Medication Considerations in the Pre-operative Patient

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Objectives

1. Understand current recommendations for medication adjustments in the preoperative period for cardiac, anticoagulant, diabetic medications and misc meds.

2. Make proper recommendations to the surgical and perioperative team regarding medication monitoring during the pre and post-operative periods

3. Be able to educate the patient regarding recommended medication adjustments, as needed in accordance with current evidence-based standards

The Purpose of the Preoperative exam

- Identify risks
  - What could complicate a surgery or result in a poor outcome?
- Provide insight
  - To the surgeon and anesthesia staff regarding issues that might require adjustments or close monitoring (i.e. Hx of anesthesia complications, HTN, Apnea etc.)
- Identify potential postsurgical complications or areas of needed vigilance
  - What will need to be monitored or watched for (blood clot risk, hx of lung disorders, blood sugars, infection risks)

Terminology Change

- Previous terminology was to say:

  ~~"The patient is cleared for surgery"~~

- Correct terminology involves providing a risk assessment regarding the patient based on:
  - The understood risk of the surgery
  - The medical assessment of the pt's potential risk for complications

Current Terminology

"This pt is assessed to be at (low, moderate or high) cardiac and pulmonary risk for complications during the intended (low, moderate , or high) risk procedure"

Risk Assessment – The Patient

- Based on the patient's:
  - Comorbid conditions
  - Physical fitness (cardiac and pulmonary)
  - Previous surgical history
  - Lifestyle behaviors (i.e. smoking, poor nutrition)
  - Duration and risk level of the intended procedure

Risk Assessment - Procedure

Potential Risk of Surgical Procedures

- **Low**

  Cataract surgery, endoscopic procedures, breast or superficial ambulatory surgery

- **Intermediate**

  Intraperitoneal and intrathoracic surgeries, carotid endarterectomy, head and neck surgery orthopedic procedures, prostate surgery

- **Major risk**

  Aortic and other major vascular surgeries, emergent trauma

ACC / AHA published guidelines

Risk Assessment – Patient Risk

From google images

Class	Physical status	Example
I	A healthy patient	A fit patient with an inguinal hernia
II	A patient with mild systemic disease	Essential hypertension, mild diabetes without end organ damage
III	A patient with severe systemic disease that is a constant threat to life	Angina, moderate-to-severe chronic obstructive pulmonary disease (COPD)
IV	A patient with an incapacitating disease that is a constant threat to life	Advanced COPD, cardiac failure
V	A moribund patient who is not expected to live 24 hours with or without surgery	Ruptured aortic aneurysm, massive pulmonary embolism
E	Emergency case	

Source: Adapted from American Society of Anesthesiologists (2013).

Thanavaro J. Cardiac Risk Assessment: Decreasing Postoperative Complications. *AORN Journal* [serial online]. February 2015;101(2):201-212

Preop Assessment Key Factors

1) Assess the potential risk of the intended surgery

2) Cardiovascular Stability

3) Pulmonary Capacity

4)Medication Assessment

Medication Assessment

- Begins with a full history of the patient's medication use
- Specifically ask about the last 3 months and use of any of the following:
  - Steroids
  - Antibiotics
  - New medications or changes,
    - as these all could have additional implications to management
- Be certain to ask about OTC medications and supplements

Medication Considerations

- What needs to be held and for how long?
- What should the patient do about held meds?
- What meds are important to continue taking?
- What needs to be monitored in the perioperative period?

