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Turning the Tide on Low Value Care

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RACP Congress
Sydney
13/5/18

Defining low value care

In search of professional consensus in defining and reducing low-value care

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MJA 203 (4) · 17 August 2015

'Care which evidence suggests confers no or very little patient benefit, or imposes a risk of harm that exceeds likely benefit, or incurs cost grossly disproportionate to the added benefits obtained'

Ineffective care vs operational waste

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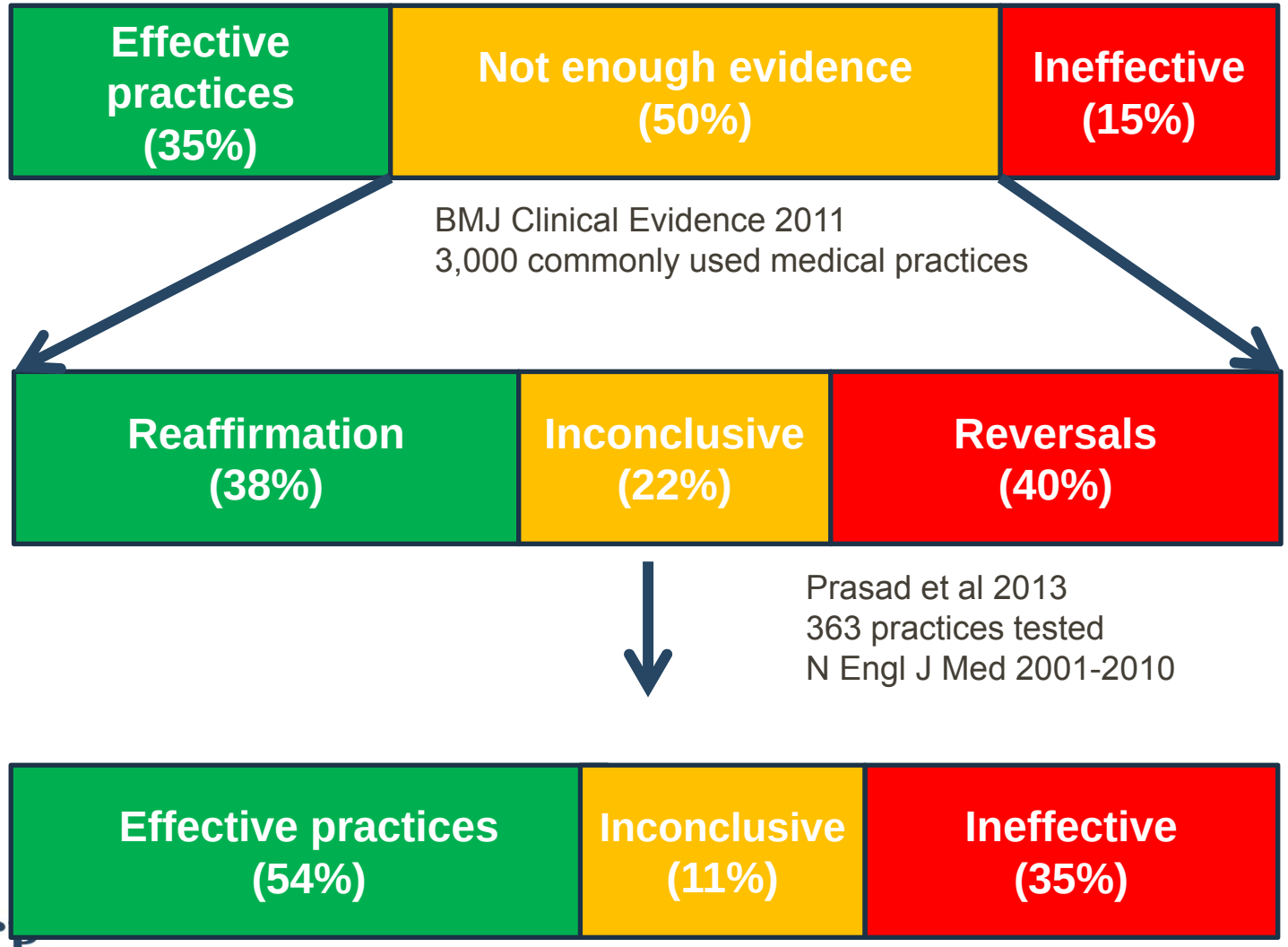
Burden of low value care

