Medical Consults Resident Handbook

Samuel Silver, MD

1st edition: 2012

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Approach to Medical Consults

Operation and length of procedure:
□ emergency surgery □ high risk surgery □ intermediate risk surgery □ low risk surgery

Past Medical History:

Cardiac:

Previous MI_____Angina _____ CCS class_____
CHF_____LVEF_____ NYHAclass_____
Prior CABG _____PCI_____
Prior stress tests – what and when?_____
prior ECHO _____ Valvular heart disease_____
CVA/TIA _____HTN_____
PVD_____Arrhythmias_____

Resp:

Asthma _____ COPD _____
OSA _____ on CPAP_____ Pulm HTN _____

Approach to Medical Consults

Endocrine:
Diabetes _____ ☐ diet controlled ☐ OHAs ☐ on insulin
Thyroid _____
steroid use in last year _____

Heme:
bleeding disorders _____
prior DVT/PE _____
☐ ASA ☐ plavix ☐ warfarin ☐ heparin ☐ other_____
anemia_____

Other systems:
renal _____ baseline Cr _____
liver _____ EtOH use _____
MSK _____ RA _____

Approach to Medical Consults

Prior surgeries _____

Medications: see attached list

Allergies_____ Compliant? _____

Functional Status:

□ <4 METS □4-10 METS □>10 METS

What is limiting patients functional status? _____

Metabolic Equivalents

Poor (<4 METs)	Moderate (4-10 METs)	Excellent (>10 METS)
Activities of daily living	Climb a flight of stairs	Heavy housework (scrub floors)
Light housework	Walk at 4mph	Jogging
Walk at 2mph	Golf (without cart)	Singles tennis

Approach to Medical Consults

Physical Exam
Labs

Impression:
Delay surgery? □YES □NO cardiac risk index score _____
perioperative risk for cardiac event _____ %
periop. Pulmonary risk _____%

Recommendations:
Cardiac:
Beta blockers □YES _____ □NO_____
Resp : _____

Endo/Heme/other_____ SBE prophylaxis_____

DVTprophylaxis_____ Medications:_____

High Risk Surgery (risk of SCD or MI >5%)	Intermediate Risk Surgery (risk of SCD or MI 1-5%)	Low Risk Surgery (risk of SCD or MI <1%)
Aortic	Carotid endarterectomy	Ambulatory
Major vascular	Head and neck	Endoscopic procedures
Peripheral artery	Intra-thoracic and intra-peritoneal	Superficial procedures
	Orthopedic	Cataract surgery
	Prostate	Breast surgery

Fleisher et al., J Am Coll Cardiol 2007; 50:e159

Multiple Models:

- Revised cardiac index (Lee, ACP)
- ACC/AHA algorithm
- Modified cardiac risk index (Detsky, ACP)

Revised Cardiac Risk Index (RCRI)

- High risk surgery

(includes intra-thoracic and intra-peritoneal)

- History of ischemic heart disease

(includes MI, positive stress test, angina, nitrate use, or Q-wave on EKG)

- History of CHF
- History of TIA or CVA
- Diabetes on insulin
- Pre-operative serum creatinine over 177µmol/L

Major Cardiac Event Rates by the Revised Cardiac Risk Index.

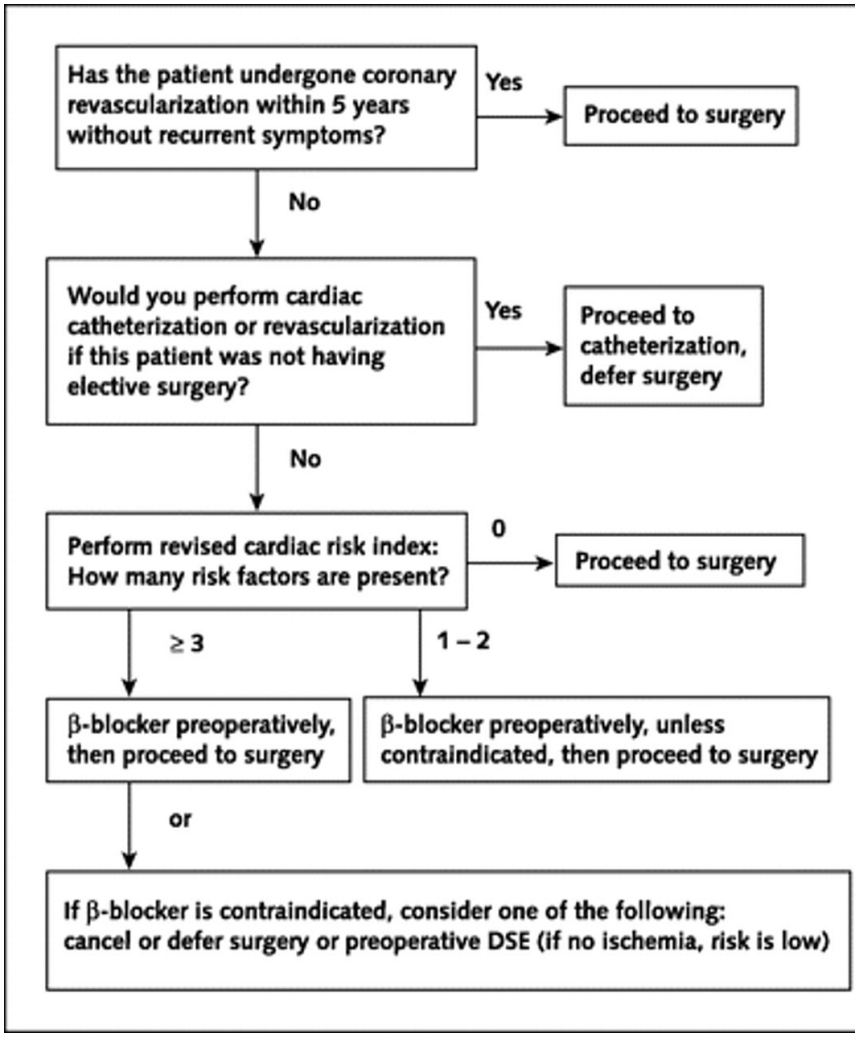
Table 2. **Major Cardiac Event Rates by the Revised Cardiac Risk Index***

Class	Events/Patients, *n/n*	Event Rate (95% CI), %
I (0 risk factors)	2/488	0.4 (0.05–1.5)
II (1 risk factor)	5/567	0.9 (0.3–2.1)
III (2 risk factors)	17/258	6.6 (3.9–10.3)
IV (≥3 risk factors)	12/109	11.0 (5.8–18.4)
ROC curve area	0.806†	

* Adapted from Lee et al. (21). ROC = receiver-operating characteristic.
† $P = 0.034$ versus original cardiac risk index (ROC curve area, 0.701), modified cardiac risk index (ROC curve area, 0.582), and American Society of Anesthesia Classification (ROC curve area, 0.697). Major cardiac events include myocardial infarction, cardiac arrest, pulmonary edema, and complete heart block. Risk factors are high-risk surgical procedure (intraperitoneal, intrathoracic, or suprainguinal vascular reconstruction), history of ischemic heart disease (excluding previous revascularization), history of congestive heart failure, history of stroke or transient ischemic attack, preoperative insulin therapy, and preoperative serum creatinine levels > 152.5 μmol/L (>2.0 mg/dL).