Key Medication Categories

- HTN Meds

  -Beta blockers, ACE inhibitors, ARBS , Calcium Channel Blockers, Diuretics
- Statins
- Diabetic Meds

  -Insulin, oral meds, and injectable
- Anticoagulants
- Steroids
  - Recent use or chronic – what to watch for
- Miscellaneous
  - Psychiatric meds, anti-seizure meds, GI meds, hormones

HTN Meds

- All BP meds have been implicated as causes of intraoperative hypotension
- Beta-blockers have been the most extensively studied, ACE inhibitors next
- Limited studies on Calcium Channel Blockers
- Diuretic not specifically studied

BETA-BLOCKERS (BB)

Beta-Blockers (BB)

- Initially in the 1990's BBs were recommended for all patients with any cardiac risk factors who were undergoing surgery

- Benefits to support the recommendation included:
  - lowering of heart rate
  - decreased QT
  - decreased afterload
  - decreased myocardial oxygen consumption
  - prevention of perioperative tachycardia and subsequent non-ST elevation myocardial infarction
  - prevention of arrhythmia (atrial fibrillation)
  - decrease in bleeding

Beta-Blockers (BB)

- Recommendations were updates in the early 2000s after specifically identifying that is was heart rate management that imparted the greatest benefits
  - Goal of HR of ~60bpm
- In 2015 ACC/AHA guidelines indicate that starting BBs in pt not otherwise on the medication was not necessarily protective and might impart increased risk of stroke

Beta-Blockers -Summary

- For patients already on BB they should remain on their therapeutic dose throughout the perioperative period without disruption

- For patients at high risk for cardiovascular complications (known CAD, hx of MI, DM) or high-risk procedures BB initiation **could** be considered, if sufficient time for titration based on HR is possible

Calcium Channel Blockers (CCB)

- No specific studies found to address withdrawal or continuation of CCB
- There was evidence from one large cohort study of reduced in-hospital mortality, but this was not supported in 2 other cohort studies
- Consensus recommendation is that if the pt is on a CCB they should continue the med perioperatively when possible to stabilize heart rate and rhythm

Castanheira L, Fresco P, Macedo A. Guidelines for the management of chronic medication in the perioperative period: systematic review and formal consensus. *Journal Of Clinical Pharmacy & Therapeutics* [serial online]. August 2011;36(4):446-467.

ACE inhibitors and ARBS

- Hemodynamic controls were more difficult to manage in patients peri-operatively when ACE or ARB medication was taken preoperatively but no significant effect on cardiovascular events or morbidity have been identified

- Volume levels needs to monitored in HTN patients to avoid hypotension and hypovolemia

- There is varied opinions or holding or continuing these medications preoperatively, but according to the ACC/ AHA guidelines are generally considered safe to continue if pt is stable on chronic therapy

Diuretics

- Generally recommended that diuretics be held the morning of surgery to avoid unpredictable fluid volume and electrolyte changes

- Restart once oral intake of fluids resumes

HTN Med Summary

- Highlights:
  - Beta-blockers and CCB should be continued throughout the peri-operative process
  - ACE, ARBs vary in clinical implication to continue or hold, but ACC/ AHA guidelines indicate generally safe to continue
  - Diuretics should be held the morning of surgery to avoid fluid and electrolyte abnormalities and worsening hypotension episodes

STATINS

Statins

- Have cardio-protective characteristics including decreased inflammation and stabilization of coronary vessels
- Best taken at night and therefore should be continued preoperatively and ongoing
- The 2014 ACC/AHA guideline supports perioperative continuation of long-term statin therapy and initiation of statins in patients who are undergoing vascular surgery or who have a clinical indication and will be undergoing a high-risk procedure.

DIABETIC MEDICATIONS

Diabetic Risks and Surgery

- Diabetics are more likely to undergo surgery for any reason than non-diabetics
- The stress of surgery creates a significant neuroendocrine response that results is numerous abnormal glucose management effects including:
  - Insulin resistance
  - decreased peripheral glucose utilization
  - Impaired insulin secretion
  - Protein catabolism
- All resulting in hyperglycemia and even ketosis
- These can be attenuated by caloric restriction immediately prior to surgery

Diabetic Risks and Surgery

- Despite the known risk for hyperglycemia-

  "The greatest risk to a diabetic patient during surgery is hypoglycemia"

