

Rapid evidence checks are based on a simplified review method and may not be entirely exhaustive, but aim to provide a balanced assessment of what is already known about a specific problem or issue. This brief has not been peer-reviewed and should not be a substitute for individual clinical judgement, nor is it an endorsed position of NSW Health.

Resuming elective surgery – low-value care

Rapid review question

What evidence is available about low-value surgery and how to reduce it?

In brief

Identifying low value care

Very few procedures are of absolutely no value in all clinical circumstances, nor are there many that are universally beneficial. Most tests and treatments fall into a 'grey zone' where they may be appropriate in different circumstances.

- A multi-platform method of identifying low-value interventions in surgical interventions encompassed a broad literature search, a targeted database search and opportunistic sampling. Interventions that were identified were assessed in terms of cost (high or low) and frequency (prevalence) (high or low). (1)
- A systematic review found the 'appropriateness method', developed by RAND and the University of California Los Angeles, to be a reliable and valid method to assess underuse and overuse of surgical procedures. The method comprises: literature review of the risks and benefits of the surgery; compilation of clinical scenarios; and rating by an expert panel in two rounds of deliberation. It results in designation of either appropriate; equivocal or inappropriate.(2) A variant of this approach has been applied in acute injury care and associated emergency surgery.(3)
- Choosing Wisely, an initiative of NPS MedicineWise, is a campaign to engage physicians and patients in conversations about unnecessary tests, treatments and procedures.(4, 5) Lists of low-value care are generated by medical colleges and societies and include surgical procedures.
 - Multiple studies have used Choosing Wisely lists as a basis to quantify the extent of low-value care in a particular jurisdiction.(6-9)
 - Many studies have highlighted endoscopy, knee arthroscopy, hysterectomy, colonoscopy as frequently provided in a low-value context.

- However, content analysis of Choosing Wisely advice found that the recommendations tended to minimise income-generating impact on their own members.(10)
- An Australian study used published audits to quantify low-value care in a range of patient groups, including those in end of life care.(11)
- Internationally, atlases of clinical variation have been used to indirectly low-value care. These compare patterns of healthcare utilisation across geographical areas.
- Some low value care is a result of cascade events triggered by a low-value service, most notably electrocardiogram preceding cataract surgery.(12)
- Multi-level modelling studies have shown hospitals are more important in explaining variation in low-value care than local health districts or statistical local area ; and that (in primary care) physician characteristics (e.g. age, sex, academic degree, professorship, publication record, trial investigation, grant receipt, pharmaceutical or device manufacturer payment) are not associated with variation.(13-15)

Reducing low-value care

- A 2015 systematic review identified 43 different terms that refer to the process of de-adoption or reducing low-value care. It found 13 frameworks to guide de-adoption. More active change interventions (e.g. de-funding, targeted education) were associated with the greatest likelihood of de-adoption.(16)
- Specific approaches explored in the literature include the following.
 - Culture – an evidence-informed framework developed in the USA highlighted four conditions necessary for reducing low value care: prioritise addressing low-value care; build a culture of trust, innovation and improvement; establish shared language and purpose; and commit resources to measurement.(17)
 - Supporting clinician-led efforts to seek professional consensus on what constitutes low-value care and the best means for reducing it.(18)
 - Shared decision making – a systematic review found that while shared decision making improved decision quality for patients about elective surgery, the impact on surgical utilisation has not been clearly demonstrated.(19)
 - Performance measures and reporting are acknowledged to play a key role however a 2016 review found available metrics to be limited in scope and coverage.(20-22)
 - A randomised trial on the effect of clinician pre-commitment to follow Choosing Wisely recommendations and decrease specific elements of low-value care found a small, unsustained decrease in potentially low-value orders for only one of three targeted conditions and may have increased alternate orders.(23)
 - Multicomponent interventions which address both patient and clinician roles in overuse were found by a 2017 systematic review to have the greatest potential to reduce low-value care.(21)
- A 2020 study of overuse of four breast cancer surgical procedures that had been subject to Choosing Wisely recommendations in the USA found variable de-implementation patterns.(24)

Background

Appropriateness in healthcare occurs along a continuum from 'always do' to 'never do'. Tests, treatments and procedures designated as 'always do' are universally beneficial, such as blood insulin for patients with type 1 diabetes while those designated as 'never do' have no therapeutic benefit, such as antibiotics for viral infections.

Clearly effective and ineffective services are greatly outnumbered by 'sometimes' interventions. Most tests and treatments fall into a 'grey zone' where they may be appropriate in different circumstances.

There are a number of complementary studies focused on medical overuse and low value care, including annual systematic reviews published in *JAMA Internal Medicine* on medical and paediatric medical overuse, and a review of medical reversals. (25-28)

The complexity of reducing low value care is widely acknowledged. (29) It requires multiple levers for change working in a coordinated way and changes in clinical decision-making, so that heuristics, tacit knowledge, habit and cognitive biases play an important role.