Empirical analyses of medical practices



Final state of practices if all untested practices were evaluated

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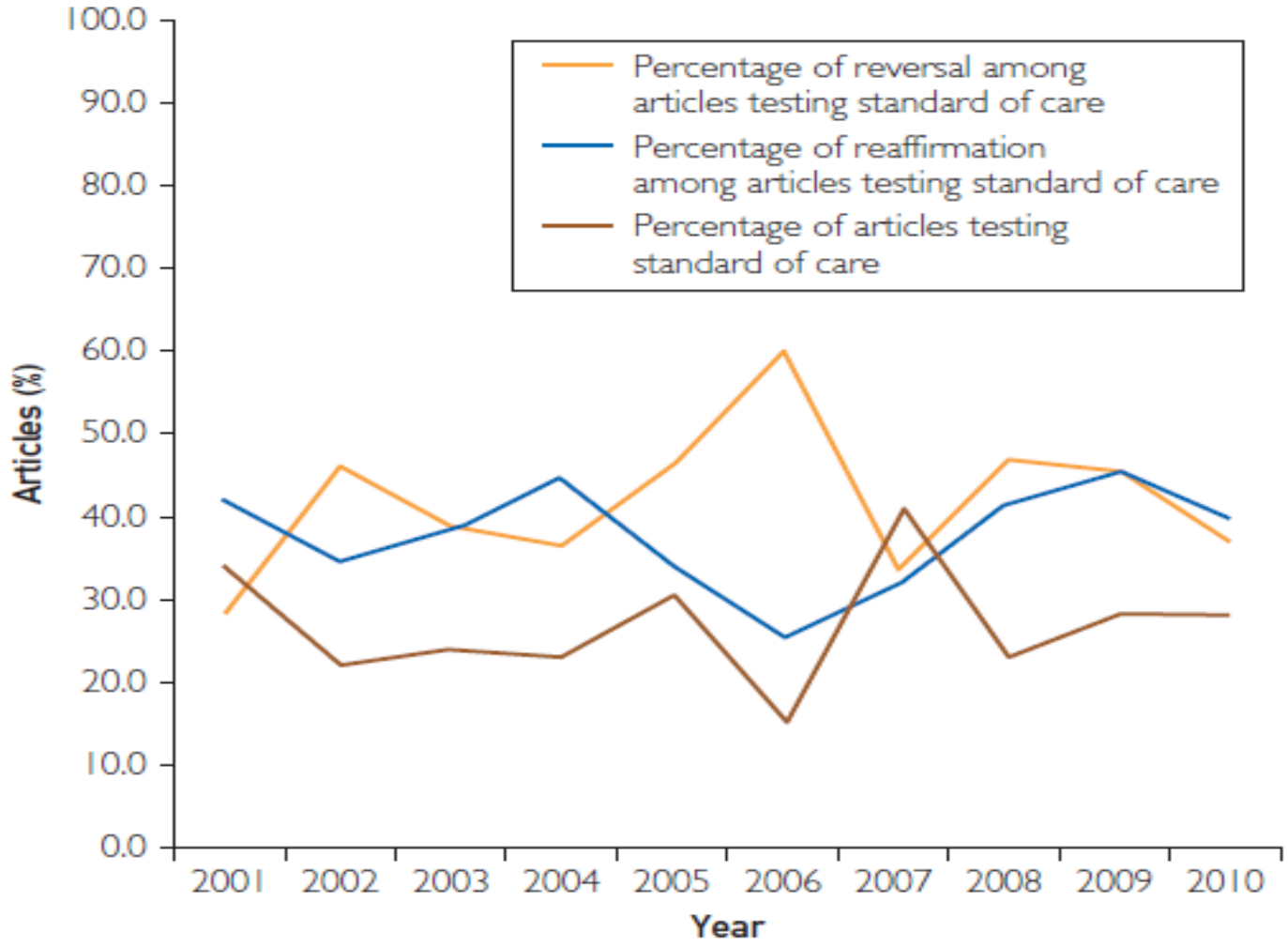
Burden of low value care

Empirical analyses of medical practices



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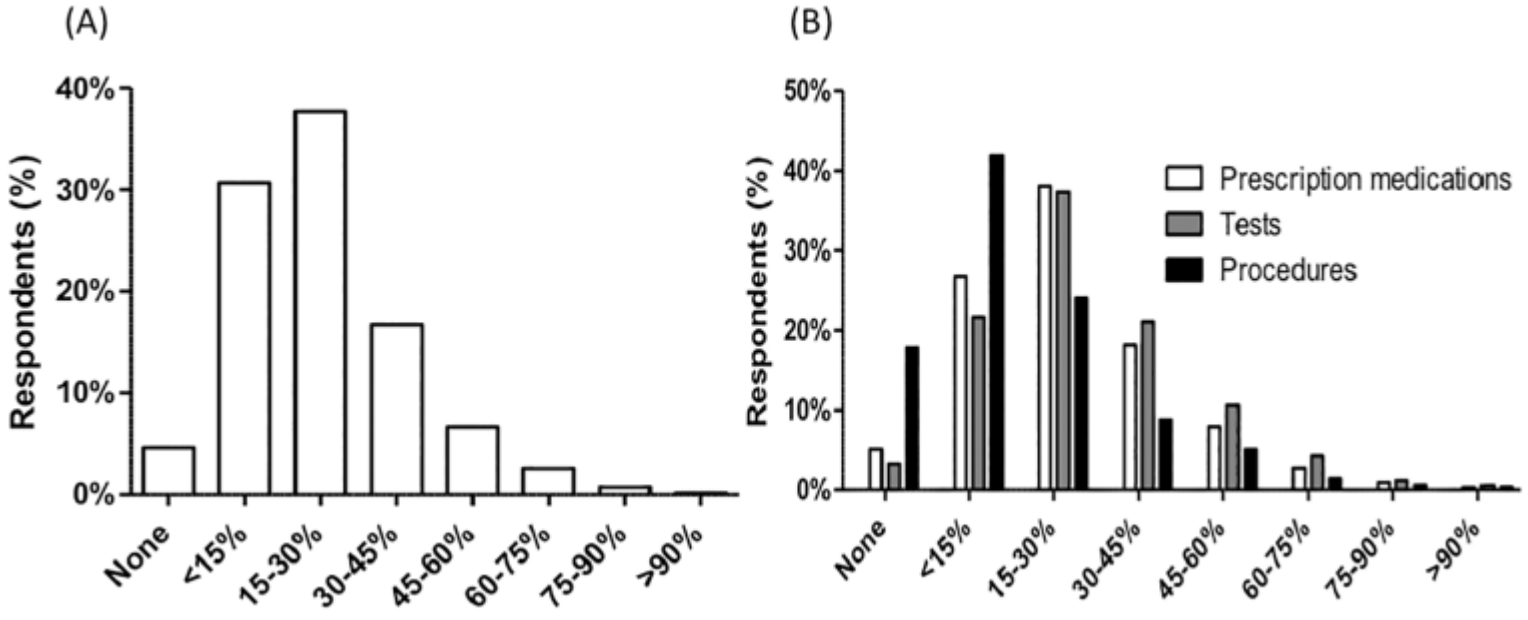
Prasad et al Mayo Clin Proc 2013

