The Art of Medical Consultation and Preoperative Risk Assessment

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Medical Consultation

- Review role of generalist.
- Understand the evidence for assessing risk.
- Review current algorithm.
- Develop risk classification strategy.
- Discuss tools to evaluate risk.
- Develop framework for the written consultation.

A Clinical Case

- 73 year old woman referred for preoperative risk assessment for THR for OA
- Activity severely limited; no CP or SOB
- Diabetes, mild HTN, s/p TAH
- Meds: Hctz 12.5 mg qd
- PE: 152/90, 86 reg, unremarkable
- Labs: Cr 1.6, Hct 37%
  EKG – LVH
  CXR - normal

Questions to Consider

- Impact of medical problems on patient's risk
- Patient's risk level
- Best possible condition for planned procedure
- Further testing
- Prophylaxes indicated
- Recommendations

The Generalist's Role

- Perform a preoperative assessment of risk.
- Correct reversible risk factors.
- Institute prophylaxis for endocarditis or DVT.
- Anticipate postoperative complications.
- Communicate with surgical team.
- Provide inpatient follow-up.

Risk Assessment

- Medical illnesses and other risk factors
- Determination of risk level
- Final assessment

Part I:
Medical Illnesses & Risk Factors

- Identify medical problems and operative risk.
- Specify risk of thromboembolism or endocarditis.
- Relate these issues to risk of surgical procedure.

Preoperative Testing

- PPV inversely related to disease prevalence

Prevalence	PPV
0.1%	1.9%
1%	16%
50%	95%

- PRCT - cataract surgery (n=19,557)
  - No benefit for preop testing
  - No difference in event rate or cancellations

Schein et al. *NEJM* 2000;342:168-175.

Selective Preop Testing

- Age
- Disease prevalence
- Type of surgery
- Exercise tolerance – 4 blocks, 2 flights

Preoperative Testing

- Recommended
  - Exercise tolerance
  - Full H&P
  - Hematocrit
  - Creatinine
  - Electrocardiogram
  - β-HCG
- Dependent on issues
  - Full CBC
  - Electrolytes
  - Glucose
  - Liver function tests
  - PT/PTT
  - Urinalysis
  - Chest x-ray
  - PFT's

Risks for Thromboembolism

- Age > 40
- Prolonged procedure or immobilization
- Type of surgery (orthopedic)
- Hip fracture
- Underlying malignancy
- Previous TED
- Estrogen use

Risk of Thromboembolism

	Calf DVT	Prox DVT	PE
Low	2	<0.4	<0.002
Moderate	10-20	2-4	0.1-0.4
High	20-40	4-8	0.4-1.0
Very high	40-80	10-20	1-5

Clagett et al. *Chest* 1995;108:312S-334S.

Part II:
Determination of Risk Level

- Physical status classification (ASA)
- Cardiac risk index (Goldman)
- Revised cardiac risk index
- Eagle criteria
- ACC/AHA Task Force Report

Potential Risk Factors

- Advanced age
- Hypertension
- Diabetes
- Renal insufficiency
- LVH on EKG
- DVT risk
- Poor functional capacity
- Hip replacement

Physical Status Classification (ASA Criteria)

I. No systemic, organic or psychiatric disease
II. Mild to moderate systemic disease
III. Severe systemic disturbance
IV. Severe life-threatening systemic disorder
V. Moribund patient not expected to survive

E. Emergency procedure

Cardiac Risk Index

History	Age over 70	5
	MI within 5 months	10
Physical	JVD or S_3	11
	Significant aortic stenosis	3
EKG	Rhythm other than sinus or PACs	7
	More than 5 PVC/min	7
General	$pO_2 < 50$, $pCO_2 > 50$	3
	$K^+ < 3$, bicarb < 20	
	BUN > 50, Cr > 3	
	Elevated ALT or chronic liver disease	
	Bedridden from noncardiac causes	
Procedure	Emergency	4
	Aortic, Intrathoracic or intraperitoneal	3
		53

Goldman et al. *NEJM* 1977;297:845-850.

Cardiac Risk Index

	Points	Major Cx	Death
I	0-5	0.7%	0.2%
II	6-12	5%	2%
III	13-25	11%	2%
IV	>25	78%	56%

Goldman et al. *NEJM* 1977;297:845-850.

Revised Cardiac Risk Index

- 6 independent predictors (n=2893)
  - High risk surgery
  - Ischemic heart disease
  - Heart failure
  - Cerebrovascular disease
  - Preop treatment with insulin
  - Preop Cr over 2 mg/dl

Lee et al. *Circulation* 1999;100:1043.

