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CAN WE LOWER LOW-VALUE CARE? POLICY MEASURES AND LESSONS IN AUSTRALIA, CANADA, ENGLAND, FRANCE, AND GERMANY

Reinhard Busse, Technische Universität Berlin

Verena Vogt, Technische Universität Berlin

Adam Elshaug, The University of Sydney

Tai M Huynh, University Health Network, Toronto

Wendy Levinson, University of Toronto

Hugh Alderwick, The King's Fund

Kalipso Chalkidou, NICE

Isabelle Durand-Zaleski, Hôpital Henri Mondor

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INTRODUCTION

In efforts to restrain the growth of health care expenditures without compromising health status or quality of care, many countries are searching for ways to reduce the use of health care technologies and services that provide little or no health benefit. Internationally, the problem is described various ways; equally, the measures to address it are described various ways, reflecting disciplinary background (e.g., clinicians vs. policymakers), focus (individual patients vs. population), time, fashion, country, and/or whether costs are explicitly taken into account. The oldest trace goes back to the UK, where Archie Cochrane published his landmark book, *Effectiveness and Efficiency: Random Reflection on Health Services,* in 1972, "which showed that decisions about which technologies to implement ought to be guided by evaluation, especially randomized controlled trials (RCTs)."[1] While mainly unnoticed at the time of publication, it was the foundation for evidence-based medicine (EBM), "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients,"[2] initiated in the 1980s in Canada, and the Cochrane Collaboration, founded in 1993. While EBM focuses on individual patients, the evidence base is also used to produce clinical guidelines, "systematically developed statements to assist practitioners and patient decisions about appropriate health care for specific circumstances;"[3] internationally, the guidelines movement was consolidated by the AGREE Collaboration in 1998, which led to the establishment of G-I-N (Guidelines International Network) in 2002. In the same spirit, the first policy-oriented offices for health technology assessment (a term coined in 1975 by the U.S. Office for Technology Assessment HTA) were set up and the International Society for Technology Assessment in Health Care (ISTAHC, today HTA international) founded in 1985.

Around the time of Cochrane's book, John Wennberg had already "discovered" the topic of small-area variation and described it (using data from Vermont) in his landmark 1973 publication in *Science*.[4] By further evaluating practice variation, it became clear that variations are much larger for some indications (e.g., treatment for low-back pain) than others (e.g., acute myocardial infarction; see below). Another early landmark publication, albeit less noticed, was "Cost, Risks and Benefits of Surgery" by Bunker and colleagues in 1977.[5]

Over time, terms like "inappropriate care,"[6–8] "unnecessary care,"[9] "overuse," "overtreatment," "overdiagnosis," "misuse," or "waste"[10,11] have been added to the discussion. In recent publications (mainly from the United States and Australia) the term "low-value care" has also been used to describe this phenomenon[12,13]—contributing to confusion among policymakers about exact definitions and possible measures to reduce it.

Overall, value is defined as the health outcomes (or benefits) achieved per dollar spent.[14] Thus low-value care can be defined "in terms of net benefit, a function of the expected […] benefit and cost for an individual or group, and is assessed relative to alternatives, including no treatment."[15] Often the term "low-value" is also used for low-benefit services without

considering cost-effectiveness. Low-value care can be further divided into overuse and misuse. The term overuse or overutilization/overtreatment describes how effectively services are delivered. Overuse can take two forms: higher volumes of services or more costly services than appropriate.[16] When no benefit is proven or the benefit is not better than an alternative service for all patients or a subgroup of patients (defined by sociodemographic and/or clinical criteria), services are clinically ineffective.[17] When the benefit is better but the service is superseded by more cost-effective services, the service is non-cost-effective. Misuse describes how efficiently services are delivered. These are, for example, services that cause avoidable adverse patient events, such as health care–associated infections or surgical care errors.

The term "inappropriate" care has also been used to describe the phenomenon of low-value health care (e.g., for services that pose more risks than benefits to the patients[7] or ineffective treatments[6]). The most widely used definition of appropriate care, probably, was developed by Brook and colleagues at the RAND Corporation: "the extent that the expected health benefits of a procedure exceed its expected negative consequences by a sufficiently wide margin that the procedure is worth doing."[18] In the studies at the RAND Corporation, the term "inappropriate" was used for specific indications or clinical situations in which the expected health benefits of a procedure fall below its expected negative consequences (for example, coronary angiography is inappropriate in patients where primary cardiac abnormality is valvular disease).[19] These studies were originally done in the United States, but later replicated in many other countries in Europe and beyond. A similar notion, but for hospital days and hospitalizations, underlies the "Appropriateness Evaluation Protocol," which was originally also developed in the United States,[20,21] but was later also applied in other, including many European, countries.

In the quality assurance discussion (the International Society for Quality in Healthcare, ISQua, was also founded in 1985), the "appropriateness" of a certain technology (e.g., procedure, drug) is seen as "indication quality" (a term mainly used in the German-language discussion, meaning "to do the right thing")—in contrast to the procedural quality ("to do the thing right") once the technology has been chosen. Both are summarized under "process quality." A particular aspect of (bad) quality is usually referred to as "patient safety"—it can relate to selecting the wrong technology (because it is producing more harm than benefits for all patients, for a defined subgroup, or the individual patient) and/or the quality of applying a principally effective and appropriate technology wrongly. The latter phenomenon caught international attention through the Institute of Medicine's report *To Err Is Human: Building a Safer Health System*, published in 2000.[22]

Table 1 is an attempt to provide a framework for understanding the various terms and definitions used to describe low-value care, in which one dimension is the target group and the other is the harm/benefit/cost. Each cell contains the description that best describes this type of low-benefit or low-value care. If harm is larger than benefit, this is mainly a safety issue. No proof of benefit, or services that are not better than others for a defined subgroup of patients, are the focus of this low-value discussion; shades of gray correspond to the degree to

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which that cell is part of the same concept. These are "effectiveness" if the focus is on "all patients" potentially receiving the technology (for drugs, all patients with the indications approved under the market authorization), "appropriateness" (where individual medical criteria or preferences are relevant), "cost-effectiveness" (where the cost-outcome relationship is worse than for alternatives), and "efficiency."

Table 1. Terms and Definitions of Low-Value Care

<table>
<tr><th></th><th>"All patients" potentially receiving the technology</th><th>All patients belonging to one or more well-defined subgroups (by age, indication …)</th><th>"Certain patients" (individual medical criteria or preferences are relevant)</th></tr>
<tr><td>Harm > benefit</td><td colspan="3">SAFETY</td></tr>
<tr><td>Benefit not proven</td><td rowspan="2">EFFECTIVE-NESS</td><td rowspan="2">FOCUS OF "LOW-VALUE CARE"</td><td rowspan="2">APPROPRIATENESS ("INDICATION QUALITY")</td></tr>
<tr><td>Benefit not better than alternative (e.g., outdated)</td></tr>
<tr><td>Benefit better but cost-outcome relation worse</td><td></td><td>"COST-EFFECTIVENESS"/ "COST-BENEFIT"</td><td></td></tr>
<tr><td>Equal benefit but provision inefficient (e.g., inpatient instead of day-care)</td><td colspan="3">EFFICIENCY*</td></tr>
</table>

* Assuming equal patient benefit/ "value"; if this is not necessarily the case, it would be more accurate to speak of "productivity."