Methods

PubMed was searched on the 20 June 2020 using the follow search terms:

(overuse OR "low value"[Title/Abstract]) AND (surgery[Title/Abstract] OR procedure*[Title/Abstract]) AND ((review[Filter]) AND (2010:2020[pdat])) 223 results

("low-value"[Title/Abstract] OR "low value"[Title/Abstract] OR overuse[Title/Abstract]) AND ((surgery[MeSH Subheading] OR surgical procedures, operative[MeSH Terms] OR general surgery[MeSH Terms] OR surgi*[Title/Abstract] OR surge*[Title/Abstract])) AND (2010:2020[pdat]) {updating of September 2019 searches "low value" [Title/Abstract] AND review [ptype]) 165 results

Results

Table 1: Peer reviewed literature on identifying low-value care in surgery

Source	Summary
Peer reviewed literature	
<p>Savings from reducing low-value general surgical interventions</p> <p>Malik, et al. 2018 (1)</p>	<ul style="list-style-type: none"> • A multiplatform method identified low value interventions in surgery. It encompassed a broad literature search, a targeted database search, and opportunistic sampling. • Interventions that were identified were assessed in terms of cost (high or low) and frequency (prevalence) (high or low); and clustered into four groups. • 71 low-value general surgical procedures were identified, of which five were of high frequency and high cost (highest impact), 22 were of high cost and low frequency, 23 were of low cost and high frequency, and 21 were of low cost and low frequency (lowest impact). Highest impact interventions included inguinal hernia repair in minimally symptomatic patients, inappropriate gastroscopy, interval cholecystectomy, CT to diagnose appendicitis and routine endoscopy in those who had CT-confirmed diverticulitis. Their estimated cost was €153,383,953. • The high cost high frequency procedures were: <ul style="list-style-type: none"> ○ repair of minimally symptomatic inguinal hernia ○ CT abdomen as first line for diagnosis of appendicitis ○ interval cholecystectomy ○ endoscopic assessment after CT-diagnosed diverticulitis ○ inappropriate indication algorithms or guidelines for upper gastrointestinal endoscopy.

Source	Summary
Peer reviewed literature	
<p>The appropriateness method has acceptable reliability and validity for assessing overuse and underuse of surgical procedures</p> <p>Lawson, et al. 2012 (2)</p>	<ul style="list-style-type: none"> • A summary of methodological studies on the RAND and University of California Los Angeles ‘appropriateness method’, which was developed to assess if variation in the use of surgical procedures is because of overuse and/or underuse. • The appropriateness method is based on a review of the literature on risks and benefits of the procedure. A comprehensive and mutually exclusive set of clinical scenarios or indications for the procedure is then compiled, complete with specific definitions for any potentially ambiguous terms (e.g., “failed medical therapy” would be explicitly defined). Because of the need to be inclusive, the list typically includes many hundreds of clinical indications. An expert panel rates each indication in two rounds. Indications are classified as ‘appropriate’ (the expected benefits of the procedure outweigh the expected harms), ‘equivocal’ (the expected benefits and harms are roughly equal, or there is disagreement among the panelists), or ‘inappropriate’ (the expected harms outweigh the expected benefits). Appropriate indications are sometimes further classified as ‘necessary’ by the panel, usually in a third round. • Review included 37 studies. • Test-retest reliability was good to very good (kappa, 0.64-0.81) for total knee and hip joint replacement, coronary artery bypass grafting and carotid endarterectomy. The interpanel reliability is moderate to very good (kappa, 0.52-0.83) for coronary artery bypass grafting and hysterectomy. Construct validity has been demonstrated by comparing the appropriateness method with guidelines and/or evidence-based approaches for endoscopy, colonoscopy, coronary artery bypass grafting, hysterectomy, and carotid endarterectomy. Predictive validity has been studied for cardiac revascularisation, in which concordance with appropriateness classification is associated with better clinical outcomes.

Source	Summary
Peer reviewed literature	
<p>Low-value clinical practices in injury care: a scoping review and expert consultation survey</p> <p>Moore, et al. 2019 (3)</p>	<ul style="list-style-type: none"> • A scoping review targeting articles, reviews and guidelines that identified low-value clinical practices specific to injury populations. • 36 experts rated clinical practices on a five-point Likert scale from clearly low value to clearly beneficial. Clinical practices reported as low value by at least one level I, II, or III study and considered clearly or potentially low value by at least 75% of experts were retained as candidates for low-value injury care. • 63 were considered candidates for low-value injury care; 33 in the emergency room, 9 in trauma surgery (six of which were related to operative management of liver, renal, splenic, and neck injuries), 15 in the intensive care unit, and five in orthopaedics (follow-up consultation, spine service consultation, repeat X-ray, orthosis for thoracolumbar burst fractures and pre-operative blood tests). The study also identified 87 "grey zone" practices, which did not meet our criteria for low-value care.
<p>Measuring 21 low-value hospital procedures: claims analysis of Australian private health insurance data (2010-2014)</p> <p>Chalmers, et al. 2019 (6)</p>	<ul style="list-style-type: none"> • Study developed indicators for 21 low-value procedures from evidence-based lists, such as Choosing Wisely, and applied them to a claims data set of hospital admissions. • Of the 14,662 patients with admissions for at least 1 of the 21 procedures in 2014, 20.8%-32.0% were low-value using the narrow and broad indicators, respectively. • Of the 21 procedures, admissions for knee arthroscopy were highest in both the volume and the proportion that were low value. • Seven low-value procedures decreased in use between 2010 and 2014, while admissions for low-value percutaneous coronary interventions and inpatient intravitreal injections increased (51% and 8%, respectively). For this sample, it was estimated 2014 Medicare contributions for admissions with low-value procedures to be between \$A1.8 and \$A2.9 million, and total charges between \$A12.4 and \$A22.7 million.