Burden of low value care

Physician self-report of routine practice

- 2,106 US physicians; 58% primary care, 42% specialists; 70% response rate
- Median of 21% of overall medical care was unnecessary:
  - 22% of prescription medications
  - 25% of tests
  - 11% of procedures



Lyu et al PLoS One 2017

Burden of low value care

Evidence-based appropriateness studies

- PubMed searched for Australasian reports Jan 2008 - Jan 2018 using 'appropriate' 'overuse' and synonyms
- Inclusion criteria: accepted evidence-based appropriateness of care standard (guideline, validated decision rule or expert consensus pathway) to measure overuse documented in medical records
- 39 studies included: 14 relating to investigations, 25 to therapies; 7 (17.9%) reported QI efforts.

- Investigations:
  - 64% to 74% for coagulation tests in hospital patients (n=2);
  - 22% for thrombophilia screening in VTE (n=1);
  - 34% to 62% for CTPA in suspected PTE (n=4);
  - 36% to 40% for imaging in low back pain (n=2); 54% for imaging in abdominal pain (n=1);
  - 63% for blood cultures (n=1)
  - 23% to 43% for troponin assays (n=2) in hospital patients;
  - 20% for echocardiography (n=1).

- Therapies:
  - 14% to 33% for blood products (n=3);
  - 39% to 73% of older patients receiving at least one inappropriate medication (n=12);
  - 63% to 90% for gastric acid suppressants in hospital patients (n=2);
  - 21% and 24% of antimicrobials for hospital infection & surgical prophylaxis respectively (n=1);
  - 77% to 89% of antibiotic prescriptions for acute respiratory infections in general practice (n=1);
  - 52% for inhaled corticosteroids in mild COPD (n=1).

- Education and decision support achieved absolute reductions in overuse of 11% to 35%.

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Scott 2018

Factors that predispose to low value care

- Vested commercial interests of health-care industry and alignment of financial incentive structures within health services bias knowledge generation and health-care delivery
- Systemic factors and cultural influences regarding health, health care, science, and technology
- Over-diagnosis of benign anomalies due to over-detection (technology) and over-definition (profession)
- Inaccurate knowledge and information regarding effective and ineffective care
- Errors and biases in decision making

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Saini et al Lancet 2017

Cognitive factors that predispose to low value care

Common biases

- Omission regret overpowering commission regret
  - ‘Safe rather than sorry’
- Over-confidence
  - anecdotal, selective observations and confirmation bias
- Pro-innovation or novelty bias
- Uncertainty (or better to know) bias
- Availability bias
- Extrapolation bias
- Framing effects
- Surrogate effects

Scott et al Med J Aust 2017

Non-cognitive factors that predispose to low value care

- Fear of malpractice (85%)
- Patient pressure/request (59%)
- Difficulty accessing medical records (38%)
- Borderline indications (38%)
- Inadequate time to spend with patients (37%)
- Lack of adequate information/previous medical history (37%)

Lyu et al PLoS One 2017

Remedial strategies

- Education and training
  - Skills in literature searching and critical appraisal
  - Use of pre-appraised secondary publications
    - to find 7% of published evidence that is valid, relevant
  - Use evidence-based guidelines using GRADE approach to evidence quality and strength of recommendation
  - Implement point of care clinical decision supports
  - Apply Choosing Wisely and EVOLVE recommendations

evolve
evaluating evidence, enhancing efficiencies.

Choosing Wisely Australia
An initiative of NPS MedicineWise

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Remedial strategies

- Audits of routine care
  - against level 1 evidence, guideline standards, appropriateness criteria

Feedback more effective when:

- baseline performance is low
- source of feedback is a supervisor or colleague
- provided more than once
- is delivered in both verbal and written formats
- includes both explicit targets and an action plan
- targets preventive or investigatory care care in ambulatory care settings