Grayburn P A , Hillis L D Ann Intern Med 2003;138:506-511

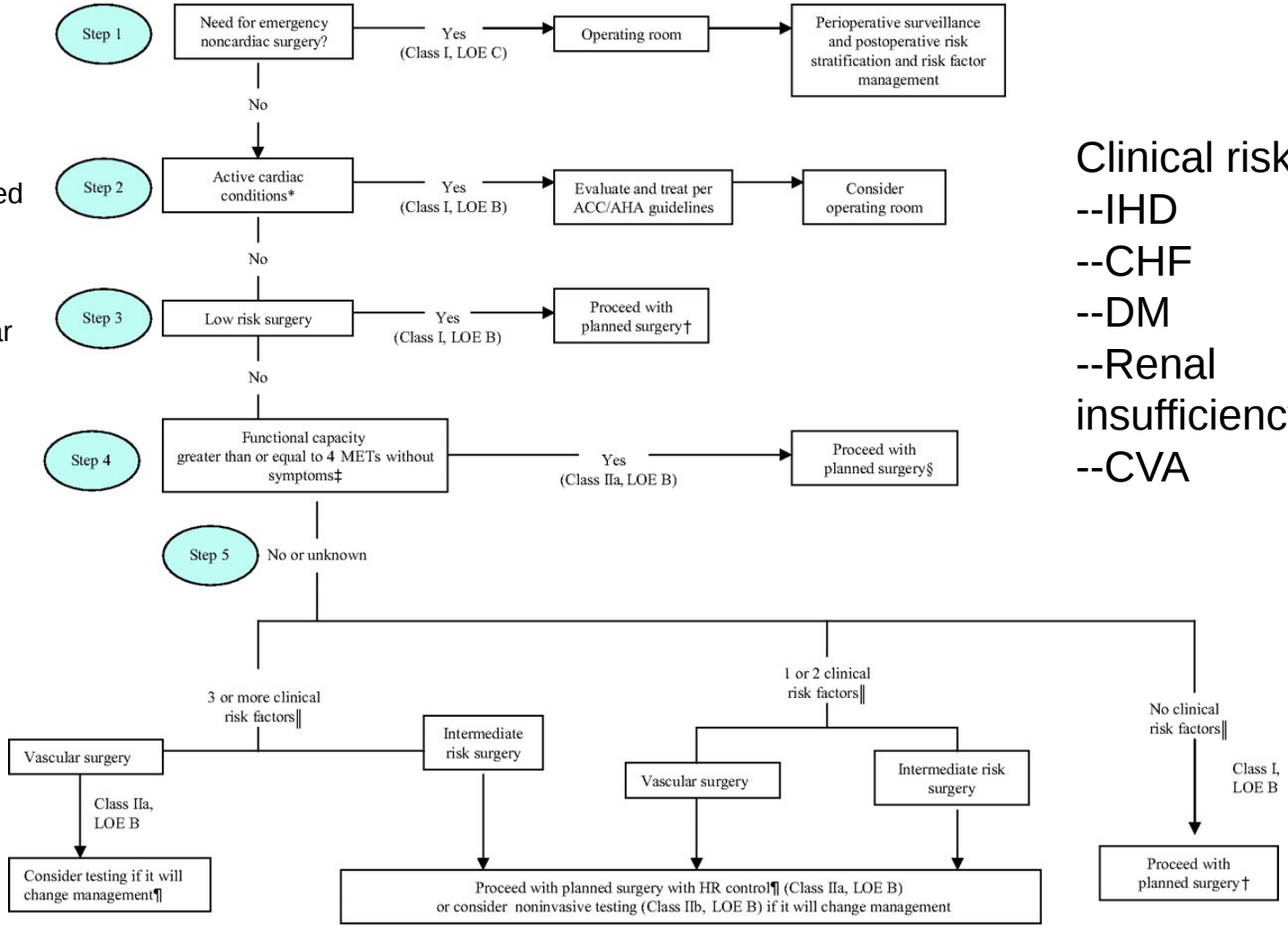
Revised cardiac index (Lee, ACP)



Grayburn P A , Hillis L D Ann Intern Med 2003;138:506-511

ACC/AHA algorithm

Active cardiac conditions:
--ACS
--decompensated CHF
--significant arrhythmia
--severe valvular disease



Clinical risk factors
--IHD
--CHF
--DM
--Renal insufficiency
--CVA

Fleisher L A et al. Circulation 2007;116:e418-e500

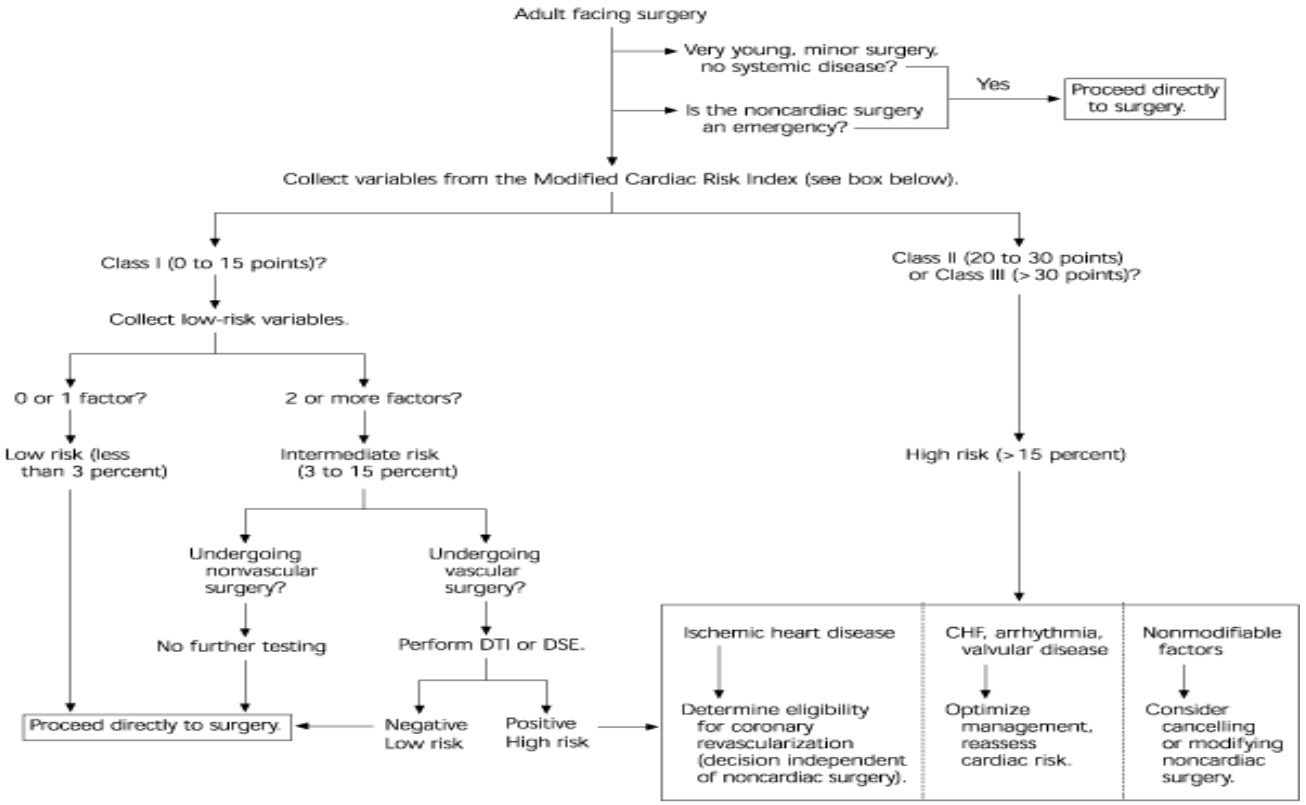
Detsky index

Table 1.—Modified Multifactorial Index

Variables	Points
Coronary artery disease	
Myocardial infarction within 6 mo	10
Myocardial infarction more than 6 mo	5
Canadian Cardiovascular Society angina	
Class 3	10
Class 4	20
Unstable angina within 3 mo	10
Alveolar pulmonary edema	
Within 1 week	10
Ever	5
Valvular disease	
Suspected critical aortic stenosis	20
Arrhythmias	
Sinus plus atrial premature beats or rhythm other than sinus on last preoperative electrocardiogram	5
More than 5 ventricular premature beats at any time prior to surgery	5
Poor general medical status*	5
Age over 70 years	5
Emergency operation	10

*Oxygen pressure <60 mm Hg; carbon dioxide pressure >50 mm Hg; serum potassium <3.0 mEq/L (<3.0 mmol/L); serum bicarbonate <20 mEq/L (<20 mmol/L); serum urea nitrogen >50 mg/dL (>18 mmol/L); serum creatinine >3 mg/dL (>260 mmol/L); aspartate aminotransferase, abnormal; signs of chronic liver disease; and/or bedridden from noncardiac causes.

