TOP 10 TAKEAWAYS...

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Department of cardiovascular disease
No Disclosures
No off-label discussions
73% of survey respondents identified a need for improved knowledge of CV pathophysiology

#10 CARDIAC CIRCULATION, KNOW IT AND LOVE IT
Roll over tracing to select a phase of the cardiac cycle.
The heart sounds

• **S1**
  Mitral (and tricuspid) valve closure
  Soft if poor EF, loud if good EF

• **S2**
  Aortic and pulmonary valve closure
  Loud if ↑ aortic (pulm) pressure

• **S3** – means “restrictive” filling

• **S4** – means “abnormal” filling
Listening Posts for Auscultation

- **AV** – 2\(^{nd}\) RICS
- **PV** – 2\(^{nd}\) LICS
- **MV** – 5-6\(^{th}\) LICS @ the apex
- **TV** – 5-6\(^{th}\) LICS parasternal
83% of survey respondents identified themselves as early career in clinic/hospital consult practices

# 9 COMMON SYSTOLIC MURMURS YOU WILL DIAGNOSE AND MANAGE
MITRAL REGURGITATION
MR Treatment

- Treat underlying conditions
- Consider MV repair when possible at experienced center
- Consider MV replacement before ventricle dilates and/or function decreases
MITRAL VALVE PROLAPSE
Mitral Valve Prolapse Pearls

- **CHANGE** in Murmur (from click-murmur or isolated late systolic murmur to holosystolic without audible click)
- Skeletal deformities in up to 50%
- Upright posture enhances auscultation of the mid-late systolic murmur
- May develop severe MR, **refer** for additional testing as patient may be candidate for mitral valve repair
- Murmur may **INCREASE** with Valsalva
- Typically do not require SBE prophylaxis
Hypertrophic Cardiomyopathy
Hypertrophic Cardiomyopathy

- Vigorous LV apical impulse – sustained
- Systolic Murmur INCREASES with Valsalva
- S4 often present
- Dyspnea, angina, palpitation, syncope
Septal Reduction Therapy

Septal Myectomy
Summary for HCM

- Dynamic condition, load dependent
  - Dynamic auscultation
  - Provocative maneuvers
  - Valsalva-separate AS from HOCM

- Sx similar to AS
- “Triple ripple” Precordial exam
- “Bifid” Carotid

- Treat symptoms, prevent SCD
Innocent/Functional Murmur Defined by PE

Short duration, soft murmur

≤ grade 2 intensity

Right sternal border

Systolic ejection pattern

No increase in intensity with Valsalva

Normal S₂

No other abnormal sounds

No LV enlargement on exam or LVH (ECG)
Aortic Stenosis
<table>
<thead>
<tr>
<th></th>
<th>Peak velocity</th>
<th>Mean gradient</th>
<th>AVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progressive</td>
<td>&lt; 4 m/s</td>
<td>&lt; 40</td>
<td>&gt; 1.0</td>
</tr>
<tr>
<td>Severe</td>
<td>≥ 4 m/s</td>
<td>≥ 40</td>
<td>≤ 1.0</td>
</tr>
<tr>
<td>Very Severe</td>
<td>&gt; 5 m/s</td>
<td>&gt; 60</td>
<td></td>
</tr>
</tbody>
</table>
Valvular Stenosis
 Indication for AVR

• Operate at onset of **ANY** symptoms
  Irrespective of LV function
  Preop coronaries if indicated

• Other indications
  Undergoing other cardiac surgery
  Moderate and severe AS
Valvular Stenosis
Asymptomatic Severe AS

• Prevent sudden death with AVR

• Studies: Extremely low incidence of sudden death if truly asymptomatic

• “Most common cause of death in the asymptomatic pt is surgery…”
Valvular Stenosis
Asymptomatic Severe AS

Echo $\rightarrow$ EF $<50\%$

TMET

Observer $\rightarrow$ "Very severe AS"
$AV \text{ Vel} > 5.0 \text{ m/s}"

Poor performance

AVR
93% of survey respondents identified diagnosis and management skills as important for practice.

# 8 DIASTOLIC MURMURS
YOU WILL DIAGNOSE AND MANAGE
Dissection of the Aorta

Widened Mediastinum
Aortic Regurgitation
Aortic valve does not close completely, blood backflows from aorta into the LV (congenital or acquired)

• Best heard at aortic area, or lower sternal edge
• Diastolic rumble
• S3 (S4)
• Short, rapid crescendo diastolic murmur
• Capillary pulsations in nailbeds
Aortic Regurgitation

Murmur

BP = \uparrow PP

Austin flint murmur
MITRAL STENOSIS
Pathophysiology Secondary Effects
Mitral Stenosis

