Updates and Errata
Current as of Feb 13, 2021

You can print these out to paste in coursebook!

Changes to slide deck in RED

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Nephrology

2

Hyperaldosteronism

- In patients with **hyperaldosteronism,** definite adrenal mass, and eligible for surgery, must first perform **adrenal vein sampling** to assess lateralization of aldosterone hypersecretion prior to ordering adrenalectomy
- For patients with established primary aldosteronism and in whom surgery is an option: selective adrenal venous sampling **to differentiate unilateral from bilateral overproduction of aldosterone**

Page 13, slide 50 in your Fri/Sat coursebook

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Immune complex: Low C3

- **Low C3:** Post-streptococcal/infectious GN
  - 2–3 weeks post-infection (strep throat/strep cellulitis, chronic abscess, endocarditis, etc)
    Presentation varies Ranging from asymptomatic, Microscopic hematuria to Nephritic syndrome: red/ brown urine, proteinuria, edema, Htn, AKI
  - Diagnosis: low C3, normal C4, +ASOT (70%), +anti-DNase B (90%)
  - Management: supportive care (this can include diuresis if edema); treat infection if still active
  - Resolves in 3 – 4 weeks
  - Biopsy only undertaken if considering other glomerular disorders, or course varies from typical trajectory i.e. severe AKI requiring dialysis: this is uncommon with PSGN

Page 20, slide 78 in your Fri/Sat coursebook

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Immune Complex: Normal C3/C4

IgA Nephropathy

- Most common cause of GN worldwide (esp Asians)
- Associated with celiac disease, HIV, cirrhosis (and others)
- **Various presentations: gross hematuria, microscopic hematuria, asymptomatic proteinuria, RPGN, or nephrotic syndrome**
- Flares with ANY infection ("syn-pharyngitic")
- HSP: systemic IgA vasculitis with arthritis, purpura, GI symptoms; think children/young adults

- Diagnosis: Biopsy (however only if systemic manifestations, ++proteinuria, renal function decline) – if it will change management
- Prognosis dependent on degree of proteinuria
  - <0.5- 1g / day: low risk of progression
  - Overt proteinuria and/or high Cr: Progression to ESRD = 15-25% at 10 years

Page 21, slide 81 in your Fri/Sat coursebook

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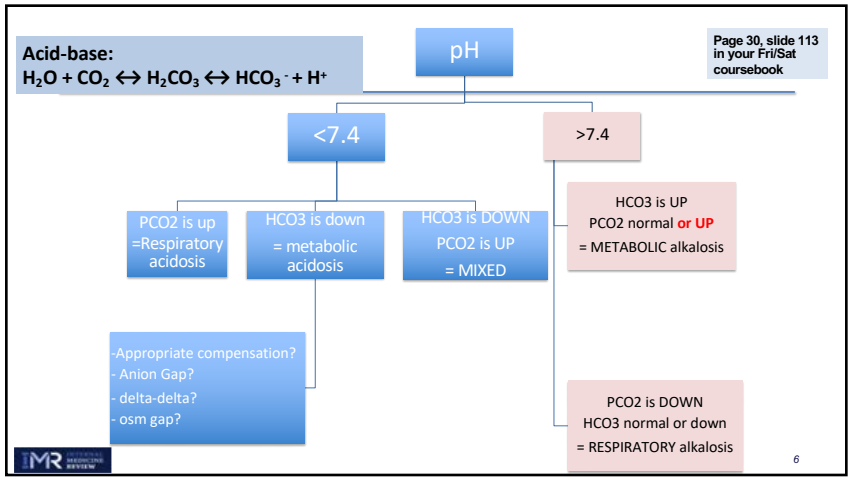

Page 30, slide 113 in your Fri/Sat coursebook

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Respirology

The following slide is enlarged picture of GINA 2020 Asthma guideline – hopefully easier to read than as printed in your coursebook on page 62, slide 242

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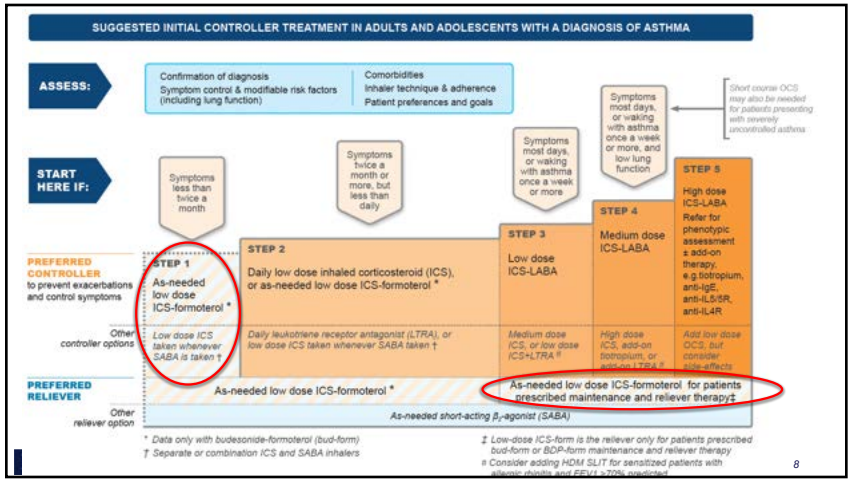

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MCQ 10

Page 83, slide 332 in your Fri/Sat coursebook

A 26 F is referred to you for dyspnea. She has a past medical history of allergic rhinitis but is otherwise well. She has been training hard for fitness competitions over the past few years and uses Fenfluramine to drop weight before competition. 4 months ago she began to notice increased dyspnea, causing her to shorten her usual 5 km jog to 2 km. Now this has progressed to dyspnea that causes her to pause when she reaches the top of the stairs. She denies PND and orthopnea but has started to notice ankle swelling bilaterally over the past 2-3 weeks, for which her family MD started her on furosemide 20 mg PO daily. Recent echocardiogram reveals an RVSP of 60, with moderate RV dysfunction. Which of the following would not be part of your **initial** investigations for the cause of her PH?

1. Pulmonary Function Testing
2. V/Q Scan
3. **CTPA**
4. CXR
5. ECG

CTPA is typically done as part of the workup for CTEPH after V/Q scan (the gold standard for CTEPH) shows unmatched perfusion defect.

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CARDIOLOGY

The Valve Disease section is here with 2020 ACC/AHA update.

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Chronic Stable CAD

Page 106, top right slide in your Fri/Sat coursebook

2. Things that help patients live longer

…with healthy lifestyle + risk factor optimization

- **Smoking cessation**, exercise, diet
- Optimize other Risk Factors
  - Hypertension or evidence of any atherosclerosis → ACEi: "Vascular protection" (HOPE, EUROPA trials) – use Hypertension Canada guidelines (see Nephro Lecture)
  - Dyslipidemia → Lipid lowering (High dose statin [target LDL-C <2.0 **or** (not and) 50% reduction])
  - Diabetes → Target A1c <7% (see Endo lecture)

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Valvular heart disease

NOTE – ACC/AHA Valve guidelines updated online Dec 20, 2020. Our slides went to press Dec 14, so anything not in your coursebook is highlighted in RED in the following slides and updated ONLINE.