ACP algorithm using Detsky index



Modified Cardiac Risk Index[a]

Low-risk variables (Eagle criteria)[14]	*Low-risk variables (Vanzetto criteria)*[15]	*Low-risk variables*[15] *(continued)*
Age > 70 years	Age > 70 years	ST-segment abnormalities on ECG
History of angina	History of angina	Hypertension with left ventricular hypertrophy
Diabetes mellitus	Diabetes mellitus	History of CHF
Q waves on ECG	Q waves on ECG	
History of ventricular ectopy	History of myocardial infarction	

Peri-operative beta blockers 2009 ACCF/AHA Guidelines

Fleischmann et al., JACC 2009 54: 2102-2128

- **Class I (benefit>>>risk; procedure should be performed)**
- Beta blockers should be continued in patients undergoing surgery who are receiving beta blockers to treat angina, symptomatic arrhythmias, or hypertension

Peri-operative beta blockers 2009 ACCF/AHA Guidelines

- **Class IIa (benefit>>risk; it is reasonable to perform)**
- Beta blockers titrated to BP and HR are probably recommended for patients undergoing vascular surgery who are at high risk owing to CAD or the finding of cardiac ischemia on preoperative assessment
- Beta blockers titrated to heart rate and blood pressure are reasonable for patients in whom preoperative assessment for vascular surgery identifies high cardiac risk, as defined by the presence of more than 1 clinical risk factor (using the RCRI)
- Beta blockers titrated to heart rate and blood pressure are reasonable for patients in whom preoperative assessment identifies coronary artery disease or high cardiac risk, as defined by the presence of more than 1 clinical risk factor, who are undergoing intermediate-risk surgery

Peri-operative beta blockers 2009 ACCF/AHA Guidelines

Class IIb: (benefit>risk; treatment may be considered)

- The usefulness of beta blockers is uncertain for patients who are undergoing either intermediate-risk procedures or vascular surgery in whom preoperative assessment identifies a single clinical risk factor in the absence of coronary artery disease
- The usefulness of beta blockers is uncertain in patients undergoing vascular surgery with no clinical risk factors who are not currently taking beta blockers

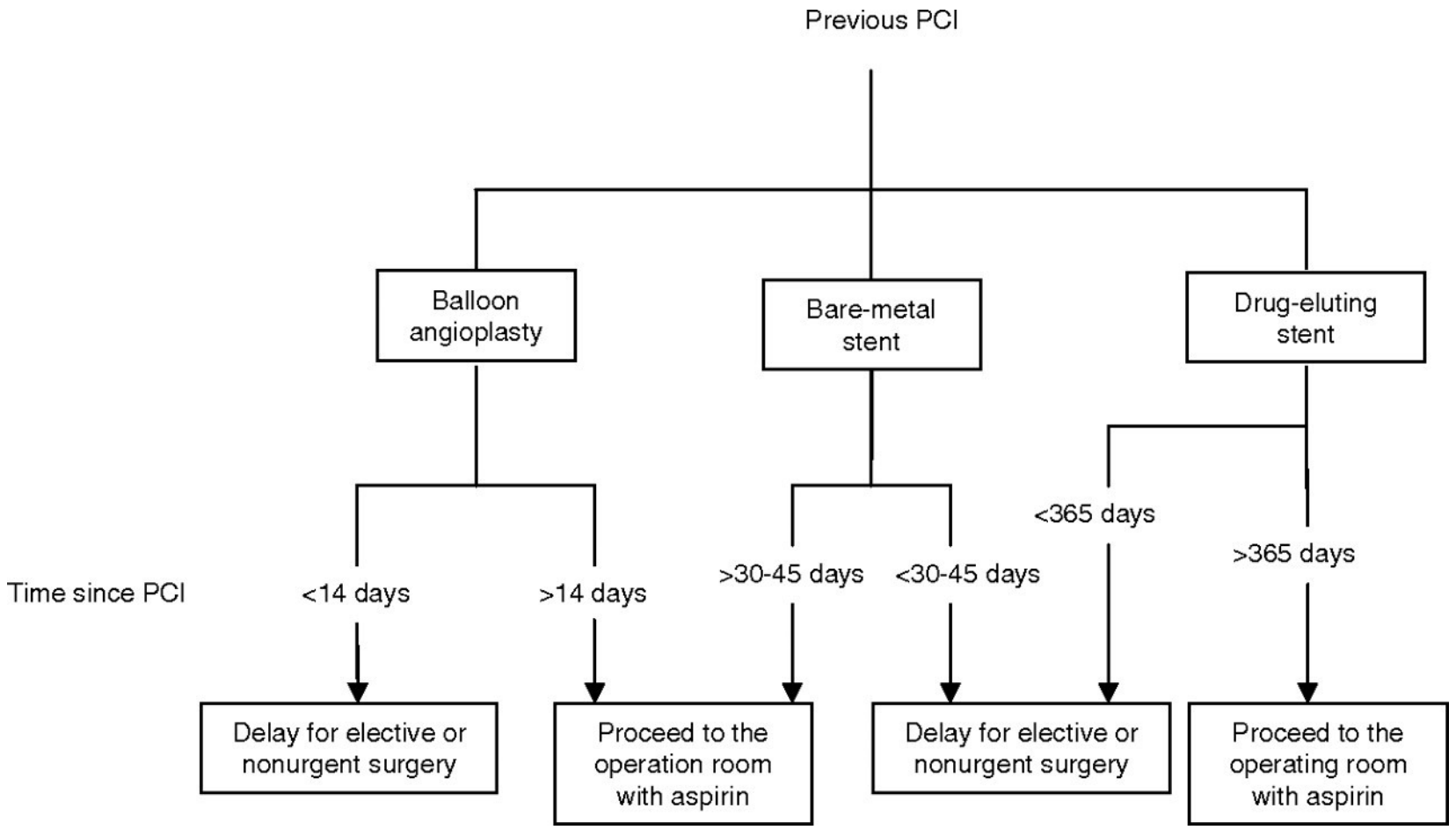
Peri-operative beta blockers 2009 ACCF/AHA Guidelines

- **Class III (risk>benefit; treatment should not be performed)**
- Beta blockers should not be given to patients undergoing surgery who have absolute contraindications to beta blockade.
- Routine administration of high-dose beta blockers in the absence of dose titration is not useful and may be harmful to patients not currently taking beta blockers who are undergoing noncardiac surgery

Peri-operative beta blockers 2009 ACCF/AHA Guidelines

- For those patients in whom a beta blocker is started, the process should begin days to weeks before elective surgery and the dose should be carefully titrated. A heart rate of 60 to 80 beats per minute (in the absence of hypotension) in the perioperative period is thought reasonable.

Figure 2. Proposed approach to the management of patients with previous percutaneous coronary intervention (PCI) who require noncardiac surgery, based on expert opinion.



Fleisher L A et al. Circulation 2007;116:e418-e500

Pulmonary Risk Stratification

post-operative pulmonary complications
Bapoje et al., 2007, Chest, 132; 1637-1645

- Atelectasis
- Infection
- Bronchospasm
- Pulmonary embolism
- Exacerbation of underlying chronic lung disease
- Respiratory failure/prolonged ventilation
- ARDS

Pulmonary Risk Stratification

Table 1. **Patient-Related Risk Factors for Postoperative Pulmonary Complications***

Risk Factor	Studies, *n*	Pooled Estimate Odds Ratio (95% CI)†	I^2, %†	Trim-and-Fill Estimate Odds Ratio (95% CI)‡
Age				
50–59 y	2	1.50 (1.31–1.71)	0.0	–
60–69 y	7	2.28 (1.86–2.80)	50.4	2.09 (1.65–2.64)
70–79 y	4	3.90 (2.70–5.65)	81.6	3.04 (2.11–4.39)
≥80 y	1	5.63 (4.63–6.85)	–	–
ASA class				
≥II§	6	4.87 (3.34–7.10)	0.0	4.87 (3.34–7.10)
≥III§	11	3.12 (2.17–4.48)	65.2	2.55 (1.73–3.76)
Abnormal chest radiograph	2	4.81 (2.43–9.55)	0.0	–
CHF	3	2.93 (1.02–8.43)	92.1	2.93 (1.02–8.03)
Arrhythmia	1	2.90 (1.10–7.50)	–	–
Functional dependence				
Partial	2	1.65 (1.36–2.01)	82.6	–
Total	2	2.51 (1.99–3.15)	67.9	–
COPD	8	2.36 (1.90–2.93)	82.0	1.79 (1.44–2.22)
Weight loss	2	1.62 (1.17–2.26)	91.7	–
Medical comorbid condition	1	1.48 (1.10–1.97)	–	–
Cigarette use	5	1.40 (1.17–1.68)	67.5	1.26 (1.01–1.56)
Impaired sensorium	2	1.39 (1.08–1.79)	63.0	–
Corticosteroid use	1	1.33 (1.12–1.58)	–	–
Alcohol use	2	1.21 (1.11–1.32)	0.0	–

* ASA = American Society of Anesthesiologists; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease.
† For I^2 definition and values, see the Appendix, available at www.annals.org.
‡ Estimates derived from meta-analysis of adjusted odds ratios from multivariable studies.
§ When compared with patients with lower ASA class values.