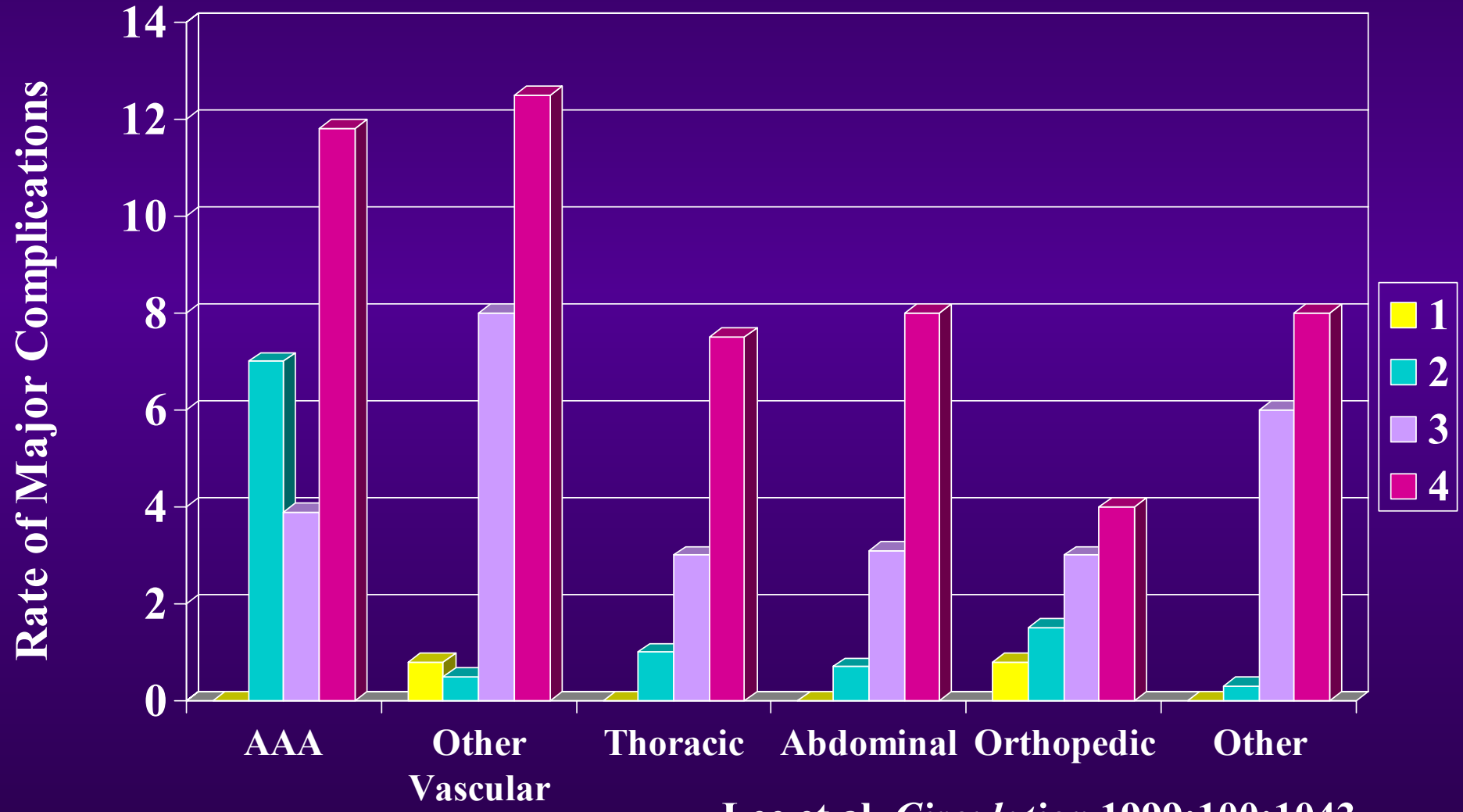
Revised Cardiac Risk Index

- Validated in 1422 patients

# Predictors	Rate of Major Cx
0	0.4%
1	0.9%
2	7%
3	11%

Lee et al. *Circulation* 1999;100:1043.

Revised Cardiac Risk Index



Lee et al. *Circulation* 1999;100:1043.

