

LOW-VALUE CARE IN AUSTRALIAN PUBLIC HOSPITALS: PREVALENCE AND TRENDS OVER TIME

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SUPPLEMENTARY MATERIAL

Supplementary Box 1: Example of narrower and broader operational definitions of low-value care

Recommendations

Don't routinely recommend surgery for a narrowed carotid artery (> 50% stenosis) that has not caused symptoms.

— EVOLVE. Australian and New Zealand Association of Neurologists (2016)

— Choosing Wisely Australia. Australian and New Zealand Association of Neurologists (2016)

Don't perform carotid endarterectomies or stenting in most asymptomatic high risk patients with limited life expectancy.

— Choosing Wisely Canada. Canadian Society for Vascular Surgery (2015)

Operational definitions

Narrower: Carotid endarterectomy with no excluding diagnosis in the episode and American Society of Anesthesiologists (ASA) code 4–5 or (age ≥ 75 and ASA 3), or with any palliative care codes or flags present. Minimum age: 18. Sex: both. Exclude emergency admissions and admissions from the emergency department.

Broader: Carotid endarterectomy with no excluding diagnoses in the episode and ASA code 4–5 or age ≥ 75 , or with any palliative care codes or flags present. Minimum age: 18. Sex: both.

“Excluding diagnoses” cover transient cerebral ischaemic attacks, vertebro-basilar artery syndrome, cerebral infarction, hemiplegia, stroke not specified as haemorrhagic or infarction, sequelae of cerebrovascular disease, and retinal artery occlusions.

Rationale

Excluding diagnoses: The recommendations refer to asymptomatic patients, but symptoms (or lack of symptoms) are not recorded in the data. Only diagnoses coded from the medical record after the care has finished are recorded. The excluding diagnoses are intended to create a proxy for

“asymptomatic” and include conditions that, if present, likely indicate the patient had symptoms at admission. The list of diagnoses was derived from Schwartz et al (*JAMA Intern Med* 2014;**174**:1067–76) and then refined during the clinical review process. Patients with these diagnoses recorded are regarded as symptomatic, and the procedure is not counted as low value.

ASA code 4-5: The ASA code is an indicator of surgical (anaesthetic) risk, and was used as a proxy for “high-risk” patients. We used the two highest codes (4, severe systemic disease that is a constant threat to life; 5, moribund patient who is not expected to survive without surgery) as indicators of high-risk patients at any age.

Age \geq 75 and ASA 3: The Canadian recommendation refers to “limited life expectancy”, and the notes to the Australian recommendation suggest an age limit of 75 years. Clinicians advised that a strict age limit is not appropriate as some older patients would benefit. Thus, for the narrower definition, we combined ASA 3 (severe systemic disease) with the age limit to allow for healthy older patients to receive the procedure. For the broader definition, we expanded the definition to count all carotid endarterectomies in patients over 75 as low value.

Palliative care: Patients with diagnoses of palliative care or waiting for palliative care are assumed to have “limited life expectancy”.

Emergency admissions: Patients admitted as an emergency are less likely to be asymptomatic, so carotid endarterectomy in these patients was not counted as low value in the narrower definition.

Supplementary Box 2: Medical specialties involved in clinical review of the low-value care measures

Aged care

Anaesthesia

Emergency medicine

General practice

Gynaecological oncology

Gynaecology

Haematology

Internal medicine

Nephrology

Occupational therapy

Orthoptics

Paediatrics

Physiotherapy

Rehabilitation medicine

Respiratory medicine

Sleep medicine

Supplementary Table 1: Operational definitions of low-value care for each procedure

Procedure (recommendation source)	Narrower low-value care definition	Broader low-value care definition	Denominator
Abdominal hysterectomy for benign disease (vs laparoscopic or vaginal) (Committee on Gynecologic Practice, 2009 [1])	Women having hysterectomy with abdominal approach, and not associated with caesarean or cancer, or endometriosis or female pelvic peritoneal adhesions. Minimum age: 18. Sex: female.	Women having hysterectomy with abdominal approach and not associated with caesarean or cancer. Minimum age: 18. Sex: female.	Episodes involving hysterectomy (any technique) in women 18 and older.
Arthroscopic lavage and debridement of knee for osteoarthritis or degenerative meniscal tears (CWA, EVOLVE, CWUS, NICE)	Knee arthroscopy in patients with diagnosis of gonarthrosis or meniscal derangements and no diagnosis of ligament strain or damage and no diagnosis of septic (pyogenic) arthritis. Minimum age: 55. Sex: both.	Knee arthroscopy in patients with diagnosis of gonarthrosis or meniscal derangements and no diagnosis of ligament strain or damage and no diagnosis of septic (pyogenic) arthritis. Minimum age: 18. Sex: both.	Episodes involving knee arthroscopy (excluding reconstructions and ligament repair) in people 18 and older.
Carotid endarterectomy for asymptomatic high-risk patients with limited life expectancy (CWA, EVOLVE, CWC, CWUS)	Carotid endarterectomy with no stroke or focal neurological symptoms recorded in the episode, and American Society of Anesthesiologists (ASA) code 4–5 or (age \geq 75 and ASA 3), or with any palliative care codes or flags present. Minimum age: 18. Sex: both. Exclude emergency admissions and admissions from the emergency department.	Carotid endarterectomy with no stroke or focal neurological symptoms recorded in the episode, and ASA code 4–5 or age \geq 75, or with any palliative care codes or flags present. Minimum age: 18. Sex: both.	Episodes involving carotid endarterectomy in people age 18 and older.