Source	Summary
Peer reviewed literature	
<p>Exploring variation in low-value care: a multilevel modelling study Badgery-Parker, et al. 2019</p>	<ul style="list-style-type: none"> • Multilevel logistic regression modelling for nine low-value hospital procedures (abdominal hysterectomy; knee arthroscopy; carotid endarterectomy; colonoscopy for constipation; endoscopic retrograde cholangiopancreatography without cholangitis; endoscopy for dyspepsia; endovascular repair of infrarenal abdominal aortic aneurysm; sentinel lymph node biopsy for melanoma in situ or T1a melanoma; spinal fusion for low back pain). • A series of six models were fit for each procedure. • Analysis of the c statistics showed that the hospital was more important than local health district or statistical local area in explaining whether patients receive low value care.
<p>Low-value care in Australian public hospitals: prevalence and trends over time Badgery-Parker, et al. 2018 (9)</p>	<ul style="list-style-type: none"> • Identified low-value episodes for 27 procedures using international and Australian recommendations as to when a test or intervention is low value (such as those produced via Choosing Wisely, the Royal Australasian College of Physicians Evolve initiative and the UK National Institute for Health and Care Excellence ‘do not do’ recommendations). • Quantified number and proportion of episodes in NSW public hospitals identified as low value by two definitions (narrower and broader), associated costs and bed-days, and variation between hospitals in financial year 2016-17; and trends in numbers of low-value episodes from 2010-11 to 2016-17. • The proportion of low-value care varied widely between hospitals. Of the 14 procedures accounting for most low-value care, seven showed decreasing trends from 2010-11 to 2016-17, while three (colonoscopy for constipation, endoscopy for dyspepsia, sentinel lymph node biopsy for melanoma in situ) showed increasing trends.

Table 1 Counts and rates of low-value care for 27 procedures, and average annual percentage change in low-value episodes for 14 procedures with higher volumes of low-value care

Procedure	Number of episodes	Number (%) of low-value episodes*		Average annual percentage change in low-value care, 2010–2011 to 2016–2017†	
		Narrower	Broader	Narrower	Broader
Endoscopy in adults <55	14 813	2018 (13.62)	2360 (15.93)	7 (6–8)	9 (8–9)
Knee arthroscopy	4218	1106 (26.22)	3002 (71.17)	-8 (-9 to -7)	-4 (-5 to -3)
Hysterectomy	3861	736 (19.06)	1207 (31.26)	-4 (-5 to -3)	-4 (-5 to -3)
Colonoscopy in adults <50	11 790	523 (4.44)	608 (5.16)	4 (2–5)	5 (4–7)
Endovascular repair of abdominal aortic aneurysm	405	175 (43.2)	236 (58.3)	-2 (-5 to 0)	-2 (-4 to 1)
Percutaneous coronary intervention	7783	130 (1.67)	341 (4.38)	0 (-4 to 3)	3 (1–6)
Carotid endarterectomy	408	80 (19.6)	93 (22.8)	-5 (-9 to -2)	-6 (-9 to -2)
Renal artery angioplasty	85	76 (89)	76 (89)	-8 (-12 to -5)	-8 (-12 to -5)
Vena cava filters	191	70 (36.7)	191 (100)	-1 (-5 to 3)	0 (-3 to 3)
Surgery for vesicoureteric reflux	115	44 (38)	44 (38)	2 (-4 to 8)	2 (-4 to 8)
Sentinel lymph node biopsy	2485	39 (1.57)	236 (9.50)	16 (9–23)	13 (9–15)
ERCP	420	35 (8.3)	79 (18.8)	-13 (-19 to -8)	-12 (-16 to -9)
Spinal fusion	1042	26 (2.50)	321 (30.81)	4 (-4 to 11)	6 (4–9)
Epidural steroid injection	184	23 (12.5)	30 (16.3)	-14 (-20 to -8)	-12 (-18 to -6)
Vertebroplasty	45	15 (33)	45 (100)		
Bariatric surgery	307	15 (4.9)	15 (4.9)		
Nasolacrimal probe in infants	9	9 (100)	9 (100)		
Vertebral biopsy	40	4 (10)	40 (100)		
Retinal laser or cryotherapy	1409	4 (0.28)	17 (1.21)		
Hyperbaric oxygen	31	4 (13)	10 (33)		
Laparoscopic uterine nerve ablation	10	3 (30)	10 (100)		
Gall bladder removal during bariatric surgery	5	1 (20)	1 (20)		
Electrotherapy	62	0 (0)	62 (100)		
Pelvic lymphadenectomy	42	0 (0)	21 (50)		
Endometrial biopsy	18	0 (0)	0 (0)		
Radiotherapy after radical prostatectomy	1289	0 (0)	0 (0)		
Electroconvulsive therapy in children	0	0	0		

*For definitions of low-value care, see online supplementary table 1.