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MCQ#4

You're asked to evaluate a 45 year old woman with dyspnea. She works as a daycare teacher but notes that over the last year she has been more short of breath running around the children. She states she immigrated to Canada 2 years ago, and started having palpitations around that time. She's not sure if the palpitations are because she's anxious/homesick. On exam, her BP is 120/80, HR 70, irreg. She is thin, not diabetic, normal renal fxn, post menopausal. You hear a normal S1S2, then another sound followed by a quiet diastolic rumble. You request an ECG which shows atrial fibrillation. What's the best answer:

A) ASA 81 mg daily
B) Apixaban 5 mg po bid
C) Rivaroxaban 15 mg po OD
D) Warfarin
E) Suggest endocarditis prophylaxis

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Valve Guiding Principles

1. Valves are a complicated topic
   - Know the **physical exam** findings (JAMA RCE/physical exam) – *end of this section*
   - Know WHEN TO REFER for CONSIDERATION of intervention (Class I guidelines)*

   Canadian guidelines are fairly old (2004).* ***AHA 2020 Valvular Heart Disease guidelines* *more applicable*

2. Valves can only be treated in 3 ways:
   1. Drugs = temporize a mechanical problem
      -But always think about stroke and endocarditis prophylaxis
   2. Surgery = effective, but carries risk
   3. Catheter-based interventions = for suitable patients

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Valve Guiding Principles

3. **Transthoracic echocardiography** is the initial diagnostic test for all valvular disease

4. **Severe** disease matters most (and often guides replacement)
   - Symptoms: angina, heart failure/dyspnea, syncope
   - LV systolic dysfunction
   - Surrogate markers of impending badness (e.g. LV dilatation, pulmonary HTN, new Afib)
   - If following with serial imaging (e.g. asymptomatic), re-image q6-12 months for **severe** valvular disease

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Valves and Medical Therapy

Few Class I recommendations for medical therapy in valve disease (primarily a **surgical** disease)

- **Aortic Stenosis** → Treat Hypertension as per standard guidelines, treat dyslipidemia per guidelines for prevention of atherosclerosis (**not** to prevent hemodynamic progression of AS – no evidence for this)
  - +Class IIb ACE/ARB may reduce mortality in patients who have undergone TAVI
- **Aortic regurgitation** → Treat Hypertension (preferably with ACE/ARB). Symptomatic AR or LV systolic dysfunction + not surgical candidate= GDMT with ACE/ARB or sacubitril/valsartan
- **Mitral stenosis** → Anticoagulation (VKA) indicated if prior embolic event OR left atrial thrombus OR Afib (paroxysmal or chronic)
- **Tricuspid + Mitral regurgitation** *(No Class I recommendations for primary MR or TR)*

ACC/AHA 2020

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Aortic stenosis

- **Etiology:** Bicuspid (young), rheumatic, calcific (old)
  - Bicuspid valves associated with pathology of aorta but not usually CAD
- **Severe AS Criteria** (mostly diagnosed on echo):
  - Mean Gradient ≥40 mmHg
  - Max jet velocity ≥4 m/s
  - (AVA <1.0 cm^2)
- Prolonged asymptomatic period, then quick deterioration with onset of symptoms (**dyspnea, syncope, angina**)
- Patients with Severe AS are **afterload dependent** (caution with vasodilators/afterload reducers, e.g. ACEi)

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Low-flow, Low-gradient AS

D2	Symptomatic severe low-flow, low-gradient AS with reduced LVEF	Severe leaflet calcification/ fibrosis with severely reduced leaflet motion	AVA ≤1.0 cm^2 with resting aortic V_{max} <4 m/s or mean ΔP <40 mm Hg Dobutamine stress echocardiography shows AVA <1.0 cm^2 with V_{max} ≥4 m/s at any flow rate	LV diastolic dysfunction LV hypertrophy LVEF <50%	HF Angina Syncope or presyncope
D3	Symptomatic severe low-gradient AS with normal LVEF or paradoxical low-flow severe AS	Severe leaflet calcification/ fibrosis with severely reduced leaflet motion	AVA ≤1.0 cm^2 (indexed AVA ≤0.6 cm^2/m^2) with an aortic V_{max} <4 m/s or mean ΔP <40 mm Hg AND Stroke volume index <35 mL/m^2 Measured when patient is normotensive (systolic blood pressure <140 mm Hg)	Increased LV relative wall thickness Small LV chamber with low stroke volume Restrictive diastolic filling LVEF ≥50%	HF Angina Syncope or presyncope

Don't fret on these details → key concepts = these are sick, symptomatic patients
Mean gradient <40, Max jet velocity <4m/s, AVA <= 1 cm2

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Aortic stenosis - Intervention

Class I indications for replacement*:

- Severe AS with symptoms
- Severe AS with LV dysfunction (LVEF <50%)
- Moderate (Class IIb) –severe (Class I) undergoing other CV surgery
- Symptomatic Low-flow, low gradient AS with LV dysfunction (LVEF<50%)
- Symptomatic Low-flow, low gradient AS with LVEF >50% *if* AS most likely cause of symptoms

*Options include conventional surgical AVR (SAVR) or transcatheter aortic valve implantation (TAVI)

- TAVI (TAVR) – expanding indications in 2020:
  - for intermediate to high surgical risk
  - age >80 or younger with life expectancy <10y
  - + consider for age 65-80* vs SAVR

Other nuanced decisions between SAVR and TAVI require expert team decision making (see detailed ACC/AHA Guideline)

- TAVI **CONTRAINDICATED** if comorbidities preclude benefit
  - palliative care recommended instead if life expectancy with reasonable QOL <1y
- All TAVI valves are **bioprosthetic (and need endocarditis prophylaxis)**

***TAVI vs Surgical AVR decision making made with expert team after shared decision making, accounting for patient values and preferences + expected longevity, valve durability, amenable anatomy etc.**

AHA Valvular heart disease, 2014 +2017 + 2020

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Aortic regurgitation

- **Acute AR**
  - Aortic dissection
  - Endocarditis
  - Trauma
  - Prosthetic valve dysfunction
- **Chronic AR**
  - Problem with aorta: dilatation (associated with autoimmune conditions, syphilis, Marfan, bicuspid, others…), dissection, trauma
  - Problem with valve: degenerative (calcific), bicuspid, rheumatic, endocarditis, VSD, iatrogenic
- "Severe AR" is defined using specific echocardiographic parameters that **you do not need to know**

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Aortic regurgitation - Intervention