The term "waste" is sometimes used synonymously to "low-value."[10] According to Fuchs, there are two possible definitions of waste in medical care: "Medical waste is defined as any intervention that has no possible benefit for the patient or in which the potential risk to the patient is greater than potential benefit. Economic waste is defined as any intervention for which the value of expected benefit is less than expected costs."[23] However, other authors, especially Don Berwick, define "waste" in a much broader sense, including failures of care coordination, fraud and abuse, administrative complexity, and pricing failure—with overtreatment being just one, albeit important component (Table 2). In the following, the term "low-value" is used to describe services that harm the patient, are comparably clinically ineffective (including cost-ineffectiveness), or are inappropriate. Related areas include unsafe technologies (which are "misused") and circumstances where provision is inefficient (also termed misuse or economic overuse—in contrast to the "medical overuse" in the core of low-value care). Of note, some attention has also been given to 'decrementally cost effective technologies'. This means that technologies can be replaced by less effective alternatives if the savings are sufficient to make the loss of health acceptable. The suggested threshold was at least $100,000 saved for 1 quality adjusted life year lost, but few such interventions have been identified so far.[24,25]

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Table 2. Low-Value Care in the Context of Waste

<table>
<tr><td rowspan="6">Failures of care coordina-tion</td><td colspan="3">Other forms of waste</td><td rowspan="6">Fraud and abuse</td></tr>
<tr><td colspan="3">UNSAFE (MISUSE/ BAD QUALITY)</td></tr>
<tr><td>INEFFECTIVE</td><td>“LOW-VALUE CARE” → OVERTREATMENT/ BAD INDICATION QUALITY</td><td>INAPPROPRIATE → OVERTREATMENT/ BAD INDICATION QUALITY</td></tr>
<tr><td></td><td>NOT COST-EFFECTIVE</td><td></td></tr>
<tr><td colspan="3">INEFFICIENT (MISUSE/ ECONOMIC OVERUSE)</td></tr>
<tr><td colspan="3">Administrative complexity Pricing failures</td></tr>
</table>

There are several ways to identify low-value health services. Evidence-based medicine is one approach to inform clinical decisions and identify services that are of low value to individual patients.[2,26] Garner et al.[27] found that Cochrane Reviews are one potential source for identifying low-value health care practices for a subgroup of patients or a whole population. However, the review’s results may not be directly applicable to each context and additional analyses have to be undertaken to facilitate local implementation,[27] where ideally clinical guidelines come into play: “ACP's Clinical Guidelines and Recommendations provide clinicians information based on the best available evidence and help physicians and patients understand the benefits, harms, and costs of interventions and to determine whether services provide good value.”[28] Evidence-based information about low-value care is published by, for example, the American Board of Internal Medicine Foundation’s Choosing Wisely initiative, the U.S. Preventive Services Task Force (USPSTF), the National Institute for Health and Care Excellence “do not do” recommendations, and the Canadian Agency for Drugs and Technologies in Health. Using these lists, Schwartz et al. found that 42 percent of Medicare beneficiaries are affected by low-value care, which constituted 2.7 percent of overall annual spending.[10]

Geographic variations in the use of health care procedures are another way to understand the existence and extent of low-value care. As already noted, Wennberg and colleagues reported geographic variation in health care delivery that is not explained by medical need, especially for preference- and supply-sensitive services. For the latter, they supposed that their overuse should result in more inappropriate care.[29] In order to test this hypothesis, they teamed with the appropriateness researchers and applied their method for six procedures.[19] However, no evidence was found that geographical variations in the use of specific procedures could be explained by variations in the utilization of inappropriate care—a disturbing result coined the “appropriateness paradox.”[19,30] Since 2002, the approach is to group clinical care into three categories with different implications for patients, clinicians, and policymakers: *effective care,*

preference sensitive care, and *supply-sensitive care,* with the latter creating the real problem—they have since then been termed *"unwarranted variations."*[31]

Policies of identifying and assessing low-value services, reducing their existing use (and redirecting those resources) have often been referred to as *disinvestment, displacement, reallocation,* or *reinvestment.*[17] These include, for example, delisting services from the benefit catalogue, pay-for-performance schemes, or informing physicians and patients about low-value care via guidelines or information campaigns, such as choosing wisely. However, it remains unclear which strategies are effective in reducing low-value care.

Using the above developed framework, the aim of the present study is to present—and categorize—strategies applied by policymakers and purchasers to reduce low-value care implemented in five countries (Australia, Canada, England, France, and Germany) and to discuss these strategies in relation to their results and transferability. In addition, the Choosing Wisely Campaign for reducing overuse will be introduced, since this campaign has been adapted and implemented in 16 countries.

CHOOSING WISELY INTERNATIONAL: A GRASSROOTS APPROACH TO ADDRESSING OVERUSE

Choosing Wisely is a campaign led by physicians and other health care professionals, with the goal of stimulating conversation between clinicians and patients about the use of unnecessary tests, treatments, and procedures and helping them to make informed choices about care. The campaign is focused on the quality of care and prevention of harm from unnecessary care, rather than on the reduction of costs.

Choosing Wisely was initially developed by the American Board of Internal Medicine (ABIM) Foundation, and launched in 2012.[32] A commitment to enhancing and supporting the professionalism of physicians, a mission articulated in the Physician Charter on Professionalism for the 21st century, was a driving force for the ABIM Foundation in launching the campaign.[33] This Charter, which was endorsed by over 130 organizations and translated into 12 languages, articulated the commitment of physicians not only to provide high quality of care for patients but also to act as stewards for the finite resources available for health care.[34] The ABIM Foundation launched Choosing Wisely to stimulate physicians to achieve this goal of health care stewardship.

The campaign was launched with the support of medical specialty societies (and later nursing and other professions), each of which developed a list of five tests, treatments, or procedures in their discipline for which there was excellent scientific evidence of overuse, waste, or harm, in other words, low value. These lists of Five Things Physicians and Patients Should Question form the key structure for the campaign. In parallel to the physician lists, *Consumer Reports* developed patient-oriented materials to explain to patients when tests or treatments

are needed and when they are not, the potential harm of unnecessary treatments, and how patients could improve their illness/condition without the overuse of medicine.