Ivers et al Cochrane Database Syst Rev 2012

Remedial strategies

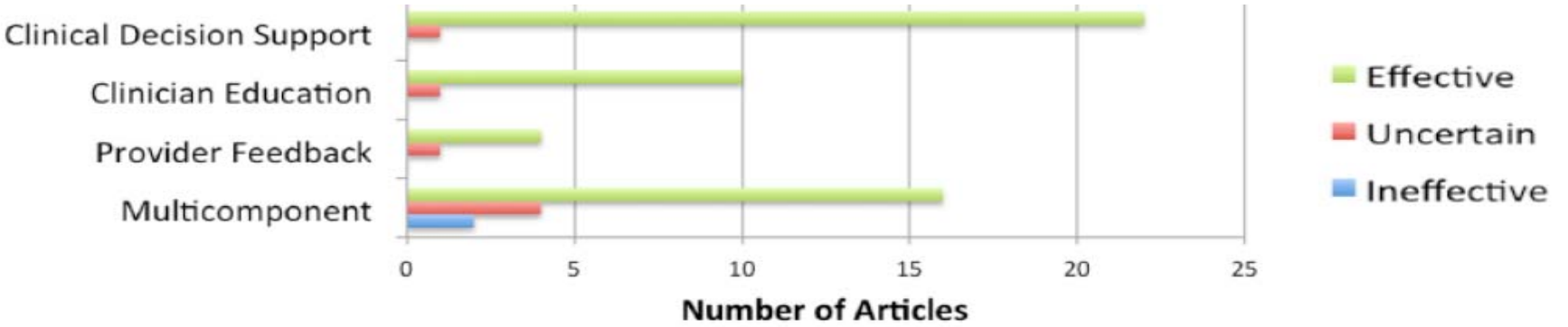
- Benchmarking against peers
  - Peer comparisons and peer profiling
    - City-level audit on appropriateness of endarterectomies circulated to physicians in Canada caused rates of appropriate indications for surgery to increase from 22% to 49% of cases, and rates of inappropriate surgeries to reduce from 18% to 4% (Wong et al 1999)
  - Clinical quality registries
    - 16 of 17 studies showed positive effects on processes of care, quality of care, treatment outcomes, adherence to guidelines and survival (Hoque et al PLoS One 2017)
  - Atlases of clinical variation
    - ACSQHC Atlas 1 and 2 showing marked variations (between 3 and 10-fold differences) in age-sex standardised rates of procedures and diagnosis-specific hospitalisations - ?effects on reducing overuse (DaSilva & Gray Med J Aust 2016)
  - International benchmarking collaborations
    - Dr Foster Global Comparators, Overuse Lancet series 2017

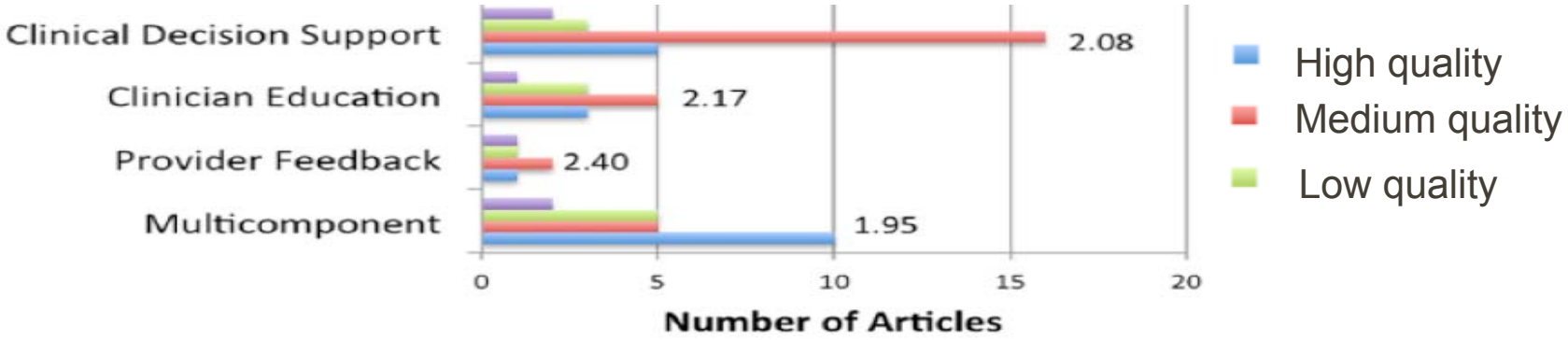
Remedial strategies

- Debiasing strategies – meta-cognition
  - Simulations, cognitive huddles and autopsies
  - Narratives of patient harm
  - Value of care considerations in clinical assessments
  - Defining acceptable levels of risk of adverse outcomes in specific scenarios
  - Substituting alternative forms of high value care
  - Reflective practice and role modelling
  - Normalisation of deviance
  - Nudge strategies and default options
  - Exposure to high value care
  - Shared decision-making

Croskerry et al BMJ Qual Saf 2013
Scott et al Med J Aust 2017
Stammen et al JAMA 2015
Korenstein & Smith JAMA Intern Med 2014

Remedial strategies





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Colla et al Med Care Res Rev 2016

Case studies

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Case study #1

- 61-year-old man presents to his GP with 6 mo history of worsening right leg claudication with exertion. He is former smoker with 20 pack year history, and has a history of dyslipidemia hypertension, type 2 diabetes mellitus, left carotid endarterectomy 5 years ago, and stenting of the right common iliac artery 10 years ago. An arterial duplex scan confirms a right superficial femoral artery proximal stenosis (>90%) and distal 50% stenosis with ankle-brachial index showing moderate distal arterial disease.

- A walking program is initiated and the dose of his ACE inhibitor is increased, but his symptoms progress over the next 12 months such that he is limited to 200m or 2 flights of stairs. He is referred to a vascular surgeon who advises femoro-popliteal bypass operation, but refers the patient to a perioperative medicine clinic requesting cardiac “clearance.”

- On review he gives no history of chest pain or past coronary events or stroke. He has no shortness of breath or wheeze and, apart from his claudication, he is otherwise asymptomatic.