Class I indications for surgery*:

- Severe AR with symptoms (dyspnea, etc)
- Severe AR with LV dysfunction (LVEF<55%), if no other cause for LV dysfunction found
- Moderate (Class IIb) to severe AR undergoing other CVSx

*May require AVR + ascending aortic replacement if aortic diameter >45 mm (more applicable to bicuspid AV patients)

AHA Valvular heart disease, 2014 +2017 + 2020

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Mitral stenosis

- Etiology is 99% rheumatic
  - Often associated with atrial fibrillation [*anticoag w/ VKA not DOAC*]
  - Management of Afib and heart rate (slower = better to prolong diastolic filling time) important considerations
  - *Anticoagulate with VKA* if i) rheumatic MS and Afib; ii) rheumatic MS and prior embolic event; iii) rheumatic MS and LA thrombus
- **Severe MS** (very severe MS):
  - **MV area ≤1.5 cm2** (very severe = ≤1 cm2)
  - Pulmonary artery systolic pressure >50mmHg
  - Diastolic pressure half time (PHT) ≥150 ms

ECHO criteria for severe MS in guidelines… but we don't think you need to memorize!

AHA Valvular heart disease, 2014 +2017 + 2020

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Mitral stenosis - Intervention

Percutaneous mitral balloon commissurotomy (PMBC) indicated if (Class I):

- Severe MS + Symptoms (NYHA III-/IV) + favourable anatomy + can be performed at a Comprehensive Valve Centre
  - **CONTRAINDICATED** if: i) LA thrombus; ii) ≥moderate MR

MV surgery (commisurotomy +/- repair OR replacement) indicated if (Class I):

- Severe MS with symptoms (NYHA III-IV symptoms) + acceptable surgical risk + **contraindicated/failed PMBC**
- Severe MS and other CVSx planned

AHA Valvular heart disease, 2014 +2017 + 2020

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Mitral regurgitation

- Acute MR
  - Ischemia with papillary muscle dysfunction
  - Infective endocarditis
- Chronic MR
  - **PRIMARY** (degenerative) = the disease
    - Valve leaflet (MVP [myxomatous, fibroelastic deficiency], rheumatic)
    - Annulus (calcification)
    - Chordae (trauma, infection, idiopathic)
    - Papillary muscle (trauma)
  - **SECONDARY** (functional) = the consequence
    - Dilated or ischemic cardiomyopathy -> leaflet tethering (being pulled towards the apex) + annular dilatation -> leaflet malcoaptation leading to regurgitation backwards
- "**Severe MR**" is defined using specific echocardiographic parameters that **you do not need to know**

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Mitral regurgitation - Intervention

PRIMARY MR – "the goal of therapy is to correct MR before onset of LV systolic dysfunction"

Class I indications for surgery (repair when possible over replacement) for **PRIMARY MR**:

- Symptomatic patients with severe 1º MR irrespective of LVEF
- Asymptomatic patients with severe 1º MR and LV systolic dysfunction (LVEF <60%, LVESD ≥ 40mm)

AHA Valvular heart disease 2020

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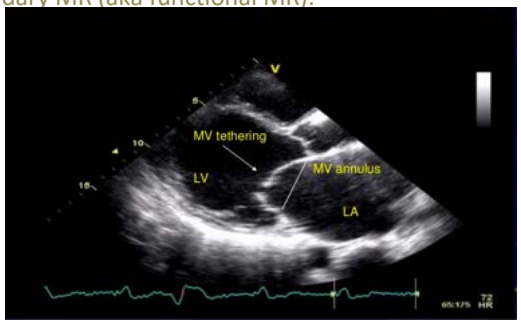
Mitral Regurgitation

- Secondary MR (aka functional MR):



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Mitral regurgitation - Intervention

NEW UPDATE IN CCS 2020 guidelines for treatment of Secondary MR

- We recommend that maximally tolerated GDMT, including cardiac resynchronization therapy (CRT) and revascularization where appropriate, be implemented **before** consideration of percutaneous mitral valve repair (PMVR) for patients with HFrEF and severe FMR (Strong Recommendation, High-Quality Evidence).
- We suggest that patients with symptomatic HF (HFrEF) despite maximal GDMT and severe mitral regurgitation be evaluated for PMVR (Weak Recommendation, Moderate-Quality Evidence).

AHA Valve 2020: Agrees with CCS – focus on GDMT, no class I indication for surgery/intervention for 2º MR.

CCS HF 2017 + 2020, + AHA Valve 2020

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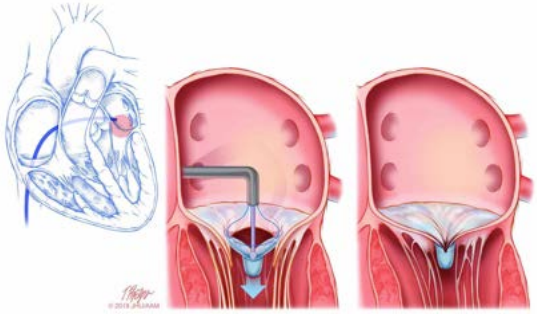
PMVR



Johns Hopkins Clinical Connection - Johns Hopkins Medicine

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Tricuspid Regurgitation

- Severe TR = echo criteria you don't need to know. Presence of elevated JVP with "c-V waves" indicate severe TR clinically.

Class I indication for surgery:

- In patients with severe TR undergoing left sided valve surgery, tricuspid valve surgery is recommended

(Don't panic at this new slide!)

AHA Valvular heart disease 2020 29

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Antithrombotic Therapy **post** Valve Replacement

- **Mechanical Valves**
  - Lifelong therapy with ~~ASA 81 mg daily +~~ VKA (warfarin)
    - Goal INR varies with type of valve and comorbidities
      - INR 2.5 for current generation AVR and no other risk factors
      - INR 3.0 for any MVR *or* old AVR (ball in cage) *or* AVR with risk factors (AFib, prior embolic event, LV systolic dysfunction, hypercoagulable state)
    - **DOACS ARE CONTRAINDICATED** (Important concept in "Valvular Afib")
  - Post-op: patient should be bridged with UFH heparin or LMWH as soon as bleeding risk is acceptable
- **Bioprosthetic Valves**
  - Lifelong therapy with ASA 81 mg po daily
  - 3-6 months post-implantation: consider VKA (INR target 2.5) in addition to ASA in pt w low risk of bleeding
    - For TAVI, can consider Clopidogrel + ASA for 6 months as an alternative to VKA in pt w low risk of bleeding
  - Bioprosthetic valve + AFIB:
    - If new onset AFIB within 3 mos of procedure: anticoagulate with VKA.
    - For AFIB >3mos post-op use DOAC or VKA based upon CHADS score

AHA Valvular heart disease 2020, CCS Antiplatelet 2018

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Infective endocarditis

- Will be covered in alternate section (Infectious Disease)
- Know:
  - Class I Indications for surgery (updated AHA 2020 in ID lecture)
  - Indications for prophylaxis against infective endocarditis (*online slides include Dec 20 updated AHA 2020 recommendations*)

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Choosing Wisely Canada

"Don't perform echocardiography as **routine follow-up** for **mild, asymptomatic** native valve disease in adult patients with no change in signs or symptoms."

