage</th>
<th>GFR (ml/min/1.73m²)</th>
<th>Management goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>≥90</td>
<td>Diagnosis, treat slow progression, reduce CV risk</td>
</tr>
<tr>
<td>2</td>
<td>60 - 89</td>
<td>Slow progression, reduce CV risk</td>
</tr>
<tr>
<td>3</td>
<td>30 - 59</td>
<td>Manage complications</td>
</tr>
<tr>
<td>4</td>
<td>15 - 29</td>
<td>Prepare for renal replacement therapy (RRT)</td>
</tr>
<tr>
<td>5</td>
<td>&lt; 15</td>
<td>RRT</td>
</tr>
</tbody>
</table>

GFR = Glomerular Filtration Rate; CV = Cardiovascular
General management of Chronic Kidney Disease

- Treat Reversible Causes
- Plan for Renal Replacement
- Slow Progression
- Adjust drug doses for GFR
- Prevent Acute Renal Failure
- Treat Complication

CKD management
Interventions for Chronic Kidney Disease Progression

- **Well studied**
  - Blood pressure control
  - Reduce proteinuria and modulation of the Renin-Angiotension-Aldosterone system
  - Avoid AKI
  - Smoking cessation
  - Glycemic control
  - Protein restriction

- **Promising preliminary studies**
  - Oral Alkali for Metabolic Acidosis
  - Treatment of hyperuricemia with Allopurinol
Hypertension ↔ CKD

- MDRD study

Fig 1. Prevalence of hypertension by level of GFR. Patients were ranked by GFR into 10 groups, each containing 179 to 180 patients. Data are presented as mean values ± SE.

Fig 2. Prevalence of hypertension by BMI. Patients were ranked into 10 groups by age- and gender-adjusted BMI percentiles based on the National Health Survey (series 11, no. 238). Data are presented as mean values ± SE.

Buckalew et al, AJKD 1996
Management of Hypertension in Patients With CKD

- Colors correspond to Class of Recommendation in Table 1.
- *CKD stage 3 or higher or stage 1 or 2 with albuminuria ≥300 mg/d or ≥300 mg/g creatinine.
- ACE indicates angiotensin-converting enzyme; ARB, angiotensin receptor blocker; BP blood pressure; and CKD, chronic kidney disease.

ACC/AHA 2017 Guidelines
Reduce proteinuria

• Even in patients with preserved GFR (> 60 ml/min)
  • Heavy proteinuria associated with 40 fold risk in renal replacement therapy
    
    JAMA 303: 1151-1158, 2010

• Albumin/creatinine ratio > 30mg/g associated with higher mortality and adverse renal outcomes

    Lancet 375: 2073-2081: 2010
## Complications of CKD based on GFR

<table>
<thead>
<tr>
<th>Complication</th>
<th>GFR range (ml/min/1.73m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt;90</td>
</tr>
<tr>
<td>Anemia</td>
<td>4%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>18.3%</td>
</tr>
<tr>
<td>25 (OH) vitamin D deficiency</td>
<td>14.1%</td>
</tr>
<tr>
<td>Acidosis</td>
<td>11.2%</td>
</tr>
<tr>
<td>Hyperphosphatemia</td>
<td>7.2%</td>
</tr>
<tr>
<td>Hypoalbuminemia</td>
<td>1%</td>
</tr>
<tr>
<td>Hyperparathyroidism</td>
<td>5.5%</td>
</tr>
</tbody>
</table>

Oral Bicarbonate may slow progression to ESRD

de Brito-Ashurst I et al. JASN 2009;20:2075-2084
Metabolic Acidosis

• Reasons to treat acidosis:
  • Bicarbonate may slow progression of CKD
  • Acidosis could lead to worsening bone disease
  • Acidosis can increase skeletal muscle breakdown and decrease lean body mass

• Target serum bicarbonate above 23meq/L

• Sodium bicarbonate or sodium citrate can be used as supplementation
Anemia management

• Anemia assessment
  • CBC and differential
  • RBC indices
  • Reticulocyte count
  • Serum ferritin to assess iron stores
  • Percent saturation (TSAT) to assess adequacy of iron for erythropoiesis

• Target hemoglobin 10-12 mg/dl

• Black Box warnings on erythropoietin stimulating agents (ESAs)
Anemia management

Iron deficiency – TSAT < 20 percent or Ferritin < 100ng/mL
IV iron is preferred over oral iron in CKD
Mrs. White is a 75 year old male with CKD stage 4. Her calcium is 10.2mg/dl, phosphorus 7.0, PTH 200, and 25 OH vitamin D is 40. What is best next step for managing her hyperparathyroidism?