- Physical examination reveals normal heart sounds, no vascular bruits, diminished pedal pulses left foot, BP 145/85, good air entry with no wheeze. Rest of the examination unremarkable

- Medications: Atorvastatin 80mg/day, Gliclazide MR 90mg/day, Metformin SR 1.5gm/day, Lisinopril 10mg/day, Aspirin 100mg/day

- Recent blood tests show normal FBC, electrolytes, creatinine, eGFR (75), LFTs, LDL cholesterol 2.1 mmol/l, HbA1c 7.1%
- ECG shows SR, normal voltages, no ST/T changes; CXR shows mild hyperinflation, no cardiomegaly.
  Spirometry shows FEV1 2.3 FVC 3.4 Ratio 68%

Case study #1

What would you recommend?

a) Reassure the surgeon and proceed with surgery
b) Defer surgery, increase dose of lisinopril and add cilostazol
c) Request an exercise ECG treadmill test
d) Request an echocardiograph
e) Request a CTCA
f) Request a stress myocardial perfusion scan

Case study #1

A persantin stress MPS with SPECT reveals normal ejection fraction, normal biventricular function and size, and no evidence of prior infarction. However there is possible stress-induced perfusion defect in the inferior wall associated with transient ischemic dilatation at rest. The patient experienced no chest pain or shortness of breath.

Case study #1

What would you recommend?

a) Reassure the surgeon and proceed with surgery
b) Commence a β-blocker as cardioprotection prior to surgery
c) Request BNP and hs-Tn
d) Request an echocardiograph
e) Request a CTCA
f) Refer for coronary angiography

Case study #1

Coronary angiography was ordered and showed multi-vessel stenoses

- 60% left main
- 80% left anterior descending
- 70% posterior descending arteries

Fractional flow reserve studies were not performed

Case study #1

What would you recommend?

a) Reassure the surgeon and proceed with surgery
b) Request an echocardiograph
c) Request cardiopulmonary stress testing
d) Refer for percutaneous coronary intervention
e) Refer for coronary artery bypass surgery
f) Advise patient to continue with medical therapy only and not to undergo vascular surgery

Case study #1

- The patient undergoes 3-vessel CABG prior to peripheral vascular intervention which is complicated by postoperative cardiogenic shock which necessitates 2 weeks' use of an intra-aortic balloon pump in the intensive care unit.

- After further recovery over a month as an outpatient, he undergoes another coronary angiogram to reassess coronary disease prior to planned vascular surgery. The angiogram reveals non-patent coronary artery bypass grafts including a newly atretic left interior mammary artery graft.

- His treating clinicians now believe he is too high a risk for open surgery to alleviate lower extremity symptoms. Nearly a year later in response to worsening claudication which now includes rest pain, percutaneous stenting of his right femoral artery stenosis is performed with improvement in lower extremity claudication.

Case study #1

Cognitive autopsy

- Cardiovascular risk assessment
- Surgical risk assessment
- Functional capacity
- Role of non-invasive testing for coronary artery disease
- Role of invasive coronary angiography +/- revascularisation
- Role of prophylactic interventions

Case study #1

Risk Prediction - RCRI

1. High risk surgery
   - Suprainguinal vascular
   - Intra-thoracic surgery
   - Intraperitoneal surgery
2. History Heart failure (history of CCF, EF < 40%)
3. History of coronary artery disease
4. History of cerebrovascular disease
5. Cr >177umol/L
6. Diabetes Mellitus with preoperative treatment with insulin

- MACE is defined as MI, pulmonary oedema, VF or cardiac arrest, CHB
- 0-1 risk factors (0.4-0.9% MACE) → low risk
- 2-6 risk factors (6.6-11% MACE) → elevated risk

Circulation 1999;100:1043-1049

High risk surgery (reported 30 day cardiac risk often > 5%) - AAA repair, major vascular surgery

Glance et al. Ann Surg 2012;255:696 – 702

CVC CardioVascular Clinics

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Case study #1

Revised Cardiac Risk Index[4]
(MI/Cardiac Arrest, complete heart block, pulmonary edema **during admission**)
High-risk surgery (3 categories)
Ischemic heart disease
Congestive heart failure
Cerebrovascular disease
Renal insufficiency (Cr > 2 mg/dl)
Diabetes treated with insulin

Reconstructed-RCRI[5]
(MI/Cardiac Arrest, complete heart block, pulmonary edema **during admission**)
High-risk surgery (3 categories)
Ischemic heart disease
Congestive heart failure
Cerebrovascular disease
Renal insufficiency (GFR < 30 cc/min)

MI or Cardiac Arrest Calculator (MICA)[7]
(MI/Cardiac Arrest **within 30 days** after surgery)

Type of surgery (21 categories)
Age
Functional status
ASA class
Renal insufficiency (Cr > 1.5 mg/dl)

ACS NSQIP Surgical Risk Calculator (ACS-SRC)[8]
(MI/Cardiac Arrest **within 30 days** after surgery)

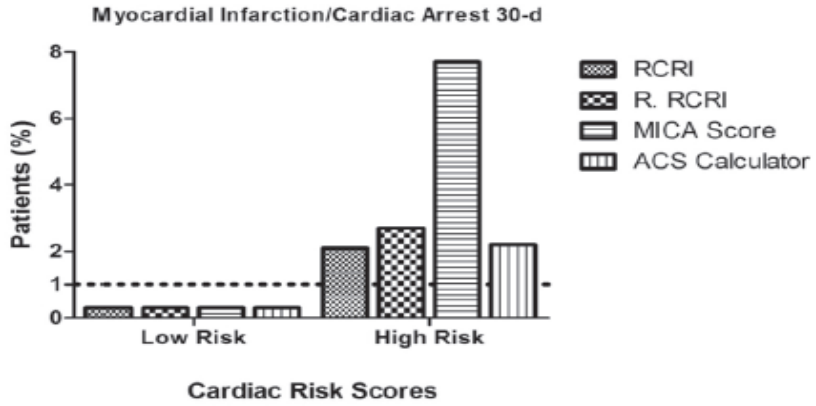
Surgical procedure (CPT codes)
Age group
Functional status
ASA class
Acute renal failure
Diabetes on oral meds or insulin
Dialysis
Congestive heart failure (<30 days)