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MCQ#4

You're asked to evaluate a 45 year old woman with **dyspnea**. She works as a daycare teacher but notes that over the last year she has been more short of breath running around the children. She states she **immigrated to Canada** 2 years ago, and **started having palpitations** around that time. She's not sure if the palpitations are because she's anxious/homesick. On exam, her BP is 120/80, HR 70, irreg. She is thin, not diabeti, normal renal fxn, post menopausal. You hear a normal S1S2, then **another sound** followed by a **quiet diastolic rumble**. You request an ECG which shows **atrial fibrillation**. What anticoag should she be on?

A) ASA 81 mg daily
B) Apixaban 5 mg po bid
C) Rivaroxaban 15 mg po OD
D) Warfarin
E) Suggest endocarditis prophylaxis

This is valvular afib, presumably rheumatic MS

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BONUS MCQ 15

Page 156, slide 621 in Fri/Sat book

A 66-year-old woman undergoes mechanical mitral valve replacement for severe symptomatic mitral regurgitation. Her other risk factors include HTN. A preoperative coronary angiogram showed no atherosclerosis. What long-term anticoagulation should she be on?

A. Apixaban 5mg BID
B. Warfarin with goal INR 2-3
C. Warfarin with goal INR 2.5-3.5 and aspirin
D. Warfarin with goal INR 3.0 (2.5-3.5)

Updated with new ACC/AHA Valve Disease Guidelines – sorry I missed this slide when updating the entire lecture Valve section! Drop ASA per new guideline ☺

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BONUS MCQ Answers 2

Page 167, slide 626 in Fri/Sat book

MCQ 15: Warfarin with goal INR 3.0 (2.5-3.5) per new ACC/AHA Valve dz guideline

For patients with a mechanical valves, warfarin alone is not adequate.

- The new ACC/AHA Guidelines no longer recommend routine use of ASA with mechanical valves… "For patients with a mechanical SAVR or mitral valve replacement who are managed with a VKA and have an indication for antiplatelet therapy, addition of aspirin 75 to 100 mg daily may be considered when the risk of bleeding is low." - so for this patient with HTN only we would not otherwise prescribe ASA!
- Patients with mitral valve prosthesis should be on warfarin with an with an international normalized ratio (INR) goal of 3 (2.5-3.5).
- Patients with a 'current generation' aortic valve prosthesis should be on warfarin with an with an international normalized ratio (INR) goal of 2.5 (2-3). Patients with older AVR (ball-cage) may benefit from higher target 3.0.
- Higher INR goals may be considered in patients who have thromboembolic events while anticoagulated within this INR range. This patient has not had a thromboembolic event therefore a higher INR goal would not be indicated.

MCQ 16: ASD (causes wide, fixed split S2)

MCQ 17: A - Absent pulses in Right Foot

MCQ 18: Answer A - Super tough question ☺ - He will decline functionally if delay surgery 12 mos. Delay 3 mos post PCI. Patients get spinal anesthesia for TKA so clopidogrel must be held7d preop. Per CCS 2020 guidelines should be on "Dual Pathway Therapy" – OAC + Clopidogrel, but recall that Xarelto dose for Dual Pathway is only 15mg not 20. Tricky tricky ☺

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Neuro Emergencies

At this time, no updates.

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Hematology

Updated Feb 13, 2021: ASH Guidelines for Prevention and Treatment of VTE in Cancer pts (e-pub Feb 11, 2021)

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ASH Guidelines for Prevention and Treatment of VTE in Cancer pts (e-pub Feb 11, 2021)

- We defined active cancer as
  - (1) nonsquamous cell or basal cell invasive cancer diagnosed within 6 months before enrollment
  - (2) cancer treated within the previous 6 months
  - (3) recurrent or metastatic cancer, or
  - (4) active cancer during the study.

We included studies if the majority (>80%) of patients presented with active cancer, as defined above.

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ASH Guidelines for Prevention and Treatment of VTE in Cancer pts (e-pub Feb 11, 2021)

- What's not new in prevention:
  - Patients with cancer should receive thromboprophylaxis (with LMWH or fonda) as inpatients
- What is new in prevention:
  - Patients with cancer who undergo major abdominopelvic surgery - *SUGGEST* they have POST DISCHARGE thromboprophylaxis continued for up to 4 weeks
  - Ambulatory patients with cancer at high risk of thrombosis receiving systemic therapy – ASH *SUGGESTS* parenteral thromboprophylaxis (LMWH) or DOAC(apixa or Riva) over no thromboprophylaxis.
    - Intermediate risk of thrombosis suggests either thromboprophylaxis OR no prophylaxis
    - Low risk of thrombosis suggests against prophylaxis
  - For multiple myeloma patients receiving lenalidomide, thalidomide, or pomalidomide-based regi- mens, the ASH *SUGGESTS* using low-dose acetylsa- licylic acid (ASA) or fixed low-dose VKA or LMWH
  - Patients with a central venous catheter – Suggest AGAINST routine thromboprophylaxis

What's high risk? Look at KHORANA score in your Onc / Heme notes, + clinical judgement /experience per ASH

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ASH Guidelines for Prevention and Treatment of VTE in Cancer pts (e-pub Feb 11, 2021)

- What's not new in treatment:
  - Patients with cancer can receive either DOAC or LMWH for acute treatment of VTE over uFH (strong recommendation)
- What is new in treatment:
  - For short term 3-6mos treatment of VTE, ASH *SUGGESTS* DOAC (Apixa, Riva, Edoxa) over LMWH
    - Caution in GI cancers and drug-drug interactions with DOACs
  - For patients with incidental VTE or subsegmental PE, ASH *SUGGESTS* short term (3-6mos) treatment rather than no treatment/ observation (eg. VTE discovered on staging CT, asymptomatic)
  - For patients with central venous catheter (CVC) related VTE, ASH *SUGGESTS* keeping CVC over discontinuing CVC
  - For patients with recurrent VTE on LMWH, ASH *SUGGESTS* increasing dose of LMWH to supratherapeutic level, or continuing at therapeutic dose.
    - Suggests AGAINST IVC filter in this setting
  - **DURATION:** RECOMMENDATION 32. **For patients with active cancer and VTE, the ASH guideline panel suggests long-term anticoagulation for secondary prophylaxis (>6 months) rather than short-term treatment alone (3-6 months).** RECOMMENDATION 33. For patients with active cancer and VTE receiving long-term anticoagulation for secondary prophylaxis, the ASH guideline panel suggests continuing indefinite anti- coagulation over stopping after completion of a definitive period of anticoagulation

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COVID and VTE Prophylaxis

- Moving target! Last ASH Guideline Dec 24, 2020 states:
  - LMWH OVER uFH
  - Fonda if HIT
  - Prophylactic dose over intermediate/therapeutic dose … however this may change in light of ATTACC Trial (results still not fully published but press releases indicate therapeutic anticoag reduced mortality), we will keep you posted.