Procedure (recommendation source)	Narrower low-value care definition	Broader low-value care definition	Denominator
Colonoscopy for constipation in people < 50 years (CWC)	Colonoscopy in a person < 50 with diagnosis of constipation, and no diagnoses of anaemia, weight loss, family or personal history of cancer of digestive system, or personal history of other diseases of the digestive system in previous 12 months. Minimum age: 18. Maximum age: 49. Sex: both.	Colonoscopy in a person < 50 with diagnosis of constipation and no diagnoses of anaemia, weight loss, family or personal history of cancer of digestive system, or personal history of other diseases of the digestive system in the episode. Minimum age: 18. Maximum age: 49. Sex: both.	Episodes involving colonoscopy in people aged 18 to 49.
Electroconvulsive therapy in children (NICE)	ECT with diagnosis of depression. Minimum age: 5. Maximum age: 11. Sex: both.	ECT with any diagnosis. Minimum age: 5. Maximum age: 11. Sex: both.	Episodes involving ECT in children aged 5 to 11.
Electrotherapy for pressure ulcers (NICE)	Electrotherapy with diagnosis of pressure ulcer. Sex: both.	Electrotherapy with any diagnosis. Sex: both.	Episodes involving electrotherapy.
Endometrial biopsy for investigation of female infertility (CWUS)	Endometrial biopsy with infertility diagnosis given as primary diagnosis, and no cancer diagnosis codes. Minimum age: 18. Sex: female.	Endometrial biopsy with infertility diagnosis, and no cancer diagnosis codes. Minimum age: 18. Sex: female.	Episodes involving endometrial biopsy in women aged 18 and older.
Endoscopic retrograde cholangiopancreatography (ERCP) without cholangitis (Tenner et al, 2013;[2] Working Group IAP/APA Acute Pancreatitis Guidelines, 2013;[3] Nesvaderani et al, 2015 [4])	ERCP with diagnosis of calculus of bile duct or biliary acute pancreatitis, and cholangitis and obstruction are not recorded. Minimum age: 18. Sex: both. Exclude emergency admissions and admissions from the emergency department.	ERCP with diagnosis of calculus of bile duct or biliary acute pancreatitis, and cholangitis and obstruction not recorded. Minimum age: 18. Sex: both.	Episodes involving ERCP in people aged 18 and older.

Procedure (recommendation source)	Narrower low-value care definition	Broader low-value care definition	Denominator
Endoscopy for dyspepsia for people < 55 years (CWC)	Endoscopy in person < 55 with diagnosis of dyspepsia, and no diagnoses of dysphagia, iron deficiency anaemia, other nutritional anaemia, abnormal weight loss, personal or family history of cancer of digestive system, or personal history of peptic ulcer disease in the previous 12 months. Minimum age: 18. Maximum age: 54. Sex: both.	Endoscopy in person < 55 with diagnosis of dyspepsia and no diagnoses of dysphagia, iron deficiency anaemia, other nutritional anaemia, abnormal weight loss, personal or family history of cancer of digestive system, or personal history of peptic ulcer disease in the episode. Minimum age: 18. Maximum age: 54. Sex: both.	Episodes involving endoscopy in people aged 18 to 54.
Endovascular repair of infrarenal abdominal aortic aneurysm (CWC)	Endovascular repair of aneurysm, with diagnosis of abdominal aortic aneurysm in the episode, and ASA score 4–5 or (age ≥ 75 and ASA 3), or with any palliative care codes or flags present. Minimum age: 18. Sex: both. Exclude emergency admissions and admissions from the emergency department.	Endovascular repair of aneurysm, with diagnosis of abdominal aortic aneurysm in the episode, and ASA score 4–5 or age ≥ 75, or with any palliative care codes or flags present. Minimum age: 18. Sex: both.	Episodes involving endovascular repair of aneurysm in people aged 18 and older with diagnosis of abdominal aortic aneurysm in the episode.
Epidural steroid injection for low back pain (CWA)	Epidural steroid injection with diagnosis of low back pain with no mention of leg pain or radiculopathy in previous 12 months. Minimum age: 18. Sex: both.	Epidural steroid injection with diagnosis of low back pain with no mention of leg pain or radiculopathy in the episode. Minimum age: 18. Sex: both.	Episodes involving epidural steroid injection in people aged 18 and older.