Eagle Criteria

- 5 clinical predictors of postop cardiac events
  - Q waves on EKG
  - Angina
  - Ventricular ectopy requiring treatment
  - Diabetes requiring therapy
  - Age over 70 years
- # predictors correlate with postop events

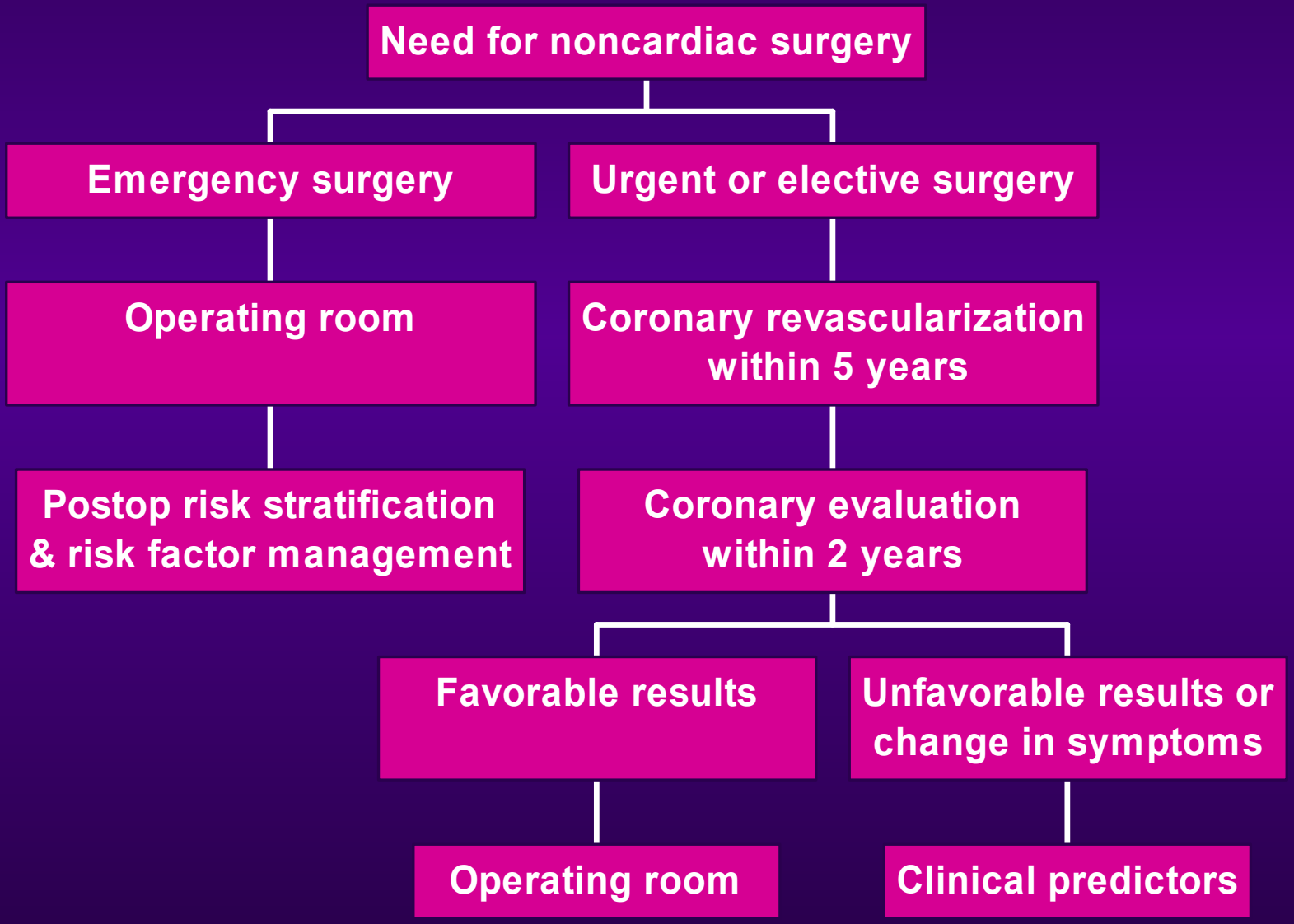
Eagle et al. *Ann Intern Med* 1989;110:859.