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Critical Care

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MCQ 4 – updated answer – see FAQ document

A 55 yo man with severe influenza pneumonia de
after admission and is transferred to the ICU. CX
airspace disease. An ECHO shows reduced RV a
start the patient on lung protective ventilation. His
TV 6mL/kg, Plateau is 24, and RR 22. ABG is pH
60, sats 89%. His PF ratio is <100. What is the ne

1. Increase the patient's sedation and start para
2. Increase the PEEP
3. Set up to prone the patient
4. Started inhaled nitric oxide (NO)
5. IV diuresis
6. Refer the patient for VV ECMO

Thanks for asking this question. IV diuresis is the answer to a different version of this question and is not the best answer here. The only point to make regarding diuresis, is if the stem sounds like it could be heart failure, you would need to rule this out before confirming the diagnosis of ARDS. In this patient the globally reduce RV/LV function is likely sepsis induced cardiomyoapthy and not primarily heart failure. For the question as well, the plateau pressures should be >30, i.e. 34 and NOT 24 (you're right that a driving pressure of 2 is not really possible and it's more likely to be 10-20). This is well beyond the scope of royal college but our driving pressures are our plateaus pressure minus peep, and should be <20 for lung protective ventilation, and if they are higher, something needs to be done ot optimize their respriatory mechanics (note also that plateaus should be <30 for lung protective ventilation). Even if you didn't know that for this quesiton, you know that the PF ratios are bad! Therefore the best next step would be to reduce PEEP to see if this improves their plateaus to achieve lung protective ventialilation, however that's not an option and may infact worsen their blood gas (but you would still try this in real life!). The question is therefore getting at the next steps in our ARDS pathways which are increase sedation and paralyze (the right answer), while preparing to prone (the next best answer or step 2).

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Tox Quick Approach

Page 245, slide 977 in Fri/Sat book

STAT Investigations

- CBC, lytes, bicarb, Cr, LFTs, CK, troponin, glucose, Ca, Mg, PO4
- ABG, lactate
- Serum osmolality, urea
- BHCG (if young female)
- Urine/Serum Tox
  - ALWAYS ask for acetaminophen, salicylates, and EtOH level
  - Specific Drug levels if known + measurable (digoxin, dilantin…)
- 12-Lead ECG
- Urinalysis (for pH), R+M (for crystals)
- Consider CT head is localizing symptoms

MENTAL CALCULATIONS:

- **anion gap** = Na-Cl-Bicarb
- **osmolar gap** = serum(osm) – calc(osm) → (2xNa+Gluc+Urea+1.25*ETOH)

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Neurology

No Updates at this time.

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Medical Oncology

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**HIGH YIELD **

Spinal Cord Compression

Page 286, slide 1143 in FRI/SAT book

Etiology

- Compression of the thecal sac by tumor in the epidural space
- Most common malignancies – Breast, Lung, Prostate, Multiple myeloma

Symptoms/Diagnosis

- **Clinical** most important – early recognition is key to preserving neurological function
- **Back pain** (often 1st sign, occurs in 95% cases)
- If spinal cord compression = UMN findings
- If cauda equina syndrome = LMN findings, Saddle anesthesia
- Leg weakness, sensory loss
- Urinary retention, Bowel incontinence

Management

- URGENT MRI **whole spine**
- **Steroids** – Dexamethasone 10mg IV x1 → Dexamethasone 4mg PO/IV QID
- **Pain control**
- **Consult** Spine surgical service AND Rad Onc

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OB Medicine

2 New Slides pertaining to AHA/ACC Valve Disease Guideline Update

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Mechanical Heart Valves (This Slide CHANGED from your coursepack **Updated AHA/ACC Valve 2020 Guidelines**)

Very High risk of valve thrombosis (5%) due to hypercoagulable state of pregnancy, + high maternal mortality (1%) in this population
- Women who cannot maintain therapeutic anticoagulation throughout pregnancy including monitoring of a/c should be counselled to avoid pregnancy (Class I recommendation)

- Warfarin agent of choice to prevent thrombosis (preferred over LMWH), but crosses placenta and dose dependent complications:
  - First trimester: warfarin embryopathy 5-7%
  - Second/third trimesters: neurologic anomalies, microcephaly, and optic atropy, neonatal hemorrhage
- Continue Warfarin in pre-conception period until pregnancy confirmed.
- All women on LMWH: bid dose-adjusted, targeting anti-Xa level 0.8-1.2 u/ml 4-6h post dose
- All women with prosthetic valves (+ high risk unrepaired severe valvular heart disease) should undergo pre-pregnancy **counseling by a cardiologist** with expertise in pregnancy. TTE should be done on all patients before pregnancy.

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Mechanical Heart Valves NEW SLIDE **Updated AHA/ACC Valve 2020 Guidelines

This slide is FYI. In real life and on exam, these women need to be managed in 3° care setting by expert cardiologists, OB-MFM!

- Warfarin **≤ 5mg**:
  - "continuation of warfarin throughout all 3 trimesters reasonable after full discussion of risks and benefits" (Class IIa) or
  - dose-adjusted LMWH trimester 1 followed by warfarin Trimester 2, 3 (Class IIb)
- Warfarin **> 5mg**:
  - switch to dose adjusted bid LMWH in first trimester (eliminate risk of embryopathy), Warfarin second and third trimester (Class IIa) or
  - Dose adjusted LMWH all three trimesters (Class IIb)
- Delivery: avoid delivery on VKA – high risk of fetal intracerebral hemorrhage!
  - Women on VKA should switch to dose-adjusted bid LMWH or IV UFH at least 1 week before planned/scheduled delivery (CLASS I)
  - Women on LMWH must be switched to IV UFH at least 36h prior to planned delivery (CLASS I)
  - Stop UFH at least 6h prior to planned vaginal delivery (CLASS I)
  - If labour begins or urgent delivery required in woman on VKA, cesarean section should be performed after reversal of anticoagulation (CLASS I)

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Infectious Diseases

Endocarditis section reproduced here with updates from ACC/AHA Valve 2020 Guidelines included

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3. CV Infections: Infective Endocarditis

References:

- Baddour LM, Wilson WR, Bayer AS, *et al*. Infective endocarditis in adults: diagnosis, antimicrobial therapy and management of complications: a scientific statement for healthcare professionals from the American Heart Association. *Circulation*. 2015;132:1-52.
- *Otto CM, Nishimura RA, Bonow RO, et al. 2020 ACC/AHA Guideline for the management of patients with Valvular Heart Disease. Circulation. 2021; 143: ONLINE ONLY as of January 1, 2021.*
- Wilson WR, Taubert KA, Gewitz M, *et al*. Prevention of infective endocarditis: guidelines from the American Heart Association. *Circulation*. 2007;116:1736-54.

