

Perioperative Management

PRINCIPLES OF SURGICAL EVALUATION

Surgical Objectives

- 3 broad potential objectives of surgical intervention:
 - 1. Disease prevention.
 - 2. Disease control.
 - 3. Symptom palliation.

Definitions of Urgency & Risk

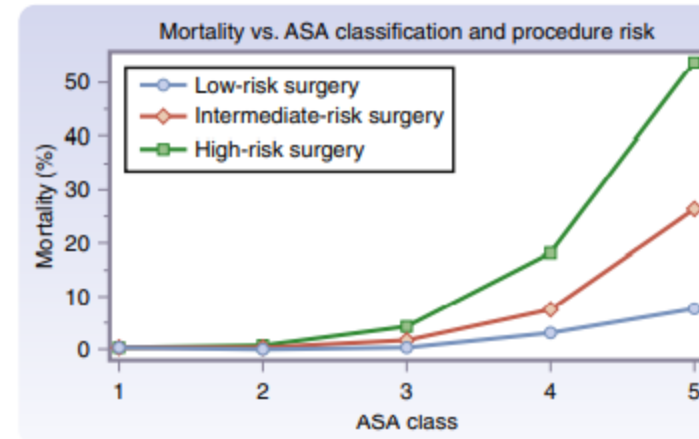
- Emergency < 6h
- Urgency 6-24h
- Time-sensitive procedure >1-6 weeks
- Elective up to 1 year
- MACE- major adverse cardiac event(death/MI)
- 2 Categories:
 - Elevated risk MACE>1%
 - Low risk MACE<1%

Risk Assessment

TABLE 10.1 American Society of Anesthesiologists physical status (ASA PS) classification.

ASA PS	DEFINITION
I	A normal healthy patient
II	A patient with mild systemic disease
III	A patient with severe systemic disease
IV	A patient with severe systemic disease that is a constant threat to life
V	A moribund patient who is not expected to survive without the operation

Adapted from Cohn SL. Preoperative evaluation for noncardiac surgery. *Ann Intern Med.* 2016;165:ITC81–ITC96.



Low risk: <1%

Superficial surgery
 Breast
 Dental
 Endocrine: thyroid
 Eye
 Reconstructive
 Carotid asymptomatic (CEA or CAS)
 Gynaecology: minor
 Orthopaedic: minor (meniscectomy)
 Urological: minor (transurethral resection of the prostate)

Intermediate risk: 1–5%

- Intra-peritoneal: splenectomy, hiatal hernia repair, and cholecystectomy
- Carotid symptomatic (CEA or CAS)
- Peripheral arterial angioplasty
- Endovascular aneurysm repair
- Head and neck surgery
- Neurological or orthopaedic: major (hip and spine surgery)
- Urological or gynaecological: major
- Renal transplant
- Intra-thoracic: non-major

High risk: >5%

- Aortic and major vascular surgery
- Open lower limb revascularisation or amputation or thromboembolism
- Duodeno-pancreatic surgery
- Liver resection, bile duct surgery
- Oesophagectomy
- Repair of perforated bowel
- Adrenal resection
- Total cystectomy
- Pneumonectomy
- Pulmonary or liver transplant

Adapted from the European Society of Cardiology and European Society of Anaesthesiology non-cardiac surgery guidelines.¹
 CAS, carotid artery stenting; CEA, carotid endarterectomy.

¹Surgical risk estimate is a broad approximation of 30-day risk of cardiovascular death and myocardial infarction that takes into account only the specific surgical intervention without considering the patient's comorbidities.

16. בן 43, ברקע יתר לחץ דם, מאוזן עם bisoprolol. מוכנס כעת באופן דחוף לחדר ניתוח בגלל

התנקבות של מעי גס עקב ירי בבטן. מהו ה- American Society of Anaesthesiologists

physical status (ASA PS) שלו?

א. II

ב. IIE

ג. III

ד. IIIE

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- א. II ←
- ב. IIE
- ג. III
- ד. IIIE

Informed Consent

- Disease Diagnosis
- Proposed Procedure
- Risks
- Success of the Procedure
- Mental Capacity
- Alternative treatment options



Geriatric Surgical Patients

Geriatric Surgical Patient

BOX 10.2 ACS NSQIP/AGS collaborative checklist for preoperative assessment of geriatric surgical patients.