ACC/AHA Task Force Report

- Need for noncardiac surgery
- Cardiac history and previous evaluation
- Clinical predictors
- Functional capacity
- Surgical risk
- Tests to determine cardiac risk

***J Am Coll Card* 1996:27:910-948; *Circulation* 1996;93:1278-1317.**

Stepwise Approach



Major Clinical Predictors

- Unstable coronary syndromes
  - Recent MI with important ischemic risk
  - Unstable or severe angina (Class III or IV)
- Decompensated CHF
- Significant arrhythmias
  - High grade AV block
  - Symptomatic ventricular arrhythmias with heart disease
  - SVT with uncontrolled ventricular rate
- Severe valvular heart disease

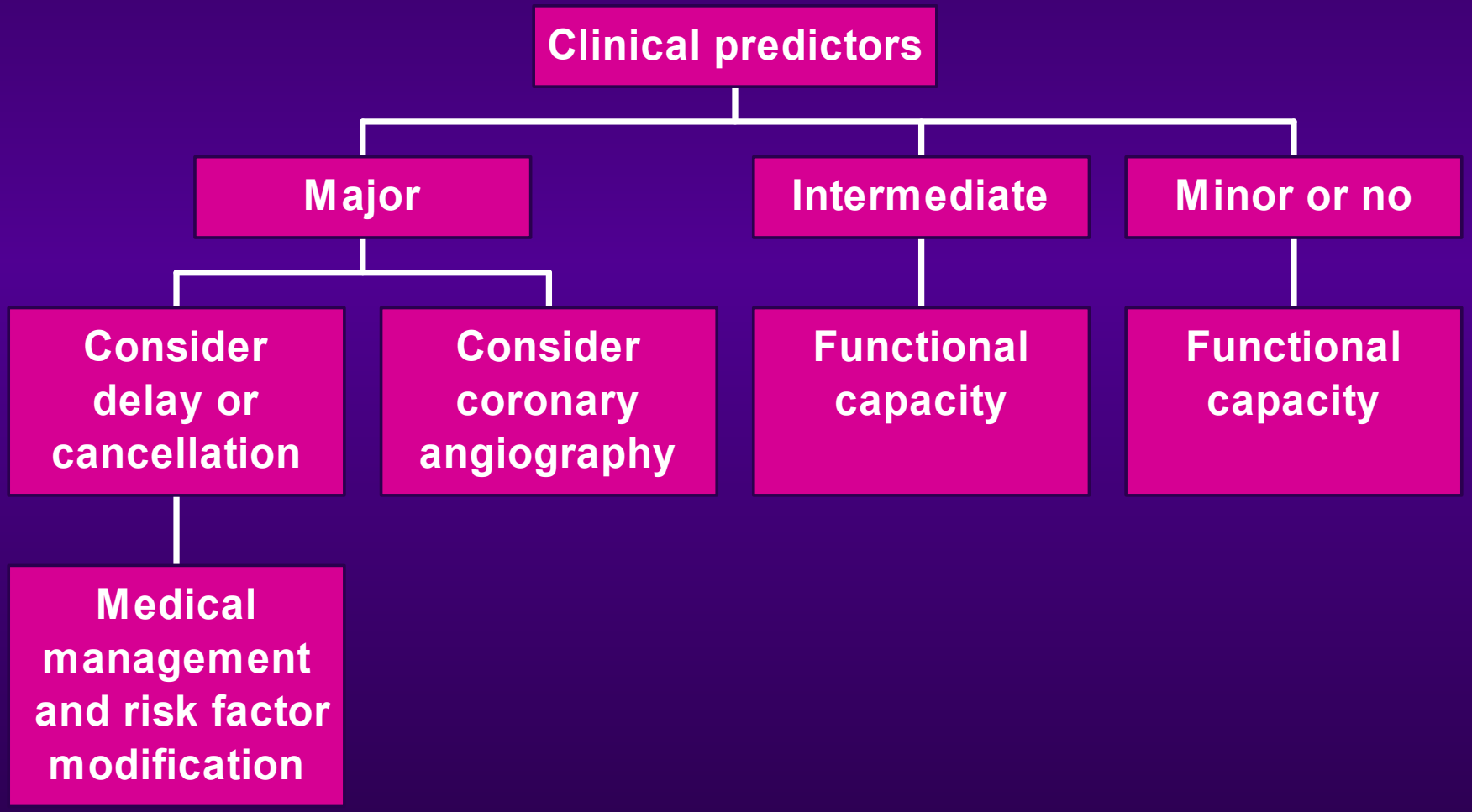
Intermediate Clinical Predictors

- Mild angina (Class I or II)
- Prior MI (by history or Q waves on EKG)
- Compensated or prior CHF
- Diabetes mellitus (esp. insulin-dependent)
- Renal insufficiency

Minor Clinical Predictors

- Advanced age
- Abnormal EKG
  - LVH, LBBB, ST-T abnormalities
- Rhythm other than sinus
- Low functional capacity
- History of stroke
- Uncontrolled systemic hypertension

