From universal health coverage to right care for health

Achieving universal health coverage is the most important means to advance health and wellbeing during the next decade. Too many countries—and not only in low-income or middle-income settings—do not have a health system that provides “access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all”, as described in Sustainable Development Goal 3.8.1

Even many high-income countries, such as the USA and the UK, see important inequalities in income, life expectancy, and health outcomes,2,3 and the prevailing political and economic landscapes are not encouraging for a reversal of this trend in the foreseeable future. At the same time, changing demographics in many countries mean that the share of the population with two or more chronic conditions will increase. As a result, the resilience and sustainability of health systems will be put under even more pressure. In a recent report by the Organisation for Economic Co-operation and Development, it is estimated that the proportion of the population in European Union countries aged 65 years or older will increase from 20% in 2015 to 30% by 2060.4 The same report states that in 2013, more than 1·2 million people in European Union countries died from avoidable illnesses and injuries—people who would not have died had there been more effective public health and prevention policies in place, or more timely and effective health care. Yet all countries are struggling with spiralling costs of health and social care, with the prospect of rationing and restricting services—a strategy that would increase inequality and injustice still further. Failure to provide treatment and preventive care at all remains the unacceptable reality in many low-income and middle-income countries for most of their populations. Clearly, something has to change in our thinking about the provision of health and health care to achieve health and wellbeing for all.

In a Series of papers5–8 and Comments9,10 in The Lancet, Vikas Saini and colleagues provide a framework for such a change of thinking. The Right Care Series examines the areas and extent of overuse and underuse of health and medical services around the world. It defines overuse as “the provision of medical services that are more likely to cause harm than good”;11 and underuse as “the failure to use effective and affordable medical interventions”.12 The Series authors argue that both overuse and underuse happen side-by-side in different countries, within countries, among populations, within institutions, and even for a single person. This situation offers an enormous (and currently poorly recognised) opportunity to tackle underuse and overuse together to achieve the right care for health and wellbeing.

What is right care? In its simplest definition it is care that weighs up benefits and harms, is patient-centred (taking individual circumstances, values, and wishes into account), and is informed by evidence, including cost-effectiveness. The Series authors acknowledge that most medical services fall into a grey zone where the benefit and harm ratio for a given individual is unknown. However, an important start is to think about, and aim to influence, the drivers of poor, unnecessary, and harmful care. The authors argue that these drivers fall into three important categories: money, finance, and organisations; knowledge, beliefs, assumptions, bias, and uncertainty; and power and human relationships.

To begin to address each of these levels, the roles of all actors have to be examined closely: patients, community leaders, and civil society; health-care providers and health service organisations; national policy makers and health technology assessment institutions; and global health leaders and professional societies. The best example, where progress is slowly being made, is perhaps that of reduced antibiotic prescribing to combat antibiotic resistance.13 Patients and the public need to be protected from false information for private gain and actively educated, engaged, and empowered to be able to make
and accept decisions that are right for them. Clinicians and health-service providers need to examine their knowledge continuously and honestly, taking account of their biases and motives for decision making. Atul Gawande, writing for The New Yorker, admits that “as a doctor I am far more concerned about doing too little than doing too much”, and explains how the missed diagnoses and omitted treatments haunt him far more than having caused harm by too much treatment. And doctors and other health-care workers need the right amount of time for each patient to decide what the right care is. Our time-starved, factory-like approach to primary care provision is not conducive to delivering the right care with deleterious and more costly consequences further down the line in a patient’s journey through the health and social care system. National policy makers, regulators, and health technology assessment organisations need to work together to negotiate affordable drug prices, and to publicly fund effective health care and interventions. It is unbelievable that the UK still funds homeopathy, on one hand, and has failed to recognise the outrageously inflated price for phenytoin sodium capsules for patients with epilepsy, on the other hand. Professional societies need to work together at a global level to provide strong, unbiased, evidence-based, and relevant treatment guidelines. Global health leaders need to recognise the opportunity to eliminate poor care and provide right care as the answer to truly and sustainably achieve healthy lives and wellbeing for all.

This Series could form the basis for serious discussions about what kind of health system we want for the 21st century as part of our commitment to universal health coverage.

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Avoiding overuse—the next quality frontier

As nations move toward universal health coverage (UHC), the stakes on quality of care rise. The poorest people in the world can least afford poor quality health care. They do not have the resources to repair the damage when care goes wrong, their development requires a healthy workforce, and money wasted on ineffective or harmful care is money denied to other essential services. Poor quality care damages wealthy nations, too. Few high-income countries have the political will to increase tax rates, and therefore government investments reflect zero sum choices—what public health care gets, public schools and public housing lose. Private sector employers, the source of half the health-care spending in the USA, also must trade those costs off against worker incomes, capital investments, and profit margins.

Quality refers to the degree of match between health products and services, on the one hand, and the needs they are intended to meet, on the other. Health care that meets needs is high quality; health care that does not meet needs is low quality. Four papers in a Series in...
The Lancet focus on two important types of quality defect: overuse of ineffective care and underuse of effective care. With comprehensive reviews of the available evidence, the Series authors leave little doubt that reducing both overuse and underuse must take centre stage in evolving health-care policies.

The magnitude of overuse reported by Shannon Brownlee and colleagues may surprise many readers. For example, a study in China found that 57% of patients received inappropriate antibiotics; inappropriate hysterectomies in the USA range from 16% to 70%; inappropriate total knee replacement rates were 26% in Spain and 34% in the USA. WHO has estimated that 6.2 million excess caesarean sections are performed each year—50% of them are in Brazil and China. Underuse of effective practices, especially in low-income settings, is less surprising, although its magnitude is harder to estimate. The variation is large across clinical procedures, but, overall, in both low-income and high-income nations, ineffective, scientifically unwarranted care seems to account for close to about one-quarter to one-third of total volume for many procedures, and for some specific conditions and procedures, probably quite a bit more.

The problems of overuse and underuse highlighted in this Lancet Series call to mind an unexpected finding published nearly 30 years ago by the RAND Corporation: that there was no correlation between geographical variation in appropriateness of care and geographical variation in the volume of care. Within the USA, regions with low use of care had the same levels of inappropriate care as regions with high use of care. The same finding seems true today on a global scale.

No one knows whether, in a perfect world, eliminating all underuse and overuse would produce net savings or increase total health-care costs. In richer nations, especially the USA, the result would almost certainly be reduced costs; in poorer ones, probably not. But, rich or poor, no country can avoid the conclusion that overuse drains opportunities from finite health resources—what Nobel Prize winning political economist Eleanor Ostrom called “common pool resources”. For nations with tight constraints on investments in health, reducing overuse could offer the biggest opportunity for releasing resources to address underuse.

The social, economic, political, and psychological factors that drive overuse are many, as highlighted by Vikas Saini and colleagues. The authors classify these drivers into three clusters: (a) the flow of money and consequent effects on incentives and the integration of care; (b) gaps in knowledge, misleading psychological tendencies, and erroneous beliefs; and (c) asymmetries in power between patients and providers, impeding proper consideration of patients’ aims and preferences. These influences are highly interrelated. For example, the medical-industrial complex, aiming to increase revenues and profit, feeds public expectations that more care is always better care (even though it is not), funds the incomes and education of health-care professionals (shaping their incentives and beliefs), and controls much of the research funding that purports to evaluate their drugs and technologies (courting bias). The asymmetry of power and information between doctors and patients can push both toward interventionist care, even if fully informed patients would prefer less invasive options. Fee-for-service health-care payment systems and those that link hospital or physician incomes to volume, such as percentage mark-ups for medication prescribing, encourage excess and discourage scepticism about time-honoured practices, even those of little merit.

With dynamics like these at work, addressing overuse as a serious quality problem is not for the faint of heart. If governments or scientific bodies attempt to prescribe, through policy or payment, when a medical practice is appropriate and when not, many status quo interests are likely to respond with accusations of so-called rationing, paralytic debates about the clinical evidence, defence of the prerogatives of professionals, and even bribes.

Nonetheless, with the magnitude of waste so high, and the risks to patients from ineffective care so grave, it behoves health-care leaders worldwide to name the problem of overuse clearly, and to support changes.
in payment, training, and, when needed, regulation to reduce it. The aim, in the words of quality expert James Reinertsen, ought to be, “all the care, and only the care, that will help the patient” (Reinertsen J, The Reinertsen Group, personal communication). Building the research base for distinguishing helpful from wasteful care needs to be part of that plan.

In recent years, WHO and other national and multinational bodies have courageously led moves toward global improvement on two important quality-of-care aims: to increase patient safety and to reduce inappropriate use of antimicrobial agents.\(^1\) As UHC gains traction, they should add a third quality aim to that portfolio: reducing the overuse of ineffective care.