Procedure (recommendation source)	Narrower low-value care definition	Broader low-value care definition	Denominator
Hyperbaric oxygen for various conditions (NICE, MSAC [5-8])	Hyperbaric oxygen to treat foot ulcers or decubitus ulcers, and no diagnosis of diabetes, necrosis, inflammation of genital organs, air embolism, or effects of radiation in the episode. Sex: both.	Hyperbaric oxygen to treat foot ulcers, decubitus ulcers, carbon monoxide or carbon dioxide poisoning, Crohn's disease, cancer, open wounds, soft tissue injuries, or sudden deafness, and diagnosis of diabetes, necrosis, inflammation of genital organs, air embolism, or effects of radiation in the episode. Sex: both.	Episodes involving hyperbaric oxygen.
Laparoscopic uterine nerve ablation (LUNA) (NICE)	LUNA in woman with diagnosis of pelvic pain or other chronic or intractable pain. Minimum age: 18. Sex: female.	LUNA in woman. Minimum age: 18. Sex: female.	Episodes involving LUNA in women aged 18 and older.
Open bariatric surgery (vs laparoscopic) (CWUS)	Bariatric procedure (including sleeve gastrectomy, gastric bypass, gastroplasty, gastric banding, biliopancreatic diversion, gastric reduction) and no previous bariatric procedure recorded within 12 months. No codes indicating revision or reversal procedure. No laparoscopic procedure codes in admission. Minimum age: 18. Sex: both.	—	Episodes involving bariatric surgery (open or laparoscopic) in people aged 18 or older.
Pelvic lymphadenectomy for the management of endometrial cancer (Frost et al 2015 [9])	Women with diagnosis of early endometrial cancer (morphology suffix /0 to /2) who receive pelvic lymphadenectomy. No other cancer diagnoses in the episode. Minimum age: 18. Sex: female.	Women with diagnosis of endometrial cancer who receive pelvic lymphadenectomy. Minimum age: 18. Sex: female.	Episodes involving pelvic lymphadenectomy in women aged 18 and older.

Procedure (recommendation source)	Narrower low-value care definition	Broader low-value care definition	Denominator
Percutaneous coronary intervention (PCI) with balloon angioplasty or stent placement for stable coronary disease (CWUS)	PCI with diagnosis of coronary disease except angina in any episode between 6 and 18 months and not less than 6 months before PCI. Minimum age: 18. Sex: both. Exclude emergency admissions and admissions from the emergency department.	PCI with diagnosis of coronary disease excluding unstable angina in any episode between 6 and 18 months and not less than 6 months before PCI. Minimum age: 18. Sex: both.	Episodes involving PCI in people aged 18 and older.
Postoperative radiotherapy after radical prostatectomy (NICE)	Men with diagnosis code for prostate cancer who have had radical prostatectomy. Radiotherapy procedure in same or later episode (within 6 weeks), or later episode (within 6 weeks) with radiotherapy as principal diagnosis. Minimum age: 18. Sex: male.	Men who have had radical prostatectomy (with or without prostate cancer coded). Radiotherapy procedure in same or later episode (within 6 weeks), or later episode (within 6 weeks) with radiotherapy as principal diagnosis. Minimum age: 18. Sex: male.	Episodes involving radiotherapy in men aged 18 and older.
Removal of gallbladder during bariatric surgery (CWUS)	Bariatric procedure with cholecystectomy in admission. No gallbladder disease in previous 12 months. Minimum age: 18. Sex: both.	—	Episodes involving bariatric surgery in people aged 18 and older.