As Highlighted in your Cardiology Lecture yesterday, our slides went to press December 14 and this guideline was released online December 20! Changes to your slide deck are in RED in the slides following.

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Question 1 Endocarditis

40 year old male with *S. mitis* endocarditis on a bicuspid aortic valve. Echo shows mild AI and small vegetations on both cusps. Treated with ceftriaxone. 10 days after initiating therapy he develops a cold, ischaemic pale leg. Symptoms last 6 hours then resolve. Next step:

A. Change antibiotics to vancomycin
B. CT head
C. Consult CV surgery for urgent surgical assessment
D. IV heparin followed by warfarin
E. Continue present management

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Question 2 Endocarditis

You are seeing a patient who underwent TAVI for severe aortic stenosis 5 years ago in pre-op clinic before a planned endobronchial biopsy. With respect to prophylactic antibiotics what do you recommend?

A. No antibiotics
B. Amoxicillin 2 g PO 30-60 min before OR
C. Clindamycin 600 mg PO 30-60 min before OR
D. Vancomycin 1 g IV 30-60 min before OR

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IE Workup – New Class I Recommendations in 2021

- Diagnostic workup
  - at least 2 sets of blood cultures prior to antibiotics
  - Initial TTE for everyone. TEE Class I indications:
    - TTE nondiagnostic or IE complications suspected or intracardiac leads

    (TEE widely used these are just the Class I – eg consider if staphylococcal, enterococcal, fungal infections)
- In patients being considered for an early change to oral antibiotic therapy for treatment of stable IE, baseline TEE before switching to Oral and repeat TEE 1-3 days before completing antibiotic regimen should be performed
- Patients with suspected or confirmed IE related to drug use should be referred to addictions medicine specialist for opioid substitution therapy

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IE – Diagnosis (Duke Criteria still recommended in AHA 2020)

Baddour LM et al, 2015

MAJOR (M)	MINOR (m)
Microbiological Evidence - Typical organisms: *S. aureus*, Viridans group strep, *S. gallolyticus* (prev. *S. bovis*), Enterococcus, HACEK group* - 2 cultures > 12h apart OR ≥3 blood cultures >1h apart - OR 1 blood culture demonstrating *Coxiella burnetii* OR Coxiella anti-phase 1 IgG ≥1:800 *HACEK: *Haemophilus, Aggregatibacter, Cardiobacterium, Eikenella, Kingella*	**Predisposition** – Heart defect, prosthetic valve, IVDU
	Fever – Temperature > 38ºC
	Vascular phenomena – Arterial emboli, septic pulmonary infarcts, mycotic aneurysm, IC hemorrhage, conjunctival hemorrhage, Janeway lesion
Endocardial Involvement (Echo) - Oscillating valvular/prosthetic mass - Valvular abscess - Dehiscence of prosthetic valve - New valvular regurgitation	**Immunological phenomena** – GN, Osler nodes, Roth spots, positive RF
	Microbiological evidence – Positive blood culture not meeting major criterion

DEFINITE IE	POSSIBLE IE
- Positive vegetation culture or histopath - 2M OR 1M+3m OR 5m	- 1M+1m OR 3m

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IE – Treatment

	Native Valve	Prosthetic Valve
MSSA	Cloxacillin OR cefazolin	Cloxacillin OR cefazolin PLUS rifampin PLUS gentamicin
MRSA or CNST^	Vancomycin	Vanco PLUS rifampin PLUS gentamicin
Viridans group strep, *S. gallolyticus/bovis*	PenG* OR ceftriaxone*	
Enterococcus faecalis	Ampicillin PLUS gentamicin OR Ampicillin PLUS ceftriaxone	
Enterococcus faecium	Vancomycin PLUS gentamicin	
HACEK group	Ceftriaxone	

^Most CNST are considered beta-lactam resistant
* Consider adding aminoglycoside with higher MIC to PCN levels.

Duration:
- 4-6 weeks
- Longer for increasing beta-lactam resistance, S. aureus, prosthetic valve

Baddour LM et al, 2015

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IE – Treatment New Class IIb recommendation in 2021

- In patients with left sided IE caused by Streptococcus, E. faecalis, S. aureus or CNST deemed stable by the multidiscip. Team after initial IV antibiotics, a change to oral abx therapy may be considered if:
  - TEE before the switch to oral therapy shows no paravalvular infection AND
  - Frequent and appropriate followup can be assured by the care team, AND
  - If a follow-up TEE can be performed 1-3 days before the completion of the abx course.

(see BONUS slide on POET trial for evidence)

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IE – CLASS I Surgical Indications

UPDATED Jan 2021 AHA/ACC Guideline

The most important indication

Decisions about surgery should be made by a "multispecialty heart valve team" of cardiologists, cardiovascular surgeons and Infectious Disease Specialists (Class I Level B)

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IE – CLASS I Surgical Indications

UPDATED Jan 2021 AHA/ACC Guideline

Early Surgical Indications "Early Surgery – during initial hospitalization before full treatment course of antibiotics"	**STRENGTH OF EVIDENCE**
Valve dysfunction with signs or symptoms of heart failure (persistent despite OMM)	Class I, Level B
Left-sided IE caused by *S. aureus*, fungi or highly resistant organisms	Class I, Level B
Heart block, annular/aortic root abscess, destructive penetrating lesions	Class I, Level B
Persistent bacteremia or fever > 5d ~~7d~~ after starting appropriate antibiotics	Class I, Level B
Complete removal of implantable electronic cardiac device (PPM/CRT/ICD) systems in patients with ~~IE and documented infection of device or leads~~ definite endocarditis	Class I, Level B
Delayed Surgery Indication:	
PROSTHETIC Valves: Relapsing infection (defined as new fevers/bacteremia after a complete course of appropriate antibiotics and interval sterile blood cultures, no other source/portal for infection)	Class I, Level C
In patients with recurrent endocarditis in the setting of continued IVDU, consultation with addiction medicine is recommended … before repeat surgical intervention is considered	*Class I, Level C*