There would be an understandable tendency to try to balance an assault on overuse with a simultaneous assault on underuse. That would reassure some who would fear loss of momentum toward encouraging increased investment in health, especially in low-income nations. Even in the poorest settings, however, it is important to attack overuse as well as underuse, so that the resources recovered from the former can be reinvested in reducing the latter.

For starters, WHO should designate a range of clinical practices for which strong evidence already exists of widespread overuse. WHO and others should organise multinational learning networks for reducing overuse, modelled on current quality improvement collaboratives.\(^2\) Multinational donors, organisations, and governments should mount a several-year effort to improve the empirical base for estimates of overuse, and to expand the target list of types and patterns of overused care.

It would be helpful for researchers and policy analysts to develop evidence-based international guidelines for health-care payment, policy, and incentive structures that could discourage overuse, to the advantage of patients and communities. A best practice template for policy and payment to support appropriateness should be developed for the consideration of ministries and legislatures.

This landmark Lancet Series on overuse and underuse constitutes a call-to-arms to improve health care globally by better matching care to needs, and practice to science. Reducing unwarranted, useless, and, therefore, harmful care is an important part of that agenda.

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1. Kaiser Family Foundation. Health insurance coverage of the total population. 2015; http://kff.org/other/state-indicators/total-population/

Addressing overuse and underuse around the world

The benefits of modern medical care have advanced the health of populations around the world, but with better health has come rising health-care spending. Not surprisingly, there is global interest in optimising the delivery of health services, exemplified by the universal health coverage (UHC) and waste in research campaigns.\(^3\) Compared with overuse, comparatively neglected is a central paradox that afflicts high-income countries (HICs) and low-income and middle-income countries (LMICs) alike: the failure to deliver needed services alongside the continuing delivery of unnecessary services. The Lancet Series on right care\(^4\) aims to bring these two issues—overuse and underuse—to the centre of global health strategies (panel).
Inappropriate care is a widespread phenomenon. Doctors in HICs and LMICs continue to underuse simple and inexpensive interventions, and to overuse ineffective but familiar, lucrative, or otherwise convenient services, despite potential patient harms. Underuse and overuse occur whether providers are paid fee-for-service or salaried in market-driven and highly regulated systems, or in systems that are funded publicly and privately. Moreover, these two issues can affect the same country, the same health organisation, the same hospital, and even the same patient.

Getting better value from health care—ie, more health per dollar spent—is a challenge common to all nations. Underuse leaves populations and patients in any setting vulnerable to avoidable disease and suffering. Overuse causes avoidable physical harms from the irreducible rate of adverse events, and financial harms from wasted resources which could be better spent on services that promote health.

In most HICs, rising health-care costs with little or no marginal improvement in population-based outcomes have become a concern across the political spectrum, and the scope of the waste is staggering. In 2010, the US Institute of Medicine estimated the annual excess cost from health-care waste in the USA at US$765 billion—with at least $210 billion in unnecessary services and $55 billion in missed disease prevention. In LMICs, the development of insurance schemes coupled with the transfer of seemingly advanced, but often merely wasteful, norms of medical care through globalised markets means that scarce resources are triple-taxed by the continuing burden of poverty, malnutrition, and infectious disease, rapidly rising rates of chronic diseases, and the adoption of expensive yet unproven medical technologies.

Defining the right care and understanding the forces that work against it constitute a crucial pathway to real affordability. Failing to do so will leave universal access to high-quality, cost-effective, and compassionate care an ever-receding mirage. The Right Care Series creates a framework for understanding overuse and underuse around the world, the common drivers of poor care, and the potentially scalable remedies to each.

What is the right care? Answering this question remains a challenge, largely because most medical services fall into a grey zone where the probability of benefit or harm is uncertain for any individual. This zone of uncertainty has at least four dimensions: (1) services for which high-quality evidence of clinical effectiveness is lacking; (2) patients for whom there is irreducible uncertainty about the potential for benefit and harm; (3) patient preferences, whether for quantity or quality of life, avoidance of harm, or ability/willingness to incur financial costs; and (4) varying cost utilities of national political economies. Globally, definitions of overuse and underuse are necessarily context dependent; the same clinical service may have different utility when refracted through the lens of the national delivery system or wealth of a country.

This last dimension includes both a nation’s capacity to pay for health care and its political willingness to do so. Underuse is generally driven in LMICs by insufficient medical resources and patients’ inability to pay. In HICs, underuse often reflects a maldistribution of resources driven by inequalities of economic or cultural power, and profit seeking for high-margin technologies at the expense of less expensive treatments. Just as inadequate capacity drives underuse, excess capacity drives overuse—so-called supply-sensitive demand. With inadequate or insufficiently independent regulatory mechanisms, particularly in the absence of adequate methods for determining population needs, many HICs have overinvested in hospital-based infrastructure and workforce while underinvesting in community-based services such as primary care or home care. A few countries, such as Denmark and China, are attempting to shift resources towards community-based care, a
model pioneered effectively in Cuba.¹⁴

With UHC adopted as a target under the United Nations Sustainable Development Goals in 2015, focusing the world’s attention on achieving the right care is an urgent task and an enormous opportunity: we could improve the value of the care we deliver and redeploy the vast waste to reduce underuse, improve overall access to care, and, in many nations, address socioeconomic determinants of health.

Winning this result will not be easy. First, we do not have detailed data on underuse and overuse. We then will need the necessary political consensus for redirecting investments now devoted to sustaining current delivery models towards newer, more balanced models as well as to health outside of health care. This will require addressing the increasingly commercial and transactional nature of medical practice that has emerged globally in the neoliberal era,¹⁵ and developing a deeper understanding of care delivery as a science. Overuse and underuse can be seen as the twin tails of a new epidemiology and a proper domain of robust inquiry for global public health.¹⁶

Although many steps will involve technical innovations and expertise, the broader goal of getting to the right care will not be possible without strong democratic participation by the people of all nations. The deepest drivers of poor care arise out of fundamental inequalities of information, wealth, and power. In addition to more and better knowledge, the path to the right care for health systems will therefore require an activated, informed, and mobilised public.

Clinicians have a unique opportunity to provide leadership in this effort and to fulfill their social responsibility to their patients and to the public.

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Right Care 1

Evidence for overuse of medical services around the world

Shannon Brownlee, Kalipo Chalkidou, Jenny Doust, Adam G Elshaug, Paul Glasziou, Iona Heath, Somil Nagpal, Vikas Saini, Divya Srivastava, Kelsey Chalmers, Deborah Korenstein

Overuse, which is defined as the provision of medical services that are more likely to cause harm than good, is a pervasive problem. Direct measurement of overuse through documentation of delivery of inappropriate services is challenging given the difficulty of defining appropriate care for patients with individual preferences and needs; overuse can also be measured indirectly through examination of unwarranted geographical variations in prevalence of procedures and care intensity. Despite the challenges, the high prevalence of overuse is well documented in high-income countries across a wide range of services and is increasingly recognised in low-income countries. Overuse of unneeded services can harm patients physically and psychologically, and can harm health systems by wasting resources and deflecting investments in both public health and social spending, which is known to contribute to health. Although harms from overuse have not been well quantified and trends have not been well described, overuse is likely to become an increasing worldwide.

Introduction

Overuse, which Chassin and Galvin defined as ‘the provision of medical services for which the potential for harm exceeds the potential for benefit’, is increasingly recognised around the world. Directly measuring overuse requires a definition of appropriate care, which is often challenging. In the USA, estimates of spending on overuse vary widely: conservative estimates based on the direct measurement of individual services range from 6% to 8% of total health-care spending, whereas studies of geographical variation (an indirect measure) indicate that the proportion of Medicare spending on overuse is closer to 29%. Worldwide, overuse of individual services can be as high as 89% in certain populations. Although overuse has mainly been documented in high-income countries (HICs), low- and middle-income countries (LMICs) are not immune. Evidence suggests widespread overuse is occurring in countries as diverse as Australia, Brazil, Iran, Israel, and Spain. Overuse can coexist with unmet healthcare needs, particularly in LMICs.

We aimed to highlight the significance of the problem of overuse and explore what is known regarding the scope and consequences of such, around the world. We have drawn on five systematic reviews (one unpublished) of overuse to help inform this paper, supplemented with reference tracking and additional structured searches of scientific and grey literature. Subsequent papers in this Series will examine the underuse of medical services worldwide, the causes of overuse and underuse, and potential solutions for both.

What is overuse?

“Though the doctors treated him, let his blood, and gave him medications to drink; he nevertheless recovered.”