1. Start Calcium Acetate
2. Low phosphorus diet
3. Start vitamin D supplement (inactive vitamin D)
4. Start Non-calcium binder
5. Start Calcitriol (active vitamin D)
Mrs. White is a 75 year old male with CKD stage 4. Her calcium is 10.2mg/dl, phosphorus 7.0, PTH 200, and 25 OH vitamin D is 40. What is best next step for managing her hyperparathyroidism?

1. Start Calcium Acetate
2. Low phosphorus diet
3. Start vitamin D supplement (inactive vitamin D)
4. Start Non-calcium binder
5. Start Calcitriol (active vitamin D)
Monitor PTH Levels
Evaluate Vit. D Status and treat as necessary
Treat acidosis

Consider:
Dietary Pi restriction
Calcium supplements/PiBinders

CKD 3

Goal:
Intact PTH 35-75 pg/ml
Calcium - normal (8.4 - 10.2 mg/dl)
Phosphorus - normal (2.7 - 4.6 mg/dl)

Consider:
Active Vitamin D sterols
calcitriol
doxercalciferol
paricalcitol

CKD 4

Goal:
Intact PTH 70-110 pg/ml
Calcium - normal (8.4 - 10.2 mg/dl)
Phosphorus - normal (2.7 - 4.6 mg/dl)

Consider:
Calcimimetic
Dialysate calcium
Dialysis Regimen
Limit calcium intake
Parathyroidectomy

CKD 5

Goal:
Intact PTH 150-300 pg/ml
Calcium - normal (prefer 8.4 - 9.5 mg/dl)
Phosphorus - 3.5 - 5.5 mg/dl

Martin et al, JASN, 2007
Bone & Mineral Disorders

- 2° hyperparathyroidism leads to ↑ bone turnover
  - ↑ risk of fracture
- ↑ Ca x Phos product is associated with:
  - Coronary artery calcification
  - Calciphylaxis
When Should Patients with CKD Be Referred to a Nephrologist?

- Unclear etiology
- Rapid decline in kidney function
- Stage 3b-4 CKD
- Stage 1 and 2 CKD
  - Active urinary sediment
  - Proteinuria
  - Difficult to control hypertension
Renal replacement therapy

• Start discussion early to plan appropriately

• Kidney Transplant

• Home dialysis
  • Peritoneal dialysis
  • Home hemodialysis

• In-center Dialysis

• Conservative Therapy
Symptoms of Uremia

• Anorexia
• Nausea and Vomiting
• Pericarditis
• Peripheral Neuropathy
• CNS Symptoms
  • Coma
  • Seizure
  • Delirium
Patient Survival on Dialysis is Better with Early Nephrology Referral

Summary

• CKD is not a specific disease, but does have a common set of complications

• Work-up should include GFR assessment, urine studies and imaging

• Treatment of hypertension and metabolic acidosis may slow progression of CKD

• Monitor iron studies, calcium and phosphorous in more advanced CKD (3b-4)

• Referral to nephrology for work-up of unclear etiology and for renal replacement therapy plan
• Thank you!
Managing Patients with Atrial Fibrillation

William Katsiyiannis, MD, FACC, FHRS
Cardiac Electrophysiology
President and Chairman, Cardiology
Minneapolis Heart Institute
Abbott-Northwestern Hospital
Projected Number of Adults With AF in the US

![Graph showing the projected number of adults with AF in the US from 1995 to 2060. The number of adults with AF is expected to increase significantly over time.]

Atrial Fibrillation
Management Principles

- Atrial Fibrillation is a Spectrum of disease
- Control Symptoms
- Reduce the risk of Stroke
AF: TREATMENT OPTIONS

Rate control
Pharmacologic
- Ca^{2+} blockers
- β-blockers
- Digitalis
- Amiodarone
Nonpharmacologic
- Ablate and pace

Prevent remodeling
ACE-I
ARB

Maintenance of SR
Pharmacologic
- Class IA
- Class IC
- Class III
- β-blocker
Nonpharmacologic
- Catheter ablation
- Surgery (MAZE)

Stroke prevention
Pharmacologic
- Warfarin
- Thrombin inhibitor
- Aspirin
Nonpharmacologic
- Isolation
- LA appendage

Adapted from Prystowsky, Am J Cardiol. 2000;85:3D-11D.
Don’t Lose Your Head!
Cardiology Curbside