Using Clinical Predictors



Functional Capacity

1 MET

Take care of self

Eat, dress, use toilet

Walk indoors

Walk 1-2 level blocks (2-3 mph)

Light housework

4 METs

4 METs

Climb flight of stairs or walk up hill

Walk level at 4 mph

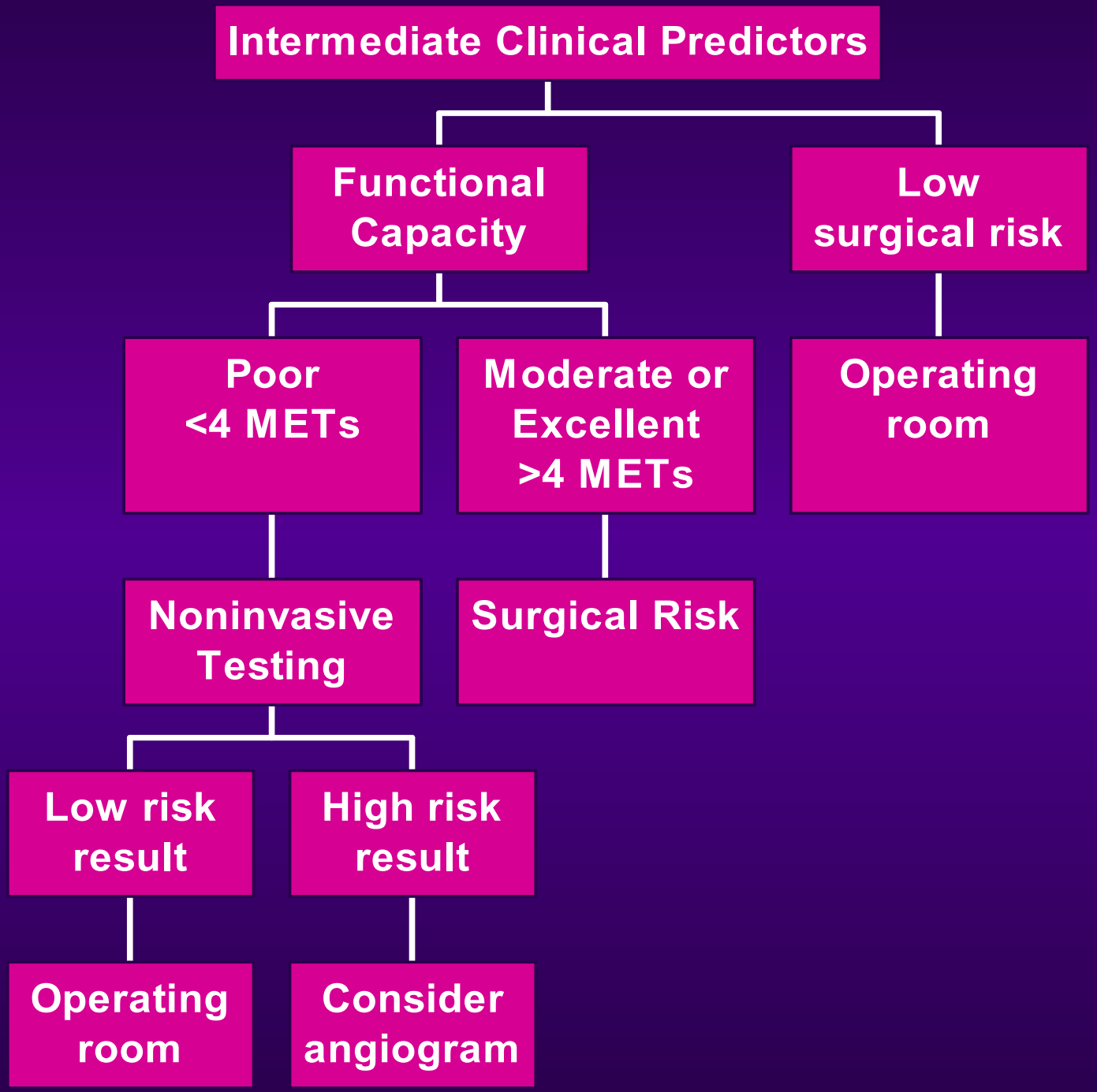
Run short distance

Heavy work