Leo Tolstoy, War and Peace

Although Chassin and Galvin’s definition of overuse is succinct, and may have broad intuitive appeal, it is difficult to address. To directly measure overuse, a definition for the appropriateness of a service is required, based on evidence that considers the balance between benefits and harms for a population or individuals. However, quantifying benefits and harms is often problematic, because evidence regarding benefits is often incomplete, and for many services harms are poorly documented. Furthermore, the threshold between appropriate and inappropriate care can vary among patients or patient groups. Additionally, the role of cost in defining low-value services varies in different settings.

Ultimately, overuse can be considered to occur along a continuum. At one end of the continuum lie tests and treatments that are universally beneficial when used on the appropriate patient, such as blood cultures in a young, otherwise healthy patient with sepsis, and insulin for patients with type 1 diabetes. At the other end of the continuum are services that are entirely ineffective, futile, or pose such a high risk of harm to all patients that they should never be delivered, such as the drug combination fenfluramine-phenetermine for obesity. However, the majority of tests and treatments fall into a...
for many conditions that lie within the grey zone. Unfortunately, clinicians often have a poor understanding of patient values, incorrectly assuming in some cases that a patient would prefer to avoid aggressive or invasive intervention, and in other cases that the patient would favour more rather than less care. This so-called preference misdiagnosis contributes to overuse (and underuse) when clinicians deliver a service that is wrong for that individual patient.

**Measurement of overuse**

Overuse can be measured in various ways. Overuse of a specific service can be measured directly within a population by use of patient registries or medical records. This approach requires a reliable definition of appropriateness for a given service, generally using an evidence-based or consensus-based guideline, or a multidisciplinary iterative panel process (eg, the RAND Appropriateness Method) to define necessary and unnecessary use. Rates of overuse are then calculated as either the proportion of delivered services that are inappropriate or as the proportion of patients who receive the service inappropriately. This direct measure, which is the most reliable indicator of overuse, has been used in a growing body of literature, including several systematic reviews (see figure 2: Overuse of selected services in four countries). However, several challenges inherent in this approach exist when applied to many health-care interventions.

First, as discussed above, evidence for defining appropriate care is scarce in many clinical situations, precluding the direct measurement of overuse for those services. Second, even if evidence is available, necessary details for defining the appropriateness of care in individual patients are often absent from guidelines, while iterative panel processes, which incorporate more nuance, are costly and time consuming. Third, few measures have been developed to assess the prevalence of overuse that occurs because patient preferences are not elicited. Electronic health records (EHR) and the development of large datasets, informed by clinical information from EHRs, have facilitated the measurement of overuse directly.

A growing literature seeks to expand knowledge of overuse through an indirect measure: identifying unexpected variations in health-care implementation. Variations in utilisation that are not attributable to differences in patient or population characteristics have been documented both within and among countries and health-care systems. Although these variations are often not related to overuse (or underuse) per se, but rather to different rates of discretionary care (or services for which the evidence does not point clearly to a right answer, such as revisit interval for patients with diabetes), unexpectedly high rates of use of a particular

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**Figure 1: Grey zone services**

Panel: The role of cost in defining overuse and low-value services

The elimination of clearly ineffective services would reduce both potential harm to patients and excess costs. However, clearly ineffective services are greatly outnumbered by grey zone interventions. Many grey zone interventions benefit very few patients or provide only small benefit relative to costs, and thus are not cost effective. Funding such low-value services poses an opportunity cost; less money is available to address unmet health needs, which subsequently reduces the funds available to improve the socio-economic determinants of health. Whereas cost-effectiveness analysis, which can quantify these tradeoffs, is formally considered in coverage decisions in HICs, such as Australia, Canada, and the UK, and an increasing number of LMICs, it is not included in appropriateness determinations in the USA.

More ambiguous grey zone, which includes: services that offer little benefit to most patients (eg, glucosamine for osteoarthritis of the knee); those for which the balance between benefits and harms varies substantially among patients (eg, opioids for chronic pain, antidepressant medications for adolescents); and the many services that are backed by little evidence to help decide which patients, if any, might benefit and by how much (eg, routine blood testing in patients with hypertension) (see figure 1: Grey zone services). Even when robust consensus has established criteria defining the appropriateness of tests and treatments (such as those developed for cardiological services in the USA), appropriateness can remain uncertain in many individual cases.

Chassin and Galvin's simple definition is further complicated by the question of whose values and preferences should determine the balance between potential benefits and acceptable harms. Certainly different patients faced with a choice of potentially beneficial treatments will vary in their views regarding the tradeoffs of each. Thus, individual patient values and preferences are critical for defining appropriate care
service can reflect overuse. In more recent years, investigators have used large databases to explore variations in the use of specific services as a method of identifying probable overuse. Examples of both direct and indirect evidence documenting overuse of specific services around the world have been noted (table). Some investigators have moved beyond individual services to evaluate rates of general overuse in health-care systems.
by evaluating variations in groups of possibly overused services, but these methods are not yet well established.

Related concepts

We use the term “overuse” to refer to any services that are unnecessary in any way. The related terms, overtreatment and overtesting, indicate the inappropriate delivery of particular types of services.

Another related term, overdiagnosis, is commonly defined as the diagnostic labelling of abnormalities or symptoms that are indolent, non-progressive or regressive, and that if left untreated will not cause considerable distress or shorten the person’s life. This definition can be complicated by the varying natural history of specific diseases, and does not entirely encompass the various settings in which overdiagnosis occurs or the role that it has in overuse. Overdiagnosis can occur as a consequence of screening (including recommended screening). For some screening tests, such as cervical cancer screening, the small risk of overdiagnosis and subsequent overtreatment are outweighed by the reduction in risk of death. For other screening tests, however, the balance is less clear and overdiagnosis may be an important driver of overuse in the form of aggressive overtreatment of clinically insignificant findings. (The third paper in this Series discusses overdiagnosis in greater detail and other drivers of overuse, including defensive medicine, which has been associated with aggressive diagnostic testing in the USA and has been identified by physicians in several countries as an important reason for overusing tests and treatments.) Overdiagnosis can also occur when the definition of disease or abnormality is broadened, leading to populations that were previously considered “normal” or healthy being labelled as diseased. This phenomenon is referred to as overmedicalisation and can result in the treatment of essentially healthy patients in whom potential benefit is small and likely to be outweighed by harms. A review of recent USA guidelines showed that for ten of the 16 guidelines studied, disease definition had been widened, potentially leading to overuse. For example, lowering risk thresholds for treating cholesterol has led to a growing proportion of populations in many countries being prescribed lipid-lowering drugs with unclear benefits. Furthermore, a broadened definition of chronic kidney disease that is used in many countries, although potentially beneficial for ensuring safe drug dosing, has led to large numbers of asymptomatic older people being labelled as ill; as many as 30% of older adults diagnosed with moderately advanced kidney disease (stage 3A) have no urine markers of kidney damage. In children, overdiagnosis can occur in frequently diagnosed conditions, such as Attention Deficit Hyperactivity Disorder (ADHD), food allergies,
gastroesophageal reflux, obstructive sleep apnea, and urinary tract infections.22

Worldwide prevalence of overuse

Overuse is gaining increasing recognition as a worldwide problem; however, the significance of it has not yet been defined. A 2012 systematic review of the prevalence of service overuse in the USA noted that the majority of studies that directly measured overuse were focused on a relatively small number of services.7 However, indirect evidence, such as studies of geographical variation, suggests that overuse is not limited to these services in the USA.7 A more recent systematic review (unpublished) of global overuse categorised 83 overused or low-value services from studies including large sample sizes (more than 800 patients).36-38 These authors identified studies from four countries (with USA studies predominating) and found that the rates of overuse of various services ranged from about 1% to 80% (see figure 2). For LMICs and many HICs, the evidence of overuse is more scarce and largely indirect, although it appears to be increasing (see for example, a 2014 report on geographical variation in health care in 13 countries). In this section, we describe worldwide rates of overuse for a selection of clinical services. We focused our attention on the services most commonly described in systematic reviews and other literature, and services in which overuse has the potential to substantially affect patients or health-care systems.

Overuse of medication

One of the best-documented examples of medication overuse in both HICs and LMICs is the inappropriate use of antibiotics, which represents a worldwide problem that has important consequences for antimicrobial resistance. Many studies have addressed inappropriate antibiotic use in patients with upper respiratory viral infections. A 2012 systematic review of overuse in the US health-care system found 59 studies documenting widely variable rates of overuse of antibiotics for upper respiratory infections.4 In Europe, rates of antibiotic prescribing for viral upper respiratory infections are high in Poland, Sweden, and the UK, with half of patients receiving unnecessary antibiotics.49-50 Additionally, across the continent, studies have documented variable rates of antibiotic prescribing for patients with acute cough, with no associated differences in rates of recovery,51 suggesting overuse.