Pressure overload: LA, RV, RA & pulmonary tree
LV protected

Courtesy of William Edwards, MD Mayo Clinic
Mitral Stenosis Pearls

- Low pitched diastolic murmur at apex
- Starts with OS, shorter S2 OS more severe MS
- No physiologic effect on the LV
- Overloaded LA, RV, PHTN
- AF common, assess for LA thrombus
- Doppler echo is gold standard tool
- PMBV reasonable for those with severe symptomatic MS and a pliable valve
Survey respondents are averaging 43 patients per week

# 7 TIPS/TRICKS AND MANEUVERS SO YOU ARE SUCCESSFUL WITH #8, 9, 10
# Cardiac Systolic Murmur

## Dynamic Ausculation Maneuvers

<table>
<thead>
<tr>
<th>Maneuver</th>
<th>MR</th>
<th>AS</th>
<th>HOCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amyl</td>
<td>↓ afterload</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>Hand grip</td>
<td>↑ afterload</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Valsalva</td>
<td>↓ preload</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Squat</td>
<td>↑ afterload and ↑ preload</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Stand</td>
<td>↓ preload and ↓ afterload</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Post PVC</td>
<td>↓ afterload; ↑ contractility</td>
<td>⇔</td>
<td>↑</td>
</tr>
</tbody>
</table>
Dynamic Auscultation

**↑ HCM murmur with ↓ LV volume**

- Valsalva maneuver
- Squat to Stand
- Amyl nitrate

<table>
<thead>
<tr>
<th></th>
<th>AS</th>
<th>HOCCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amyl Nitrite</td>
<td>↓ afterload &amp; contractility</td>
<td>↑</td>
</tr>
<tr>
<td></td>
<td>↓ preload</td>
<td></td>
</tr>
<tr>
<td>Valsalva</td>
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</table>
# 6 SBE COVERAGE OR NOT...
Antibiotic Prophylaxis

Recommended only for **dental procedures that may result in bleeding** (including cleaning), **respiratory tract procedures only if there is an incision/biopsy of mucosa**, and **surgical procedures involving infected skin, structure or musculoskeletal tissue** and in the presence of the following conditions:

- Prosthetic heart valves
- History of endocarditis
- Heart transplant with valvulopathy of the transplanted heart
- CHD that is uncorrected (or partially corrected) or has been corrected within the past 6 months

**Antibiotic prophylaxis is not recommended for GI / GU procedures**
# Endocarditis Prophylaxis

If able to take oral medication

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Adults (≥18 years old)</th>
<th>Children*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>2 g oral</td>
<td>50 mg/kg oral</td>
</tr>
</tbody>
</table>

*Children weighing >40 kg should receive adult dosages, maximum dosage should not exceed adult dosing.

No dosing adjustment necessary for renal or liver failure.

Allergic to penicillin or ampicillin and able to take oral medication

<table>
<thead>
<tr>
<th>Treatment (choose one)</th>
<th>Adults (≥18 years old)</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cephalexin†‡</td>
<td>2 g oral</td>
<td>50 mg/kg oral</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>600 mg oral</td>
<td>20 mg/kg oral</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>500 mg oral</td>
<td>15 mg/kg oral</td>
</tr>
<tr>
<td>Clarithromycin</td>
<td>500 mg oral</td>
<td>15 mg/kg oral</td>
</tr>
</tbody>
</table>

*Children weighing >40 kg should receive adult dosages, maximum dosage should not exceed adult dosing.

†Cephalosporins should NOT be used in an individual with a history of anaphylaxis, angioedema, or urticaria due to penicillins or other beta-lactam antibiotics.

‡Or other first- or second-generation cephalosporin in equivalent adult dosage.

No dosing adjustment necessary for renal or liver failure.
Over 50% identify guidelines, appropriateness criteria important to practice

# 5 ECHO, NO ECHO
When to Get an Echo/When Not to

Presence of cardiac murmur

Systolic murmur

- Grade 1 or 2 and midsystolic
  - Asymptomatic and no associated findings
    - No further workup
  - Other signs or symptoms of cardiac disease
    - Echocardiography
      - Catheterization and angiography if required

Diastolic or continuous murmur

- Grade 3 or higher holosystolic or late systolic
  - Echocardiography

# 4 SCREEN / DON'T SCREEN
Bicuspid Aortic Valve – New Insights

Screen first degree relatives

Scan entire aorta (MRA or CT)
Aortic Dilatation
Bicuspid Aortic Valve

Aorta > 5.5 cm – operate for aortic dilation itself
(> 5.0 cm if FH or rapid growth or low risk)

Aorta > 4.5 cm – replace aorta if AVR indicated
Other Screening

• Coronary artery disease
• Diabetes
• Hypertrophic cardiomyopathy
• Preventive screening (wt, bp, waist circumference, nutrition, nicotine, substances, supplements, home safety, fit testing)
• Other
# 3 WHAT CAN YOU DO FOR THE PRACTICE?
• Team models that work
• Patient, clinician satisfaction
• Financial outcomes
• Practice initiatives / incentives
• Quality improvement projects
• Standardization of management
• Cost effective care
• Comprehensive care
• Subspecialty standardization and individualized care
• Moderator
• Preceptor
• Educator
• Researcher
• Leader for improvement
# 2 KNOW YOUR PEEPS
(NETWORK)
Cardiovascular Team Professionals