In addition to conducting a complete history and physical examination of the patient, the following assessments are strongly recommended:

- Assess the patient's **cognitive ability** and **capacity** to understand the anticipated surgery.
- Screen the patient for **depression**.
- Identify the patient's risk factors for developing postoperative **delirium**.
- Screen for alcohol and other substance abuse/dependence.
- Perform a preoperative **cardiac** evaluation according to the American College of Cardiology/American Heart Association algorithm for patients undergoing noncardiac surgery.
- Identify the patient's risk factors for postoperative **pulmonary** complications and implement appropriate strategies for prevention.
- Document **functional status** and history of **falls**.
- Determine baseline **frailty** score.
- Assess patient's **nutritional status**, and consider preoperative interventions if the patient is at severe nutritional risk.
- Take an accurate and detailed **medication history**, and consider appropriate perioperative adjustments. Monitor for **polypharmacy**.
- Determine the patient's **treatment goals** and **expectations** in the context of the possible treatment outcomes.
- Determine patient's family and social support system.
- Order appropriate preoperative **diagnostic tests** focused on elderly patients.

Cognitive Impairment & Delirium

BOX 10.3 Cognitive assessment with the Mini-Cog and interpretation of the Mini-Cog.

Cognitive Assessment With the Mini-Cog: Three-Item Recall and Clock Draw¹⁴

1. GET THE PATIENT'S ATTENTION, THEN SAY:

"I am going to say three words that I want you to remember now and later.
The words are: *banana, sunrise, chair*. Please say them for me now."

Give the patient three tries to repeat the words. If unable after three tries, go to next item.

2. SAY ALL THE FOLLOWING PHRASES IN THE ORDER INDICATED:

"Please draw a clock in the space below. Start by drawing a large circle.
Put all the numbers in the circle and set the hands to show 11:10 (10 past 11)."

If the subject has not finished clock drawing in 3 minutes, discontinue and ask for recall items.

3. SAY: "What were the three words I asked you to remember?"

Interpretation of the Mini-Cog¹⁴

SCORING:

Three-item recall (0 to 3 points): 1 point for each correct word

Clock draw (0 or 2 points): 0 points for abnormal clock

2 points for normal clock

A NORMAL CLOCK HAS ALL OF THE FOLLOWING ELEMENTS:

All numbers 1 to 12, each only once, are present in the correct order and direction (clockwise) inside the circle.

Two hands are present, one pointing to 11 and one pointing to 2.

ANY CLOCK MISSING ANY OF THESE ELEMENTS IS SCORED ABNORMAL.

REFUSAL TO DRAW A CLOCK IS SCORED ABNORMAL.

Total score of 0, 1, or 2 suggests possible impairment.

Total score of 3, 4, or 5 suggests no impairment.

Mini-Cog, copyright S. Borson (soon@uw.edu).

BOX 10.4 Risk factors for postoperative delirium.

Age greater than 65 years

Cognitive impairment

Severe illness or comorbidity burden

Hearing or vision impairment

Current hip fracture

Presence of infection

Inadequately controlled pain

Depression

Alcohol use

Sleep deprivation or disturbance

Renal insufficiency

Anemia

Hypoxia or hypercarbia

Poor nutrition

Dehydration

Electrolyte abnormalities (hypernatremia or hyponatremia)

Poor functional status

Immobilization or limited mobility

Polypharmacy and use of psychotropic medications (benzodiazepines, anticholinergics, antihistamines, antipsychotics)

Risk of urinary retention or constipation

Presence of urinary catheter

Aortic procedures

Medication Management

- Medication History(Over the counter ,Eye drops ,Vit' ,Herbal products).
- Beta-blockers.
- Adverse effects, drug-drug interaction , impaired renal or liver clearance , perioperative sedation , predisposition to delirium.

Functional Status & Frailty

BOX 10.5 Functional assessments for activities of daily living.