Evidence of antibiotic overuse in LMICs is largely indirect. Global consumption of antibiotic drugs has risen by 36% between 2000 and 2010, with growing economies such as Brazil, China, India, Russia, and South Africa accounting for 76% of this increase.52 The extent to which this increase represents overuse is not known, however, a 2015 systematic review2 of medication use in China and Vietnam found evidence for antibiotic overuse in both countries. Furthermore, a 2005 systematic review2 of patterns of antibiotic use, which included studies from around the globe, found high rates of inappropriate administration, including substantial patient consumption of so-called leftover antibiotics. Similarly, a 2013 Cochrane review10 of the effect of interventions to improve antibiotic prescribing in patients admitted to hospital included studies from both HICs and LMICs, suggesting wide recognition of the problem of inappropriate antibiotic use, however, the review did not directly quantify prescribing rates.

In other clinical specialties, unexpectedly high prescribing rates for specific drugs in individual health systems suggests overuse. Bevacizumab, an expensive and generally ineffective treatment for breast cancer, is not recommended by the National Institute for Health and Care Excellence (NICE) in the UK, and its US Food and Drug Administration marketing authorisation for breast cancer was withdrawn. However, the drug is reimbursed by health insurers in Colombia for all licensed and unlicensed cancer indications at great expense to the country’s health-care system.104 Similarly, erythropoiesis stimulating drugs, epoetin alfa and beta and darbepoetin alfa, have been widely and inappropriately used in Romania to treat ribavirin-induced anaemia in patients with Hepatitis C and organ transplantations, in the absence of supporting evidence.105

Overuse of screening tests

High rates of inappropriate use of screening tests have been documented, often in the context of concurrent underuse in appropriate populations. In the USA, where there is widespread public support for cancer screening,106 overuse of screening for cervical cancer107,108 in women at very low-risk, and overuse of mammography in women with short life expectancy, who are unlikely to benefit from diagnosis and treatment,109 has been documented. Furthermore, inappropriate use of colonoscopy screening has been found in both the USA and Canada.110-112

Few studies have evaluated rates of inappropriate cancer screening outside of North America. A notable exception is South Korea’s aggressive use of ultrasound screening, which has led to a 15-fold increase in incidence of papillary thyroid cancer. The death rate from this cancer has remained unchanged throughout the period of increased screening, and it is estimated that 99.7–99.9% of screen-detected thyroid cancers in Korea represent overdiagnosis.113 Patients subjected to unnecessary thyroidectomy face an 11% risk of hypoparathyroidism and a 2% risk of vocal cord paralysis, demonstrating clear downstream harms of inappropriate screening. Despite low levels of appropriate mammography screening and widespread doubts regarding the cost-effectiveness of mammograms,114 there are reports of touring mammography vans in India that provide indiscriminate breast cancer screening in women as young as 18 years old,115 much of which represents clear overuse.
Overuse of diagnostic tests

Overuse of testing appears to be common, driven by availability, apparent objectiveness, and the increasing sensitivity of tests to detect disease. Although few systematic analyses of inappropriate use of diagnostic tests have been performed in general, some specific diagnostic services have been evaluated around the world. For example, overuse of endoscopy seems to be common globally. In primary care practices in Switzerland, 14% of colonoscopy referrals and 49% of referrals for upper endoscopy represented overuse. Elsewhere in Europe, appropriateness rates for endoscopy have been reported in Portugal, Spain, Italy, and Norway; overuse accounted for between 13% and 33% of tests, and at an Israeli centre 16% of endoscopies were unnecessary. Studies in the USA have reported overuse rates as high as 60%. In Saudi Arabia, which has open access to endoscopy, nearly half of procedures were deemed inappropriate. A Dutch study found that approximately a quarter of patients received appropriate colonoscopy after removal of colorectal adenomas, with both overuse and underuse of surveillance observed.

Overuse of therapeutic procedures

Surgery and other invasive procedures are likely to be commonly overused in high-income countries. Although prevalence of directly-measured overuse were not reported, Elshaug and colleagues identified more than 150 low-value services in use in Australia, and in the USA, up to 42% of Medicare beneficiaries had received at least one of 26 low-value treatments, with these interventions accounting for as much as 2.7% of overall Medicare spending. Such findings are suggestive of widespread overuse of these services.

There are ample global data regarding the overuse of several cardiovascular procedures, despite clear and broadly accepted appropriateness criteria. Inappropriate percutaneous coronary intervention has been documented in many countries, with a prevalence of 4–12% in the USA; 10–14% in Germany; 16% in Italy; 22% in Israel; 20% in Spain; and 4% in Korea. In one second-opinion centre in India, 55% of recommended cardiac stents or surgery were deemed inappropriate.

Site of care delivery

The site of care delivery and the intensity of care provided are relevant to overuse since more intense care carries a greater risk of complications, and is more costly. If more intense care does not improve outcomes for a condition when compared with less invasive or intensive care, it represents overuse. Hospital care overuse has been documented in both HICs and LMICs. A 2000 systematic review found widely varying rates of inappropriate hospital admissions around the world, ranging from 1% to 54% of hospital admissions. Rates of hospital care overuse in specific countries measured using established criteria to determine appropriateness, were 18–25% in France, 33% in Germany, 19% among internal medicine admissions in Portugal, 7% at a referral centre in Spain, 27% in rural hospitals in China, and widely variable across three Egyptian hospitals, with rates ranging between 0% and 79%. Additionally, studies have shown broad variations in rates of hospital use both within and among countries, suggesting possible overuse, as well as underuse, of hospital care in different locations. Many of these variations are particularly striking with regard to “ambulatory care-sensitive” conditions, or conditions for which high-quality primary care is likely to prevent the need for hospital admission. Overuse of hospital care for ambulatory care-sensitive conditions demonstrates that overuse of one (usually more aggressive) service can result from underuse of another, often less aggressive service.

End-of-life care

In many countries, evidence exists for the overuse of aggressive care for dying patients and simultaneous underuse of appropriate palliative care. Despite evidence that the majority of people around the world would prefer to die at home, about half die in hospital worldwide, with considerable variation among countries. Inappropriately aggressive cancer care near the end of life has been identified as a common problem in Canada, the USA, and the UK, with regional variations observed. Overuse of aggressive end-of-life care in the UK, for example, includes futile insertion of percutaneous endoscopic gastrostomy tubes and administration of chemotherapy that hastens death. Furthermore, ineffective intensive care unit treatment at the end of life has been reported in Canada, the USA, and Brazil. A study from Korea found that the majority of terminal cancer patients received futile intravenous nutrition during the last week of life, with discussions of palliation in only 7% of cases.

Although few systematic assessments of end-of-life care have been performed in LMICs, it is likely that futile care at the end of life is not limited to HICs. In one study in India, nearly half of patients with cancer were diagnosed late and received ineffective radiotherapy. In Brazil, one in five patients with cancer were administered useless medication, most often a statin. Overall, it is likely that overuse of aggressive care and underuse of palliative care at the end of life is commonplace in both HICs and LMICs.

Harms to patients and health-care systems

Overuse is likely to harm patients physically, psychologically, and financially, and could threaten the viability of health-care systems by increasing costs and diverting resources. However, our ability to collect strong evidence that describes the direct consequences of overuse on patients and health systems has been impeded.
by the same factors that challenge our ability to document overuse itself, including an incomplete evidence base for effectiveness and limited reporting of treatment harms.\textsuperscript{15,25} Much of what we know regarding the harms of overuse is derived from estimates and extrapolations.