Smetana G W et al. Ann Intern Med 2006;144:581-595

Annals of Internal Medicine

Pulmonary Risk Stratification

Table 2. **Procedure-Related Risk Factors for Postoperative Pulmonary Complications**

Risk Factor	Studies, *n*	Pooled Estimate Odds Ratio (95% CI)*	I^2, %†	Trim-and-Fill Estimate Odds Ratio (95% CI)*
Surgical site				
Aortic	2	6.90 (2.74–17.36)	97.30	–
Thoracic	3	4.24 (2.89–6.23)	89.70	4.24 (2.89–6.23)
Any abdominal	6	3.09 (2.54–3.77)	59.50	3.01 (2.43–3.72)
Upper abdominal	4	2.96 (2.40–3.63)	66.40	2.91 (2.35–3.60)
Neurosurgery	2	2.53 (1.84–3.47)	71.00	–
Head and neck	2	2.21 (1.82–2.68)	0.00	–
Vascular	2	2.10 (0.81–5.42)	98.70	–
Emergency surgery	6	2.52 (1.69–3.75)	93.80	2.21 (1.57–3.11)
Prolonged surgery	5	2.26 (1.47–3.47)	67.80	2.26 (1.47–3.47)
General anesthesia	6	2.35 (1.77–3.12)	81.70	1.83 (1.35–2.46)
Transfusion (>4 units)	2	1.47 (1.26–1.71)	0.00	–

* Estimates derived from meta-analysis of adjusted odds ratios from multivariable studies.
† For I^2 definition and values, see the Appendix, available at www.annals.org.

Smetana G W et al. Ann Intern Med 2006;144:581-595

Annals of Internal Medicine

Pulmonary Risk Stratification

Table 3. **Summary Strength of the Evidence for the Association of Patient, Procedure, and Laboratory Factors with Postoperative Pulmonary Complications***

Factor	Strength of Recommendation†	Odds Ratio‡
Potential patient-related risk factor		
Advanced age	A	2.09–3.04
ASA class ≥ II	A	2.55–4.87
CHF	A	2.93
Functionally dependent	A	1.65–2.51
COPD	A	1.79
Weight loss	B	1.62
Impaired sensorium	B	1.39
Cigarette use	B	1.26
Alcohol use	B	1.21
Abnormal findings on chest examination	B	NA
Diabetes	C	
Obesity	D	
Asthma	D	
Obstructive sleep apnea	I	
Corticosteroid use	I	
HIV infection	I	
Arrhythmia	I	
Poor exercise capacity	I	
Potential procedure-related risk factor		
Aortic aneurysm repair	A	6.90
Thoracic surgery	A	4.24
Abdominal surgery	A	3.01
Upper abdominal surgery	A	2.91
Neurosurgery	A	2.53
Prolonged surgery	A	2.26
Head and neck surgery	A	2.21
Emergency surgery	A	2.21
Vascular surgery	A	2.10
General anesthesia	A	1.83
Perioperative transfusion	B	1.47
Hip surgery	D	
Gynecologic or urologic surgery	D	
Esophageal surgery	I	
Laboratory tests		
Albumin level < 35 g/L	A	2.53
Chest radiography	B	4.81
BUN level > 7.5 mmol/L (>21 mg/dL)	B	NA
Spirometry	I	

* ASA = American Society of Anesthesiologists; BUN = blood urea nitrogen; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; NA = not available.
† Recommendations: A = good evidence to support the particular risk factor or laboratory predictor; B = at least fair evidence to support the particular risk factor or laboratory predictor; C = at least fair evidence to suggest that the particular factor is not a risk factor or that the laboratory test does not predict risk; D = good evidence to suggest that the particular factor is not a risk factor or that the laboratory test does not predict risk; I = insufficient evidence to determine whether the factor increases risk or whether the laboratory test predicts risk, and evidence is lacking, is of poor quality, or is conflicting. From reference 12.
‡ For factors with A or B ratings. Odds ratios are trim-and-fill estimates. When these estimates were not possible, we provide the pooled estimate.

Smetana G W et al. Ann Intern Med 2006;144:581-595

Annals of Internal Medicine

Pulmonary Risk Stratification

Strategies to reduce complications

Preoperative:

Smoking cessation for eight weeks
Inhaled ipratropium or tiotropium for all patients with clinically significant COPD
Inhaled beta-agonists for patients with COPD or asthma who have wheezes or dyspnea
Preoperative glucocorticoids for patients with COPD or asthma who are not optimized and whose airway obstruction has not been maximally reduced
Delay elective surgery if respiratory infection present
Antibiotics for patients with infected sputum
Preoperative inspiratory muscle trainingentive spirometry in high risk patients
Epidural analgesia in place of parenteral opioids

Pulmonary Risk Stratification

Strategies to reduce complications

Intraoperative:

Choose alternative procedure lasting less than three to four hours when possible
Minimize duration of anesthesia
Surgery other than upper abdominal or thoracic when possible
Regional anesthesia (nerve block) in very high-risk patients
Avoid use of pancuronium as a muscle relaxant in high-risk patients
Choosing laparoscopic rather than open abdominal surgery when possible may be beneficial

Postoperative:

Deep breathing exercises or incentive spirometry in high risk patients
Epidural analgesia in place of parenteral opioids

Anticoagulation

Sunnybrook Guidelines

Principles:

Assume that (for most patients) there is no active thrombosis when the anticoagulants are stopped. This means that significant new thrombosis is unlikely to begin as soon as warfarin is stopped. Even for high thrombosis risk patients, the risk per day off anticoagulants is very low.

The INR does not have to be completely normal to have adequate hemostasis – there is no increased bleeding associated with an INR < 1.5.

If the peri-procedure anticoagulation regimen is too aggressive, bleeding risk will increase and this may result in even more prolonged anticoagulant reversal and, therefore, increased thrombosis risk.

Patients should not spend a day in hospital for anticoagulation alone – admission to hospital for cessation of anticoagulation and bridging with intravenous heparin is rarely (if ever) necessary.

Anticoagulation Sunnybrook Guidelines

There are 3 steps in this management process:

1. Assessment of the procedure-related risk of bleeding i.e. identification of patients who require no interruption in their anticoagulation.

2. Assessment of the risk of thrombosis – this will determine whether “bridging anticoagulation” is recommended or whether the patient can be managed with interruption of the anticoagulation alone.

3. Preparation of an Anticoagulation Management Plan.

Anticoagulation Sunnybrook Guidelines

STEP 1: Assessment of Procedure-Related Bleeding Risk

Procedures generally associated with such a low risk of bleeding that interruption of anticoagulation is NOT required:

- 1. Cataract surgery
  2. Excision of small skin lesions
  3. Upper GI endoscopy (with or without mucosal biopsy)
  4. Diagnostic colonoscopy (without polypectomy)
  5. Most dental procedures (multiple extractions of adjacent teeth and dental surgery generally require some interruption in anticoagulation)
  6. Thoracentesis, paracentesis, arthrocentesis

- In these patients, it is recommended that an INR be obtained within 1 week before the procedure to ensure that it is not supra-therapeutic.