Activities of Daily Living*

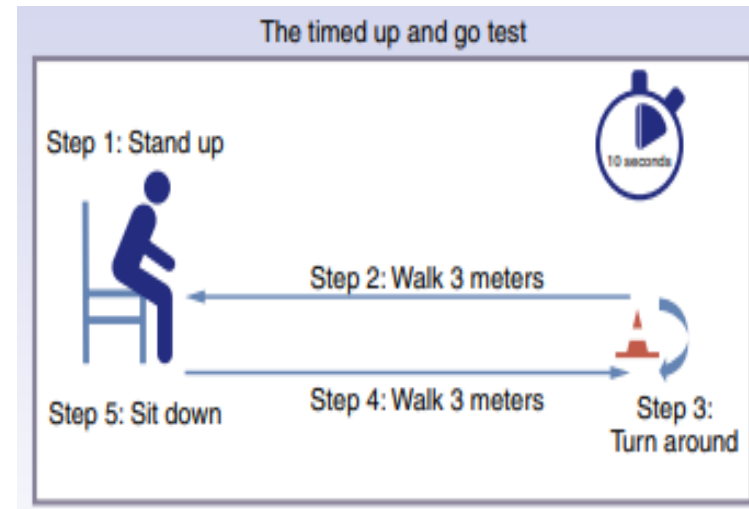
- Bathing
- Dressing
- Toileting
- Transferring
- Continence
- Feeding

Instrumental Activities of Daily Living†

- Telephone ability
- Shopping
- Food preparation
- Housekeeping
- Laundry
- Transportation
- Medication management
- Handling finances

Other

- Muscle strength
- Balance
- Gait
- Walking speed
- Transfer ability



Assessment of exercise and functional capacity

- FCE
- MET's

Functional Capacity
Excellent (>7 METS)
Outdoor work (shovel snow etc.)
Recreation (ski, basketball, jog/walk)
Moderate (4-7METS)
Walk at 4 mph without stopping
Recreation (dance, roller-skate)
Outdoor work (garden, rake, weed)
Poor (<4 METS)
Wash dishes, dust, make bed
Shower/dress without stopping

A functional capacity >4 METs can generally proceed to surgery without further evaluation and acceptable risk. If the surgery is deemed high-risk, and the functional capacity is <4 METs, additional testing may be warranted if it would modify management [8].

Table 3. Perioperative Complications Among Patients With Good or Poor Exercise Tolerance

Perioperative Complications†	No. (%) of Patients		P*
	Good Exercise Tolerance (n = 269)	Poor Exercise Tolerance (n = 343)	
Cardiovascular (total)	14 (5.2)	33 (9.6)	.04
Arrhythmia	10 (3.7)	18 (5.3)	.37
Myocardial ischemia	2 (0.7)	13 (3.8)	.02
Myocardial infarction	1 (0.4)	2 (0.6)	>.99‡
Hypotension	4 (1.5)	6 (1.8)	>.99‡
Congestive failure	3 (1.1)	6 (1.8)	.74‡
Pulmonary (total)	17 (6.3)	31 (9.0)	.21
Hypoxia	8 (3.0)	19 (5.5)	.13
Ventilator ≥24 h	8 (3.0)	9 (2.6)	.79
Pneumonia	4 (1.5)	10 (2.9)	.24
Adult respiratory distress syndrome	2 (0.7)	4 (1.2)	.70‡
Bronchospasm	3 (1.1)	3 (0.9)	>.99‡
Pulmonary embolism	1 (0.4)	1 (0.3)	>.99‡
Other	2 (0.7)	0 (0.0)	.19‡
Neurologic (total)	6 (2.2)	20 (5.8)	.03
Delirium	6 (2.2)	17 (5.0)	.08
Other	0 (0.0)	4 (1.2)	.14‡
Infections (total serious)§	6 (2.2)	10 (2.9)	.60
Surgical site			
Superficial	5 (1.9)	11 (3.2)	.30
Deep	5 (1.9)	6 (1.8)	>.99‡
Bacteremia	1 (0.4)	3 (0.9)	.64‡
Abscess	0 (0.0)	1 (0.3)	>.99‡
Sepsis	0 (0.0)	1 (0.3)	>.99‡
Other	1 (0.4)	4 (1.2)	.39‡
Miscellaneous (total)	6 (2.2)	15 (4.4)	.15
Deep vein thrombosis	2 (0.7)	3 (0.9)	>.99‡
Renal insufficiency	2 (0.7)	3 (0.9)	>.99‡
Alcohol withdrawal	2 (0.7)	3 (0.9)	>.99‡
Fall	0 (0.0)	2 (0.6)	.51‡
Other	1 (0.4)	5 (1.5)	.24‡
Unexpected transfer	15 (5.6)	38 (11.1)	.02
Code blue	2 (0.7)	0 (0.0)	.19‡
Death	2 (0.7)	1 (0.3)	.59‡
Total serious complications‖	28 (10.4)	70 (20.4)	.001

Cardiovascular System

Clinical Parameter	RCRI Point
Prior TIA or CVA	1
Diabetes mellitus requiring insulin therapy	1
Serum creatinine ≥ 2 mg/dL	1
History of coronary artery disease	1
High-risk surgery (chest, abdominal or suprainguinal vascular surgery)	1

Abbreviations: TIA = transient ischemic attack; CVA = cardiovascular accident.