**Harms to patients**

Few studies have directly documented patient harms from overuse, however, estimates of physical harm to patients from overuse can be inferred from data on adverse events and studies regarding overuse of specific treatments. For example, Cushman and colleagues\textsuperscript{16} used outcomes from a global orthopaedic registry for total knee and hip arthroplasty to estimate a rate of 7–8% for serious adverse events, which included severe infection, revision, cardiovascular events, and death. Other researchers estimate that more than 20% of total knee replacements in Spain and 30% in the USA are inappropriate.\textsuperscript{16,25} Thus we can estimate that 2–3% of patients undergoing arthroplasty surgery in those two countries are unnecessarily harmed by an inappropriate procedure, with approximately 14 000 patients suffering harm from unnecessary knee and hip arthroplasty per year in the USA alone. Other examples of documented harm from overuse include high rates of overuse of implantable venous cava filters and low rates of appropriate removal,\textsuperscript{26} with known excess venous thrombotic complications in 10% of patients who receive them,\textsuperscript{27} and continued overuse of tight glycemic control in intensive care units, despite evidence of higher rates of hypoglycemic complications without reductions in mortality.\textsuperscript{28}

Psychological harms from overuse have only been documented for fewer clinical situations but may be common. Several authors have noted that treatment in hospital may lead to unnecessary physical isolation of patients\textsuperscript{29} with negative consequences including loneliness, feelings of stigmatisation, and depression.\textsuperscript{30,31} Furthermore, screening for breast cancer is known to lead to the diagnosis of precancerous lesions, such as ductal carcinoma in situ,\textsuperscript{32} which has been associated with anxiety for several years after diagnosis and patient overestimation of future cancer risk.\textsuperscript{33–35}

Patients can also suffer from being inappropriately labelled as “ill” as a result of unnecessary testing. As early as 1967, Bergman and Stamm found that among adolescents with heart murmurs, which had been previously (and possibly unnecessarily) evaluated and deemed “innocent”, 40% continued to experience restricted activity and 63% had parents who continued to believe their child was unhealthy.\textsuperscript{36} Harm from labelling can also occur in the context of mental illness. For example, it is widely acknowledged that ADHD is overdiagnosed and overtreated in the USA and other HICs. ADHD is also overtreated in some LMICs,\textsuperscript{37} although some children with ADHD fail to receive appropriate treatment. There is scant research on the effect of an ADHD diagnosis on a child’s sense of self-esteem and ability to modulate their own behaviour, but the label has been shown to affect teacher’s expectations and peer interactions, which can substantially influence a child’s self-perceptions.\textsuperscript{38–40}

Financial costs represent a potentially important but poorly documented source of harm from overuse to patients. In the USA, cost has been identified as a known consequence of all medical care\textsuperscript{41} and of cancer treatment in particular,\textsuperscript{42} with medical bills contributing to over half of personal bankruptcies,\textsuperscript{43} although the contribution of overuse is not known. Similarly, in Australia, parents of children with cancer reported high out-of-pocket expenses,\textsuperscript{44} and WHO has documented medical indebtedness across the globe. Health care is a major source of impoverishment and indebtedness among the poor of India,\textsuperscript{45–47} and 15% of rural Vietnamese families with one member with a chronic illness experience financial catastrophe.\textsuperscript{48} Determining the financial burden of overuse on patients requires active investigation in the future.

**Harms to health-care systems**

Although there are few direct measurements of the proportion of health-care spending attributable to overuse, evidence is emerging that suggests the cost might be considerable. A study\textsuperscript{49} regarding the inappropriate use of bone scans for US Medicare beneficiaries with prostate cancer found that 21% of patients at low risk and 48% of patients at moderate risk of bone metastases underwent at least one scan, despite recommendations against scanning in these groups, at an annual cost of US$11 300 000. Experts estimate that prevalence of overuse contributes substantially to health-care spending in the USA.\textsuperscript{50} Based on a conservative estimate, the USA spent at least $270 billion on care that could be defined as overuse in 2013, despite the fact that millions of Americans do not have adequate access to basic health care. Overuse might also strain health-care budgets in other countries.\textsuperscript{51} In Australia, where many common services are believed to be overused,\textsuperscript{52} the growth in health care expenditure from the rising volume of medical services has been identified as the greatest threat to the financial position of the government, and a bigger cause of health-care cost increases than population growth or ageing.\textsuperscript{53}

Of particular concern is the potential financial effect of overuse on LMICs. The use of expensive advanced technology in HICs, such as new cancer biologics, imaging devices, and multi-focal cataract replacement lenses, spreads through globalised markets to LMICs, potentially crowding out less technological (and potentially higher value) means of promoting population health.\textsuperscript{54} In India, private health insurance and formal sector employees’ insurance programmes cover expensive cancer drugs for a tenth of the country’s population, although the general population does not have access to many basic health-care interventions.\textsuperscript{55}
Although the extent to which the use of expensive services represents true overuse as opposed to lower-value care from a public health perspective is not clear, overuse is a potential threat to both the viability of public budgets and to population health in LMICs.

**Worldwide trends in overuse**

Is overuse getting better or worse? This is a difficult question to answer for several reasons. First, we are only beginning to conceptualise overuse as a general system problem and to develop system-level metrics. Second, there are no measures in general use and providers in most countries have few incentives to report overuse. Third, health-care systems are complex and dynamic, reducing or eliminating overuse of one service or in one site of care could encourage overuse in another, particularly in systems whereby providers are paid a fee-for-service and expect to maintain revenue.

We do know that there has been increased attention among health ministers, clinicians, policy makers and the public, with respect to overuse during the past 5–10 years, particularly in HICs but also in some LMICs. However, awareness of the problem has not automatically led to clinicians delivering the right care. In the USA, for example, concerns about excessive caesarean delivery have existed for decades, however, incidence has continued to rise (from 21% in 1996 to 31% in 2006). Furthermore, despite longstanding concerns regarding the overuse of imaging with CT and MRI, their use increased between 8% and 10% annually from 1996 to 2010.

In LMICs, overuse appears to be increasing, at least for certain services. In Tanzania, rates of caesarean delivery rose from 19% in 2000 to 49% in 2011 among low-risk deliveries, with similar increases over time in India, Nepal, and Bangladesh. Financial incentives and government policies can contribute to increased overuse. In China, government cuts in subsidies led hospitals to charge patients for care, potentially contributing to notably high rates of caesarean delivery (46% in one study in a rural area). Amid allegations of physician corruption and kickbacks from the pharmaceutical industry and diagnostic centres, there are reports from India of inappropriate use of drugs, diagnostic tests, and procedures, including strikingly high rates of hysterectomies. These trends appear to be novel and probably reflect increases in overuse over the past decade, but there are few data documenting longitudinal changes.

HICs are experimenting with specific initiatives to address overuse, such as NICE’s “do not do” list, attention to low-value practices in Australia, and the Choosing Wisely campaign (http://www.choosingwisely.org/). However, there are few studies in either HICs or LMICs addressing the impact of such initiatives. Additionally, EHRs, which have been used as a tool to reduce overuse locally, could be used more broadly in the future. The fourth paper in this Series reviews efforts around the world to reduce overuse.

**Conclusion**

There is strong evidence for the widespread overuse of several specific medical services in many countries, suggesting that overuse is common around the world and might be increasing. However, this paper highlights a key challenge: measuring overuse and developing robust evidence for its prevalence in health services and patient populations. There is a clear need for a research agenda to develop such evidence. Overuse is likely to cause harm to both patients and health-care systems and thus, physicians, politicians and policy makers in both HICs and LMICs must understand overuse and act to reduce it.

**Contributors**

All authors participated in the development of the report, including conception, provision of data and references, writing of the manuscript, revision of the draft, and approval of the final version. SB and DK wrote drafts, which were improved and revised by all other authors. KeC developed Figure 2.

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Right Care 2

Evidence for underuse of effective medical services around the world

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Underuse—the failure to use effective and affordable medical interventions—is common and responsible for substantial suffering, disability, and loss of life worldwide. Underuse occurs at every point along the treatment continuum, from populations lacking access to health care to inadequate supply of medical resources and labour, slow or partial uptake of innovations, and patients not accessing or declining them. The extent of underuse for different interventions varies by country, and is documented in countries of high, middle, and low-income, and across different types of health-care systems, payment models, and health services. Most research into underuse has focused on measuring solutions to the problem, with considerably less attention paid to its global prevalence or its consequences for patients and populations. Although focused effort and resources can overcome specific underuse problems, comparatively little is spent on work to better understand and overcome the barriers to improved uptake of effective interventions, and methods to make them affordable.