Since the creation of Choosing Wisely, over 70 medical specialty societies in the United States have developed lists for their specialty and the campaign has been adapted and implemented in nearly 20 other countries. In order to deepen understanding on baseline rates of overuse, the international Choosing Wisely group is working with the Organization for Economic Development (OECD).[35] The OECD is presently collaborating with the Choosing Wisely international group to measure baseline rates on three of the common areas of overuse identified by the collaborative: use of antibiotics for viral infections; imaging for low back pain without appropriate clinical findings; use of benzodiazepines in patients over age 65 years. This initial cross-country measurement effort is a starting point for further analysis and will allow for overall comparisons around the use and overuse of certain tests and treatments, and facilitates the exploration of possible reasons for variation in overuse between countries.

Choosing Wisely is a young campaign. The impact depends not only on the development of lists of recommendations and patient materials, but on the implementation of recommendations by clinicians. This requires a variety of stakeholders—such as hospitals, office practices, and regional health units—to develop strategies to encourage implementation. In general, these strategies range from lower intensity efforts such as engaging patients and educating physicians, to mechanisms to incorporate Choosing Wisely into local quality improvement efforts, to strategies that embed Choosing Wisely recommendations in ordering practices through electronic ordering or the use of order sets. At present there are many organizations experimenting with these approaches and generating preliminary, but unpublished, data on impact. For example, at Cedars-Sinai Medical Centre in California, close to 200 Choosing Wisely recommendations have been incorporated into the electronic ordering system. Pre-post design studies show 5 percent to 30 percent declines in some tests or treatments.

Critics of Choosing Wisely have identified limitations: some of the lists do not include procedures that may be overused but generate revenue for specialty physicians; the absence of patient engagement in the list development; and the slow pace of evidence establishing the campaign's impact.[36] While such criticisms have merit, the campaign is still young and is actively working to address such limitations through ongoing list development processes, integration into medical education, and robust measurement, implementation and evaluation efforts. The degree of professional engagement and support for reducing low-value care exceeds what could be achieved through payment mechanisms alone, and is an innovative alternative to top down approaches.

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AUSTRALIA

In 1993, Australia became one of the first countries to require that an economic evaluation (comparative clinical and cost effectiveness) form part of the evidence submitted when considering the funding of a new drug. Those processes are covered in detail elsewhere[37,38] so the following focuses on low-value medical services as opposed to pharmaceuticals.

Re-assessing items on the Medicare Benefits Schedule

At the national (Medicare) level in Australia, redressing the presence of low-value care has been integrated under the responsibility of the Commonwealth (federal) Department of Health, including the Medical Services Advisory Committee (MSAC), which makes recommendations to the health minister about what medical services offer sufficient safety and (cost)-effectiveness to warrant public subsidy on Australia's fee-for-service Medicare Benefits Schedule (MBS).

The MSAC has always held within its purview the role of re-assessing items on the MBS (approximately 5,700 of them) but it has been increasingly evident that the attention needed to assess the persistent wave of new and emerging services and technologies seeking listing meant the MSAC's capacity to address existing items was limited.[39]

In 2009, a Quality Framework for Australia's MBS was developed under the auspices of the MSAC.[11] As part of this initiative, the then health minister commissioned a full review of health technology assessment (HTA) in Australia, with one recommendation being the development of a post-market surveillance system. In 2010 there was a name change, to Comprehensive Management Framework for the MBS, but the approach did not vary. It involved a review of individual MBS items, which dovetailed with existing HTA processes, as well as whole-of-specialty reviews.[40] A scanning process identified and prioritized appropriate candidates for review.[17] Using this process, 156 possible candidates were identified and provided to government for consideration; government identified 15 for initial rapid review and potential full HTA.[11] Outcomes from the review would include (for example) one or more of the following:

- Amendments to the item (service) description such that it better captures the patient group/s most likely to benefit from any procedure (reducing indication/scope creep);
- Limits being placed on the frequency or intervals of services, such as diagnostic tests;
- An increase, decrease, or maintenance of the fee based on assessments of relative value;
- A complete stop to public funding of the item (i.e., removal of the item).

One individual technology that was removed from the MBS was vertebroplasty for osteoporotic vertebral fractures.[41] Following the whole-of-specialty review of ophthalmology, a decision was made to reduce the fee for cataract surgery. Advances in technology had delivered on their promises: procedures could be done far more quickly and thus efficiently than when they were first introduced (and priced). Of the 61 ophthalmology item descriptors

on the schedule only 20 remained unchanged through the process. Items were either clarified, modified (e.g., refinement of indications and/or eligible patient groups), split, merged, or entirely removed.[40] Successful examples of item descriptor and fee modifications occurred in pathology. Vitamin D testing, which had increased 4,800 percent from 2003 to 2013, saw its item descriptor modified to better capture patient groups at high risk of deficiency, interval limits were put in place, and a moderate fee reduction occurred. Early evidence of a decrease in testing points to a projected $500 million in savings over five years (from annual Medicare expenditure of AUD$20 billion). Similar refinements to B12 and folate look to contribute approximately AUD$260 million in savings over five years.

With the Comprehensive Management Framework up and running, there was a change of government late in 2013 that saw the program suspended. Then in April 2015 the health minister committed to a revitalized Healthier Medicare initiative, with three priorities: the Medicare Benefits Schedule (MBS) Review Taskforce; the Primary Health Care Advisory Group (PHCAG); and a review of Medicare compliance rules.[42] The MBS Review 13-member taskforce has engaged in broad stakeholder consultation (clinical, patient, community) and now oversees multiple clinical committees and clinical working groups to undertake an accelerated program of MBS reviews to align MBS-funded services with contemporary clinical evidence and improve health outcomes for patients. Priority areas will take account of factors including concerns about safety, clinically unnecessary service provision, with leverage points to build on those listed in dot points above.[43] The Taskforce will present its first interim report in December 2015.

Other measures intended to reduce low-value care

The Australian Commission for Safety and Quality in Health Care has joined the OECD project measuring geographic variations in care.[44,45] Academics have also undertaken similar indirect measures.[6] A large project directly measuring low-value care has also commenced utilizing a methodology used by Schwartz et al. in the United States.[10]

Acceptability and support for the initiatives

Early acceptability and support for these Australian initiatives can be traced to a number of factors. First, as a pioneer in HTA and cost-effectiveness analyses to inform policy, Australia boasts a proud history of openly engaging with its broader community in questions of choice under resource scarcity and notions of opportunity cost. This has been bolstered with the more recent, broader attention being paid to low-value care. Choosing Wisely rolled out formally in Australia in 2015 as did sister programs such as the Royal Australasian College of Physician's EVOLVE, and Cancer Australia's Statements (oncology specific). Groups such as the Consumer Health Forum of Australia have been strong proponents of the new drive for greater appropriateness in health care, and influential elements of the media have carried dedicated, supportive coverage with, for example, a nationally televised, prime-time 50-minute special, *Wasted*.[46] All of these voices carry the same message: low-value care equals waste, which robs resources from higher-value care.