†Average annual percentage changes were only estimated for the 14 procedures with the highest numbers of low-value episodes (narrower definition). ERCP, endoscopic retrograde cholangiopancreatography.

Source	Summary
Peer reviewed literature	
<p>Measuring the frequency and variation of unnecessary care across Canada</p> <p>Bouck, et al. 2019 (7)</p>	<ul style="list-style-type: none"> • Focuses on three Choosing Wisely Canada recommendations <ol style="list-style-type: none"> 1. imaging for lower back pain in the absence of red flags 2. routine performance of preoperative testing for patients undergoing low-risk surgeries 3. routine screening mammography for average-risk women aged 40-49. • Two retrospective cohort studies were conducted using administrative health care data, collected between fiscal years 2011-12 and 2012-13, to respectively quantify use of these types of low value care in Alberta, Saskatchewan, and Ontario. • For pre-surgery measures, a cardiac test preceded 17.9 to 35.5% of low-risk surgical procedures across Alberta, Saskatchewan, and Ontario.
<p>Measuring low-value care in medicare</p> <p>Schwartz, et al. 2014 (8)</p>	<ul style="list-style-type: none"> • Drawing from evidence-based lists of services that provide minimal clinical benefit (Choosing Wisely, USA Preventive Services Task Force ‘D’ recommendations, the National Institute for Health and Care Excellence ‘do not do’ recommendations, the Canadian Agency for Drugs and Technologies in Health health technology assessments. • Study developed 26 claims-based measures of low-value services. It used 2009 claims for 1,360,908 Medicare beneficiaries. Services detected by more sensitive versions of measures affected 42% of beneficiaries. • The 26 measures included preoperative testing (chest radiography, echocardiography, pulmonary function test, stress testing), imaging, cardiovascular procedures (percutaneous coronary intervention for stable coronary disease, renal artery angioplasty or stenting, carotid endarterectomy in asymptomatic patients, inferior vena cava filters), and surgery (vertebroplasty for osteoporotic vertebral fractures, knee arthroscopy for osteoarthritis).

Source	Summary
Peer reviewed literature	
<p>Analysis of physician variation in provision of low-value services Schwartz, et al. 2019 (13)</p>	<ul style="list-style-type: none"> • Retrospective analysis of variation in provision of low-value healthcare services among primary care physicians, estimating the proportion of variation attributable to physician characteristics. • Included of USA Medicare fee-for-service claims of 3,159,834 beneficiaries served by 41,773 generalist physicians from 1 January 2008, through 31 December 2013. • Multilevel modelling estimated the extent of variation in service use across physicians within their region and provider organisation, adjusted for patient clinical and sociodemographic characteristics and sampling variation. • The proportion of variation attributable to physician characteristics that may be used to predict performance (age, sex, academic degree, professorship, publication record, trial investigation, grant receipt, pharmaceutical or device manufacturer payment, and panel size) was estimated via additional regression analysis. • Observable physician characteristics accounted for only 4.4% of physician variation within region and 1.4% of physician variation within organisation.
<p>Low-value service use in provider organizations Schwartz, et al. 2018 (15)</p>	<ul style="list-style-type: none"> • Multilevel modelling of data from 4,039,733 beneficiaries served by 3,137 provider organisations in the USA. • Variation across organisations, persistence within organisations over time, and correlations in use of different types of low-value services within organisations were estimated, with adjustment for beneficiary sociodemographic and clinical characteristics. • Organisations provided 45.6 low-value services per 100 beneficiaries on average, with considerable variation across organisations (90th/10th percentile ratio, 1.78), including substantial between-organisation variation within hospital referral regions.

Source	Summary
Peer reviewed literature	
	<ul style="list-style-type: none"> • Low-value service use within organisations was highly correlated over time and positively correlated between 13 of 15 pairs of service categories with the greatest correlation between low-value imaging and low-value cardiovascular testing and procedures. • Use of low-value services in provider organisations exhibited substantial variation, high persistence, and modest consistency across service types. These findings are consistent with organisations shaping the practice patterns of affiliated physicians.
<p>A framework for measuring low-value care Miller, et al. 2018 (30)</p>	<ul style="list-style-type: none"> • Review of existing methods to measuring low-value care to develop an integrated framework that combines additive, indicator and comparative approaches. • Additive approach – identify services with low value, and measure frequency and cost. Hypothesises that the wasteful services with the largest associated expenditures make up a substantial portion of low-value care (an 80/20 rule), and that measuring the magnitude of this relatively small number of services will allow approximating total waste. • Indicator approach – identify marker conditions procedures and produce an index and broader assessment of low value or waste. Hypothesises that tracking a small number of low-value procedures which may signal systematic waste can provide input to statistical methods to approximate the overall magnitude of low-value care. • Comparative approach – compare spending across geographical regions. Hypothesises that low-value care is best measured not by counting waste of individual procedures, but by analysing total spending and relative patient outcomes across geographic or organisational units.
<p>Prevalence and cost of care cascades after low-value preoperative electrocardiogram for cataract surgery in fee-for-service Medicare beneficiaries</p>	<ul style="list-style-type: none"> • Focus on the downstream healthcare use triggered by low-value services, sometimes referred to as care cascades, these include tests, treatments, visits, hospitalisations, and new diagnoses made after a common low-value service.