Introduction

Underuse—the failure to deliver a health service that is highly likely to improve the quality or quantity of life, which is affordable, and that the patient would have wanted—is responsible for considerable avoidable morbidity and mortality. For example, WHO estimated¹ that in 2015, 1.5 million children died of vaccine-preventable illnesses. The Born too Soon Preterm Action Group estimates that an 84% reduction in the more than 1 million annual deaths in preterm babies could be achieved through universal health coverage and use of selected interventions, such as antenatal corticosteroids and kangaroo mother care, which involves maintaining prolonged skin-to-skin contact between the baby and mother; however, the uptake of such interventions has been painfully slow. Underuse varies substantially between and within countries. For example, high-income countries (HICs), which already have relatively low cervical cancer rates and well established screening programmes, have documented a 68% reduction in high-risk human papilloma virus (HPV) infection rates as a result of HPV

Panel 1: History of the slow uptake, and current underuse, of antenatal steroids to prevent mortality and morbidity in premature births

1972
First randomised control trial (RCT) shows antenatal corticosteroids hasten fetal maturation, reduce risks of respiratory distress syndrome, intraventricular hemorrhage, and neonatal death²

1981
Paper by Crowley consolidating the results of four RCTs³

1984
Collaborative Group on Antenatal Steroid Therapy finds no detectable growth or physical, motor, or developmental deficiencies⁴

1989
Systematic review of RCTs shows significant benefit from steroid therapy⁵

1995
National Institutes of Health Consensus Conference recommends steroids based on a meta-analysis⁶

2010
Meta-analysis shows greater benefit in low-income and middle-income countries⁷

2011
WHO’s 29 Country Survey of Maternal and Newborn Health documented only 52% of women in preterm labour receive corticosteroids⁸

Key messages

- Underuse is responsible for substantial suffering, disability, and loss of life worldwide, in both high-income and low-income countries
- Underuse is prevalent across different types of health-care systems, payment models, and health services
- The causes of underuse are multi-layered: from inadequate access, health system failures, clinicians being unaware or unskilled to provide required interventions, and patients not accessing or declining them
- Underuse occurs alongside overuse, particularly in areas where there is competitive tension between profitable and low-cost interventions
- Policy makers, funders, clinicians, and civil society urgently need to recognise, invest, and resolve the slow uptake of effective, affordable, but non-promoted interventions

This is the second in a Series of four papers about Right Care

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immunisation programmes. By contrast, in India, where more women die from cervical cancer than childbirth, access to HPV vaccination and even to low-technology screening, such as visual inspection of the cervix with acetic acid, is limited.

Underuse and overuse can occur simultaneously. A common tragedy in both wealthy and poorer countries is the use of expensive, and sometimes ineffective, technology while low-cost effective interventions are neglected. For example, a 2013 study in Tanzania found a concurrent increase in maternal mortality and caesarean section in low-risk births; at the same time, whether due to distance or financial barriers, only 50% of all deliveries were done by a skilled provider.

In this paper we review what is known about the scope and consequences of underuse around the world. We undertook a literature search for primary resources and systematic reviews on underuse, supplemented with an iterative citation search of relevant articles. From this literature we offer a description of what is known about the prevalence of underuse and the harm it causes patients, populations, and health systems worldwide.

**Measuring underuse**

Although underuse is known to occur in all countries and health systems in which it has been studied, remarkably little research has focused on determining the global prevalence of underuse, or even the degree to which most medical services are underused in appropriate patients. Most studies of underuse have focused not on prevalence or harm, but rather on methods of remedying the underuse of specific services.

Studies of variations in practice, between and within countries, provide an indirect method of assessing possible underuse. Considerable variations occur in the use of many elective tests and treatments (eg, coronary bypass rates vary by more than three-fold across countries and by up to six-fold within countries; knee replacement rates vary by more than four-fold across countries and by more than five-fold within some countries). Such studies suggest some degree of inappropriate use; however, there is usually no way to determine from variation per se that areas in which rates are high are experiencing overuse, or that areas in which rates are low are suffering from underuse.

Global burden of disease studies have focused on the prevalence of illness and risk factors rather than underuse of medical services; surveys in low-income and middle-income countries (LMICs), such as the Demographic and Health Surveys and UNICEF’s Multiple Indicator Cluster Surveys, have included availability of some health services, such as antenatal and perinatal care, and vaccination, as markers to track the development of health-care systems. However, such studies have generally not provided a full view of underuse of even those few services; even when a service is available in a system, the study might not measure the percentage of the population that does not access it. For example, in estimates of the underuse of corticosteroids to prevent preterm birth, studies focus on women who visit a clinic to see a health-care professional and do not receive appropriate steroid treatment, thus not capturing women who never attend a clinic, thereby producing an underestimate of underuse.

For a few conditions, population-based prevalence of underuse, including underdiagnosis and undertreatment, has been assessed directly via national surveys, which include questions about underuse before, during, and after clinical care. For example, in the USA, the National Health and Nutrition Examination Surveys estimated that 31% of adults aged 18 years and older, and 70% of adults aged 65 years and older had hypertension (based on an average of three blood pressure measurements during the survey, and self-reported medication). Pharmacological treatment rates had improved modestly from 60% between 1999 and 2002, to 70% between 2005...
and 2008, and the proportion of patients with controlled blood pressure increased from 33% to 46%. Although these figures still reflect considerable underdiagnosis and undertreatment of hypertension, they are very good compared with results from other countries (figure 1), such as sub-Saharan Africa, where of those with hypertension, only between 7% and 56% (pooled prevalence 27%) were aware of their hypertensive status before the surveys; 18% of individuals with hypertension were receiving treatment; and only 7% had controlled blood pressure. Surveys of HIV show similar gaps between awareness of virus status, treatment, and control of viral load (figure 1) for the USA and Tanzania. For most health conditions, however, similar population studies assessing underuse are uncommon, and thus we can draw only an incomplete picture of the global prevalence and effect of underuse.

To assess the available data for underuse at the population level, we divided the continuum of care into four stages, adapted from a previous model. At each of the four stages, patients might not receive or use potentially beneficial treatment (figure 2). The four stages are: (A) a total or partial lack of access to health care (because the system does not offer coverage or patients are unable to reach or pay for available care, or both); (B) unavailability of effective services within the local health-care system; (C) a failure of clinicians to deliver or prescribe effective, affordable interventions; and (D) a failure of patients to commence or adhere to effective, affordable interventions. The effect of these four stages is cumulative, as illustrated in figure 2. Once the patient has accessed care, underuse at stages 3 and 4 might occur because of a lack of awareness, knowledge, or skills, in addition to other reasons such as habit, inertia, and inconvenience on the part of either clinician or patient. Physicians and other health-care workers may not provide appropriate tests or treatments, for various reasons including ignorance of the evidence, competing therapies promoted by financial interests, lack of confidence or technical skills, insufficient time, or implicit substitution of their own values and preferences for those of their patient. These problems can be compounded if clinicians are busy delivering unneeded or undesired care. The potential for and prevalence of underuse can thus accumulate because of multiple problems at each stage of the health-care continuum.

**Worldwide prevalence of underuse**

The following section of this paper provides some estimates of underuse at each of the four stages shown in figure 2.

(A) Access to health care

Patients may have no, or little access to health care because of remoteness, poverty, lack of coverage, immigration status, or other factors. Poor access to medical care because of financial barriers occurs even in HICs. A recent survey of 11 Organisation for Economic Co-operation and Development countries found the percentage of the population unable to access medical care because of costs, as measured by prescriptions, tests, or health-care professional visits that patients did not attend, ranged from 4% in the UK, to 37% in the USA, with a median of 15% (Germany). The prevalence of underuse due to financial barriers in LMICs is likely to be substantially worse, but data are more scarce. To monitor global access to health care and ensure comparability between countries WHO and the World Bank have recommended eight core tracer health service indicators: family planning, antenatal care, skilled birth attendance, child immunisation (three doses of diphtheria, tetanus and pertussis [DTP]-containing vaccine), antiretroviral therapy, tuberculosis treatment, and improved water sources and sanitary facilities. These health services are identified as essential and should be available universally in all countries, regardless of socioeconomic stage or epidemiological status. The report estimated that in 2013 more than 400 million people were still unable to access one or more of the following basic health services: women whose demand for family planning was not met, pregnant women who did not attend at least four antenatal visits (minus 38% to account for unintended pregnancies), infants who did not receive three doses of DTP-containing vaccine, HIV-positive adults and children not receiving HIV treatment, adults with new cases of tuberculosis not receiving tuberculosis treatment, and children aged 1–14 years not sleeping under an insecticide-treated bednet.

(B) Availability in the health system

Even when a population has access to health care, some effective interventions are not available because of limited resources, regulatory control, or other factors. For example, a low per capita supply of physicians or hospital beds can mean that patients do not receive...
needed care. Excessive waiting times for elective surgery, such as cataracts or hip replacements, financial barriers to specific treatments (expensive cancer chemotherapy), and a paucity of practitioners (cognitive behavioural therapy [CBT]), are clear examples of limited availability even in countries with universal health-care coverage.

The recent Cancer Atlas reports that in HICs, most patients with terminal cancer have access to opioids for pain relief, whereas in LMICs as few as 11% do (57% average access for Africa; 69% in southeast Asia), despite opioids being on the WHO essential medicines list, having a low cost relative to many drugs, and strong evidence that they are the most effective treatment for severe pain due to cancer.

Human resource shortages are a persistent problem contributing to underuse in LMICs. For example, countries in sub-Saharan Africa (except for South Africa and Botswana) average less than two pathologists per million population, compared with 15 per million in Taiwan, 26 per million in Canada, and 44 per million in the USA. Lack of human resources can also afflict HICs. In 2004, the UK’s National Institute for Health and Care Excellence issued guidelines recommending the use of psychological therapies—particularly CBT—in depression, anxiety, and other conditions; however, the UK workforce was insufficient to deliver the recommended treatments, and a training initiative, the Improving Access to Psychological Therapies programme, was established. Access to mental health services is worse in LMICs than in HICs: a 2015 WHO report estimated that treatment coverage for depression was 41% in the HIC surveys, compared with only 18% in LMICs.