STEP 2: Assessment of Thrombosis Risk

- In certain situations, where the short-term thrombosis risk is high and the procedure is not urgent, delaying the procedure until the thrombosis risk decreases is the preferred option (e.g. recent DVT, recent mechanical heart valve).

Anticoagulation Sunnybrook Guidelines

Low Risk Patients - Patients Generally Requiring Interruption of Anticoagulation Only (No bridging)

DVT or PE more than 3 months ago
Atrial fibrillation (most patients)
Valvular heart disease
Cardiomyopathy
Post myocardial infarction prophylaxis
Stroke prophylaxis
Peripheral arterial disease
Low risk mechanical aortic valves (low risk valve, good LV function, sinus rhythm, no prior TE complications)

In these patients, it is recommended that an INR be obtained 4-7 days before the procedure to ensure that it is not supra-therapeutic.

Anticoagulation Sunnybrook Guidelines

Moderate Risk Patients – Patients in Whom Bridging Anticoagulation is Recommended

DVT less than 3 months ago
Prosthetic mitral heart valves
High risk aortic valves (previous TIA/stroke, atrial fibrillation, severe LV dysfunction)
Cardiac thrombus presumed to be present less than 3 months
Other patients considered to be at moderate thromboembolic risk

- NOTE: For patients who do not fall into one of the risk groups above, a decision about the most appropriate anticoagulant management should be made in conjunction with the patient's relevant specialist (cardiologist, neurologist, cardiac surgeon, vascular surgeon) and/or with the Thromboembolism Service.

Anticoagulation Sunnybrook Guidelines

STEP 3: Preparation of the Anticoagulation Management Plan

Moderate Risk Patients – Patients Requiring Bridging Anticoagulation

- 1. Obtain an INR 5-7 days before the procedure date.
  2. Hold warfarin beginning 5 days before the procedure.
  3. Commence enoxaparin on the 3rd day before the procedure, generally in a dose of approximately 1.5 mg/kg, given in the morning.
  4. An optional INR may be obtained on the day before the procedure. If the INR is greater than 1.7, give vitamin K 1 mg PO on the day before the procedure. If the INR is greater than 2.5, a higher dose of vitamin K should be considered. Then recheck the INR prior to the procedure.
  5. The patient does not require admission the day before the procedure for anticoagulation management.
  6. On the day of the procedure, the patient should not receive a pre-procedure dose of enoxaparin.
  7. After the procedure, the Thromboembolism Service (pager 8170) should be contacted to supervise the subsequent anticoagulant management (unless a specific post-procedure anticoagulant management plan has already been created)

Anticoagulation Sunnybrook Guidelines

STEP 3: Preparation of the Anticoagulation Management Plan

Moderate Risk Patients – Patients Requiring Bridging Anticoagulation…continued

- 8. On the evening of the procedure, a decision will be made about restarting warfarin:
  a) if the patient is actively bleeding or has a high bleeding risk, no warfarin is given
  b) if the patient's post-procedure bleeding risk is low, then warfarin can be restarted at the patient's usual maintenance dose
  9. On the day after the procedure, the TE Service will decide about initiating enoxaparin.
  a) if the patient remains at relatively high bleeding risk, then enoxaparin 40 mg SC daily may be started
  b) if the patient is not at high bleeding risk, then enoxaparin approximately 1.5 mg/kg SC daily may be restarted
  10. Warfarin and bridging enoxaparin will continue until a therapeutic INR has been achieved.

Typical Bridging Anticoagulation Protocol

Protocol Day	Action
-6	Usual dose of warfarin
-5	No warfarin
-4	No warfarin
-3	No warfarin; enoxaparin 1.5mg/kg in AM
-2	No warfarin; enoxaparin 1.5mg/kg in AM
-1	No warfarin; enoxaparin 1.5mg/kg in AM (optional INR…see text for details)
Procedure	Preoperatively=no enoxaparin Postoperatively=depends on bleeding risk (see text for details)
+1	Low bleeding risk=enoxaparin 1.5mg/kg sc od Moderate bleeding risk=40mg sc od Warfarin at usual maintenance dose
+2	Low bleeding risk=enoxaparin 1.5mg/kg sc od Moderate bleeding risk=40mg sc od Warfarin at usual maintenance dose
+3	Low bleeding risk=enoxaparin 1.5mg/kg sc od Moderate bleeding risk=40mg sc od Warfarin at usual maintenance dose
+4	Low bleeding risk=enoxaparin 1.5mg/kg sc od Moderate bleeding risk=40mg sc od Warfarin at usual maintenance dose
+5	Warfarin at usual maintenance dose

TABLE 1. ESTIMATED RATES OF THROMBOEMBOLISM ASSOCIATED WITH VARIOUS INDICATIONS FOR ORAL ANTICOAGULATION, AND THE REDUCTION IN RISK DUE TO ANTICOAGULANT THERAPY.

INDICATION	RATE WITHOUT THERAPY	RISK REDUCTION WITH THERAPY
	percent	
Acute venous thromboembolism*		
Month 1	40	80
Months 2 and 3	10	80
Recurrent venous thromboembolism*†	15‡	80
Nonvalvular atrial fibrillation	4.5‡	66
Nonvalvular atrial fibrillation and previous embolism	12‡	66
Mechanical heart valve	8‡	75
Acute arterial embolism		
Month 1	15	66

*The increase in the risk of venous thromboembolism associated with surgery (estimated to be 100-fold) is not included in these rates.

†The term refers to patients whose last episode of venous thromboembolism occurred more than three months before evaluation but who require long-term anticoagulation because of a high risk of recurrence.

‡The rate shown is per year.

TABLE 3. RECOMMENDATIONS FOR PREOPERATIVE AND POSTOPERATIVE ANTICOAGULATION IN PATIENTS WHO ARE TAKING ORAL ANTICOAGULANTS.*

INDICATION	BEFORE SURGERY	AFTER SURGERY
Acute venous thromboembolism		
Month 1	IV heparin†	IV heparin†
Months 2 and 3	No change‡	IV heparin
Recurrent venous thromboembolism§	No change‡	SC heparin
Acute arterial embolism		
Month 1	IV heparin	IV heparin¶
Mechanical heart valve	No change‡	SC heparin
Nonvalvular atrial fibrillation	No change‡	SC heparin

*IV heparin denotes intravenous heparin at therapeutic doses, and SC heparin subcutaneous unfractionated or low-molecular-weight heparin in doses recommended for prophylaxis against venous thromboembolism in high-risk patients.

†A vena caval filter should be considered if acute venous thromboembolism has occurred within two weeks or if the risk of bleeding during intravenous heparin therapy is high.

‡If patients are hospitalized, subcutaneous heparin may be administered, but hospitalization is not recommended solely for this purpose.

§The term refers to patients whose last episode of venous thromboembolism occurred more than three months before evaluation but who require long-term anticoagulation because of a high risk of recurrence.

¶Intravenous heparin should be used after surgery only if the risk of bleeding is low.

Dabigatran

Pharmacologic Properties:

- Peak level = 2 hours
- 80% renal clearance
- Half-life = 11-17 hours (longer in elderly and those with renal dysfunction)
- No antidote or proven reversal agent (FFP is NOT APPROPRIATE)

Dabigatran

Monitoring of dabigatran patients before an invasive procedure

Relationship between bleeding risk and conventional coagulation tests is uncertain
If the procedure requires reversal of anticoagulation, obtain an aPTT.
If the aPTT is normal, it is reasonable to assume that there is unlikely to be a significant dabigatran bleeding risk.
If the aPTT is >35 seconds, patient management will depend on the bleeding risk of the procedure and the aPTT. It should usually imply delay of the procedure.

Restarting dabigatran following an invasive procedure

The restart of dabigatran after an invasive procedure depends on the post-procedure bleeding risk.
Keep in mind that the patient achieves therapeutic level anticoagulation approximately 2 hours after a dose.