Moderate recreation

Strenuous sports

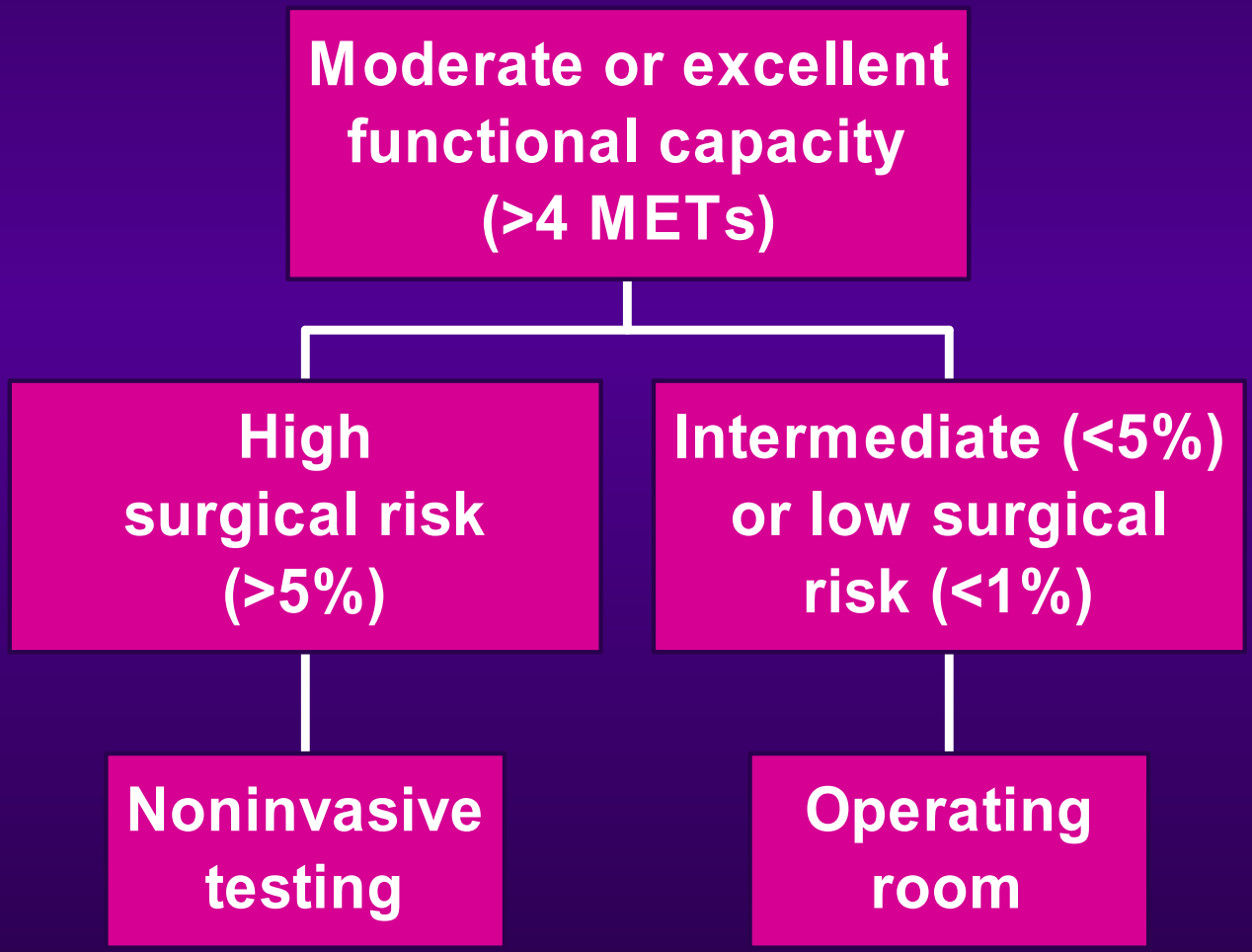
>10 METs


Intermediate Clinical Predictors
Functional Capacity
Low surgical risk
Poor <4 METs
Moderate or Excellent >4 METs
Operating room
Noninvasive Testing
Surgical Risk
Low risk result
High risk result
Operating room
Consider angiogram