Source	Summary
Peer reviewed literature	
Ganguli, et al. 2019 (12)	<ul style="list-style-type: none"> • An observational cohort study that focuses on care cascades post preoperative electrocardiogram for patients undergoing cataract surgery. • Uses fee-for-service Medicare claims data from beneficiaries aged 66 years or older without known heart disease who were continuously enrolled between 1 April 2013 and 30 September 30 2015, and underwent cataract surgery between 1 July 2014 and 30 June 2015. Exposures: Receipt of a preoperative electrocardiogram. The comparison group included patients who underwent cataract surgery but did not receive a preoperative electrocardiogram. • Among 110,183 cataract surgery recipients, 12 408 (11.3%) received a preoperative electrocardiogram (65.6% of them were female); of those, 1978 (15.9%) had at least one potential cascade event. The comparison group included 97,775 participants (63.1% female). • Those who received a preoperative electrocardiogram experienced between 5.11 and 10.92 additional events per 100 beneficiaries relative to the comparison group. This included between 2.18 and 7.98 tests, 0.33 treatments, 1.40 new patient cardiology visits, and 1.21 new cardiac diagnoses.
<p>Overuse of health care services in the management of cancer: a systematic review</p> Baxi, et al. 2017 (31)	<ul style="list-style-type: none"> • Systematic review of research articles quantifying overuse of any medical service in patients with a cancer diagnosis, excluding studies of cancer screening. • Included 59 articles measuring overuse of 154 services related to imaging, procedures, and therapeutics in cancer management. • The majority of studies addressed adult or geriatric patients (98%) and focused on USA populations (76%). • The most studied services were diagnostic imaging in low-risk prostate and breast cancer. Few studies evaluated active cancer therapeutics or interventions aimed at reducing overuse. Rates of overuse varied widely among services and among studies of the same service.

Source	Summary
Peer reviewed literature	
<p>Head and neck cancer in the elderly: frailty, shared decisions, and avoidance of low value care</p> <p>Mady, et al. 2018 (32)</p>	<ul style="list-style-type: none"> • Head and neck cancer is a disease of older adults. Recurrent and metastatic head and neck squamous cell carcinoma portends a poor prognosis, with median overall survival of less than 12 months. • Within this vulnerable population, significant treatment-related toxicities and physical and psychosocial sequelae can be devastating to quality of life at the end of life. • Shared decision making and early comprehensive palliative and support services are at the crux of the approach to older adults with head and neck cancer. In doing so, low-value care that fails to meet the goals of patients and their caregivers at the end of life may be avoided.
<p>Overuse in cancer care: do European studies provide information useful to support policies?</p> <p>Grilli, et al. 2018 (33)</p>	<ul style="list-style-type: none"> • A review of European studies on overuse of diagnostic or therapeutic procedures or interventions in breast, colorectal, lung and prostate cancer patients. • Included 94 studies, most focused on breast (n = 38) and colorectal (n = 30) cancer. • Information on prevalence of low-value care was available only for a relatively limited number of procedures or interventions. Overall, estimates of overuse tended to be higher for diagnostic procedures (median prevalence across all studies, 24%) than for drugs, surgical procedures or radiotherapy (median overuse prevalence always lower than 10%).
<p>Choosing wisely in oncology: necessity and obstacles</p> <p>Saletti, et al. 2018 (34)</p>	<ul style="list-style-type: none"> • A review of medical literature on adequacy of screening, diagnostic, treatment and follow-up procedures and the potential impact of Choosing Wisely. • Notes treatment appropriateness is less debated, but acknowledges evaluation methods have been developed (including the European Society for Medical Oncology magnitude of clinical benefit scale).
<p>Deimplementation of the Choosing Wisely recommendations for low-value breast cancer surgery: a systematic review</p>	<ul style="list-style-type: none"> • Major surgical organisations participating in the Choosing Wisely campaign identified four breast cancer operations as low value: <ol style="list-style-type: none"> 1. axillary lymph node dissection for limited nodal disease in patients receiving lumpectomy and radiation

Source	Summary
Peer reviewed literature	
Wang, et al. 2020 (24)	<ol style="list-style-type: none"> 2. re-excision for close but negative lumpectomy margins for invasive cancer 3. contralateral prophylactic mastectomy in patients at average risk with unilateral cancer 4. sentinel lymph node biopsy in women 70 years or older with hormone receptor-positive cancer. <ul style="list-style-type: none"> • Study evaluated deimplementation, determined the implications of decreased use, and recognised possible barriers and facilitators. • A systematic review of published literature on use trends in breast surgery. • In the USA rates of axillary lymph node dissection for patients with limited nodal disease decreased by approximately 50% (from 44% in 2011 to 30% to 34% in 2012 and 25% to 28% in 2013), and national rates of lumpectomy margin re-excision have decreased by nearly 40% (from 16% to 34% before to 14% to 18% after publication of a consensus statement). Conversely, national rates of contralateral prophylactic mastectomy continue to rise each year, accounting for up to 30% of all mastectomies for breast cancer (range in all mastectomy cases: 2010-2012 28%-30%; 1998 <2%), and rates of sentinel lymph node biopsy in women 70 years or older with low-risk breast cancer are persistently greater than 80% (range, 80%-88%). • Factors associated with high rates of contralateral prophylactic mastectomy use are younger age, white race, increased socioeconomic status, and the availability of breast reconstruction; limited data exist on factors associated with high rates of sentinel lymph node biopsy in women 70 years or older.