Ever wish you could consult with a cardiologist immediately about your patient? Now you can. 612-863-8800
Atrial Fibrillation is a Spectrum of disease

- Control Symptoms
- Reduce the risk of Stroke
Atrial Fibrillation - Spectrum of Disease

Paroxysmal

Persistent

Permanent

Trigger/initiation

Substrate/maintenance

AF duration

Progressive Remodeling in AF

Marrouche NF Heart Rhythm, October 2010
Progressive Remodeling in AF

Teh AW et al. Heart Rhythm, Vol 9, No 4, April 2012
Atrial Fibrillation - Spectrum of Disease

Atrial Fibrillation is NOT one condition

- Control Symptoms
- Reduce the risk of Stroke
Major Cause of Stroke

- 15% of all strokes attributable to atrial fibrillation
- Stroke risk persists even in asymptomatic atrial fibrillation
- Stroke risk persists even in patients treated for atrial fibrillation

## CHA₂DS₂-VASc Risk Score

<table>
<thead>
<tr>
<th>Risk</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHF or LVEF ( \leq 40% )</td>
<td>1</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>Age ( \geq 75 )</td>
<td>2</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
</tr>
<tr>
<td>Stroke/TIA/Thromboembolism</td>
<td>2</td>
</tr>
<tr>
<td>Vascular Disease</td>
<td>1</td>
</tr>
<tr>
<td>Age 65 - 74</td>
<td>1</td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
</tr>
</tbody>
</table>
Stroke prevention

Pharmacologic
- Aspirin
- Warfarin
- Thrombin/Xa inhibitor

Nonpharmacologic
- Isolation
- LA appendage
“To prevent a heart attack, take one aspirin every day. Take it out for a run, then take it to the gym, then take it for a bike ride...”
Aspirin Compared with Control

<table>
<thead>
<tr>
<th>Study</th>
<th>No. of Events</th>
<th>Patient-years</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFASAK</td>
<td>35</td>
<td>807</td>
</tr>
<tr>
<td>SPAF</td>
<td>65</td>
<td>1457</td>
</tr>
<tr>
<td>EAFT</td>
<td>130</td>
<td>838</td>
</tr>
<tr>
<td>Combined*</td>
<td>230</td>
<td>3102</td>
</tr>
</tbody>
</table>

Risk Reduction (%)

*Total risk reduction is negligible
Stroke prevention

Pharmacologic
• Aspirin
• **Warfarin**
• Thrombin/Xa inhibitor

Nonpharmacologic
• Isolation
• LA appendage
Efficacy of Warfarin Compared with Control in Five Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>No. of Events</th>
<th>Patient-years</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFASAK</td>
<td>27</td>
<td>811</td>
</tr>
<tr>
<td>BAATAF</td>
<td>15</td>
<td>922</td>
</tr>
<tr>
<td>CAFA</td>
<td>14</td>
<td>478</td>
</tr>
<tr>
<td>SPAF</td>
<td>23</td>
<td>508</td>
</tr>
<tr>
<td>SPINAF</td>
<td>29</td>
<td>972</td>
</tr>
<tr>
<td>Combined*</td>
<td>108</td>
<td>3691</td>
</tr>
</tbody>
</table>

*Total risk reduction for all 5 studies combined is 68%
Anticoagulation Rates vs. Stroke Rates

The graph shows the trend of stroke rates per 1000 patient-years and the percentage of AF patients on warfarin from 1992 to 2002. The stroke rates decreased from 1992 to 2000, with a slight increase in the last years. The percentage of AF patients on warfarin showed a steady increase from 1992 to 2002, reaching around 60% in 2002.

The bars represent ischemic strokes and hemorrhagic strokes, with lower bars indicating fewer cases and higher bars indicating more cases. The line graph shows the trend of warfarin use, increasing over the years.
Stroke prevention

Pharmacologic
- Aspirin
- Warfarin
- Thrombin/Xa inhibitor

Nonpharmacologic
- Isolation
- LA appendage
The Coagulation Cascade
Dabigatran (Pradaxa)

- Direct Thrombin Inhibitor
- Fixed Dosing – 150 mg bid
- No monitoring
- Fast onset/off
  – c/w Coumadin
- RE-LY – AF
Rivaroxaban (Xarelto)

- Direct Factor Xa Inhibitor
- Fixed Dosing – 10 mg qd
- No monitoring
- Fast onset/off
  - c/w Coumadin
- ROCKET – AF
Apixaban (Eliquis)