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CANADA

Several recent studies have shown that low-value care is a significant problem in Canada.[47–49] However, there has not been a significant public discussion about the issue, despite a relatively high level of public awareness; public opinion research commissioned by the Canadian Medical Association in early 2015 indicated that 62 percent of Canadians believe that there is a significant amount of unnecessary care in the health care system, and 24 percent said that their doctor has recommended a test or treatment they thought was unnecessary.[50]

Numerous measures have been implemented to address low-value care, but they are fragmented due to the fact that Canada's 13 provinces and territories each administer their own health insurance plan and set their own strategic priorities. In 2012, the provinces and territories jointly established the Health Care Innovation Working Group, which made "appropriateness of care" one of its three priority areas for collaboration. However, progress to date has been limited.[51]

Various mechanisms are available to address low-value care in Canada, ranging from the identification of specific cases of low-value care to their implementation through different financial and nonfinancial levers, mostly at the provincial and territorial levels.

Re-assessing items on benefit schedule

For cases of low-value care that are funded as an insured service and appear as an explicit line item on the schedule of benefits, government payers can delist or put in place restrictive conditions under which the health care provider will be reimbursed. A recent example of this process at work is the 2010 decision by the Ontario government to restrict the use of vitamin D testing, after an exponential increase in testing volume of 2,500 percent from 2004 to 2010. Based on an evidence assessment and recommendation by the Ontario Health Technology Advisory Committee, the government restricted insured vitamin D testing access to those with specific clinical indications. Vitamin D testing decreased from approximately 800,000 tests in 2009 to 300,000 in 2011.[52] A similar approach was followed in the province of British Columbia in 2013 and Alberta in 2015.

Information about low-value care directed to providers

Mechanisms exist at the national and provincial levels to assess and publish the evidence behind existing and new technologies, tests, and treatments. At the national level, this includes the Canadian Agency for Drugs and Technologies in Health (CADTH), an independent, not-for-profit organization that undertakes HTAs and other reviews, usually on behalf of federal and provincial governments. However, many provinces have established similar mechanisms of their own, including the Ontario Health Technology Advisory Committee, Alberta Health Technologies Decision Process, and Quebec's Institut national d'excellence en santé et en services sociaux. These mechanisms typically result in specific recommendations to governments and the health care system in general, but are nonbinding and stop short of actual implementation.

Choosing Wisely Canada is one of the rare examples of a Canada-wide approach to reduce low-value care. Launched in April 2014, it is organized by the Canadian Medical Association and the University of Toronto. Choosing Wisely Canada maintains the most comprehensive guide to low-value care ever compiled in Canada; it now numbers over 160 specific recommendations. Many health care delivery organizations, such as hospitals and health regions, are making the reduction of low-value care a priority for internal quality improvement efforts, which often involve physician education, changes to order entry systems, medical directives, etc. Based on the Choosing Wisely Canada recommendations, North York General Hospital in Toronto has been able to reduce test ordering in the emergency department by 40 percent.

Physician education is seen as an important strategy for reducing low-value care. The Ontario College of Family Physicians operates an accredited continuing professional development program focusing exclusively on educating family physicians about low-value care, while Alberta's Physician Learning Program uses audit and feedback to accomplish similar goals. Choosing Wisely Canada has also provided education through medical professional organizations. Similarly there are increasing efforts to introduce issues of appropriate care and overuse of low-value services into medical education. CanMeds 2015, the competency framework of the Royal College of Physicians and Surgeons, sets out competencies related to "stewardship" of health care resources that need to be incorporated into resident education.

Information directed to patients

Overall patient/public education has been minimal to date. Recently, the "more is not always better" social marketing campaign was launched by Choosing Wisely Canada to educate patients and the public about low-value care and to encourage joint decision-making. This includes patient education materials covering 30 different topics, such as appropriate use of antibiotic and imaging.

ENGLAND

Improving value for money is not a new ambition in the National Health Service (NHS). But the need to make the best use of limited resources has come into sharper focus since the unprecedented slowdown in NHS funding growth in 2010.[53,54] Various studies have identified opportunities to do this by improving quality and reducing low-value care.[55–60] This includes analysis by national bodies in the NHS of the scale of unwarranted variations in clinical practice most notably in the form of *The NHS Atlas of Variation in Healthcare*[56] — and the cost of 'low-value' clinical procedures.[58] These studies have mainly been directed towards purchasers and providers in the NHS, to help them identify opportunities to improve value in their local services.

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National assessments and professional guidelines

Since 1999—long before the recent NHS funding crisis—the National Institute for Health and Care Excellence (NICE) has been responsible for promoting the effective use of NHS resources. It does this by carrying out health technology appraisals, developing clinical guidelines and guidance, and identifying low-value activities for potential disinvestment (for example, by creating "do not do" lists).[61] While NHS organizations are required to provide resources for medicines and procedures recommended by NICE's technology appraisals, they do not have to implement all of NICE's clinical guidelines.[62]

NICE has become increasingly sophisticated to evaluating the cost-effectiveness of medicines and treatments for different types of patients. This means that NICE is also able to recommend that some technologies are only cost-effective for certain groups of patients (and therefore "optimizes" the usage by recommending restrictions for other groups of patients)—which was the case in 18% of all 571 decisions between March 2000 and September 2015.[63]

Evidence of NICE's impact is mixed.[64–66] While there have been reductions in use of some treatments considered low-value by NICE's technology appraisals, implementing clinical guidelines has been more challenging.[65] In some cases NICE guidelines have led to significant reductions in low-value care,[67] while in other, more complex cases—for example, recommendations for effective diabetes care—practice falls well short of NICE's standards.[68]

Approaches to local disinvestment

Despite NICE's role in the system, there is little national agreement on which services are low value.[27] This has led NHS commissioners to create their own lists of potentially low-value procedures for local disinvestment.[69] A well-known example is the Croydon list, first developed by Croydon Primary Care Trust in 2005, which identified 34 potentially low-value procedures. Yet despite some local successes in reducing use of certain services,[70] commissioners in the NHS have typically found disinvestment difficult.[71,72]

Financial incentives

Various de facto mandatory pay-for-performance schemes have been introduced to try to improve value for money in the NHS. This includes the Quality and Outcomes Framework in primary care (with around half its measures relating to clinical processes) and Best Practice Tariffs in secondary care (paying fixed prices for episodes according to best practice), both aimed at incentivizing evidence-based interventions and reducing use of high-cost services. Evidence suggests that some (but not all) of these schemes have improved processes and quality of care, but evidence of their impact on outcomes is limited.[73]

More recently, some commissioners have started to develop capitated budgets for providers covering the care of defined population groups, with payments linked to delivery of agreed outcomes. The aim has been to incentivize investment in prevention and out-of-hospital services and reduce low-value care—for example, by reducing unnecessary hospital admissions—but in most cases it is too early to assess their impact.[74]

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The Quality, Innovation, Productivity and Prevention program

Responding to funding pressures in 2010, the NHS embarked on a national program to try to close the gap between demand for services and available funding—initially called the Quality Innovation, Productivity and Prevention program (QIPP). First the NHS needed to make improvements of around £20 billion by 2014/15.[53] Then it calculated that it needed to achieve around the same again by 2020/21.[54]

While official estimates suggest that the NHS has made cost savings, and efficiency (or at least productivity) increases, since 2010,[75] this has largely been a result of freezing staff pay and cutting the national tariff.[76] Researchers recently analyzed rates of six potentially low-value procedures on the Croydon list (see next section) in the NHS in 2011—the first year of QIPP—and compared these with two benchmark procedures. They found reductions in three procedures compared with the benchmarks, but the rates of the others stayed the same or even increased.[77]

Looking within the national picture, many examples can be found of clinical teams improving value by reducing variations and waste and redesigning services.[55] A national database exists bringing together examples from successful projects,[78] but spreading best practice has been a longstanding and persistent challenge. Reducing low-value care in future fundamentally relies on engaging clinicians across the NHS in leading improvements from the bottom up.