Table 2: Peer reviewed literature on reducing low-value care

Source	Summary
Peer reviewed sources	
<p>Limit, lean or listen? A typology of low-value care that gives direction in de-implementation</p> <p>Verkerk, et al. 2018 (35)</p>	<ul style="list-style-type: none"> • Describes a typology of low-value care comprising three categories: <ul style="list-style-type: none"> ○ ineffective care, such as antibiotics for a viral infection ○ inefficient care, which is effective but is of low-value through inefficient provision or inappropriate intensity, such as chronic benzodiazepine use ○ unwanted care, which is appropriate for the clinical condition it targets, but is low-value since it does not fit the patients' preferences, such as a treatment aimed to cure a patient that prefers palliative care. • The three types differ in the most promising strategy for deimplementation, to limit, lean or listen respectively.
<p>Design and use of performance measures to decrease low-value services and achieve cost-conscious care</p> <p>Baker, et al. 2013 (20)</p>	<ul style="list-style-type: none"> • This paper gives an overview of performance measures that target low-value services to help physicians understand the strengths and limitations of these measures. It provides specific examples of measures that assess use of low-value services, and discusses how these measures can be used in clinical practice and policy.
<p>“Choosing wisely” to reduce low-value care: a conceptual and ethical analysis</p> <p>Blumenthal, 2013 (36)</p>	<ul style="list-style-type: none"> • Considers various mechanisms that could be used for the reduction of low-value care (i.e. incentives, punishments and nonrational influences, such as appeals to social norms, emotions, or ego, and creation of conditions that make avoidance easy such as defaults and reminders). Provides normative guidelines for the use of each.

Source	Summary
Peer reviewed sources	
<p>Shared decision making and choice for elective surgical care: a systematic review Boss, et al. 2016 (19)</p>	<ul style="list-style-type: none"> • Shared decision making may improve quality care delivery, promote evidence-based practice, and reduce overuse of surgical care. • Systematic review of studies evaluating use and outcomes of shared decision making in elective surgery. • Included 24 studies. The most common area studied was spine (7 of 24), followed by joint (5 of 24) and gynaecologic surgery (4 of 24). • 20 studies used decision aids or support tools, including multimedia or video (13 of 20), written (3 of 20), or personal coaching (4 of 20). • The effect of shared decision making on preference for surgery was mixed across studies, showing a decrease in surgery (9 of 24), no difference (8 of 24), or an increase (1 of 24). • Shared decision making tended to improve decision quality (3 of 3) as well as knowledge or preparation (4 of 6) while decreasing decision conflict (4 of 6).
<p>Disinvestment in healthcare: an overview of HTA agencies and organisations activities at European level Calabro, et al. 2018 (37)</p>	<ul style="list-style-type: none"> • A review of health technology assessment agency work on disinvestment. • Eight methodological projects or frameworks, one case study and one dissemination initiative were included.
<p>Interventions aimed at reducing use of low-value health services: a systematic review Colla, et al. 2017 (21)</p>	<ul style="list-style-type: none"> • Systematic review on the effectiveness of interventions to reduce low-value care in general. • Multicomponent interventions addressing both patient and clinician roles in overuse have the greatest potential to reduce low-value care. • Clinical decision support and performance feedback have a solid evidence base; provider education yields changes by itself and when paired with other strategies.

Source	Summary
Peer reviewed sources	
	<ul style="list-style-type: none"> • Further research is needed on the effectiveness of pay-for-performance, insurer restrictions, and risk-sharing contracts to reduce use of low-value care. • While the literature reveals important evidence on strategies used to reduce low-value care, meaningful gaps persist.
<p>Taking action on overuse: creating the culture for change Parchman, et al. 2017 (17)</p>	<ul style="list-style-type: none"> • Describes an action-planning framework to engage providers in reducing overused service. • Informed by a comprehensive review of social science theory and literature, published reports of successful and unsuccessful efforts to reduce low-value care, and interviews with innovators of value-based care initiatives in 23 healthcare organisations across the USA. A multi-stakeholder advisory committee provided feedback on the framework and guidance on optimising it for use in practice. • Four conditions found to be necessary for change: prioritise addressing low-value care; build a culture of trust, innovation and improvement; establish shared language and purpose; and commit resources to measurement. • These conditions foster productive sense-making conversations between providers, between providers and patients, and among members of the healthcare team about the potential for harm from overuse and reflection on current frequency of use.
<p>Measures used to assess the impact of interventions to reduce low-value care: a systematic review Maratt, et al. 2019 (38)</p>	<ul style="list-style-type: none"> • A systematic review to characterise measures used to assess interventions to reduce low-value care. • Developed a framework to classify measures into: utilisation (e.g. number of tests ordered), outcome (e.g. mortality), appropriateness (e.g. overuse of antibiotics), patient-reported (e.g. satisfaction), provider-reported (e.g. satisfaction), patient-provider interaction (e.g. informed decision-making elements), value, and cost. • 101 published and 16 ongoing studies were included in the review.