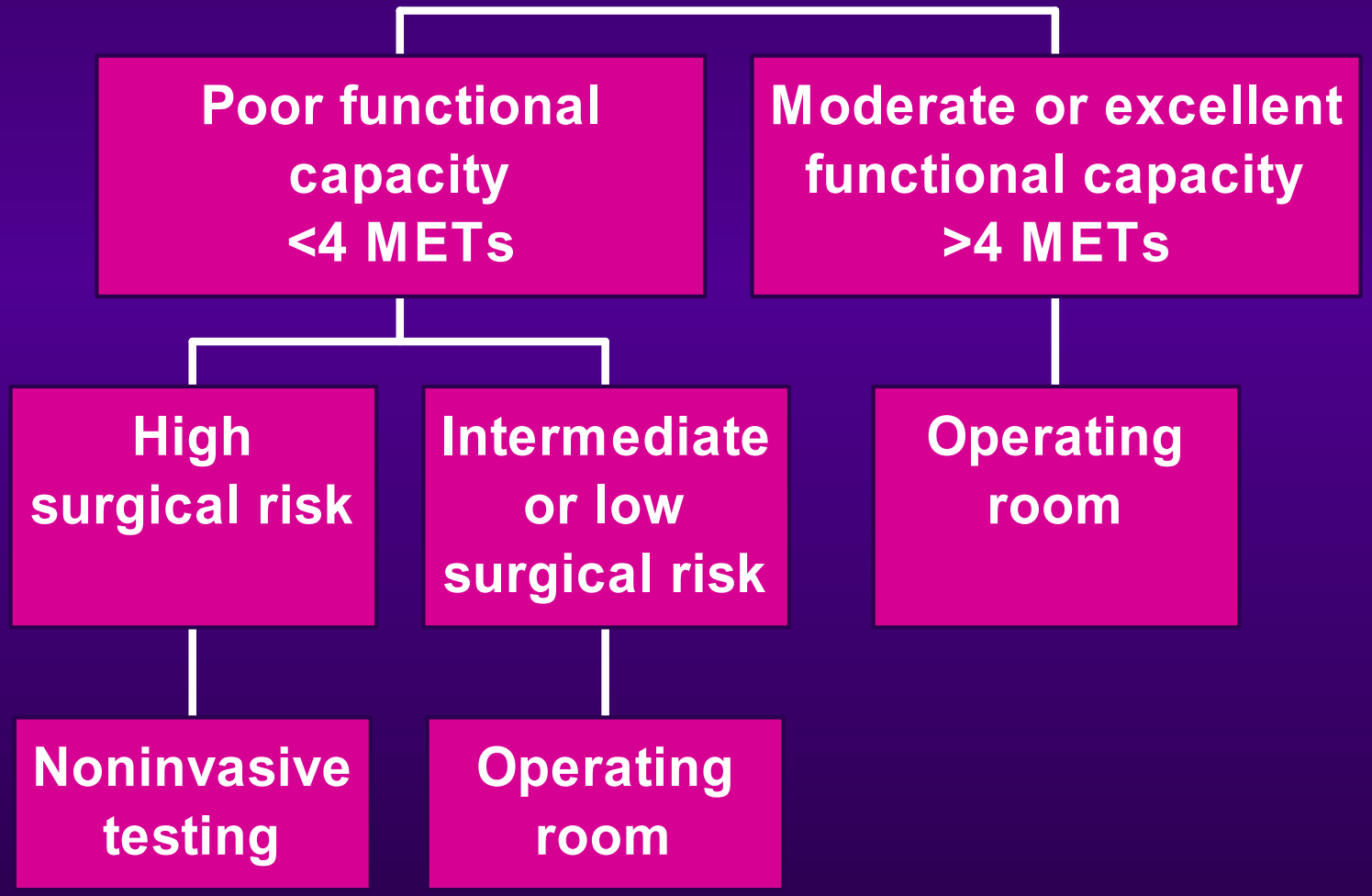
Surgical Risk and Mortality

- High (>5%)
  - Emergent major operations, particularly in elderly
  - Aortic and major vascular procedures
  - Peripheral vascular procedures
  - Prolonged procedures with large fluid shifts +/- blood loss
- Intermediate (<5%)
  - Intraperitoneal / Intrathoracic surgery
  - Carotid endarterectomy
  - Orthopedic surgery
  - Head and neck surgery
  - Prostate surgery
- Low (<1%)
  - Endoscopic procedures
  - Cataract surgery
  - Superficial procedures
  - Breast surgery

Intermediate Clinical Predictors - Using Surgical Risk



Minor or No Clinical Predictors



Impact of Using Guidelines

	Before n=102	After n=94	Late n=104	P Value
Preop stress tests (%)	88	47		<.00001
Cardiac cath (%)	24	11		<.05
Cost	$1087	$171		<.0001
Death (%)	4	3	2	NS
MI (%)	7	3	5	NS

Froehlich et al. *J Vasc Surg* 2002;36:758-63

Assessing Preoperative Risk

- Need for surgery
- Cardiac history and previous evaluation
- Clinical predictors
- Functional capacity
- Surgical risk
- Tests to determine cardiac risk