Information about low-value directed to patients and providers

According to surveys, patients and the public, as well as NHS organizations and researchers, notice waste in the NHS[79]— and it has been recognized that the misunderstanding of patients' preferences contributes by encouraging overtreatment.[80] A Choosing Wisely initiative was recently launched by the Academy of Medical Royal Colleges to engage patients and the public, alongside clinicians, in efforts to reduce low-value care.[81] It is too early to assess its impact.

A range of other resources are made available to commissioners and providers in the NHS to help them analyze and understand comparative quality and outcomes of local services (for example, including the NHS Atlases of variation and 'commissioning for value' data packs).[82]

A longer-term view: a combination of measures

Aside from the recent focus on improving value in the NHS, there are lessons in the improvements made over a much longer period.[55] One example is acute medical and surgical length of stay in England, which fell from an average of more than 10 days in 1974 to just over 4 days in 2014. The causes of this improvement have been multiple and overlapping, including new clinical approaches and technologies, reductions in variations, better coordination of care, and financial incentives. Other examples include switching longer hospital stays to day cases and increased rates of generic prescribing.

Low-value care does persist. Take antibiotic prescribing. In 1998, the Department of Health published a report recommending no prescribing of antibiotics for people with simple coughs,

colds, and sore throats.[83] This was followed by a series of guidelines for professionals and public campaigns to try to reduce prescribing rates. Yet evidence suggests that prescribing for coughs and colds increased significantly between 1999 and 2011, while prescriptions for sore throats remained stable.[84] Some have recently called for regulators to punish overprescribing doctors to help tackle the problem.[85]

FRANCE

In the five years preceding 1996, expenditure on health care in France increased at an average yearly rate of 4 percent to 5 percent and by 1996 it amounted to about 10 percent of the gross domestic product. A containment policy for health care expenditure became law in August 1993 (Loi Teulade 93-8). Here, low-value care meant either a harmless prescription which was not required, or that the benefit did not justify the risk of harmful side effects.

In later years, the definition of low-value was extended to include redundancy and inefficient care. Low-value hospital care was estimated in 2004 to be as high as 75 percent for pre-operative testing, 30 percent for hospital days, and 25 percent for selected procedures, such as colonoscopy or vascular stenting. Inefficient care (e.g., procedures that could be performed as day cases instead of overnight admissions) concerned 25 percent of selected procedures (varicose veins, carpal tunnel, cataract, knee surgery) and reductions could save €100 million per year.[86]

Delisting low-value pharmaceuticals

In France, pharmaceuticals are evaluated both in regard to their effectiveness (SMR) as well as their added benefit over other pharmaceuticals for the same indication (ASMR). The SMR assessment determines the percentage of the costs covered by SHI—or, looking at it from the patient perspective, the degree of cost-sharing required, which can go as high as 100 percent. In other words, the patient would pay for the drug entirely out-of-pocket. While the ASMR assessment is applied to new pharmaceuticals only, and is the basis for determining the drug price, the SMR assessment is also applied to drugs already on the market. Since 2005, 600 drugs have been fully delisted (no reimbursement) or moved to the 15 percent reimbursement rate—a preliminary step to delisting. For such drugs, prescription rates decreased by 50 percent. The real impact on drug expenditures is not clear, because prescriptions shifted to other drugs.

Direct financial incentives

The containment policy for health care expenditure introduced mandatory medical practice guidelines, known as références médicales opposables (RMOs). These guidelines aimed to limit low-value or dangerous care by fining physicians who overprescribed. The costliness of a prescription was considered from the viewpoint of the payer. The guidelines were applied immediately after their publication and the enforcement procedures began after a two-month observation period.

The number of violations per doctor was determined by doctors from the health department of the social security administration. They sampled prescriptions over two months. Fines, which could range from approximately USD 200 to USD 1,500, were determined by a weighted combination of the indices of redundancy or harm and cost and of the total number of violations. A threshold for the minimum number of violations needed for legal action against a doctor was established for each guideline. A total of 13,000 doctors (roughly 10%) were surveyed over two years. Altogether 1,278 were peer reviewed, and proceedings were taken out against 186; 75 were eventually fined. Compliance was best for antibiotics and nonsteroidal anti-inflammatory drugs (40% to 45% of prescriptions were written according to the guidelines), and worst for antihypertensive drugs, corticosteroids, and drugs for diabetes (5% to 15% according to guidelines).

The first guidelines, in 1994, were criticized because of methodological flaws and possible conflicts of interest; they were developed by the SHI institutions, that is, the payers. The second group, issued in 1995 and 1996, were written by the Agency that preceded the current HAS. The procedures that rendered the guidelines mandatory were the sole responsibility of the social security administration and doctors' unions.[87] In 1999, the State Council declared them illegal because the sanctions could be higher than was permitted by the 1998 agreement between the two sides; this wasn't questioning the principle, but the level of penalties was illegal.

Indirect financial incentives with intention to reduce low-value care

Ten years later, in 2009, the SHI introduced a pay-for-performance scheme—contrat d'amélioration des pratiques individuelles (CAPI, or contract to improve individual practice), an agreement between the SHI and each volunteering practitioner. The scheme rewarded the organization of the practice, compliance with prevention and treatment guidelines for chronic conditions, use of generic drugs and, more to the point, reduced use of vasodilators and benzodiazepines. Despite the opposition of the unions (which were bypassed by the contracts), the CAPI was successful enough that after two years it was incorporated into the agreement signed between the SHI and the unions, under the name of remuneration sur objectifs de santé publique (ROSP, or payment by public health objectives).

Success was measured by the number of physicians who volunteered and by the targets achieved. With regards to low-value care, the average reduction of prescriptions varied between 1.5 percent and 3 percent over a one-year period for contracting physicians, while noncontracting physicians reduced the same prescriptions by an average 0.5 percent to 1.5 percent.[88]

Information about low-value

Each year, the SHI produces a report that lists proposed actions to reduce low-value care and attaches a value for each, measured in Euros.[89] The 2016 plan proposed:

- early discharge schemes for deliveries, orthopedic surgery, heart failure, COPD, wounds, and stroke, for expected savings of €170 million;

- reduced prescription of useless or redundant tests, for savings of €60 million.