Source	Summary
Peer reviewed sources	
	<ul style="list-style-type: none"> • Most published studies focused on reductions in utilisation rather than on clinically meaningful measures (e.g. improvements in appropriateness, patient-reported outcomes) or unintended consequences.
<p>Towards understanding the de-adoption of low-value clinical practices: a scoping review</p> <p>Niven, et al. 2015 (16)</p>	<ul style="list-style-type: none"> • Systematic review the literature on de-adoption. The review documents current terminology and frameworks, maps the literature to a proposed framework, identifies gaps in the understanding of de-adoption, and identifies opportunities for additional research. • 109 articles were included in the final review. • There were 43 unique terms referring to the process of de-adoption. The most frequently cited was 'disinvest' (39% of citations). • The focus of most citations was evaluating the outcomes of de-adoption (50%), followed by identifying low-value practices (47%), and/or facilitating de-adoption (40%). • Most articles cited randomised clinical trials (41%) that demonstrate harm (73%) and/or lack of efficacy (63%) as the reason to de-adopt an existing clinical practice. • Eleven citations described 13 frameworks to guide the de-adoption process. • Active change interventions were associated with the greatest likelihood of de-adoption. • A model for facilitating de-adoption is proposed.
<p>Precommitting to choose wisely about low-value services: a stepped wedge cluster randomised trial</p> <p>Kullgren, et al. 2018 (23)</p>	<ul style="list-style-type: none"> • Sought to test whether clinicians committing their future selves, i.e. precommitting, to follow Choosing Wisely recommendations with decision supports could decrease potentially low-value orders. • A 12-month stepped wedge cluster randomised trial among 45 primary care physicians and advanced practice providers in six adult primary care clinics of a USA community group practice. • Clinicians were invited to precommit to Choosing Wisely recommendations against imaging for uncomplicated low back pain, imaging for uncomplicated headaches and unnecessary antibiotics for

Source	Summary
Peer reviewed sources	
	<p>acute sinusitis. Clinicians who precommitted received 1-6 months of point-of-care precommitment reminders as well as patient education handouts and weekly emails with resources to support communication about low-value services.</p> <ul style="list-style-type: none"> The intervention was not associated with a change in the percentage of visits with potentially low-value orders overall, for headaches or for acute sinusitis, but was associated with a 1.7% overall increase in alternate orders (p=0.01). For low back pain, the intervention was associated with a 1.2% decrease in the percentage of visits with potentially low-value orders (p=0.001) and a 1.9% increase in the percentage of visits with alternate orders (p=0.007). No changes were sustained in follow-up.
<p>Issue at the heart of advancing the de-adoption of low-value care. proceedings from an expert roundtable</p> <p>Weiner, et al. 2017 (39)</p>	<ul style="list-style-type: none"> A roundtable of USA leaders and stakeholders from industry, think-tanks, provider and patient groups, and academic experts discussed how health systems, payers, and providers can spur the de-adoption of medical and technologies no longer considered valuable. Four specific aspects of de-adoption were identified. <ol style="list-style-type: none"> Value – targeting ineffective, even harmful, care or expanding efforts to address care of limited value. Resource allocation – spending less or redirecting spending. Quality improvement – a subset of quality improvement or a distinct process Level of intervention – policy, payment, provider, or organisation.
<p>Evaluation of an intervention to reduce low-value preoperative care for patients undergoing cataract surgery at a safety-net health system</p>	<ul style="list-style-type: none"> Pre-post intervention study to evaluate a multipronged intervention to reduce low-value preoperative care for patients undergoing cataract surgery. Using plan-do-study-act cycles, a quality improvement nurse reviewed medical records and engaged the anaesthesiology and ophthalmology chiefs with data on overuse. All three educated staff and trainees on reducing routine preoperative care.

Source	Summary
Peer reviewed sources	
Mafi, et al. 2019 (40)	<ul style="list-style-type: none"> • Preoperative visits decreased from 93% to 24% in the intervention group and increased from 89% to 91% in the control group. Chest X-rays decreased from 90% to 24% in the intervention group and increased from 75% to 83% in the control group. Laboratory tests decreased from 92% to 37% in the intervention group and decreased from 98% to 97% in the control group. Electrocardiograms decreased from 95% to 29% in the intervention group and increased from 86% to 94% in the control group. • During 12-month follow up, visits increased in the intervention group to 67%, but chest X-rays (12%), laboratory tests (28%), and electrocardiograms (11%) remained low (P < .001 for all time-group interactions in both periods).