Low risk = 0-1; moderate risk = 2; high risk ≥ 3 . Event rates increase as RCRI score increases.

TABLE 10.2 Surgical risk estimates depending on the type of operation.

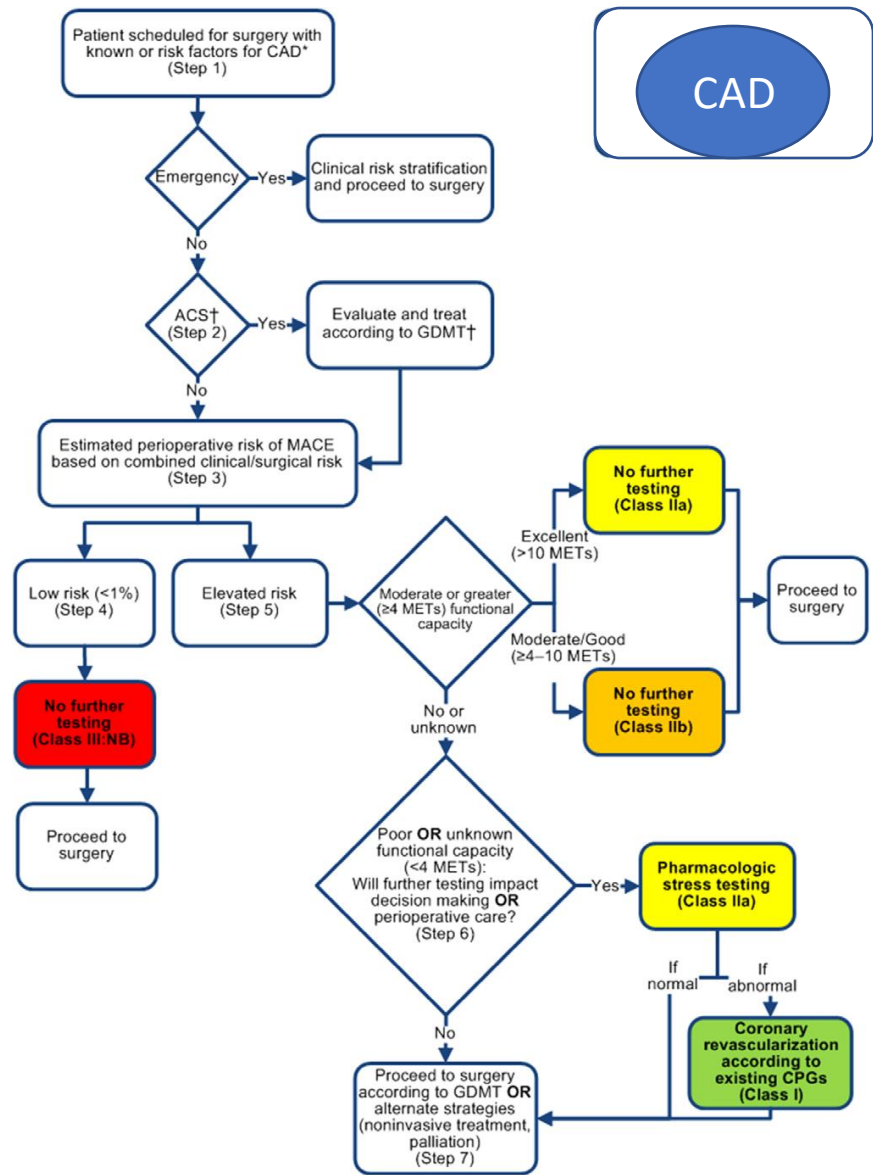
LOW RISK: <1%	INTERMEDIATE RISK: 1%–5%	HIGH RISK: >5%
<ul style="list-style-type: none"> • Superficial surgery • Breast • Dental • Endocrine: thyroid • Eye • Reconstructive • Carotid asymptomatic (CEA or CAS) • Gynecology: minor • Orthopedic: minor (meniscectomy) • Urological: minor (transurethral resection of the prostate) 	<ul style="list-style-type: none"> • Intraoperative: splenectomy, hiatal hernia repair, cholecystectomy • Carotid symptomatic (CEA or CAS) • Peripheral arterial angioplasty • Endovascular aneurysm repair • Head and neck surgery • Neurologic or orthopedic: major (hip and spine surgery) • Urologic or gynecologic: major • Renal transplant • Intrathoracic: nonmajor 	<ul style="list-style-type: none"> • Aortic and major vascular surgery • Open lower limb revascularization or amputation or thromboembolectomy • Duodenopancreatic surgery • Liver resection, bile duct surgery • Esophagectomy • Repair of perforated bowel • Adrenal resection • Total cystectomy • Pneumonectomy • Pulmonary or liver transplant