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BONUS Read on own

IE – Class II Surgical Indications

** UNCHANGED in 2020 from 2017 AHA/ACC Guideline

Class II Other Surgical Indications Endocarditis	STRENGTH
Early surgery (during initial hospitalization and before completion of course of antibiotics) is reasonable in those with recurrent emboli and persistent vegetations despite appropriate antimicrobial therapy	Class IIa, Level B
Early surgery (during initial hospitalization and before completion of course of antibiotics) may be considered in patients with Native Left sided valvular endocarditis with mobile vegetation > 10mm With or WITHOUT embolic phenomenon , esp when anterior MV leaflet	Class IIb, Level B
Early (as opposed to delayed) surgery for patients who have had a minor (no extensive neuro deficits) embolic stroke without ICH, in patients with an indication for IE surgery	Class IIb, level B
Consider delay IE surgery >4 weeks in hemodynamically stable patients after a major ischemic or hemorrhagic stroke.	Class IIb, Level B

Nishimura et al, 2017 AHA/ACC Focused Updated from 2014

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IE - Prophylaxis

Wilson et al, 2007
AHA/ACC Valve 2020 Guideline in RED

Patient Population	Procedure
Prosthetic cardiac valve *(including TAVI)* *Prosthetic material for cardiac valve repair (eg)annuloplasty ring, chord, clips*	Dental procedures involving gingival manipulation, *manipulation of the periapical tissue and perforation of oral mucosa (AHA 2020 and IDSA)*
Previous IE	Respiratory tract WITH transection of respiratory mucosa (e.g. tonsillectomy, adenoidectomy) *(IDSA only)*
Congenital heart disease - Cyanotic CHD, unrepaired - CHD post-repair within 6 months - CHD post-repair with residual defect	All surgeries through skin and infected tissues receive prophylaxis already
Cardiac transplantation recipients with *valve regurgitation attributable to structurally abN valve*	*** NOT FOR GI/GU/Gyne procedures!**

Regimen (give 30-60 min before procedure):
- Amoxicillin 2g PO x1, NPO → Ampicillin 2g IV/IM OR cefazolin/ceftriaxone 1 g IV/IM
- PCN allergy → Cephalexin 2g PO OR clindamycin 600mg PO OR azithro 500mg PO
- NPO + PCN allergy → Cefazolin/ceftriaxone 1g IV/IM OR clindamycin 600 mg IM/IV

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BONUS Read on own

BONUS: POET Trial

Partial Oral versus IV Antibiotic Treatment for Endocarditis. NEJM 2019.

- 400 adults with IE (*S. aureus*, Strep, *E. faecalis*, CNST) randomized to IV antibiotics for duration or oral transition after at least 10 days IV (average 17 days IV).
- Primary endpoint was composite of all cause mortality, unplanned cardiac surgery, embolic events or relapse of bacteremia within 6 mo.
- Primary outcome occurred in 24 patients (12.1%) in the IV group and 18 patients (9.1%) in the oral group (p=0.4) showing non-inferiority.
- Caveat was followed 3 times per week and all had TEE, mostly L sided IE, very few (1%) Persons Who Inject Drugs (PWID). Not yet widely adapted into practice.

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Question 1 Endocarditis

40 year old male with *S. mitis* endocarditis on a bicuspid aortic valve. Echo shows mild AI and small vegetations on both cusps. Treated with ceftriaxone. 10 days after initiating therapy he develops a cold, ischaemic pale leg. Symptoms last 6 hours then resolve. Next step:

A. Change antibiotics to vancomycin
B. CT head
C. Consult CV surgery for surgical assessment
D. IV heparin followed by warfarin
E. Continue present management

This is one of the indications for consideration of surgical approach (ongoing bacteremia despite appropriate therapy). Know these for your exam. No indication to change antibiotics (strep universally susceptible).

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Question 2 Endocarditis

You are seeing a patient who underwent TAVI for severe aortic stenosis 5 years ago in pre-op clinic before a planned endobronchial biopsy. With respect to prophylactic antibiotics what do you recommend?

A. No antibiotics
B. Amoxicillin 2 g PO 30-60 min before OR
C. Clindamycin 600 mg PO 30-60 min before OR
D. Vancomycin 1 g IV 30-60 min before OR

TAVI is an indication for prophylaxis
ACC 2017 Guidelines don't expressly mention prophylaxis before ENT/Respiratory procedures (whereas ENT Guidelines and 2007 ACC guidelines do expressly suggest this). However, we feel the previous guideline from 2007 is consistent with current surgical prophylaxis guidelines and so prophylaxis in this scenario (TONSILLECTOMY) is indicated.

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Geriatrics

No updates at this time

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Gastroenterology

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Hemochromatosis Clarification--> Reconciling ACG with Choosing Wisely Hepatology

As per Choosing Wisely Hepatology (https://choosingwiselycanada.org/hepatology/) HFE genotyping should only be performed in patients with an elevated serum ferritin AND fasting transferrin saturation > 45%, whereas ACG 2019 HFE guideline suggests elevated ferritin OR Tsat >45%.

As Per Dr. Kosick:
** "As an addendum to my talk I would go with the Choosing Wisely Canada recommendations over the ACG guideline for the specific point! There is a very small subset of patients that could be missed i.e. some non-HFE formed of primary iron overload, though for the purposes of the IM Royal College Exam I would go with the above statement."

Reference: Page 118, slide 471 in Sunday book

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Rheumatology

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Treatment of Gout: Chronic*

Page 145, slide 578 in Sunday book

Definite indications for uric acid lowering therapy (ULT):

1. TWO OR MORE (>=2) attacks / year
2. Tophaceous gout
3. Gouty arthropathy (i.e. erosions)

Conditional indications for ULT if 1 episode PLUS:

1. CKD Stage 3+
2. Uric acid level > 535
3. Urolithiasis

! "#$%& '( ) '*"+", -*./regular exercise, weight loss, avoidance of alcohol and sugar-sweetened drinks, heavy meals and excessive intake of meat & seafood

- *Overlap with anti-inflammatory prophylaxis with either colchicine or NSAID for ! "#$%& '( ) *to prevent gout flares during titration of ULT*
- *ULT can be initiated at time of flare (no longer need to wait until flare resolution)*

Allopurinol

- Recommended first-line for all-comers; start at 100mg/d (or 50mg if CKD IV) and up-titrate until reach target uric acid level < 356
- Adjust for renal function
- Risks of hypersensitivity syndrome (worse with THIAZIDES) – dermatitis (TEN/Steven Johnson Syndrome (SJS)), fever, eosinophilia, hepatic necrosis, nephritis, diarrhea
- Consider testing for HLA-B*5801 in Southeast Asian and African Canadian patients (risk of SJS)

2020 ACR Guideline for management of Gout. ! "#$ %&"'( ) '*+(72(6):744-760.

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Management of Small Vessel Vasculitis