Venous Thromboembolism

Asymptomatic DVT in hospitalized patients not on prophylaxis

Type of Surgery	DVT (%)	Recommended TP Options	Initiation
Medical patients	10-20	--enoxaparin 40mg sc qhs	
General surgery	15-40	--enoxaparin 40mg sc Qam	--0-1 hour pre-op if no epidural --2-4 hours after epidural insertion
Major gynecologic	15-40	--enoxaparin 40mg sc qhs	
Major urologic	15-40	--enoxaparin 40mg sc od	
Neurosurgery	15-40	--TEDs or --enoxaparin 40mg sc od	--if LMWH, start no sooner than day after surgery
Stroke (ischemic)	20-50	--enoxaparin 40mg sc qhs	
Spinal cord injury	60-80	--call TE service	
Hip fracture	40-60	--enoxaparin 40mg sc od	--if surgery is delayed, start enoxaparin on admission
Hip/knee arthroplasty	40-60	--rivaroxaban 10mg po Qam	Morning after surgery
Major trauma	40-80	TE service	
Critical care	10-80	--enoxaparin 40mg sc qhs	

Level of Risk	DVT risk without prophylaxis	Suggested thromboprophylaxis
Low risk --minor surgery in mobile patients --medical patients who are fully mobile	<10%	--No specific prophylaxis --aggressive ambulation
Moderate risk --most general, open gyneologic, or urologic surgery patients --medical patients (bedrest or sick)	10-40%	LMWH or UFH; fondaparinux
High risk --hip/knee arthroplasty; hip # --major trauma, SCI	40-80%	LMWH or UFH; fondaparinux
High VTE and bleeding risk		Mechanical thromboprophylaxis

Endocarditis Prophylaxis

- Need a high risk condition AND a high risk procedure for prophylaxis to be initiated

Endocarditis Prophylaxis

High risk condition

Cardiac conditions associated with the highest risk of adverse outcome from endocarditis for which prophylaxis with dental procedures is reasonable

Prosthetic cardiac valve or prosthetic material used for cardiac valve repair
Previous IE
Cardiac transplantation recipients who develop cardiac valvulopathy
Congenital heart disease (CHD) listed below:
--Unrepaired cyanotic CHD, including palliative shunts and conduits
--Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first 6 months after the procedure
--Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (which inhibit endothelialization)

Dental procedures

Dental Procedures for Which Endocarditis Prophylaxis Is Reasonable for Patients at high risk for developing IE

- All dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa
- The following procedures and events do not need prophylaxis:

--routine anesthetic
--injections through noninfected tissue
--taking dental radiographs
--placement of removable prosthodontic or orthodontic appliances
--adjustment of orthodontic appliances
--placement of orthodontic brackets
--shedding of deciduous teeth
--bleeding from trauma to the lips or oral mucosa

Respirology Procedures

- Invasive procedure of the respiratory tract that involves incision or biopsy of the respiratory mucosa, such as tonsillectomy and adenoidectomy.
- Antibiotic prophylaxis is not recommended for bronchoscopy unless the procedure involves incision of the respiratory tract mucosa.
- For patients who undergo an invasive respiratory tract procedure to treat an established infection, such as drainage of an abscess or empyema, we recommend that the antibiotic regimen administered to these patients contain an agent active against viridans group streptococci

GI Procedures

- The administration of prophylactic antibiotics solely to prevent endocarditis is not recommended for patients who undergo GU or GI tract procedures, including diagnostic esophagogastroduodenoscopy or colonoscopy

GI Procedures

- Patients with infections of the GI or GU tract may have intermittent or sustained enterococcal bacteremia.
- For patients with a high risk condition who have an established GI or GU tract infection or for those who receive antibiotic therapy to prevent wound infection or sepsis associated with a GI or GU tract procedure, it may be reasonable that the antibiotic regimen include an agent active against enterococci, such as penicillin, ampicillin, piperacillin, or vancomycin

Endocarditis Prophylaxis

Oral	Amoxicillin	2g
Unable to take oral medication	Ampicillin	2g IM or IV
	Cefazolin or ceftriaxone	1g IM or IV
Allergic to PCN; able to take oral medication	Cephalexin	2g
	Clindamycin	600mg
	Azithromycin or Clarithromycin	500mg
Allergic to PCN; unable to take oral medication	Cefazolin or ceftriaxone	1g IM or IV
	Clindamycin	600mg IM or IV

Diabetes Management

The goals of perioperative diabetic management include:
Prevention of ketoacidosis
Avoidance of marked hyperglycemia
Avoidance of hypoglycemia

- Beyond avoidance of marked hyperglycemia and hypoglycemia, it is less clear as to how "tight" glucose control needs to be perioperatively
- There is a paucity of controlled trials on the benefits and risks of "loose" or "tight" glycemic control in these patients, with the exception of patients in the intensive care unit or who have had an acute MI.
- In addition, the vast majority of the patients in these studies were not previously known to have diabetes, but developed postoperative hyperglycemia during the course of their ICU care.

Diabetes Management

A subgroup analysis of two randomized trials assessing tight control in the ICU setting raised the possibility that the apparent benefits of tight control may not extend to patients with known diabetes

Thus, the current optimal target for glucose in postoperative patients remains unclear.

Diabetes Management

- Ideally, all patients with diabetes should have their surgeries as early in the AM as possible to minimize glycemic fluctuations while they are NPO

Type 2 DM, no insulin

	Night before OR	AM of OR	Prior to OR (at hospital)	Post-op
Type 2 --diet controlled	N/A	N/A	--check BG and start sliding scale if high --start IV fluid with dextrose if insulin is given	--check BG and start sliding scale if high --start IV fluid with dextrose if insulin is given
Type 2 --OHA	--take usual OHAs	--hold all OHAs	--check BG and start sliding scale if high --start IV fluid with dextrose if insulin is given	--check BG and start sliding scale if high --start IV fluid with dextrose if insulin is given --restart OHAs when eating

On Insulin

General Information

- Patients who use insulin can continue with subcutaneous insulin perioperatively (rather than an insulin infusion) for procedures that are not long and complex
- In the waiting room, check BG and start sliding scale if high
- Start IV fluid with dextrose if insulin is given (eg. 2/3 and 1/3 @ 75-125cc/hr)

On Insulin
Night before OR

- All options are reasonable; the evidence is currently based on expert opinion
- Option 1: switch patients taking long-acting insulin (eg. glargine) to an intermediate-acting insulin one to two days prior to surgery because of a potential increased risk for hypoglycemia.
- Option 2: continue the long-acting insulin while the patient is NPO and start on intravenous dextrose in the waiting room.
- Option 3: reduce the night time (supper or HS) intermediate-acting insulin on the night prior to surgery to prevent hypoglycemia if the patient has borderline hypoglycemia or "tight" control of the fasting blood glucose.
- Basal metabolic needs utilize approximately one half of an individual's insulin even in the absence of oral intake; thus, patients should continue with some insulin even when not eating.
- **This is mandatory in type 1 diabetes to prevent ketoacidosis.**

On Insulin
AM of OR

For minor, early morning procedures where breakfast is likely only delayed, patients may delay taking their usual morning insulin until after the surgery and before eating.

For patients undergoing morning procedures where breakfast and possibly lunch are likely to be missed or for surgeries that take place later in the day:

- Omit any short-acting insulin on the morning of surgery
- For patients who take insulin only in the morning, give between one-half to two-thirds of their usual total morning insulin dose (both intermediate and short-acting insulin) as intermediate or long-acting insulin to provide basal insulin during the procedure and prevent ketosis.

On Insulin
AM of OR

- For patients who take insulin two or more times per day, give between one-third to one-half of the total morning dose (both intermediate and short-acting insulin) as intermediate acting insulin only
- Patients on continuous insulin infusion may continue with their usual basal infusion rate.

Consider starting IV fluid with dextrose if insulin is given (eg. 2/3 and 1/3 @ 75-125cc/hr)

IV Insulin Infusions

- Intravenous insulin is usually required for long and complex procedures (eg. CABG, renal transplant, or prolonged neurosurgical operations)
- Insulin infusions should be started early in the morning prior to surgery to allow time to achieve glycemic control

Post-Operative Management

- The preoperative diabetes treatment regimen (oral agents, oral agents plus insulin, or basal-bolus insulin) may be reinstated once the patient is eating well
- Patients on subcutaneous insulin pre-op:
  --continue on sliding scale along with an iv dextrose solution to prevent hypoglycemia
  --once the patient is able to tolerate food, OHA or other insulin regimens can be titrated back
- If an insulin infusion has been used:
  --it should be continued in patients who do not resume eating postoperatively.
  --switch to subcutaneous insulin when tolerating food

Stress Steroids

The following patients can be considered not to have suppression of their hypothalamic-pituitary-adrenal axis:

- Any patient who has received any dose of glucocorticoid for less than three weeks.
- Patients who have received daily doses of less than 5 mg/day of prednisone or its equivalent.
- Patients treated with alternate-day glucocorticoid therapy if the dose is equivalent to the sum of physiologic replacement for two days.