CAS, Carotid artery stenting; CEA, carotid endarterectomy.

From Kristensen SD, Knuuti J, Saraste A, et al. 2014 ESC/ESA guidelines on non-cardiac surgery: cardiovascular assessment and management: The Joint Task Force on Non-Cardiac Surgery: cardiovascular assessment and management of the European Society of Cardiology (ESC) and the European Society of Anaesthesiology (ESA). *Eur J Anaesthesiol.* 2014;31:517–573.

Cardiovascular System

- 30%
- 4-6 weeks after MI, metal stent 30 days, 1 year after DES.
- BB reduce perioperative mortality by 50%(given 3 weeks before and up to 2 years post surgery).



Pulmonary System

- 6% of all Abdominal Surgery present Pulmonary complication:
- Pneumonia/infection
- Respiratory failure with prolonged ventilation
- Exacerbation of COPD
- Parenchymal collapse with or without effusion

TABLE 10.5 ARISCAT risk score system (top) and associated postoperative pulmonary complication rate by intervals (bottom).

	MULTIVARIATE ANALYSIS		
	OR (95% CI) N = 1624*	β COEFFICIENT	RISK SCORE†
Age (y)			
≤50	1		
51–80	1.4 (0.6–3.3)	0.331	3
>80	5.1 (1.9–13.3)	1.619	16
Preoperative SpO₂ (%)			
≥96	1		
91–95	2.2 (1.2–4.2)	0.802	8
≤90	10.7 (4.1–28.1)	2.375	24
Respiratory infection in the last month	5.5 (2.6–11.5)	1.698	17
Preoperative anemia (≤10 g/dL)	3.0 (1.4–6.5)	1.105	11
Surgical incision			
Peripheral	1		
Upper abdominal	4.4 (2.3–8.5)	1.480	15
Intrathoracic	11.4 (4.9–26.0)	2.431	24
Duration of Surgery (h)			
≤2	1		
>2 to 3	4.9 (2.4–10.1)	1.593	16
>3	9.7 (4.7–19.9)	2.268	23
	2.2 (1.0–4.5)	0.768	8
Emergency procedure	RISK SCORE INTERVALS*		
	LOW RISK (<26 POINTS)	INTERMEDIATE RISK (26–44 POINTS)	HIGH RISK (≥45 POINTS)
Development subsample, no. (%) of patients†	1238 (76.2)	288 (17.7)	98 (6.0)
Validation subsample, no. (%) of patients	645 (77.1)	135 (16.1)	57 (6.8)
PPC rate, development subsample, % (95% CI)	0.7 (0.2–1.2)	6.3 (3.5–9.1)	44.9 (35.1–54.7)
PPC rate, validation subsample, % (95% CI)	1.6 (0.6–2.6)	13.3 (7.6–19.0)	42.1 (29.3–54.9)

Pulmonary System

- **Indications for Lung Function Test:**

- Lung resection.

- One lung intubation(chest surgery).

- Major abdominal surgery in patients <60y Smoking/major morbidity.

- FEV1 < 0.8L/sec or 30% less than expected-Lung complications.

- **Pulmonary perioperative procedures:**

- Stop Smoking.

- Broncodilators.

- Abx in Astma patients.

- Physiotherapy.

- Epidural Anesthesia.

23. איזה מבין הבאים הוא גורם סיכון לסיבוך ריאתי לאחר ניתוח?

a. אסטמה


b. ניתוח חירום

c. גיל פחות מ 40

d. השמנת יתר

23. איזה מבין הבאים הוא גורם סיכון לסיבוך ריאתי לאחר ניתוח?