- There are considerable control measures that can be implemented in the operative period to regulate glucose
  - Goal range is 140-200 mg/dl during surgery

- Therefor medication adjustments should be made in accordance with the preoperative scenario that will best reduce the risk of hypoglycemia and identify quickly management needs for hyperglycemia

ASA newsletter 10.17.12

Diabetic Medication Categories

- Oral medications
  - Metformin, sulfonylureas, biguanides, DDP4s,
- Non-insulin injectables
  - GLP-1Inhibitors
- Insulin

Oral Diabetic Meds

All DM oral meds are recommended to be held the morning of surgery for the following reasons:

- Metformin – Due to potential renal implication from hypoperfusion
  - Should not be restarted until compent renal function is established
- Sulfonylureas have been implicated most with hypoglycemia
  - For more fragile diabetics consider holding this med 48 hours before surgery due to residual effects

Oral Diabetic Meds (cont)

- TZDs indicated in fluid retention and peripheral edema
- SGLT2 inhibitors can effect volume management as well as AKI and concerns for euglycemic ketoacidosis
- DPP4 inhibitors do not work without glucose and therefore are safe to continue if desired – but to reduce confusion with patients can be held without concern the morning of surgery

Injectable DM Meds

- GLP-1 analogs
  - Most significant effect is on GI motility which can create significant postoperative challenges
  - Therefor recommended to hold these medication in the immediate preoperative setting which can include the night before if determined necessary

Insulin Management

- This is were the Art of Medicine is needed
- There is a large number of "*It Depends*" involved with insulin management surrounding the operative period
- Knowing the possible duration and timing of the surgery helps guide best choices
- Assessing the pts stability of glucose control also impacts the management options

Insulin Management – It Depends

- How long is the surgery?
  - Short procedures early in the day where breakfast is just delayed do not necessarily need any adjustments
  - Longer procedures (more than 4 hrs) would warrant holding short acting insulin

- Do they use Long Acting Insulin?
  - Basal insulin for Type 1 DM should continue
  - Type 2 DMs should be assessed for fragility regarding possible changes to dose
    - (reduce the dose or hold all together)

Insulin Management – It Depends

- Do they take 2 different types of insulin?
  - Consider reducing the dose by ¼-½ the usual dose of both the night before or morning of surgery depending on usual dosing time

- Insulin Pump?
  - Usually can continue basal rate- anesthesia may d/c pump and manage independently
  - make sure to highlight pump use in recommendations

Diabetic Meds

- Hold oral meds the morning of surgery
- Hold all incretin medications the day of surgery
  - Could continue DPP-4 Inhibitors
    - but why? –That's just confusing
- Insulin should be adjusted based on the type and fragility of the patient
- Insulin pumps- continue basal insulin until surgery

Diabetic Med Summary

- Insulin management requires a very personalized approach
- Curbside consults with the endocrinology provider, certified diabetic educator, pharmacist or nurse specialist are always helpful

ANTICOAGULANTS

Anticoagulants

- Not all surgeries require holding of anticoagulants
  - Consider the potential bleeding risk and severity of the surgery
- ASA (and all other NSAIDS) should be held for at least 5 days, but ASA is best if held for 7-10 due to platelet effect
- Most non-coumadin meds are recommended to be held for 5 days prior
  - But some can be stopped as close as 48hrs – check each brand specifics
- Coumadin should be held 5-7 days prior to surgery
- Must determine if bridging with lovenox or heparin is needed

Anticoagulant Considerations

- **Bridging should be considered in pts with:**
  - Prior stroke or systemic embolic event
  - Mechanical mitral valve
  - Mechanical aortic valve and additional stroke risk factors
  - Atrial fibrillation and multiple stroke risk factors
  - Venous thromboembolism (VTE) within the previous three months
  - Recent coronary stenting
  - Previous thromboembolism during interruption of chronic anticoagulation
  - Active or recent cancer