- Direct Factor Xa Inhibitor
- Fixed Dosing – 5 mg bid
- No monitoring
- Fast onset/off
  – c/w Coumadin
- ARISTOTLE
Stroke prevention

Pharmacologic
• Aspirin
• Warfarin
• Thrombin/Xa inhibitor

Nonpharmacologic
• Isolation
• LA appendage
My Doctor said "Only 1 glass of alcohol a day". I can live with that.
WATCHMAN LAA Closure Device
WATCHMAN LAA Closure Device
WATCHMAN LAA Closure Device
WATCHMAN LAA Closure Device
Atrial Fibrillation
Management Principles

- Atrial Fibrillation is NOT one condition
- Control Symptoms
- Reduce the risk of Stroke
Atrial Fibrillation
Management Goals

• Control Symptoms
  – Rate Control
  – Rhythm Control
### Atrial Fibrillation

#### Rhythm vs Rate control

<table>
<thead>
<tr>
<th>Study</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIAF</td>
<td>No improvement in symptoms or QOL</td>
</tr>
<tr>
<td>RACE</td>
<td>No improvement in mortality</td>
</tr>
<tr>
<td>AFFIRM</td>
<td>No improvement in mortality or in composite endpoint (mortality - hosp - stroke)</td>
</tr>
</tbody>
</table>

2. *NEJM* 2002  
3. *NEJM* 2002
AF: TREATMENT OPTIONS

Rate control

Pharmacologic
- Ca²⁺ blockers
- β-blockers
- Digitalis
- Amiodarone

Nonpharmacologic
- Ablate and pace

Prevent remodeling

Maintenance of SR

Pharmacologic
- Class IA
- Class IC
- Class III
- β-blocker

Nonpharmacologic
- Catheter ablation
- Surgery (MAZE)

Stroke prevention

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Adapted from Prystowsky, Am J Cardiol. 2000;85:3D-11D.
AF: TREATMENT OPTIONS

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Maintenance of SR

Pharmacologic
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- Thrombin inhibitor
- Aspirin

Nonpharmacologic
- Isolation
- LA appendage

AF: TREATMENT OPTIONS

Adapted from Prystowsky, Am J Cardiol. 2000;85:3D-11D.
Efficacy Maintaining NSR $\geq 6$ Months

![Bar chart showing percentage of NSR maintained over 6 months for different drugs.](chart.png)
“We’re going to try a new procedure... Either way, you’ll be famous.”
Atrial Fibrillation

Radiofrequency Ablation
Atrial Fibrillation
Radiofrequency Ablation
Atrial Fibrillation

Radiofrequency Ablation
3-Dimensional Imaging
Irrigated Tip Ablation Catheter
Developing Technologies

Cryoablation of PV
Atrial Fibrillation Ablation Using the Arctic Front™ Balloon
Cryo - Adhesion
Robotic Navigation
EP Fellows in Training!
Atrial Fibrillation

Ablation success rates?
"I’m stumped. We’ll have to wait for the autopsy."
Atrial Fibrillation

Radiofrequency Ablation Success Rates

• **Depends on:**
  – Type of atrial fibrillation (Parox vs Persistent)
  – Degree of atrial enlargement (substrate remodeling)
• **Duration of AF, patient age, HTN, DM, HCM**
• **Paroxysmal and Normal Atrial size**
  >80%
• **Persistent and or atrial enlargement**
  ~70%
Atrial Fibrillation
Management Principles

- Atrial Fibrillation is NOT one condition
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- Reduce the risk of Stroke
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612-863-8800
ENOUGH AFib!!!!!!
The U.S. COPD Epidemic

• 30 million U.S. adults have COPD (12% of population)

• 3% of all physician office visits

• 126,000 deaths/yr

• 4th leading cause of death
COPD Treatment: Goals

**Reduction in Mortality**

- Tobacco cessation
- Oxygen for pts with resting hypoxemia

**Reduction in Symptom Burden and Risk for Exacerbation**

- Pharmacotherapy including inhalers
- Pulmonary Rehabilitation
- Vaccination for pneumococcus and influenza
COPD and Smoking Cessation

Normal aging: $\downarrow \text{FEV}_1 \sim 20-30 \text{ mL/yr}$

Smokers susceptible to COPD: $\downarrow \text{FEV}_1 \sim 50-90 \text{ mL/yr}$

Quit Smoking: $\downarrow \text{FEV}_1 \sim 20-30 \text{ mL/yr}$

You (age 55)

$\downarrow \text{FEV}_1 \sim 20-30 \text{ mL/yr}$
Lung Cancer Screening With Low-Dose CT