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d. השמנת יתר

Renal System



Hepatobiliary System

TABLE 10.6 Modified Child-Turcotte-Pugh scoring system with historic-associated survival statistics.

	CLASS A	CLASS B	CLASS C
Total points	5–6	7–9	10–15
Historic 1-year survival	100%	80%	45%
Historic 2-year survival	85%	60%	35%
	POINTS		
VARIABLES	1	2	3
Encephalopathy	None	Grade 1–2	Grade 3–4
Ascites	Absent	Slight	Moderate
Serum albumin (g/L)	>3.5	2.8–3.5	<2.8
International normalized ratio	<1.7	1.7–2.3	>2.3
Total bilirubin (mg/dL) or fl. I. (mg/dL)	<2	2–3	>3
in patients with PBC/PSC	<4	4–10	>10

10. בן 50, ברקע שחמת הכבד. צלול, מתמצא בזמן ובמקום ומדבר לעניין.

מועמד לניתוח אלקטיבי בעוד יומיים עקב ממאירות המעי הגס. בבדיקת הבטן ללא מיימת. בבדיקות מעבדה טרום ניתוחיות –

בילירובין – 2.5, אלבומין – 3, PT – 18 שניות, INR – 2.

מה ההמלצה למטופל זה טרום הניתוח?


- a. להתחיל טיפול במשתנים
- b. לתקן תפקודי קרישה
- c. לטפל בחוסמי בתא, לקטולוז וסנדוסטטין
- d. לשפר רמת חלבון בדם (אלבומין)
- e. ביצוע ביופסיה של הכבד

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- c. לטפל בחוסמי בתא, לקטולוז וסנדוסטטין
- d. לשפר רמת חלבון בדם (אלבומין)
- e. ביצוע ביופסיה של הכבד

Hematologic System

TABLE 10.9 Oral anticoagulants.

DRUG	TRADE NAME	MECHANISM	MONITORING	CLEARANCE	ONSET	HALF-LIFE (HOURS)	PREOP HOLD	POSTOP RESUME	REVERSAL
Warfarin	Coumadin	Inhibitor of vitamin K-dependent factor synthesis	PT/INR	Hepatic (CYP1A2, CYP3A4)	>4 days	36–42	5 days	12–24 hours	PCC, FFP, vitamin K
Dabigatran	Pradaxa	Direct thrombin inhibitor	NA	Renal	1–2 hours	12–17	2 days	2–3 days	Idarucizumab
Rivaroxaban	Xarelto	Direct factor Xa inhibitor	Anti-Xa assay	Hepatic (CYP3A4)	2–4 hours	5–9	2 days	2–3 days	PCC
Apixaban	Eliquis	Direct factor Xa inhibitor	Anti-Xa assay	Hepatic (CYP3A4) Renal	3–4 hours	8–12	2 days	2–3 days	Andexanet alpha PCC Andexanet alpha

Adapted from Sunkara T, Ofori E, Zarubin V, et al. Perioperative management of direct oral anticoagulants (DOACs): a systemic review. *Health Serv Insights*. 2016;9:25–36.

From Carson JL, Guyatt G, Heddle NM, et al. Clinical Practice Guidelines from the AABB: red blood cell transfusion thresholds and storage. *JAMA*. 2016;316:2025–2035.

Hematologic System

- **Anemia**-30% blood loss before symptoms.
- **Check Hb levels**:-Hb<7 Give blood.
-Hb7-10 symptoms? Cardiac patient? give blood.
-Hb>10 no blood.
- **PLT**<50,000-Give PLT.
- **Heparin/LMWH Bridging**-High risk for clot formation(recent VTE/History of CVA/TIA,IHD with high risk for stroke).
- LMWH stop 24h restart 12-24h after surgery.
- Heparin stop 6h restart 12-24h after surgery.

11. בן 58 מועמד לניתוח אלקטיבי לתיקון בקע מפשעתי, מטופל ב apixaban (Eliquis) עקב פרפור עליות כרוני. כמה זמן לפני הניתוח יש להפסיק את התרופה במטרה למנוע דמם ניתוחי?


- a. 6 שעות לפני הניתוח
- b. 12 שעות לפני ניתוח
- c. 24 שעות לפני ניתוח
- d. 2-3 ימים לפני ניתוח
- e. שבוע לפני ניתוח

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e. שבוע לפני ניתוח

104. בן 60, ברקע פרפור עליות, מטופל ב-Rivaroxaban (Xarelto), תפקודי כליות תקינים. נשלח לביצוע קולונוסקופיה לצורך כריתת פוליפ שהודגם בבדיקה קודמת אך לא הוסר אז. מה עליך להמליץ למטופל לגבי הטיפול ב-Rivaroxaban לקראת הבדיקה?