Membership

++ About Membership

++ Become a Member

Cardiovascular Team Student Membership
Clinical Pharmacist
Physician Assistant
Cardiovascular Physician Practicing in the U.S./Canada
Academic Cardiologist or Scientist in the U.S./Canada
Cardiovascular Physician Practicing Outside the U.S./Canada
Professional in a Cardiovascular-Related Subspecialty
Cardiovascular Team Professionals
Nurse
Rehabilitation Specialist
Cardiovascular Technologist
Cardiovascular Veterinarian
Health IT Managers
Training Program Administrators
Geriatrician
Cardiovascular Administrator

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++ Why Join: Your Membership Benefits

++ How to Apply: The Application Process
Atrial fibrillation, SVT, STEMI, NSTEMI, Cardiac Devices, Valvular heart disease, DAPT, Chol, Periop, Cholesterol, Obesity, CV Risk

# 1 ACC/AHA GUIDELINES – FOR MANAGEMENT EVIDENCE
Guidelines

2016 Focused Update on New Pharmacologic Therapy for Heart Failure | Key Points to Remember

Download ACC's Guideline Clinical App

Keep Track of Guidelines and Clinical Documents That Are in Progress

Filter by Topic

Results 1-10 of 29

Heart Failure Focused Update on Pharmacological Therapy

document type: Guidelines
clinical topic: Heart Failure and Cardiomyopathies, Acute Heart Failure
publish date: May 20, 2016

Dual Antiplatelet Therapy in Patients with Coronary Artery Disease Focused Update

document type: Guidelines
clinical topic: Acute Coronary Syndromes, Anticoagulation Management, Cardiac Surgery
publish date: Mar 29, 2016
Guideline Clinical App

The ACC’s Guideline Clinical App is the mobile home of clinical guideline content and tools for clinicians caring for patients with cardiovascular disease. You can access guideline recommendations, “10 Points” summaries, and tools such as risk scores, calculators and algorithms. Customize your App by using the bookmark, note-taking, and shareable PDF features.

The App is available for free in the iTunes (iPhone, iPad) and Google Play (Galaxy, Nexus, other Android devices) app stores. Use the links below from your mobile device to download the App.

- Download the App From iTunes
- Download the App From Google Play

The App currently offers content for the following guidelines:

- Atrial Fibrillation
- Cardiovascular Risk
- Coronary Artery Bypass Graft
- Cholesterol
- Device-Based Therapy
- Dual Antiplatelet Therapy Update
- Heart Failure
- Lifestyle
- Non-ST-Elevation Acute Coronary Syndromes
- Obesity
- Percutaneous Coronary Intervention
- Perioperative Management for Noncardiac Surgery
- Stable Ischemic Heart Disease
- ST-Elevated Myocardial Infarction
- Supraventricular Tachycardia
- Valvular Heart Disease
Learning Objectives

• Clinical Guidelines
• CV resources for busy clinicians
• Practice improvement opportunities
• Tips/Tricks for physical exam and differential diagnosis
• Collaboration and networking with CV colleagues
• ACC resources / support for CV Team members
• Unique opportunities for your practice at home
Top 10 Summary

• Identify CV pathophysiology and common conditions you will see in practice
• Facilitate evidenced based guideline directed treatment and surveillance
• Review the handouts/slides
• Check out the resources at ACC
Enjoy the meeting!

linderbaum.jane@mayo.edu
Phone  507-284-2129
Resources

- 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary: A Report of the American College of Cardiology/American Heart
- 2008 Focused update incorporated into the ACC/AHA 2006 guidelines for the management of patients with valvular heart disease
- Antman, EM; Anbe, DT; Armstrong, PW; et al. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction; a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Revise the 1999 Guidelines for the Management of Patient with Acute Myocardial Infarction). J AM Coll Cardiol. 2004; 44:e1-211.
Web Resources

- www.cardiosource.com
- www.blaufuss.org
- www.acc.org
- www.cvtoolbox.com
- askmayoexpert.com
Clicks

Systolic clicks

Ejection click
- Bicuspid AV
  - Early Systole
    - With valve opening
  *In PS, softer with inspiration

- Bicuspid PV*
  - Early Systole

- MVP
  - Mid – late Systole

Non-ejection click

Other
- Ventricular septal aneurysm
- Atrial septal aneurysm
- Cardiac tumors
- Pulmonary HTN
- Systemic HTN
Valvular Stenosis

Obstruction

Afterload

Hypertrophy

Cor flow

Diastolic dysfunction

$O_2$ mismatch