Eligibility

1. Age 55-80
2. ≥ 30 pack-year smoking hx
3. Current smoker or quit in last 15 years
4. Life expectancy not limited by other end-stage disease

Inhaler Delivery Devices and Drugs

Pressurized Metered Dose Inhaler (MDI)

Soft Mist Inhaler

Dry Powder Inhaler

β₂ Agonist
Relax airway smooth muscle
Increase ciliary beat frequency

Muscarinic Antagonist
Prevent parasympathetic bronchoconstriction
Inhibit goblet cell mucous secretion

Inhaled Corticosteroid
Decrease airway inflammation
A 62 year-old man who recently quit smoking is seen in primary care clinic for insidious dyspnea on exertion and wheezing. Spirometry shows airflow obstruction (FEV₁/FVC 0.59) with an FEV₁ of 55% predicted and incomplete reversal after albuterol. He has SOB only when walking uphill. He was treated as an outpatient with 5 days of prednisone and azithromycin earlier this year, no other exacerbations. What is the best choice of inhalers for this patient?

A) Albuterol/ipratropium (SABA/SAMA) p.r.n.
B) Fluticasone/salmeterol twice daily (ICS/LABA) and albuterol p.r.n.
C) Salmeterol twice daily (LABA) and albuterol p.r.n.
D) Tiotropium daily (LAMA) and albuterol p.r.n.
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D) Tiotropium daily (LAMA) and albuterol p.r.n.
A Simplified Approach To COPD Inhalers

FEV1 > 60% pred
Low symptom burden
0 or 1 exacerbation

• Albuterol + ipratropium

FEV1 < 60%
MDI use > twice/week

• LAMA monotherapy

High symptom burden
>1 exacerbation
Blood eos < 100 cells/uL

• LAMA + LABA combo

Elevated blood eos
Asthma phenotype

• Triple therapy (LAMA + LABA + ICS)

Referral to Pulmonary

“Considerations such as formulary, cost, inhaler device attributes, and patient preference should influence decisions about which inhaler to prescribe”

Riley CM, Sciurba FC. JAMA 2019; 321:786
Inhaler Adherence

• Big problem
  • Correct dose
  • Correct interval
  • Proper technique

• 6% of COPD patients given a Diskus inhaler and teaching were adherent (proper technique + >80% of doses) after hospital discharge

Minimize the dosing burden = improved adherence?

Umeclidinium (LAMA)
Vilanterol (LABA)
Fluticasone (ICS)
A 55 year-old man is seen in primary care clinic for hospital follow-up after a severe COPD exacerbation, his third this year. He is adherent to “triple therapy” and has quit smoking. He does not have a chronic cough. Baseline spirometry before this exacerbation shows airflow obstruction (FEV$_1$/FVC 0.61) with an FEV$_1$ of 35% predicted. His absolute blood eosinophil count is 350 cells/μL now, after finishing prednisone 1 week ago. A pulmonologist is consulted. What is a reasonable next step to decrease his exacerbation burden?

A) Roflumilast PO daily  
B) Azithromycin 250 mg PO daily  
C) Subcutaneous anti-IL-5 therapy every month (mepolizumab)  
D) Prednisone 10 mg PO daily  
E) Endobronchial valve placement
A 55 year-old man is seen in primary care clinic for hospital follow-up after a severe COPD exacerbation, his third this year. He is adherent to “triple therapy” and has quit smoking. He does not have a chronic cough. Baseline spirometry before this exacerbation shows airflow obstruction (FEV$_1$/FVC 0.61) with an FEV$_1$ of 35% predicted. His absolute blood eosinophil count is 350 cells/uL now, after finishing prednisone 1 week ago. A pulmonologist is consulted. What is a reasonable next step to decrease his exacerbation burden?

A) Roflumilast PO daily
B) Azithromycin 250 mg PO daily
C) Subcutaneous anti-IL-5 therapy every month (mepolizumab)
D) Prednisone 10 mg PO daily
E) Endobronchial valve placement
COPD Co-Morbidities: Heart Failure

- Spirometry under-utilized
- Guideline-based BB and bronchodilator therapies

Canepa M, et al. *JACC Heart Failure* 2019; e-pub ahead of print
Summary

- Timless: smoking cessation!

- Integrate symptom burden, exacerbation frequency, and spirometry to choose intensity of inhaler therapy

- Barriers to adherence (and therefore effectiveness)

- COPD is a heterogeneous syndrome with important co-morbidities
Questions?

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