- **Cryoglobulinemic Vasculitis secondary to Hepatitis C Virus**
  - **Mild/Moderate:** Purpura, livedo reticularis, mild/non-debilitating neuropathy, GN without renal failure
    - Induction: Antiviral therapy +/- Corticosteroids
    - Maintenance: Antiviral therapy
  - **Severe:** Cutaneous ulcers, ischemia, severe/debilitating neuropathy, GN with renal failure/nephrotic syndrome, GI involvement
    - Induction: Rituximab + Corticosteroids
    - Maintenance: Antiviral therapy
  - **Life Threatening:** Rapidly progressive GN, CNS involvement, intestinal ischemia, alveolar hemorrhage
    - Induction: PLEX + Corticosteroid pulses + Rituximab or Cyclophosphamide
    - Maintenance: Antiviral therapy

Page 158, slide 629 in Sunday book

Muchtar *et al.* How I treat cryoglobulinemia. *Blood.* 2017; 129(3): 289-298. 71

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Endocrinology

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Diabetes and Vascular Protection

ABCDE's

- **A**1C ≤ 7.0%
- **B**P < 130/80
- **C**holesterol LDL <2.0 or >50% reduction
- **D**rugs to protect the heart when indicated → statin, ACEi/ARB, ASA, antihyperglycemic agents with CV benefit (GLP-1 agonist, SGLT2 inhibitor)
- **E**xercise/Healthy Eating
- **S**moking cessation

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Perioperative Medicine

One slide changed by ACC/AHA Valve disease update

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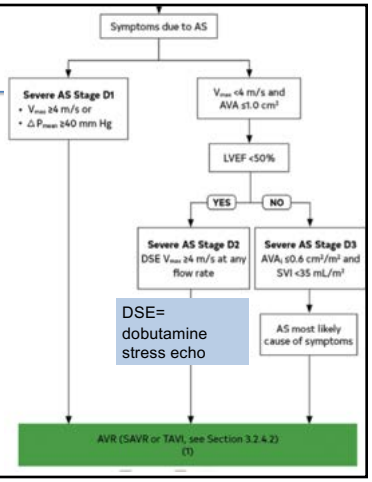
Who to suspect: "Moderate" AS by ECHO w Severe AS Symptoms

KEY CONCEPTS: low flow / low gradient AS is advanced stage AS + is symptomatic, but does not meet ECHO criteria for severity

- If SYMPTOMATIC + EF <50 = order dobutamine stress echo
- If SYMPTOMATIC + EF >50 = AVR if expert believes AS cause of symptoms

2020 AHA/ACC guideline on Management of Valvular Heart Disease



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Applied/Oral Scenario & Medical Ethics

Online Only Lecture, IMR2021

Updated MAID Slides follow in view of Bill C7

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End of Life Scenario: Medical Assistance in Dying

- February 2015 – Superior Court of Canada ruled in Carter v. Canada, that the prohibition of assisted suicide was contrary to Canadian Charter of Rights and Freedoms
- June 2016 – Royal Assent for Act to amend Criminal Code to allow Medical Assistance in Dying
- January 2021 – Bill C7 Amendment approved by Senate
- 2 options
  - MD or NP directly administers a substance that causes death
  - MD or NP provides a drug that person self-administers

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End of Life Scenario: MAID

Eligibility

- Must meet all of following:
  - Be eligible for health services funded by government (ie. have health card)
  - Be at least 18 years old and mentally competent
  - Have a **grievous and irremediable** medical condition
    - Bill C-7: Mental Illness alone does not qualify
  - Personally make a voluntary request for MAID, free from outside pressure or influence
  - Provide informed consent
- Grievous and irremediable definition
  - **DOES NOT NEED TO BE A FATAL OR TERMINAL CONDITION**
  - Must be a serious illness, disease, disability in an advanced, irreversible state
  - Must result in unbearable physical or mental suffering that cannot be acceptably relieved
  - Bill C-7 – No longer is there a requirement that patient's death is **reasonably foreseeable**

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MAID: What has Changed: Bill C-7 Adopted by House and Senate, 2021

i) repeals the requirement that "a person's natural death would be reasonably foreseeable".
ii) Excludes patients "suffering solely from mental illness"

With this new legislation there are 2 tracks to pursuing MAID:

1) Persons whose death is reasonably foreseeable – eg. Terminal malignancies

→ the 10 day reflection period will no longer be required between date of request for MAID and the procedure/death itself
→ Written request must only be witnessed by 1 person, not 2
→ If person has difficulty communicating Bill C-7 writes that medical practitioner must take every means to allow for patient to reliably understand and communicate their wishes

2) Persons whose death is not reasonably foreseeable – eg. Severe Multiple Sclerosis → more stringent safeguards*

→a 90 day waiting period between first assessment and provision of MAID. Timeline can be shortened if patient at risk of losing capacity.

→2 mandatory assessments by MD or NP; one of which must be by someone with expertise in the person's condition. (does not have to be a specialist)

→Practitioner must inform the person of the "means available to relieve their suffering, including, where appropriate, counselling services, mental health and disability support services, community services and palliative care and has been offered consultations with relevant professionals who provide those services or that care," and discussing with the person "reasonable and available means to relieve the person's suffering" and "agree[ing] with the person that the person has given serious consideration to those means."

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MAID: What has Changed: Bill C-7 Adopted by House (2020) + Senate, Feb 10, 2021

- Exceptions to the requirement for final consent for MAID
  - The requirement that patients be capable on day of provision of MAID has been challenged due to nature of terminal illness and fluctuating capacity at end of life.
    - ❖If Death reasonably foreseeable 2 exceptions to final consent in Bill C7:
      - (i) Advance consent arrangement where MAID can be provided by a specific date if the patient has lost capacity
      - (ii) Patients will have option to self administer MAID – back-up option for provider to complete if self-administration fails to produce death but renders patient incapable (!)
    - ❖If Death is not reasonably foreseeable – evidence indicates patients adapt to development of further disability and may find QOL so it is impossible to reliably predict a date on which they might want MAID if capacity is lost. This cohort of patients is not allowed to give advance consent.

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MAID under Bill C7: Practical Examples of what has changed

- A 75yF diagnosed with Dementia. Is capable at this time. Now under Bill C7 can request MAID and give consent for procedure; recognizing that they may lose capacity for consent by date of procedure.
- A 48yM has metastatic colorectal cancer. He has a malignant bowel obstruction and is in severe pain, unable to eat and is obstipated with constant vomiting. He is no longer required wait 10 days from requesting MAID to completion of the procedure.

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MAID Primer in Ontario

- https://www.cpso.on.ca/Physicians/Policies-Guidance/Policies/Medical-Assistance-in-Dying [Updated: Dec 2018]
  - CPSO requires that you offer palliative care (and best practices would support this!)
  - CPSO Policy will have to be updated in view of Bill C7. Their website last accessed Feb 13, 2021 and has yet to be updated to reflect this amendment.
- If you conscientiously object to MAID you **must** refer them to someone else
  - Must also provide them with information about the process
  - Must not 'abandon' the patient – provide effective referral
  - MOHLTC in Ontario has hotline for this to help you find provider in your area- 1-844-243-5880

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