- a. יש להמשיך את הטיפול ללא הפסקה
- b. יש להפסיק את הטיפול 7 ימים לפני הפעולה
- c. יש להפסיק 5 ימים לפני הפעולה ולוודא ש-INR תקין
- d. יש להפסיק יומיים לפני הפעולה ללא צורך במתן הפרין עד הפעולה
- e. יש להפסיק 3 ימים לפני הפעולה ולתת עד הפעולה הפרין

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- e. יש להפסיק 3 ימים לפני הפעולה ולתת עד הפעולה הפרין

Endocrine

- **Diabetes:**

- Diet Control Diabetes-Fast before Surgery as non diabetic.

- Oral medication control-Stop Metformin 48h before surgery.

- Insulin control-Stop long acting insulin,night before surgery use intermediate insulin 2/3& day of surgery ½ of dinsulin dose.

- Use D5W/D10W as crystaloids.

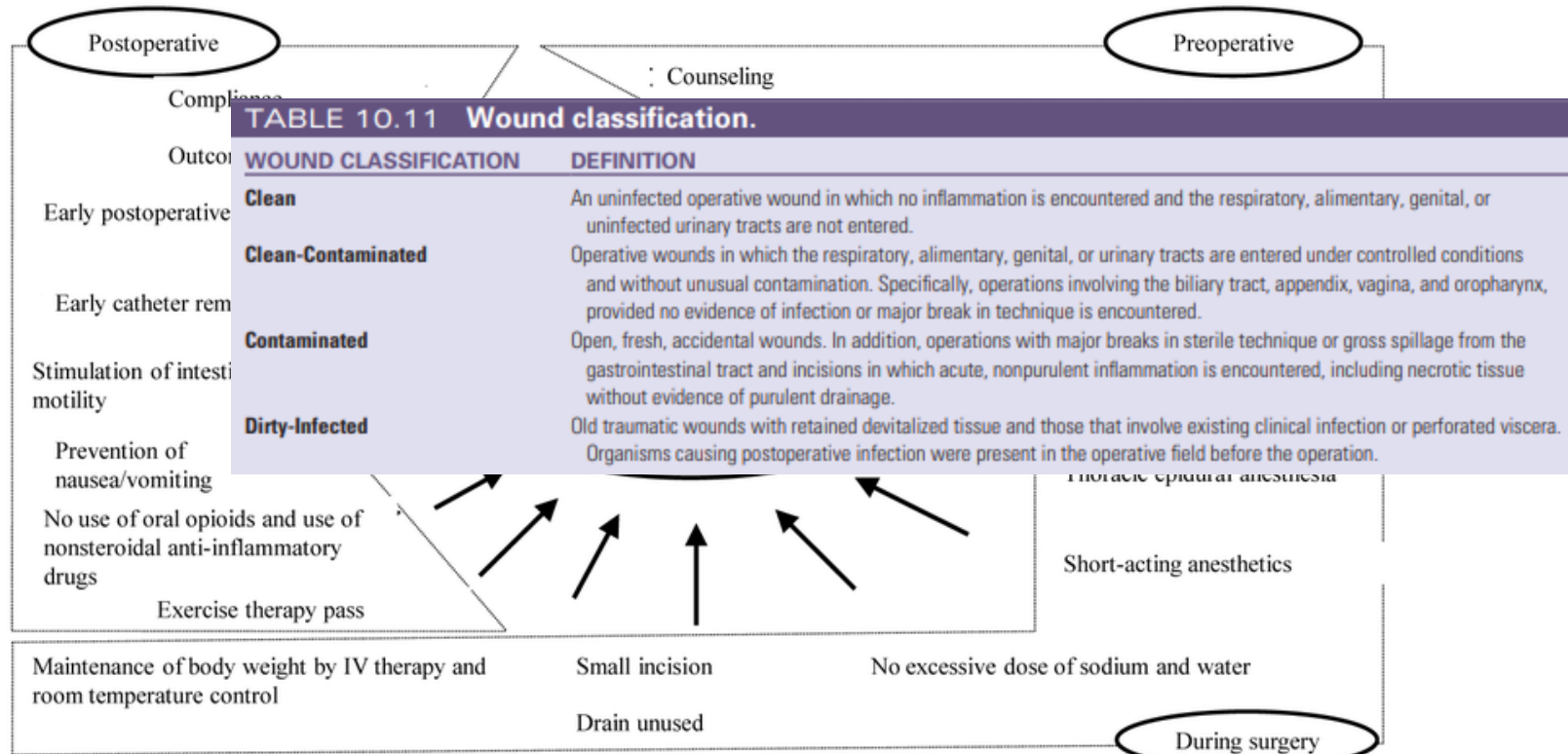
- Assess **Thyroid Function** before surgery(TSH,T4),continue Medication.