The global unmet need for surgery, which is estimated to be over 320 million surgical procedures per year, is concentrated mostly in LMICs. A 2015 global analysis of the ratio of minimum procedures needed to procedures done, showed large deficits in southern and southeast Asia and most of sub-Saharan Africa, where less than half of the minimum needed procedures are done.

In some of the countries studied, failure to deliver needed surgery can occur at both stages A and B, because dependent patients do not have access to care, or there is limited capacity to perform surgery, or both.

There are no ideal solutions to these problems, but they can be solved. However, implementation will usually require persistence to overcome a series of barriers and bottlenecks. For example, avoidable and treatable blindness persists despite interventions.

### Panel 2: Fred Hollows steps in reducing avoidable and treatable blindness in low-income countries, via low-cost cataract surgery

**Mid-1980s**
Hollows initiated goal to reduce the cost of eye health care and treatment in low-income countries (training Ruit from Nepal and Desbele from Eritrea)

**Late 1980s and early 1990s**
Lens costs prohibitive, so Hollows, with Ruit and Desbele, build intraocular lens manufacturing facilities in Nepal and Eritrea

**By 2010**
The Fred Hollows laboratories in Nepal and Eritrea had manufactured over four million low-cost intraocular lenses, for both local use and global use.

(C) Clinician uptake
Even when access and availability of services are not an issue, discrepancies can occur between best care, as suggested by evidence and guidelines, and what clinicians do in practice. For example, the CareTrack study found that adult Australians received appropriate care in only 57% of 35 573 eligible health-care encounters. In the USA, a study published in 2003 found that patients received only 54-9% of recommended care.

Furthermore, Hack Barth and Berwick estimated between US$102 billion and $154 billion in wasteful spending in the USA in 2011, which resulted from the failure to deliver best care—ie, poor execution or lack of widespread adoption of known best care processes.

The international interest in research translation and quality improvement reflects the growing recognition of the slow and inconsistent uptake of effective medical
services by clinicians worldwide. Evidence–practice gaps generally narrow with time, but uptake can be both slow and incomplete, resulting in avoidable suffering. The slow implementation of Semmelweis’s demonstration of the importance of hand washing to prevent transmission of infections in delivery wards illustrates the problems of uptake. A century after his death, there is still chronic underuse of appropriate hand washing in both HICs and LMICs, resulting in avoidable morbidity and mortality.\(^1\)

Clinicians also do not administer many evidence-based treatments to appropriate patients. For example, a review of 29 studies in several countries\(^1\) found underuse of anticoagulation in patients with non-valvular atrial fibrillation (NVAF) who are at high risk of stroke; even for patients with a CHADS-2 (congestive heart failure, hypertension, age >75 years, diabetes mellitus, and previous stroke or transient ischaemic attack) score of 2 or more, seven of nine studies reported treatment levels below 70%. In a 2014 national registry study from China, only 19% of patients with NVAF and acute stroke were discharged on anticoagulation therapy, and physician’s concern around bleeding risk was the most common reason for not prescribing it.\(^3\) A study of nursing home patients in France found that less than 50% of those at high risk of stroke were on anticoagulation; physicians caring for these patients wrongly thought that paroxysmal atrial fibrillation causes fewer thromboembolic events than persistent atrial fibrillation.\(^4\) Although stroke prevalence is low in Africa compared with the developed world, atrial fibrillation is a leading cause of stroke, and studies in various African countries have shown underuse of anticoagulation, ranging from 34% in Cameroon to 75% in South Africa.\(^5\) These studies also show that those living in urban centres were more likely to receive anticoagulation than those in rural areas. Furthermore, access to new oral anticoagulants is limited in many countries.

The slow and inconsistent uptake of β blockers for patients who have had a myocardial infarction illustrates the dynamic nature of underuse (figure 3). 8 years after the Beta-Blocker Heart Attack Trial,\(^5\) only 34% of patients in the USA were treated at discharge, and even fewer had sustained adherence, according to hospital audit data. Subsequent improved uptake required support from national guidelines and inclusion in hospital accreditation standards.

The underuse of β blockers for more than a decade after publication of the original trial results, reinforces the fact that underuse of any given health service can occur at multiple stages along the continuum of care, even in HICs: health systems can fail to provide sufficient access to effective medication; physicians can fail to prescribe effective treatment; and patients might not adhere to effective treatment. It also highlights the important role of health system processes in addressing underuse through mechanisms such as quality improvement and accreditation processes to drive behavioural change.

Slow, inconsistent, or stalled uptake by clinicians appears to be the standard rather than the exception, but with considerable variation across interventions. After angioplasty for the treatment of coronary artery disease was presented at an American Heart Association meeting in 1977, widespread adoption occurred in less than a decade in the USA and many other HICs. Subsequent evidence that transradial angioplasty reduces complications compared with the transfemoral technique has not led to comparably rapid uptake.\(^6\) Some of the reasons for faster adoption, such as testability, ease of learning, relative advantage, and compatibility with the pre-existing system, were documented in the 1950s by Rogers in his seminal work on the diffusion of innovations;\(^6\) however, these patterns do not always hold true for the uptake of medical interventions.

Underuse of a given effective intervention, even when affordable, is often greater in lower-income countries than in high-income countries, but not always. For example, the use of antenatal corticosteroids for preterm delivery (panel 1) varies considerably across countries. A recent survey of 29 countries\(^7\) found that use ranges from 16% to over 90% (figure 4). While use appears to be higher in HICs, some LMICs, such as Palestine and Peru, have good uptake, whereas Japan and Brazil have low uptakes. However, a 2015 antenatal corticosteroid cluster-randomised trial,\(^8\) which found an increase in neonatal deaths from antenatal corticosteroids, has suggested that transfer and scaling up of interventions requires caution, and sometimes additional evidence. Whether this increase arose as a result of unreliable dating of gestational age, increased sepsis, or other
problems is uncertain, but illustrates that interventions do not occur in isolation, but within a context of other diagnostic and supportive treatments.

(D) Patient use and adherence

Patients not attending scheduled visits or not accepting recommended care can occur as a result of barriers, including distance, affordability, culture, stigma, language, socio-economic status, and race. For example, in the Chinese registry study discussed previously, in 30% of non-use of warfarin cases, it was the patient who declined anticoagulation. However, even when patients accept treatment recommendations adherence can be poor, hence diluting the effectiveness of a health-care system, that ensures that the first three stages on the treatment continuum do not pose a barrier to treatment. For example, secondary prevention with drugs and lifestyle changes following acute myocardial infarction has greatly improved outcomes, but a recent retrospective cohort analysis in the USA documented low adherence at 12 months after discharge for prescribed drugs: 66% of patients were taking their β blockers, 63% angiotensin-converting enzyme (ACE) inhibitors/angiotensin receptor blockers (ARBs), and 66% statins. These findings are echoed in a multicountry survey of patients with a self-reported cardiovascular disease event in the past four years, where use of preventive medication was generally low. Adherence was highest in HICs (antiplatelet drugs 62%, β blockers 40%, ACE inhibitors or ARBs 50% and statins 66%), but much lower in low-income countries (8-8%, 9-7%, 5-2%, and 3-3%, respectively), and decreased with reduction of country economic status (p for trend <0.0001 for every drug type).

The causes of non-adherence can be complex. Building on our previous example, underuse of warfarin in patients with NVAF at high risk of stroke is common, with less than 60% of people receiving optimum treatment. As stated earlier, these care gaps may be in part due to the physician values and concerns, but can also result from poor assessment of patient values and concerns. In a study of the maximum increased risk of bleeding (threshold risk) that people would tolerate to achieve a reduction of three strokes in 100 patients, the median threshold risk for both patients and physicians was ten additional bleeds, but with wider variability in patients than clinicians (patient range 0–100, physician range 0–50): one cluster of patients and physicians would tolerate fewer than ten bleeds and another cluster of patients, but not physicians, would accept more than 50. This example illustrates that when patients are poorly informed of treatment choices and potential outcomes, or their preference has been ignored or not elicited, the right treatment might not be delivered.

Harms to patients and health systems

What is the extent of harm caused by underuse? The most obvious and concerning harms are poor patient outcomes—unrelieved symptoms, serious disability, and deaths, including preventable maternal and perinatal deaths. Such adverse outcomes have been documented in both LMICs and HICs (figure 5), but there are also significant harms related to non-clinical outcomes, such as financial burdens for patients and families, spending precious remaining time in a hospital instead of at home, loss of patient autonomy, and diminished ability to participate in daily life.