Stress Steroids

Patients who should be assumed to have functional suppression of hypothalamic-pituitary-adrenal function include:

- Any patient who has received more than 20 mg/day of prednisone or its equivalent for more than three weeks
- Any patient who has clinical Cushing's syndrome.

The intermediate categories of patients are more problematic; specific testing (ie. ACTH stimulation test) may be necessary to determine the presence of HPA axis suppression

Table 2. Guidelines for Adrenal Supplementation Therapy*.

Table 2. Guidelines for Adrenal Supplementation Therapy*

Medical or Surgical Stress	Corticosteroid Dosage
Minor Inguinal hernia repair Colonoscopy Mild febrile illness Mild-moderate nausea/vomiting Gastroenteritis	25 mg of hydrocortisone or 5 mg of methylprednisolone intravenous on day of procedure only
Moderate Open cholecystectomy Hemicolectomy Significant febrile illness Pneumonia Severe gastroenteritis	50-75 mg of hydrocortisone or 10-15 mg of methylprednisolone intravenous on day of procedure Taper quickly over 1-2 days to usual dose
Severe Major cardiothoracic surgery Whipple procedure Liver resection Pancreatitis	100-150 mg of hydrocortisone or 20-30 mg of methylprednisolone intravenous on day of procedure Rapid taper to usual dose over next 1-2 days
Critically ill Sepsis-induced hypotension or shock	50-100 mg of hydrocortisone intravenous every 6-8 h or 0.18 mg/kg/h as a continuous infusion + 50 µg/d of fludrocortisone until shock resolved May take several days to a week or more Then gradually taper, following vital signs and serum sodium

*Data are based on extrapolation from the literature, expert opinion, and clinical experience.[5,6,11,15,20-22] Patients receiving 5 mg/d or less of prednisone should receive their normal daily replacement, but do not require supplementation.[13] Patients who receive greater than 5 mg/d of prednisone should receive the above therapy in addition to their maintenance therapy.

Coursin, D. B. et al. JAMA 2002;287:236-240

Obstetrical Medicine

Chronic/pre-existing hypertension:

--Systolic pressure ≥140 mmHg or

--Diastolic pressure ≥90 mmHg

--Precedes pregnancy or is diagnosed before the 20th week of pregnancy

--can be primary or secondary to a variety of medical disorders

Obstetrical Medicine

Gestational hypertension:

--Systolic pressure ≥140 mmHg or

--Diastolic pressure ≥90 mmHg

--No previous history of HTN

--Diagnosed after the 20th week of pregnancy

--No proteinuria

Obstetrical Medicine

- Pre-eclampsia:

--Systolic pressure ≥140 mmHg or

--Diastolic pressure ≥90 mmHg

--no previous history of HTN

--Diagnosed after the 20th week of pregnancy

--Proteinuria (over 300mg on 24hour urine); 1+ (30mg/dL) on dipstick is suggestive but not diagnostic

Obstetrical Medicine

- Pre-eclampsia superimposed upon chronic HTN:

--chronic HTN

--new onset proteinuria after 20 weeks gestation

--other suggestive features:
low platelets, high LFTs

Severe pre-eclampsia

- CNS dysfunction (HA, visual changes)
- RUQ/epigastric pain
- ALT or AST over twice normal
- sBP over 160 or dBP over 110
- Platelets under 100
- Over 5g over proteinuria per day
- Oliguria
- Pulmonary edema
- Fetal growth restriction

Other helpful tests include hemoglobin, LDH, uric acid, creatinine

Severe pre-eclampsia

- Eclampsia refers to the development of grand mal seizures in a woman with gestational hypertension or pre-eclampsia

Management

- Definitive treatment of preeclampsia is delivery to prevent development of maternal or fetal complications from disease progression
- Consider delivery (and of the following should be an indication for delivery):
  --fetus is near term
  --severe pre-eclampsia
  --complications with mother or fetus
- Consider conservative approach:
  --fetus is at a non-viable gestation age
  --mild pre-eclampsia
  --Mother and fetus are both stable

BP management

- Lowering blood pressure does not affect the course of pre-eclampsia
- Prevents maternal stroke, but could lead to placental under-perfusion
- Guidelines based on consensus opinions
- sBP over 160 or dBP over 110 (some recommend sBP over 150, dBP over 100)
- Consider initiating management if symptoms attributable to hypertension (HA, vision changes, end organ damage)
- Target blood pressure is sBP 130 to 150 and dBP 80 to 100 (consensus opinion)

Acute

- labetalol 20 mg intravenously followed by doses of 20 to 80 mg Q 10 min up to a maximum total cumulative dose of 300 mg
- A constant infusion of 1 to 2 mg/min can be used
- Hydralazine 5 mg intravenously followed by 5-10mg boluses Q 15 min. If a total dose of 30 mg does not achieve optimal blood pressure control, another agent should be used.

Chronic

- Methyldopa 250 mg po bid/tid (max 3000mg)
- Labetalol 100 mg po bid (max 2400mg)
- Nifedipine XL 30 po od (max 120 mg)
- Hydralazine 10 mg po qid (max 300)

Avoid

- Atenolol (low birth weights)
- Diuretics (decrease placental perfusion)

Contraindicated

- Nitroprusside
- ACEi
- ARB

Magnesium

- In a randomized placebo-controlled trial including 10,000 women (MAGPIE), about 100 women with mild preeclampsia and about 60 women with severe preeclampsia would need to be treated to prevent one seizure
- Seizure prophylaxis does not prevent progression of disease unrelated to convulsions
- There is no consensus on the optimal magnesium regimen, when it should be started and terminated, or route of administration
- Magnesium is usually initiated at the onset of labor or induction, or prior to cesarean delivery. It is usually not given to stable antepartum patients off the labor unit

Magnesium

The most common regimen is a loading dose of 6 grams intravenously over 15 to 20 minutes followed by 2 grams per hour as a continuous infusion

There does not appear to be a clear threshold concentration for insuring the prevention of convulsions, although a therapeutic range of 2.0 to 3.5 mmol/L has been recommended

- Dosing should be adjusted in women with renal insufficiency
- The maintenance dose is given only if a patellar reflex is present, respirations exceed 12 per minute, and the urine output exceeds 100 mL per four hours
- Magnesium should be continued for 24 hours postpartum

Post-partum

- Preeclampsia-related hypertension usually resolves spontaneously within a few weeks
- Some cases may take as long as six months to resolve
- Blood pressure may be significantly higher in the immediate postpartum period than antepartum or intrapartum (administration of saline solution, loss of the pregnancy associated vasodilation, NSAIDs)
- Antihypertensive agents may be required temporarily postpartum if hypertension is severe (160/110)
- The blood pressure should be monitored closely, ideally with evaluation in the patient's home, to avoid hypotension as the blood pressure returns to her normal baseline level.

Diabetes in Pregnancy

RECOMMENDATIONS

1. Women with type 1 or type 2 diabetes of reproductive age should:
   a. Use reliable birth control if sexually active and if glycemic control is not optimal *[Grade D, Consensus]*.
   b. Be counselled about the necessity of pregnancy planning, including the importance of good glycemic control and the need to stop potentially embryopathic drugs prior to pregnancy *[Grade D, Consensus]*.