Procedure (recommendation source)	Narrower low-value care definition	Broader low-value care definition	Denominator
Renal artery angioplasty or stenting (Health Policy Advisory Committee on Technology, 2016 [10])	Angioplasty/stenting with diagnosis of renovascular hypertension, atherosclerosis of renal artery, or hypertensive kidney disease or hypertensive heart and kidney disease in the episode, and no diagnosis of fibromuscular dysplasia or pulmonary oedema. Minimum age: 18. Sex: both.	—	Episodes involving angioplasty or stenting (not specified as coronary or cerebral) in people aged 18 and older with diagnosis of renovascular hypertension, atherosclerosis of renal artery, hypertensive kidney disease or hypertensive heart and kidney disease.
Retinal laser or cryotherapy for lattice degeneration (CWA)	Retinal laser or cryotherapy procedure and lattice degeneration diagnosis, with no procedure code indicating repair of retinal detachment, or history of diagnosis of retinal detachment in previous 12 months. Minimum age: 18. Sex: both.	Retinal laser or cryotherapy procedure and lattice degeneration diagnosis, with no procedure code indicating repair of retinal detachment, or history of diagnosis of retinal detachment in the episode. Minimum age: 18. Sex: both.	Episodes involving retinal laser or cryotherapy in people aged 18 and older.
Sentinel lymph node biopsy for melanoma in situ or T1a melanoma (EVOLVE, CWUS)	Sentinel lymph node biopsy for melanoma in situ (morphology code M872–M879 /0–2). No other cancer code in the episode. Minimum age: 18. Sex: both.	Sentinel lymph node biopsy for melanoma in situ or melanoma (morphology code M872–M879 /0–3). No other cancer code in the episode. Minimum age: 18. Sex: both.	Episodes involving sentinel lymph node biopsy in people aged 18 and older.
Spinal fusion for low back pain (CWA, EVOLVE, CWC)	Spinal fusion with diagnosis of low back pain with no mention of sciatica, spondylolisthesis, spinal abnormality, or pain in legs in previous 12 months. Minimum age: 18. Sex: both.	Spinal fusion with diagnosis of low back pain or spinal stenosis with no mention of sciatica, spondylolisthesis, spinal abnormality, or pain in legs in episode. Minimum age: 18. Sex: both.	Episodes involving spinal fusion in people aged 18 and older.

Procedure (recommendation source)	Narrower low-value care definition	Broader low-value care definition	Denominator
Surgery for vesicoureteric reflux (NICE)	Repair surgery on ureter, with diagnosis of vesicoureteral-reflux-associated uropathy. Maximum age: 11. Sex: both.	—	Episodes involving repair or reimplantation of ureter in people aged 0 to 11.
Unblocking nasolacrimal duct in infants (CWUK)	Probing of nasolacrimal duct in infant with diagnosis of inflammation, stenosis, insufficiency, or stricture of lacrimal passages, or other congenital malformation of lacrimal apparatus. Maximum age: 12 months. Sex: both.	Probing of nasolacrimal duct in infant. Maximum age: 12 months. Sex: both.	Episodes involving probing of nasolacrimal duct in infants aged < 12 months.
Vena cava filters for pulmonary embolism prevention (CWUS)	Inferior vena cava filter insertion with no history of or current pulmonary embolism diagnosis or deep vein thrombosis in previous 12 months, no current acute venous thromboembolism, and no diagnosis of adverse effects of anticoagulant or antithrombotic drugs in the episode. Minimum age: 18. Sex: both.	Any insertion of inferior vena cava filter, with no diagnosis of adverse effects of anticoagulant or antithrombotic drugs in the episode. Minimum age: 18. Sex: both.	Episodes involving insertion of inferior cava filters in people aged 18 and older.
Vertebral biopsy for vertebral fracture (Griffith and Guglielmi, 2010;[11] Griffith, 2015 [12])	Needle biopsy of vertebra with diagnosis of vertebral fracture or collapsed vertebra. Minimum age: 18. Sex: both.	Any needle biopsy of vertebra. Minimum age: 18. Sex: both.	Episodes involving needle biopsy of vertebra in people aged 18 and older.

Procedure (recommendation source)	Narrower low-value care definition	Broader low-value care definition	Denominator
Vertebroplasty for osteoporotic vertebral fracture (American Academy of Orthopaedic Surgeons, 2010 [13])	Procedure of vertebroplasty with a diagnosis of osteoporotic vertebral fracture in the episode, and no evidence of bone cancer, myeloma or hemangioma in the previous 12 months. Minimum age: 18. Sex: both.	Procedure of vertebroplasty. Minimum age: 18. Sex: both.	Episodes involving vertebroplasty in people aged 18 and older.

Recommendation sources: CWA, Choosing Wisely Australia; CWC, Choosing Wisely Canada; CWUK, Choosing Wisely United Kingdom; CWUS, Choosing Wisely United States; EVOLVE, Royal Australasian College of Physicians EVOLVE initiative; MSAC, Medicare Services Advisory Committee. Further details of the indicators (including specific procedure and diagnosis codes used) are available from the authors on reasonable request.

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