Dyspnea
Smoker (within past year)
Severe COPD
Ventilator dependent
Sepsis (within 48 hours)
Disseminated cancer
Hypertension requiring meds
Wound class
Sex
Steroid use (chronic)
Ascites (within 30 days)
BMI class

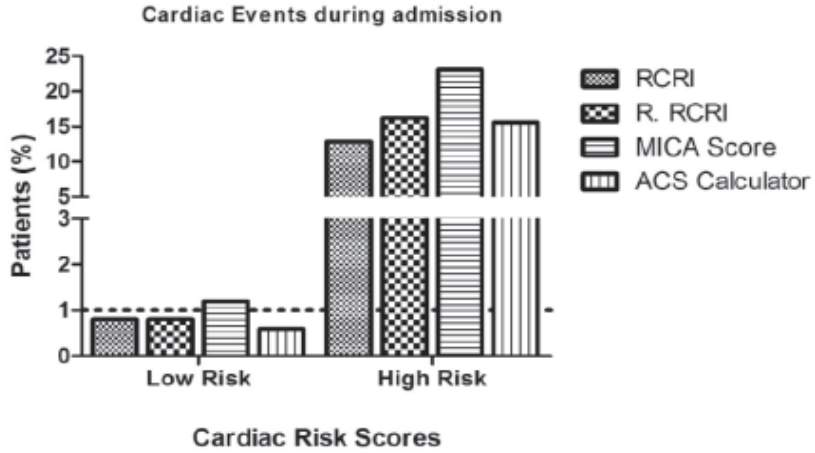
Cohn et al
Am J Cardiol 2018

Case study #1

A) Number of patients (%) with major cardiac events 30-day after surgery in low or elevated (high) risk group according to different cardiac scores.



B) Number of patients (%) with any cardiac events during admission in low or high risk group according to different cardiac scores.



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Cohn et al
Am J Cardiol 2018

Case study #1

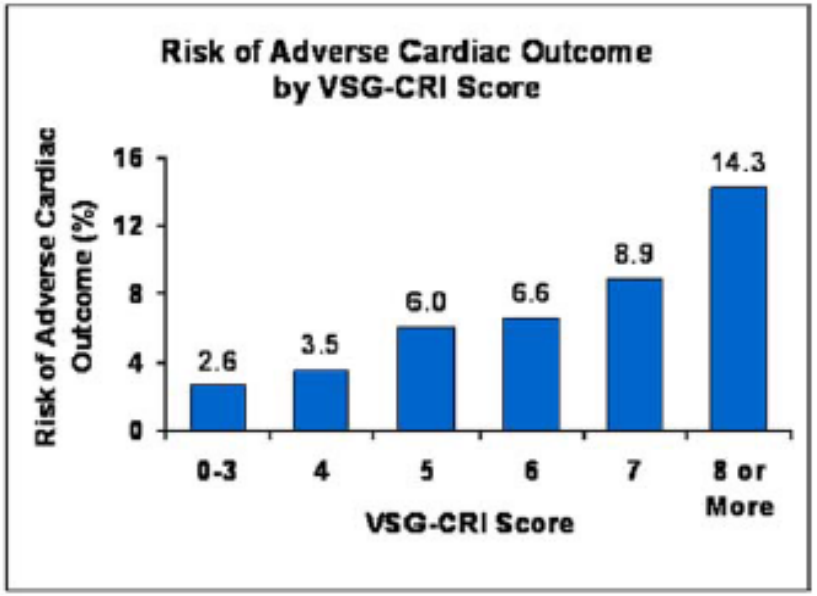
Step 1:

Calculate VSG-RCI Score

VSG-CRI Risk Factors	# Points
Age ≥ 80	4
Age 70-79	3
Age 60-69	2
CAD	2
CHF	2
COPD	2
Creatinine > 1.8	2
Smoking	1
Insulin Dependant Diabetes	1
Long term β-Blockade	1
History of CABG or PCI	-1

Step 2:

Use VSG-CRI Score To Predict Risk of Adverse Cardiac Outcome



Age (2) + COPD (2) = 4

Bertges et al J Vasc Surg 2010

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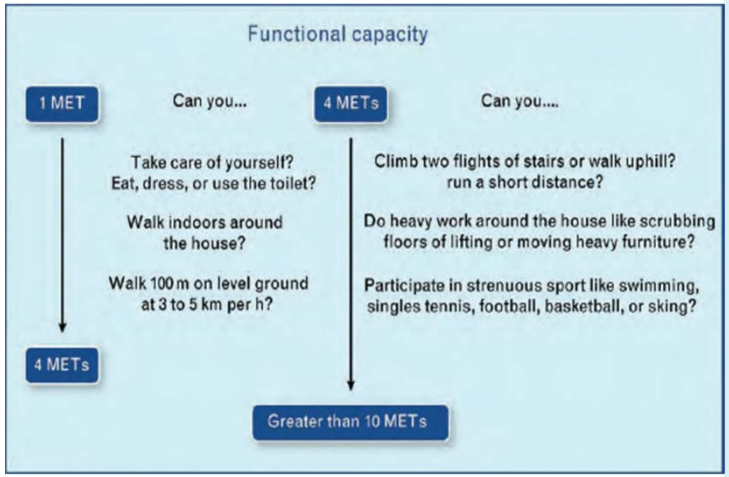
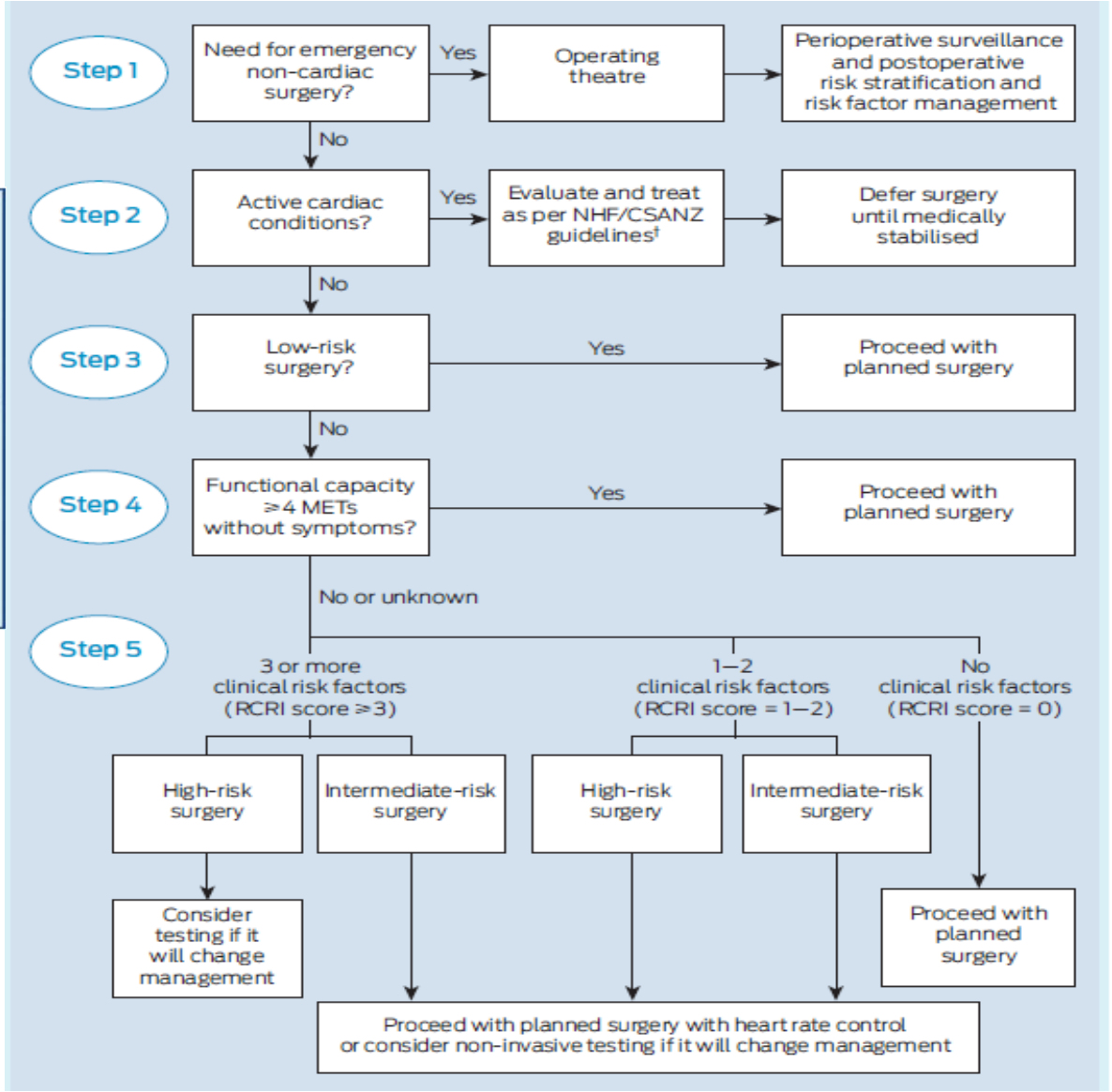
Case study #1





Scott et al Med J Aust 2013
Fleisher et al JACC 2014
Wolk et al JACC 2014
ESC Eur J Anaesthesiol 2014

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Case study #1

- Non-invasive testing
  - Does it increase accuracy of estimates of cardiac risk over and above clinical indices?
  - Will the results lead to change in clinical management?
- Patient was, at most, intermediate risk with good functional capacity and receiving optimal medical therapy
- MPS scan was equivocally positive –
  - ‘Preserved exercise tolerance is associated with a low perioperative risk, and as stated in current guidelines, MPS is unlikely to help with perioperative decision making in such patients.
  - Preoperative MPS has the greatest utility in the management of intermediate- to high risk patients with limited exercise tolerance whose signs or symptoms suggest but do not prove the presence of potentially severe or unstable coronary disease’
    - Weinstein & Steingart J Nucl Med 2011

Case study #1

- CTCA – adds more predictive information but only slightly in intermediate risk patients
  - RCRI – c-statistic 0.631
  - CTCA – c-statistic 0.757 or 0.762
  - PPV 8%; NPV 99%
    - Hwang et al Circ Cardiovasc Imaging 2015
    - Ahn et al JACC 2013
- Cardiopulmonary stress testing - may provide additional prognostic information in older patients with cardiopulmonary disease or patients undergoing major thoracic or abdominal operations
  - currently insufficient data to show its routine use alters perioperative care or outcomes compared with bedside risk stratification methods
    - Stringer et al Curr Opin Anaesthesiol 2012

Case study #1

- Pre-op natriuretic peptides

Table 3. Sensitivity, Specificity, Confidence Interval of Positive and Negative Likelihood Ratios of Preoperative Natriuretic Peptides in the Literature.