Anticoagulant Special Tips

- Low bleeding risk surgeries do not necessarily require disruption to anticoagulant therapy
  - Ex. Cataracts, dental cleanings, skin procedures
  - Interestingly:
    - Select cardiac procedures (implantable devices)

    and
    - Endovascular procedures showed equal or improved outcomes if anticoagulant therapy was not disrupted
- When in doubt curbside consult cardiology

STEROIDS

Steroids

- Risk of adrenal insufficiency and cortisol deficiency that can occur during periods of stress, like surgery
- This can result in an inadequate stress response, and increase the risk of refractory hypotension and shock
- If the patient is on chronic steroids of 5mg or more then stress dose steroids should be considered
- Also if the patient was on 20mg or more for more than 5 days in the last 3 weeks – consider stress dose
- Most chronic doses can be continued at usual doses unless extreme physical stress anticipated

Stress Dose Steroids

- Cochran review and numerous studies have been unable to adequately define what a “stress dose” is
- Most research indicates continuing the same daily dose is sufficient
- Many long time practicing internists or anesthesiologists have more intense regimens they utilized based on the pts daily dose
- The most important thing is to indicate you are aware of the steroid use and how you recommend managing it

MISCELLANEOUS MEDICATION CONSIDERATIONS

Psychiatric Meds

- No specific studies noted to compare withdrawal of medication of any category
- Generally considered safe to continue these medications throughout the operative period, as complications of unmanaged seizure likely worse
- Could consider reducing to half dose of SSRI's if prolonged NPO status
- Care should be taken to monitor for serotonin syndrome

Anti-seizure Medications

- Stabilizing the neurologic functions improves anesthesia and reduces complications
- Anti-seizure medication should be continued and neurologic activity monitored closely

GI meds

- Management of reflux has been shown to reduce aspiration complications in the perioperative period

- These medications, including H2 Blockers and PPIs should be continued per pts usual regimen

Thyroid Medications

- **Balanced hormones are best !**
- Continue meds per usual unless specific reason to alter dosing
  - Such as brain, thyroid or other endocrine surgery

Estrogen Medications

- Again

  Balanced hormones are best !!!

- Consideration for DVT risk should be reviewed
  - However, those risks should have been addressed before such medication are started

Estrogen Medications

- OCPs should be continued throughout the surgical period

- HRT could be considered to be stopped if DVT risk is high –
  - but some studies suggest stopping within 4 weeks of surgery could create more disruption than benefit

General Medication Considerations

- Consider the impact of the medication:
  1. What will happen if we stop it?
  2. What will happen if we don't stop it?

  Answer those 2 questions and preoperative recommendation will make more sense

- Is this something that can be given IV if needed during the procedure?

Educating the Patient about Preop Med Changes

- Recent research project from Mayo Clinic in Jacksonville FL titled:

  Improving preoperative medication instructions and patient adherence: A collaborative, hospital-based quality improvement project. Journal Of Perioperative Practice [serial online]. March 2015;25(3):40-45.

Identified 2 significant barriers to proper medication management in the preoperative patient

Pt Ed Research

1. Patients did not understand most preoperative instruction, resulting is significant noncompliance with recommendations

2. Many providers gave incorrect or insufficient instructions based on standard guidelines

Pt Ed Research

- Positive Interventions
  - Creation of an organizational wide medication instruction sheet improve clarity of pt education
  - Implementation of a Pre-anesthesia medical evaluation clinic improved medication management accuracy
  - Quick reference cards and online learning module on the clinic's website improved medication management and proper instruction accuracy as well, especially for primary care providers.

Conclusion

- Medication Considerations in the Pre-operative Patient required diligence
- Understanding the main mechanism of action of the drugs being managed is key to making good recommendations
- Having guidelines easily accessible improves accuracy
- Each patient's medication management must be considered individually based on:
  - Health status
  - Co-morbid conditions
  - Intended procedure

Questions

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