Conclusion and prospects

The trend toward increasing involvement of the SHI in medical practice has been sustained over the past 10 years, despite occasional setbacks. Physicians' unions have opposed the role of SIH in guidelines enforcement (the initial RMOs were abandoned after the State Council ruled that the financial penalties mechanism was illegal) but finally agreed to positive pay-for-performance. More recently, an attempt by the SHI to stop reimbursement of noninvasive ventilation for patients with sleep apnea who did not comply with the minimum duration of use was also blocked by the State Council. On the whole, there is public support for reducing prescriptions of tests and drugs, far more than for limiting reimbursement or increasing premiums (68% vs 44% vs 22%).[90] The SHI is currently using a mix of financial incentives and regulations directed toward both patients and providers. The overall control of health care expenditures has improved although it is difficult to disentangle quality improvement from price controls.

GERMANY

While the problem of inappropriate care is estimated to be huge—for example, an early study with 1986 data estimated the degree of inappropriate hospital use to be 18.4 percent, or 26.6 million patient days in the former West Germany[91]—political attention to it has varied, and the commitment to address it has been modest and incoherent, even if several initiatives and individual measures can be identified. From the 1970s to the 2000s, several health care policies/reforms aimed at limiting the rise in costs. Most of the measure included in these reforms were aimed at the way providers are paid (e.g., replacing single item fee-for-service through payment bundles in ambulatory care or introducing diagnosis-related groups (DRGs) for hospitals), placing budgets on sectoral (regional associations of SHI-affiliated ambulatory care physicians) or provider level (hospitals) and, to a much more limited extent, the removal of certain categories of benefits (crowns and dentures in 1997, which, however, were quickly reinstated and nonprescription drugs in 2004).

However, alongside these major developments there was also a discussion about using money appropriately and efficiently. The major milestone in this respect was the voluminous (three volumes) 2000/01 report of the Advisory Council for the Concerted Action in Health Care, "Appropriateness and Efficiency."[92–94] Volume III (in itself published in three volumes) was titled "Overuse, Underuse and Misuse," providing a state-of-the-art assessment of such problems in Germany—without putting exact numbers behind the problems, however. They defined overuse as services that exceed the individual needs for services or are delivered without evidence-based medical (additional) value. Misuse was defined as causing avoidable damage (medically or economically) through, for example, improper or nontimely application. The report fueled, at least for some time, the discussion and reform agenda but

was also met with skepticism by the medical profession ("the majority of care is appropriate care"), which, however, put clinical guidelines high on their agenda (see below).

Restricting the indications of services

Already in 1997, the predecessor of today's Federal Joint Committee was legally authorized not only to evaluate all new technologies before their inclusion in the ambulatory care fee schedule (and thus, the benefit package), but also with evaluating existing services in respect to their effectiveness and appropriateness. Among the few examples of such restrictions were magnetic resonance tomography for the female breast, which was restricted to local exclusion of recurrence of a mamma carcinoma or search for primary tumours;[95] equally, osteodensitometry, which had been used very often during the 1990s, was restricted (the indications were broadened again in 2013). Another example for a restriction of a service to certain indications is acupuncture, which is only covered for chronic pain in the lumbar spine or the knee, following a trial under routine conditions of care in Germany. While the setting-up of the Institute for Quality and Efficiency in Health Care (IQWiG) has greatly improved the capacity to scientifically evaluate health services, actual decisions often effect only new services that do not affect the daily service provision (e.g., treatment with low-energy lasers in ambulatory care[96] or proton therapy in prostate cancer in stationary care[97]).

On the other hand, the internationally well-publicized evaluation of new pharmaceuticals for their additional benefit over existing therapeutic alternatives does not lead to the exclusion of the new drug in cases of no additional benefit but only affects the reimbursement price.

Information

The medical profession in Germany has an elaborate system of clinical guidelines, produced both by the medical specialty associated and overseen by the Association of Scientific Medical Associations. Clinical guidelines[98] make recommendations regarding evidence-based low- and high-value care and also offer "do not" recommendations, such as the following: "Do not perform imaging techniques in acute low back pain if there is no indication of serious illness based on medical history and physical examination" (National Disease Management Guideline on Low Back Pain)[99] or "A long-term therapy with oral corticosteroids is not recommended" (National Disease Management Guideline COPD).[100] However, there is no explicit claim regarding the extent of overuse or low-value care.

Much more recently, the Bertelsmann Foundation published atlases for a number of inpatient procedures, such as Caesarean section or knee operations at district level (faktencheck-gesundheit.de).[101] The Central Research Institute of Ambulatory Health Care analyses procedures and care-related activities in the outpatient sector and publishes atlases on different regional levels (versorgungsatlas.de). The aim of these atlases is to engage different stakeholders (e.g., health care providers as well as patients) in the discussion on the causes of and possible actions to reduce these variations.

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PLACING POLICY MEASURES INTO A FRAMEWORK OF LOW-VALUE CARE

In this section, we use our framework for types of low-value care to list possible policy measures to tackle the problem (Table 3). Our appendix table sorts the approaches by the five countries into this framework. Table 3 demonstrates the wide array of possible interventions, both directed at problems arising in rows (e.g., if benefit is not proven) as well as within columns (i.e., those stemming from different sizes of patient groups). The measures include, for example, the delisting (or the nonlisting) from the publicly funded package (or the restriction to certain indications), financial incentives such as selective nonpayment in case of using technologies inappropriately or copayment rates reflecting the benefit, pay-for-performance schemes and bundled payments (based on the assumption that providers will select the higher-value services over the low-value ones), to information-based measures such as Choosing Wisely.

Table 3. Policy Options to Address the Various Types of Low-Value Care

<table>
<tr><th></th><th>"All patients"</th><th>Patients in one or more well-defined subgroups</th><th>"Certain patients"</th><th>Policy options</th></tr>
<tr><td>Harm > benefit</td><td colspan="3">SAFETY</td><td>• Revoke license for technology/ procedure</td></tr>
<tr><td>Benefit not proven</td><td rowspan="2">EFFECTIVE-NESS</td><td rowspan="2">FOCUS OF "LOW-VALUE CARE"</td><td rowspan="2">APPROPRI-ATENESS ("INDICATION QUALITY")</td><td>• Mandate HTA for inclusion in benefit package</td></tr>
<tr><td>Benefit not better than alternative</td><td>• Remove from benefit package
• Harmonize payment to for both alternatives to provider</td></tr>
<tr><td>Benefit better but cost-outcome relation worse</td><td></td><td>"COST-EFFECTIVENESS"/ "COST-BENEFIT"</td><td></td><td>• Differentiate payment to provider/ cost sharing to reflect cost-outcome relation</td></tr>
<tr><td>Equal benefit but provision inefficient</td><td colspan="3">EFFICIENCY</td><td>• Change payment to make more costly/ inefficient way less attractive</td></tr>
<tr><td>Policy options</td><td>• Remove from benefit package</td><td>• Restrict coverage to certain indications/ subgroups
• Information campaigns/ guidelines to providers
• Selective non-payment
• Bundled payment
• Information campaigns to population/ patients</td><td>• Quality measurement (outcome)
• Bundled payment</td><td></td></tr>
</table>