2. Before attempting to become pregnant, women with type 1 or type 2 diabetes should:
   a. Receive preconception counselling regarding optimal diabetes management and nutrition, preferably in consultation with an interdisciplinary pregnancy team, to optimize maternal and neonatal outcomes *[Grade C, Level 3 (47,88,89)]*.
   b. Strive to attain a preconception A1C ≤7.0% (<6.0% if safely achievable) to decrease the risk of:
      • Spontaneous abortions *[Grade C, Level 3 (90), for type 1 diabetes; Grade D, Consensus, for type 2 diabetes]*
      • Congenital malformations *[Grade C, Level 3 (47,91,92)]*
      • Pre-eclampsia *[Grade C, Level 3 (93,94)]*
      • Progression of retinopathy in pregnancy *[Grade A, Level 1A (24), for type 1 diabetes; Grade D, Consensus, for type 2 diabetes]*.
   c. Supplement their diet with multivitamins containing 5 mg folic acid at least 3 months preconception and continuing until at least 12 weeks postconception *[Grade D, Consensus]*. From 12 weeks postconception and throughout the pregnancy, the first 6 weeks postpartum and as long as breastfeeding continues, supplementation should consist of a multivitamin with 0.4 to 1.0 mg folic acid *[Grade D, Consensus]*.
   d. Discontinue medications considered to be potentially embryopathic, including any from the following classes:
      • ACE inhibitors and ARBs *[Grade C, Level 3 (42)]*. In the setting of hypertension, these may be replaced with antihypertensives that are known to be safe in pregnancy (calcium channel blockers, beta-blockers, labetalol, hydralazine and methyldopa) *[Grade D, Consensus]*.
      • Statins *[Grade D, Level 4 (95)]*.
   e. Undergo an ophthalmologic evaluation by an eye care specialist. Repeat assessments should be performed during the first trimester, as needed during the rest of pregnancy and within the first year postpartum *[Grade A, Level 1, for type 1 diabetes (24,96); Grade D, Consensus, for type 2 diabetes]*.
   f. Be screened for nephropathy *[Grade D, Consensus]*. If microalbuminuria or overt nephropathy is found, glycemic and blood pressure control should be optimized to minimize maternal and fetal complications and progression of nephropathy *[Grade C, Level 3 (33,37)]*.

3. Women with type 2 diabetes who are planning a pregnancy or become pregnant should:
   a. Switch from oral antihyperglycemic agents to insulin *[Grade D, Consensus]*. This should preferably be done prepregnancy, except in the setting of PCOS, where metformin can be safely used for ovulation induction *[Grade D, Consensus]*. The safety of metformin beyond ovulation induction in women with type 2 diabetes remains unknown *[Grade D, Consensus]*.
   b. Receive an individualized insulin regimen to achieve glycemic targets, with consideration given to intensive insulin therapy *[Grade A, Level 1 (65)]*.

4. Pregnant women with type 1 or type 2 diabetes should:
   a. Strive to achieve target glucose values:
      • Fasting/preprandial PG: 3.8 to 5.2 mmol/L
      • 1h postprandial PG: 5.5 to 7.7 mmol/L
      • 2h postprandial PG I: 5.0 to 6.6 mmol/L
   b. Perform SMBG, both pre- and postprandially (≥4 times/day if needed) to achieve glycemic targets and improve pregnancy outcomes *[Grade C, Level 3 (47)]*.
   c. Receive nutrition counselling from a registered dietitian who is part of the DHC team during pregnancy *[Grade C, Level 3 (89)]* and postpartum *[Grade D, Consensus]*. Recommendations for weight gain during pregnancy should be based on pregravid body mass index (BMI) *[Grade D, Consensus]*.
   d. Avoid ketosis during pregnancy *[Grade C, Level 3 (97)]*.

5. Women with type 1 diabetes in pregnancy should receive intensive insulin therapy with multiple daily injections or an insulin pump to attain glycemic targets during pregnancy *[Grade A, Level 1A (20,65)]*.

Postpartum

6. Women with type 1 diabetes in pregnancy should be screened for postpartum thyroiditis with a thyroid-stimulating hormone test at 6 weeks postpartum *[Grade D, Consensus]*.

Diabetes in Pregnancy

Standard Subcutaneous Insulin Orders for Pregnant Patients

- There is an antepartum form for use prior to labour & delivery and two intrapartum forms for use in established labour. One is for use in women with Type 2 diabetes and gestational diabetes and the other for women with Type 1 diabetes.
- When you are called to see someone after hours you need first to establish the Type of diabetes (1, 2 or GDM)
- If they have been seen in the Obstetric medicine clinic there should be a letter in EPR outlining the clinical history.
- You also need to know if they are being given betamethasone as this will increase the insulin resistance and affect you choice of insulin dose.

Diabetes in Pregnancy

Test times and goals for blood glucose control in pregnancy

- In pregnancy, we test 2 hours after meals and adjust the dose according to this result.
- However you may want to check the glucose before a meal as well to allow the addition of a correction dose of insulin. This may necessitate more frequent testing than the standard regimen.
- The target fasting glucose is <5.3mmol/l and 2hrs PC<6.7mmol/l.
- Asymptomatic hypoglycemia is not treated unless the glucose is below 3.5mmol/l

Insulin regimens

- If insulin is required because the fasting blood glucose concentration is high, an intermediate-acting insulin, such as NPH insulin, is given before bedtime
- If postprandial blood glucose concentrations are high, insulin aspart or insulin lispro is given before meals
- If both preprandial and postprandial blood glucose concentrations are high or if the woman's postprandial glucose levels can only be blunted if starvation ketosis occurs, then a six injection per day regimen is utilized.
- The insulin is divided according to the following schedule: 50 percent as NPH insulin (given in three equal doses before breakfast, before dinner and before bedtime) and 50 percent as three preprandial rapid-acting insulin injections.

Insulin regimens

- Only insulin aspart and insulin lispro have safety and efficacy data in pregnancy
- There are good data supporting the safety and effectiveness of NPH in pregnancy
- Long-acting insulin analogs (glargine, detemir) have not been studied extensively in pregnancy,

Type 1 diabetes

Expected Outcome

- maintain an optimal blood glucose level of **3.8-6.6 mmol/L** during the intrapartum period.

Intervention:

- Test blood glucose on admission or 2 hours after last meal.
  Have patient monitor BG on arrival and 2hr pc (each meal) prior to active labour.
  Monitor Blood Glucose q1h once in active labour.
  Stop all insulin or pump therapy when in active labour.
  Patient may have clear fluids in labour.
  Initiate IV Lactated Ringers.

Type 1 diabetes

INTRAPARTUM GLUCOSE TESTING:

- Follow sliding scales (insulin drip) on Intrapartum Orders-Adult Type 1 Diabetes
  If BG is 3.4 mmol/L or less, DO NOT START INSULIN DRIP
  At delivery of placenta, change to standard insulin drip nomogram

POSTPARTUM:

- Test glucose once after delivery, at 2h pc meals and bedtime.
  Clear fluids to diabetic diet as ordered
  Complete standard subcutaneous insulin order sheet based upon pre-pregnancy insulin requirements.

Type 1 diabetes

ELECTIVE CAESAREAN SECTION:

- NPO as per standard (Follow NPO guidelines)
- Discontinue all subcutaneous insulin.
- Initiate IV Lactated Ringers
- After Caesarean section follow standard insulin drip.

Type 2 diabetes

Expected Outcome:

- Maintain an optimal blood glucose level of **3.8-6.6 mmol/L** during the intrapartum period.

Intervention:

- Test blood glucose on admission or 2 hours after last meal.
  Have patient monitor BG on arrival and 2hr pc (each meal) prior to active labour.
  Monitor Blood Glucose q1h once in active labour. minutes with changes to the cervix.
  Stop all insulin or pump therapy when in active labour.
  Patient may have clear fluids in labour.
  Initiate IV Lactated Ringers

Type 2 diabetes

Intrapartum Glucose Testing:

- Follow sliding scales (insulin drip) on Intrapartum Orders-Adult Type 2 Diabetes and Gestational Diabetes
  If BG is 3.4mmol/L or less, DO NOT START INSULIN DRIP
  At delivery of the placenta stop IV insulin

Postpartum:

- Test glucose once after delivery, at 2h pc meals and bedtime x 24 hours.
  Clear fluids to diabetic diet as ordered
  Reassess insulin needs based on monitoring above

Type 2 diabetes

Elective Caesarean Section:

- NPO as per standard (Follow NPO guidelines)
- Discontinue all subcutaneous insulin.
- Initiate IV Lactated Ringers

End