	Sensitivity (95% CI)	Specificity (95% CI)	Positive Likelihood Ratio	Negative Likelihood Ratio
Buse et al[15]	0.75 (0.62-0.85)	0.62 (0.42-0.79)	1.97[a]	0.40[a]
	0.90 (0.72-0.97)	0.65 (0.48-0.79)	2.57[b]	0.15[b]
Young et al[16]	0.84 (0.79-0.88)	0.76 (0.71-0.81)	3.49	0.21
Rodseth et al[17]	NA	NA	2.30[c]	0.42[c]
			2.00[d]	0.53[d]

Abbreviations: CI, confidence interval.
[a]≥6-month all-cause mortality.
[b]≤90-day all-cause mortality.
[c]Death or nonfatal myocardial infarction at 30 days after surgery.
[d]Death or nonfatal myocardial infarction ≥180 days after surgery.

Table 2. Pretest Probability and Corresponding Posttest Probability at ≤90 Days for Major Complications, Calculated Through Negative Likelihood Ratio With BNP Less Than or More Than 100.

	Pretest Probability (Case Scenario)	Posttest Probability (BNP < 100)	Posttest Probability (BNP ≥ 100)
ESC/ESA	5%	0.8%	13.5%
RCRI	6.6%	1.1%	18.2%
ACS-NSQIP	18.8%[a]	3.5%[a]	59.5%[a]
	0.9%[b]	0.1%[b]	2.3%[b]
	1.1%[c]	0.2%[c]	0.4%[c]

Abbreviations: BNP, brain natriuretic peptide; ESC/ESA, European Society of Cardiology/European Society of Anaesthesiology; RCRI, Revised Cardiac Risk Index; ACS-NSQIP, American College of Surgeons National Surgical Quality Improvement Program.
[a]Serious complications.
[b]Cardiac complications.
[c]Death.

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Vetrugno et al
Semin Cardiothoracic Vasc Anesth 2018

Case study #1

Pre-op hs-Tn

- Preoperative hs-cTnT >14 ng/L (odds ratio 3.67, 95% CI 1.65-8.15) of post-operative MI

Nagele et al Am Heart J 2013

- Addition of hs-cTnT (>14 ng/L) and NT-proBNP (>300 ng/L) to RCRI significantly improved the prediction of postoperative MI
- AUC ROC increased from 0.590 for RCRI to 0.716
- PPV and NPV for hs-cTnT: 9% and 97%
- PPV and NPV for NT-proBNP: 8% and 96%

Kopec et al Anes Analg 2017

Case study #1

Coronary angiography +/- revascularisation

- Even with multi-vessel disease, revascularization prior to major non-cardiac surgery does not improve outcomes
    - McFalls et al N Engl J Med 2004
    - Poldermans et al JACC 2007 (DECREASE V trial)
    - Monaco et al JACC 2009
    - Fihn et al JACC 2012 (AHA/ACC guidelines)

Case study #1

β-blocker therapy

- Meta-analysis of 9 well conducted “secure” trials (including POISE, and excluding the “nonsecure” Dutch [Polderman] trials):
- 27% increase in 30-day all-cause mortality
- 73% increase in non-fatal stroke
- 27% decrease in non-fatal MI

Bouri et al. Heart 2013

RCRI score	London et al[31]		Lindenauer et al[30]	
	Relative risk for inhospital death	NNT to reduce inhospital death	Odds ratio for inhospital death	NNT to reduce inhospital death
0	1.26 (0.88–1.81)	na	1.43 (1.29–1.58)	na
1	0.89 (0.72–1.10)	na	1.13 (0.99–1.30)	na
2	0.63 (0.50–0.80)	105 (69–212)	0.90 (0.75–1.08)	227 (132–1091)
3	0.54 (0.39–0.73)	41 (28–80)	0.71 (0.56–0.91)	62 (48–92)
⩾4	0.40 (0.25–0.64)	18 (12–34)	0.57 (0.42–0.76)	33 (28–42)

RCRI = Revised Cardiac Risk Index. NNT = number needed to treat. na = not applicable. * Data relate to propensity-adjusted analyses in both studies, except for NNT in Lindenauer et al,[30] for which only results of whole-study analyses were published. Numbers in parentheses are 95% confidence intervals.

Scott et al Med J Aust 2013

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Case study #1

Low value care contributed to…..

- Unnecessary use of cardiac investigations to further determine cardiac risk
- Over-estimation of operative risk
- Unnecessary revascularisation which incurred near-fatal complications
- Delayed vascular surgery

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- **Avoid ordering cardiac stress testing for asymptomatic patients prior to undergoing low to intermediate risk non-cardiac surgery**

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Wrap up

On reflection, what was the MAIN reason you feel explained why some or all of your decisions differed from the evidence presented?

a) I was not aware of the evidence
b) I was aware of the evidence but uncertain if it applied to this patient and considered more investigation and intervention were indicated
c) I was aware of the evidence and felt it was relevant to this patient but I remained concerned this patient was high risk and warranted a more aggressive approach
d) I was aware of the evidence and felt it was relevant to this patient but I have seen similar cases where patients appeared to have done better with a more aggressive approach
e) I was aware of the evidence and felt it was relevant to this patient but I was confident that, on this occasion, modern investigations and interventions were likely to confer better outcomes and therefore worth pursuing
f) I was aware of the evidence and felt it was relevant to this patient but the practice in my hospital (or the views of my specialist colleagues) is to pursue further investigations and interventions in such cases