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DISCUSSION

This paper has described examples of measures to address low-value care in five countries: Australia, Canada, England, France, and Germany. It demonstrates that the problem of low-value care is persistent – more than 40 years after Cochrane pointed to the fact how little we know about the effectiveness of many medical interventions and Wennberg demonstrated large regional variations not explained by medical need, 30 years after Brook described the inappropriateness of much of medical care, and equally 30 years after the foundation of both the International Society for Technology Assessment in Health Care and the International Society for Quality in Healthcare. A large array of measures – reaching from mandatory to voluntary, involving positive and negative financial incentives or not, addressing providers or patients – have been used to combat low-value care, no matter under which terminology it is known in the various settings – be it ineffectiveness, inappropriateness, overuse, misuse, inefficiency, or most recently, "low-value care".

Countries delisted services from the benefits schedule, reduced fees, or restricted the use of a service to specific indications. While these approaches often resulted in a noticeable decrease in the use of the targeted low-value service, the delisting approach is, with the possible exception of pharmaceuticals, not particularly common and often restricted to diagnostic procedures. In many cases, implementation is complicated because of one or more of the following factors:

- Measuring the value of care is difficult, especially to achieve a large enough consensus among relevant stakeholders; and where decisions are reached, they are sometimes successfully challenged by those affected: examples include the case of AHCRP's 1994 low-back pain guidelines resulting in Congress withdrawing the agency's funding in 1995[102] or French physicians successfully challenging the fines for violating the mandatory "do not"-guidelines (RMOs) in 1999.[103]
- All too often the value is very dependent on the clinical context—if the patient's condition (e.g., comorbidity) is a relevant factor necessitating a significant amount of physician judgment and/or joint decision-making with patients is needed to determine the proper course of action.
- The only area where countries have made real progress in this respect seems to be pharmaceuticals, where the benefit—and added benefit over alternatives—is often based on subgroup analyses, with a differentiated decision made in most countries. Pharmaceuticals are the only sector where value-based pricing has seen any progress—even though in Germany this price also applies for those subgroups for which the assessment has not demonstrated value over the alternative.
- Low-value care is a product of inefficient delivery—for example, inpatient delivery of care for patients who could have been treated in the outpatient sector.

- Low-value care is not an explicit item on the schedule of benefits—this is true for the vast majority of tests done in hospitals, which have traditionally been funded through global budgets or fee-for-service.

Given such difficulties, it is unsurprising that policymakers have shifted to other measures, either pay-for-performance (P4P), where performance can be (partly) linked to reducing, if not avoiding, low-value care, or efficiency-increasing incentives such as diagnosis-related groups (DRGs). P4P schemes have been introduced in England and on a voluntary basis in France. Evidence suggests that some of these schemes have improved processes and quality of care but evidence on their impact on outcomes is limited.[73,88] However, the definition of low-value care inside P4P schemes—and equivalent bonuses if it is reduced—pose almost similar questions than addressing low-value care directly. Policymakers in many countries have therefore resorted to a seemingly easier way, putting incentives for increasing efficiency in place. Possibly the best known examples are DRGs in hospitals, which indeed increase productivity (i.e., less resources are used per hospital stay), but not necessarily value. Additionally, the increased productivity leads to more capacity, which in return is filled with more—possibly inappropriate—cases, or cases that could be better (more efficiently) treated as day cases. The intention of bundled payments is similar to DRGs, but evidence from the Netherlands has shown that overall costs can even increase if bundles are defined too narrowly (e.g., only bundling diabetes services[104]).

Information about low-value care constitutes another set of measures. All countries included in the analyses publish clinical guidelines with recommendations or lists of low-value services. However, evidence on the effectiveness of guidelines and those lists is mixed or has not been analyzed/reported. Some studies found a lack of knowledge/trust on evidence-based medicine being a barrier for putting guideline recommendations into practice. One example is the PSA screening: 36.0 percent of the physicians interviewed (n= 123) disagreed or strongly disagreed with recommendations from USPSTF; 37.7 percent said that they would not change their screening practices.[105] The barriers for the physicians to stopping routine PSA screening are that patients allegedly expect the physicians to continue screening, a lack of time to explain changes, fear of malpractice litigation, and discomfort with uncertainty. Another barrier is a lack of patient information (shared decision-making).[106] It therefore seems doubtful whether penalties for ordering PSA tests now discussed by Medicare can be successfully introduced. Tackling the large majority of low-value care seems to require addressing physician decision-making, influencing physician behaviors, and patient expectations simultaneously.

In order to overcome such information biases, the Choosing Wisely campaign was launched by the ABIM Foundation in 2012 with the goal of stimulating conversation between clinicians and patients about the use of unnecessary tests. This campaign has been adapted in nearly 20 other countries. However, there are some critics of this campaign and evidence on its success is still missing. In addition, there are attempts to introduce issues of appropriate care and low-value services into medical education (e.g., CanMeds 2015).

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Overall, the country profiles show that no single approach can address the sizable and complex issue of low-value care. Consequently, in some countries a mix of regulations directed to patients and providers is under consideration, mixing mandatory and voluntary approaches, addressing both providers and patients—and using financial measures to help to put the message across. Whether countries will be more successful than in the past remains to be seen.

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APPENDIX

In the following table, the various measures undertaken—or planned—in the five countries are listed, sorted by the type of measure.

Overview of Measures to Address Low-Value Care

		Measure implemented (kept/ abolished)? By whom?	Results	Conclusions
Total exclusion of low-value care from benefit basket				
Delisting of services/ goods previously covered (or limiting their indication)	AU	Vertebroplasty for osteoporotic vertebral fractures delisted. Pathology items receive refinements by indication targeting and setting test frequency or interval limits	Achieved on Medicare Benefits Schedule by Health Minister	Vertebroplasty no longer subsidized by Medicare; Considerable $ savings occurring from Vitamin D/B12/folate test reductions
	CA	Government payers can delist services		
	DE		Germany: Delisting of services by GBA	
	FR	Since 2005 and ongoing: 600 drugs delisted (reimbursement 0%) or reduced to reimbursement to 15% of costs (seen a preliminary step to delisting)	prescription decrease of 50%	The real impact on drug expenditures is not clear since there was a prescription shift to other drugs
	UK			
Specific thresholds to identify low-value in HTA-based decisions	AU	See framework in Elshaug et al. 2009[17]	Framework used with data drawn from horizon scanning	Framework implemented[11]; in newest process this is also bolstered with Choosing Wisely recommendations and clinical nominations
	CA	See framework in Elshaug et al. 2009[17] as applied in Ontario[107]		
	DE			
	FR	For drugs and devices (ASMR assessment): ASA		
	UK	NICE technology appraisal based on threshold of £20-30k; NICE can restrict treatments based on their HTAs		
Direct financial incentives				
Directed to providers: Selective non-payment if	AU	*Yes, under consideration in new policy process (MBS Review)*		
	CA	Government payers can put in place restrictive conditions under which the healthcare provider will be reimbursed		