- **Adisson's disease:**Prednisone>5mg for 3 weeks/Y-Risk for AI.

- Hydrocortisone:**Low(no)/Intermediate(50-75mg for 1-2d)/high risk operations(100-150mg for 2-3d).

- **Estrogen/Tamoxifen:**Stop one Month before surgery.

Preoperative considerations & care protocols



Prophylactic Abx

- **Risk factors for wound infection:**
Age, Diabetes, Obesity, Immunodeficiency, Undernourishment, previous SSI, Chronic disease.
- **Clean**-no Prophylaxis.
- **Clean-contaminated**-Cefazolin 2g IV 1/2h before surgery.
- **Contaminated+Dirty**-Aerobs&anaerobs before during and after.
- **Colon Preparation:**Meroken 3L+FLEET*2+neomycin&erythromycin 3 doses.(from contaminated to clean contaminated).

Fast Feed

TABLE 10.10 Nutritional Risk Screen (NRS-2002) tool.

IMPAIRED NUTRITIONAL STATUS		SEVERITY OF DISEASE (~INCREASE IN REQUIREMENTS)	
Absent Score 0	Normal nutritional status	Absent Score 0	Normal nutritional requirements
Mild Score 1	Weight loss >5% in 3 months or food intake below 50%–75% of normal requirement in preceding week	Mild Score 1	Hip fracture* chronic patients, in particular with acute complications: cirrhosis,* COPD.* <i>Chronic hemodialysis, diabetes, oncology</i>
Moderate Score 2	Weight loss <5% in 2 months or BMI 18.5–20.5 + impaired general condition or food intake 25%–60% of normal requirement in preceding week	Moderate Score 2	Major abdominal surgery* Stroke*
Severe Score 3	Weight loss >5% in 1 month (>15% in 3 months) or BMI <18.5 + impaired general condition or food intake 0%–25% of normal requirement in preceding week	Severe Score 3	<i>Severe pneumonia, hematologic malignancy</i> Head injury* Bone marrow transplantation* <i>Intensive care patients (APACHE >10).</i>
Score:	+	Score:	= Total score
Age	if 70 years: add 1 to total score above	= Age-adjusted total score	

TABLE 10.15 Recommended minimum fasting periods between oral intake and general anesthesia for elective operations.

INGESTED MATERIAL	MINIMUM FASTING PERIOD
Clear liquids	2 hours
Breast milk	4 hours
Infant formula	6 hours
Nonhuman milk	6 hours
Light meal	6 hours
Fried foods and meat	8+ hours

Adapted from Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures: an updated report by the American Society of Anesthesiologists Task Force on Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration. *Anesthesiology*. 2017;126:376–393.

Score ≥3: the patient is nutritionally at-risk and a nutritional care plan is initiated.
Score <3: weekly rescreening of the patient. If , for example, the patient is scheduled for a major operation, a preventive nutritional care plan is


Nutritional Assessment

- TPN 7 days before surgery-Severe Malnutrition.
- TPN after surgery- Complications.
- **Obesity**:BMI>40 OR BMI>35+Chronic Morbidity+cardiopulmonary risk factors(AHT,LVH,PHT,CHF,IHD).
 - 0-1- Start BB.
 - 2+ Cardiopulmonar risk factors-Cardiologic consult.

14. בת 40, חולת קרוהן מזה 10 שנים, מתאשפזת במחלקה כירורגית ומועמדת לכריתת מעי על רקע מחלתה. איזו מבין בדיקות הדם הבאות היא המהימנה ביותר להערכת המצב התזונתי של המטופלת?

- a. רמת קלציטונין
- b. רמת פרה-אלבומין
- c. רמת הגלוטאמין
- d. רמת TSH

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Operating Room



Thank
you