Table 3: Grey literature

Source	Summary
Grey literature	
<p>Warning over 'heroic', 'futile' surgery when the patient has no hope</p> <p>Dow, 2018 (41)</p>	<ul style="list-style-type: none"> • Audit of surgical mortality
<p>Victorian audit of surgical mortality: report 2018</p> <p>Royal Australasian College of Surgeons, Victorian Audit of Surgical Mortality Management Committee, 2018 (42)</p>	<ul style="list-style-type: none"> • The VASM is part of the Australian and New Zealand Audit of Surgical Mortality (ANZASM), a national network of regionally-based audits of surgical mortality that aim to ensure the highest standard of safe and comprehensive surgical care. • The VASM monitors trends in surgical mortality and clinical management issues in order to identify areas for improvement in the care delivered by health services in Victoria. • Other reports available on the Royal Australasian College of Surgeons web page.
<p>Australian atlas of healthcare variation series</p> <p>Australian Commission on Safety and Quality in Health Care (43)</p>	<ul style="list-style-type: none"> • This series explores how healthcare use in Australia varies depending on where people live. It investigates reasons for variation that may be unwarranted, and provides specific achievable actions to reduce unwarranted variation. • In 2015, focus on surgical interventions included: <ul style="list-style-type: none"> ○ knee arthroscopy hospital admissions, 55 years and over ○ cataract surgery, 40 years and over ○ lumbar spine surgery hospital admissions, 18 years and over ○ radical prostatectomy hospital admissions, 40 years and over

Source	Summary
Grey literature	
	<ul style="list-style-type: none"> ○ hysterectomy and endometrial ablation hospital admissions ○ tonsillectomy hospital admissions 17 years and under ○ myringotomy hospital admissions 17 years and under ○ hip fracture hospital admissions 65 years and over ○ hip fracture average length of stay in hospital by peer group 65 years and over. <ul style="list-style-type: none"> ● In 2017, focus on surgical interventions included: <ul style="list-style-type: none"> ○ knee replacement ○ lumbar spinal decompression ○ lumbar spinal fusion ○ laparoscopic cholecystectomy ○ appendicectomy ○ cataract surgery.
<p>Choosing Wisely Australia NPS MedicineWise (44)</p>	<p>The following are the recommendations from the Royal Australasian College of Surgeons.</p> <ol style="list-style-type: none"> 1. Don't perform repair of minimally symptomatic or asymptomatic inguinal hernias without careful consideration, particularly in patients who have significant co-morbidities. 2. Do not use ultrasound for the further investigation of clinically apparent groin hernias. Ultrasound should not be used as a justification for repair of hernias that are not clinically apparent. 3. Don't transfuse more units of blood than absolutely necessary, noting that many hospitals have developed policies on indications for transfusion with a view to minimisation. 4. Do not use endoscopy for investigation in gastric band patients with symptoms of reflux.

Source	Summary
Grey literature	
	<ol style="list-style-type: none"> 5. Don't do computed tomography (CT) for the evaluation of suspected appendicitis in children and young adults until after ultrasound has been considered as an option. 6. Don't order computed tomography (CT) scan of the head/brain for sudden hearing loss. 7. Don't prescribe oral antibiotics for uncomplicated acute discharge from grommets. 8. Don't prescribe oral antibiotics for uncomplicated acute otitis externa. 9. Don't routinely obtain radiographic imaging for patients who meet diagnostic criteria for uncomplicated acute rhinosinusitis. 10. Don't obtain computed tomography (CT) or magnetic resonance imaging (MRI) in patients with a primary complaint of hoarseness prior to examining the larynx.

Source	Summary
Grey literature	
<p>Getting it right first time (GIRFT) program</p> <p>Royal National Orthopaedic Hospital, et al. (45)</p>	<ul style="list-style-type: none"> • Started as a national program in England’s NHS in November 2016. • One of 11 sub-programs designed to support all NHS hospitals to deliver increased productivity, reduce unwarranted variation and improve quality. • £60m of funding. • Aims to deliver savings between £240m to £420m in 2017-18 and £1.4bn per year by 2020-21. • Not a replacement for audit. • Peer-led deep dives and feedback is key; support for implementation . • Piloted in orthopaedics; now expanded to 46 clinical work streams. • Current workstreams <ul style="list-style-type: none"> ○ Surgical specialties: breast surgery, cardiothoracic surgery, cranial neurosurgery, ear, nose and throat surgery, general surgery, gynaecology and maternity, ophthalmology, oral and maxillofacial, orthopaedic surgery, orthopaedic trauma surgery, paediatric surgery, plastic surgery and burns, spinal surgery, urology surgery, vascular surgery, paediatric trauma and orthopaedics. ○ Clinical services workstreams: adult critical care, outpatients, pathology, radiology. ○ Medical specialties: acute and general medicine, anaesthesia and perioperative medicine, cardiology, dermatology, diabetes, emergency medicine, endocrinology, gastroenterology, geriatric medicine, hospital dentistry, lung cancer, mental health – rehabilitation, mental health – adult crisis and acute mental health, mental health – child and adolescent mental health services, neonatology, neurology, paediatric critical care, renal medicine, respiratory, rheumatology, stroke. ○ Cross cutting themes: coding, litigation, medicines optimisation, procurement and technology, surgical site infection audit.

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