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service is used inappropriately	DE			
	FR	Non reimbursement of expensive drugs outside guidelines		
	UK	NHS commissioners create their own lists of potentially low-value procedures for local disinvestment (e.g., Croydon list); NICE negative list of technologies means payment can be withheld by commissioners	Commissioners have typically found disinvestment difficult	
Payment rates vary with value or are reduced for efficiency	AU	Cataract surgery: 50% fee reduction proposed by Govt.	Heavily contested by ophthalmologists so negotiations led to smaller % reduction but a freeze on annual indexation fee increases	
	CA			
	DE			
	FR	Reduced reimbursement for inpatient surgery (inpatient admissions <48hrs)	20% increase in ambulatory surgery	Increase from 17 to 38 procedures targeted for substitution
	UK	Best Practice Tariff – eg uterine embolization better value for providers than radical hysterectomy for heavy menstrual bleeding		
Usage of low-value care requires prior authorization	AU	*Yes, occurs for some subsidized pharmaceuticals so under consideration in new policy process for medical services (MBS Review)*		
	CA			
	DE			
	FR	Yes for statins rosuvastatine & ézetimibe alone or with simvastatine[90]	Implementation began in late 2014	
	UK	NICE negative list of technologies – requires local authorization through exception panels for funding		
Bonuses if low-value care is below a certain threshold/ reduced to a certain extent	AU			
	CA			
	DE			
	FR	Yes, included in the P4P scheme	2% reduction in prescription for benzodiazepines	
	UK			
Directed to patients: Co-	AU	*Under consideration in new policy process (MBS Review) but in Australia Doctors can charge a gap fee*		

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payment rates vary with value	CA			
	DE			
	FR	For drugs but in practice the copayment is covered by complementary insurance, except for those drugs with a 15% reimbursement		
	UK	Best practice tariffs[53]		
Other and indirect financial measures (with intention to reduce low-value care)				
Capitation/ budgets/ bundled payments	AU	*Yes, 'chronic condition management' items exist and this broader concept is under consideration in new policy process (MBS Review)*		
	CA			
	DE			
	FR			
	UK	Some commissioners have started develop capitated budgets for providers with payments linked to delivery of agreed outcomes	Too early to assess the impact	
Payment is dependent on guidelines adherence	AU	*Yes, under consideration in new policy process (MBS Review). In effect the item descriptors will better reflect 'appropriate use criteria' allowing leverage against care that does not meet these criteria.*		
	CA			
	DE			
	FR	RMOs; but: The State Council declared the financial penalties illegal[103]	decrease of 45million € in drugs prescription[108]	
	UK	Various (VTE, dementia early detection, pressure sores) CQUIN initiatives linking payment or penalties to guidelines[109] Also no payment for emergency readmission within 30 days		
Pay-for-performance and similar	AU	*Yes, under consideration in new policy process (MBS Review)*		
	CA			
	DE	In selective contracts (integrated care)		
	FR	CAPI and ROSP	Yes; average bonus 5,600€	Started with GPs and extended to cardiologists and gastroenterologists

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	UK	Various pay-for-performance schemes have been introduced in the NHS: e.g., Quality and Outcomes Framework in primary care; Best Practice Tariffs in secondary care	Evidence suggests that some but not all of these schemes have improved processes and quality of care but evidence of their impact is limited[73]	
Information about low-value (but no financial consequences)				
Directed to providers: choosing-wisely campaign etc.	AU	*Yes, 3 such campaigns underway: Choosing Wisely; College of Physicians 'EVOLVE' and Cancer Australia 'Statements'. Many individual hospitals are developing and trialing unique initiatives at low-value care reduction*	Sydney Local Health District trialed a 'one less prick' campaign, successfully reducing low-value in-hospital blood draws	
	CA	Choosing Wisely was launched in 2014; Physician education about low-value care by the Ontario College of Family Physicians; *Efforts to introduce issues of low-value services into medical education (CanMeds 2015)*	North York General Hospital in Toronto has been able to reduce test ordering in the emergency department by 40%	
	DE			
	FR			
	UK	Choosing Wisely was recently launched by the Academy of Medical Royal Colleges; A national database brings together examples from successful projects	Too early to assess its impact	
Explicit mentioning of low-value technologies in guidelines	AU	*Yes, under consideration in new policy process (MBS Review)*		
	CA	CADTH and some provinces publishes evidence regarding existing and new technologies, tests and treatments		
	DE	"Do not" recommendations in National Disease Management Guidelines (e.g., low back pain, asthma…)		
	FR	By the SHI in the yearly report to the prime minister and parliament		
	UK	"Do not do" lists created by NICE; NICE negative list from technology appraisals	In some cases guidelines have led to significant reductions in low-value care[76] while in other, more complex cases practice falls short of NICE's standards	
Non-public feedback about individual	AU	*Yes, ACSQHC atlas of variation and plans are afoot to feedback to clinicians as a benchmarking tool, particularly at the hospital level (not yet planned to individual Doctor level)*		

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usage of low-value care	CA	Choosing Wisely Canada has launched a campaign called “more is not always better” directed at patients and the general public		
	DE	Peer review by the Initiative of Quality Medicine (IQM) (inpatient); “Qualitätszirkel” (outpatient)	300 IQM peer reviews within the last five years; 68,000 physicians and psycho-therapists participated in Qualitätszirkel	
	FR	Visits by representatives of the social health insurance Prescription profiling for statins (based upon[110]) and NACOs Readmission after hip replacement	Reduced prescription of newer statins	
	UK	Various including the NHS Atlas of Variation		
Directed to patients: information campaigns (about low-value technologies) etc.	AU	*Yes, Choosing Wisely + representative bodies such as Consumer Health Forum plus media*		
	CA			
	DE	Bertelsmann Stiftung reports on low-value procedures and their use in Germany; Central Research Institute of Ambulatory Health Care analyses regional variation in low-value procedures in the outpatient sector		
	FR	Antibiotics for viral infections Transportation in ambulances for patients who can travel seated Third party payer vs generics: patients who want to get drugs free of charge at the pharmacy have to accept generics	30-70% decrease in patented drugs sales in the first trimester	
	UK	Various, including the Antibiotic awareness campaign[111]		
Directed to both: public disclosure of low-value care use by providers	AU	*ACSQHC atlas of variation—only at geographic area level, not to hospital or individual doctor level.*		
	CA			
	DE			
	FR	Antibiotics for viral infections; cholesterol lowering drugs		
	UK	Various, including: NHS Atlases of variation, Commissioning for value data packs		

In italics: Measure discussed (but not implemented) or planned.

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