Potential Risk Factors

Advanced age	Minor effect
Hypertension	DBP <110 → no effect
Diabetes	Intermediate risk
Renal insufficiency	Intermediate risk
LVH on EKG	Minor effect
DVT risk	Moderately high risk
Poor functional capacity	Need further work-up
Hip replacement	Intermediate risk

Preoperative Non-Invasive Testing

If any 2 factors present:

- Intermediate clinical predictors
- Poor functional capacity (< 4 METS)
- High surgical risk

Assessment of Cardiac Risk

- Resting echocardiogram function
- Exercise stress testing
- Pharmacologic stress testing
  - Dipyridamole or adenosine thallium
  - Dobutamine echo
- Coronary angiography

Resting LV Function

- Echocardiogram or MUGA
- Predictive value
  - LVEF <35% leads to postop CHF
  - No consistent correlation with postop ischemia
- Indication
  - Poorly controlled CHF
  - Unknown systolic or diastolic function

Exercise Testing

- Detection of significant CAD

	Sensitivity	Specificity
Mean	68%	77%
Three vessel CAD	81%	86%

Exercise Testing

- Assessment of functional capacity

Ischemia at <4 METs	High risk
Normal at >130/min	Low risk

- Predictive value of adequate negative test

Negative PV	93%
Nondiagnostic	30-70% with PVD

Pharmacologic Stress Testing

- Adenosine or dipyridamole thallium testing
  - High sensitivity and specificity
  - NPV > 95%
  - PPV 5-25%
- Dobutamine echocardiography
  - NPV 93-100%
  - PPV 7-30%

Selecting the Best Test

- High risk patients
- Ambulatory
- Non-ambulatory

Noninvasive testing

Stress test

Perfusion imaging

Stress echo

- Similar PPV and NPV with dobutamine echo and dipyridamole thallium testing

Risk Assessment

- Medical illnesses and other risk factors
- Determination of risk level
- Final assessment

Part III: Final Assessment

- Document any medical contraindications to general anesthesia.
- List any pending test, evaluation or medical criteria for surgery.
- Do not “clear” the patient unless you can provide a money-back guarantee.

Final Assessment

- *No absolute contraindication to the planned procedure pending…*
- *The patient is in the best possible condition for the planned procedure.*

Preoperative Therapy

- Coronary artery bypass
- Percutaneous coronary intervention
- Beta-adrenergic blockade
  - Decrease in perioperative ischemic
  - 15% ARR in MI, unstable angina, CHF requiring hospitalization, death at 6 months

Beta-blocker Prophylaxis

Double blind RCT, n=200

Atenolol vs. placebo

	Cardiac Events			Event-free
	6 mons	1 yr	2 yrs	Survival
Atenolol	0	3	10	83
Placebo	8	14	21	68

Mangano et al. *NEJM* 1996;335:1713-1720.

Beta-blocker Prophylaxis

RCT, n=112 high risk patients

- 1 or more risk factor
- Positive dobutamine stress test
- Bisoprolol vs. standard care

	30 dys	Cardiac Mortality	Nonfatal MI
Bisoprolol	3.4	3.4	0
Control	34	17	17

Poldermans et al. *NEJM* 1999;341:1789.

Beta-blocker Prophylaxis

- For patients at high cardiac risk undergoing vascular surgery
- Start days to weeks before surgery
- Titrate to 50-60 bpm

Prophylaxis of Thromboembolism

- Strong evidence for prophylaxis

- Available agents
  - Low-dose heparin
  - Low molecular weight heparin: 37% RRR
  - Low-dose warfarin
  - Less useful: Dextran, ASA

Perioperative Risk Assessment

- Intermediate risk given diabetes, poor functional capacity and type of surgery
- Hypertension, advanced age and renal insufficiency do not affect risk.
- Moderately high risk for postoperative DVT
- Normal adenosine thallium → Low risk
- No absolute medical contraindication for general anesthesia.

Recommendations

- Hold Hctz on the morning of surgery.
- DVT prophylaxis of choice.
- Consider preoperative beta-blocker.
- Check glucose in RR, qac and qhs. Cover with regular insulin (1 unit/25 mg% >200)

Conclusions

- Utilize a stepwise approach to preoperative risk assessment.
- Determine urgency of surgery, cardiac history, clinical predictors and risk of surgical procedure.
- Use noninvasive testing judiciously.
- Make clear and precise recommendations.
- Follow the patient postoperatively.