Harms to patients

The substantial differences in life expectancy between countries suggest likely underuse of effective prevention and treatment, but precise quantification of the contribution of underuse to population-based health statistics is difficult. One study of declines in so-called amenable mortality—which would be attributable to underuse—found that it slowed for Americans younger than 65 years, relative to their peers in Europe. For example, from 1999 to 2007, amenable mortality rates in men fell by only 19% in the USA compared with 37% in the UK, and among women, the rates fell by 18% and 32%, respectively. Deaths from circulatory conditions, such as cerebrovascular disease and hypertension, were considered the main reason that amenable death rates remained relatively high in the USA. The authors point out several limitations in trying to estimate avoidable mortality, but suggest one reason might be the poor access for people who are uninsured. For example, insurance coverage reforms in Massachusetts (2001–2005 compared
from an improved range of maternal, newborn, and child health primary health-care services. (A) International variation in maternal death rate. (B) Causes and preventability of maternal deaths in Pakistan.

This and other countermeasures for underuse (and overuse) will be discussed in greater detail in the fourth paper in this Series.

Maternal mortality is largely avoidable, and hence provides a clearer picture. Although maternal mortality has fallen globally by 47% between 1990 and 2010, the Millenium Development Goal (a 75% reduction) was not achieved by 2015. Of the estimated 287 000 maternal deaths in 2010, LMICs account for 99%, with the majority in sub-Saharan Africa (162 000) and southern Asia (83 000).

The more than 100-fold differences in maternal mortality between countries suggest that most of these deaths are preventable, and figure 5 shows estimates of the potential effect of better access to services in Pakistan.

Some changes in practice are demonstrably feasible at low or no cost. In the Philippines, Maria Silvestre found that poor newborn care, such as no delayed clamping, was causing preventable morbidity and mortality. Maria Silvestre and colleagues developed a guideline and training programme—Unang Yakap (the first embrace)—to overcome this, reducing admissions to the neonatal intensive care unit (NICU), neonatal sepsis rates, and maternal and newborn deaths in the 11 pilot hospitals. This example shows the negative effect of underuse of delayed clamping on both morbidity and mortality, and the health system, which pays for preventable NICU admissions.

With constrained budgets, not all underused interventions are affordable. Hence the Disease Control Priorities in Developing Countries Report has recommended four categories to describe the efficiency of interventions: (1) neglected opportunities (low coverage but high cost-effectiveness); (2) interventions to scale back (high coverage but low cost-effectiveness); (3) interventions for which scaling up is inefficient (low coverage and low cost-effectiveness); and (4) cost-effective interventions used widely (high coverage and high cost-effectiveness).

The first of these is most relevant to underuse and the report highlights more than 25 low-cost opportunities that are neglected, which often have a cost of less than $100 per disability-adjusted life-year averted, such as: hygiene promotion for diarrheal disease; training volunteer paramedics with lay first responders; intermittent preventive malaria treatment in pregnancy; insecticide-treated bednets; acute management of myocardial infarction with aspirin and β blockers; and HIV/AIDS peer and education programmes for high-risk groups.

Reducing underuse can apply to processes designed to improve care. For example, by a stepwise process improvement in the insertion of central lines in intensive care units, Pronovost was able to reduce infections leading to sepsis and death to zero. When these processes were replicated across 103 intensive care units in Michigan, this improvement saved 1500 lives and around $175 million over an 18 month period, suggesting underuse of this quality improvement process has resulted in considerable

with 2007–2010) resulted in a significant decrease in all-cause mortality compared with the control counties in other states (–2·9%; p=0·003, or an absolute decrease of 8·2 deaths/100 000 adults): deaths from causes amenable to health care also significantly decreased (–4·5%; 8·2 deaths/100 000 adults): deaths from causes amenable to health care also significantly decreased (–4·5%; p=0·003, or an absolute decrease of

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mortality and cost. Similarly, the CRUSADE Quality Improvement Initiative tracked and improved coronary care. The failure to use such processes represents both unnecessary loss of lives and wasted resources. This example also illustrates a wider problem that the underuse of effective interventions is not limited to clinicians and patients; policy makers and managers also fail to implement processes based on evidence.

**Harms to health systems**

Underuse often represents a misallocation of resources: opportunities to provide needed, effective, and cost-effective care are often competing with less effective services, which may be more heavily marketed and more expensive. Moreover, what might represent underuse in one country has to be considered in the proper context in another, according to resources and priorities. For example, the Department of Health in the Philippines has invested heavily in newer, expensive vaccines such as human papilloma virus, rotavirus, pneumococcal, and dengue vaccines, despite the fact that they have not yet achieved full coverage for more standard, cheaper vaccines such as DPT, measles, mumps and rubella, and polio, and consequently children are still dying of measles, diphtheria, and tetanus.

In many countries, Health Technology Assessment processes have been established to control overuse, but this has had some drawbacks: new, expensive, high technology devices, services, and pharmaceuticals come under scrutiny, because they are expensive, often have an eager sponsor making the submission, and have an enthusiastic and influential clinical workforce (such as surgeons or specialists). Low-technology treatments might have high value but lack these three dimensions and thus avoid the re-imburser’s scrutiny.

**Conclusion**

Underuse occurs at all stages along the care continuum: from poor health-care access, to lack of availability, failure of providers to deliver service, and failure of patients to use it. Underuse also appears to occur across countries, regardless of payment model or health system, and in clinical settings ranging from rural clinics to tertiary hospitals. Despite the fact that underuse is frequently recognised as a problem around the world, obtaining good estimates of its extent is hampered by a lack of studies of many conditions and health services, the complexity of the problem, and the paucity of population monitoring. Furthermore, studies of the harms of underuse are in particularly short supply. Although global spending on health and medical research is about $200 billion per year, only a small fraction is aimed at better understanding and overcoming the barriers that prevent better uptake of effective interventions, and methods to make them affordable.

The estimates and examples of underuse in this paper indicate that it remains a serious problem in both HICs and LMICs. Underuse causes substantial harm to both patients and health systems, and is deserving of greater attention from the health care and research communities. A much more systematic approach for identifying important areas of underuse is needed if we are to address this serious problem.

The global health community must focus its attention and resourcing for health policy and health systems work at each of the stages we have outlined. Subsequent papers in this Series will look at the causes and drivers of underuse (and overuse) and possible solutions, but investment and action are urgently required.

**Contributors**

SB, VS, and PG drafted the outline; PG led the redrafting; all authors contributed to sections and examples in the paper, provided substantial revisions, and approved the final version of the manuscript.

**Declaration of interests**

We declare no competing interests.

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Right Care 3

Drivers of poor medical care


The global ubiquity of overuse and underuse of health-care resources and the gravity of resulting harms necessitate an investigation of drivers to inform potential solutions. We describe the network of influences that contribute to poor care and suggest that it is driven by factors that fall into three domains: money and finance; knowledge, bias, and uncertainty; and power and human relationships. In each domain the drivers operate at the global, national, regional, and individual level, and are modulated by the specific contexts within which they act. We discuss in detail drivers of poor care in each domain.

Introduction

Papers 1 and 2 in this Series outline the scope of poor care from both overuse and underuse of medical services. Drivers of poor care reside in three major domains: money and finance; knowledge, bias, and uncertainty; and power and human relationships. Drivers operate in specific contexts and contribute to the overall quality and quantity of care delivered. These contexts are best considered as different levels in an ecosystem of care delivery: global; national, legal, regulatory, and cultural; regional, institutional, and social; and the individual locus of the doctor–patient relationship.

Multiple drivers of poor care interact throughout this ecosystem. We aim to outline a navigational chart for addressing this fundamental problem of modern health care. Reducing poor care will require a well contextualised, multidimensional, and concerted effort by health-care professionals, policy makers, and the public. Previous definitions of quality of care have focused on evidence-based health outcomes of individuals and populations incorporating patient preferences.1 Our conception of the right care extends this definition further by including the importance of stewardship in the distribution of societal resources through what inherently is a political process.

Drivers at the global level affect multiple actors across all societies—for example, the mass media and multinational corporations. At national, regional, and local levels, variation in legal and regulatory regimes, power relationships among stakeholders, and cultural norms and traditions, act differentially. Social networks—of patients and families on one side and professionals and delivery systems on the other—act as local mechanisms of transmission of all drivers. Provider stakeholders, such as professional societies, operate locally, nationally, and increasingly, globally, to convey standards of practice, even as they legitimate clinicians’ professional autonomy.

The creation and dissemination of knowledge occurs at various levels via multiple actors. However, care itself is initiated at the individual level from the centre of the ecosystem, where up to 80% of health-care costs are initiated. Here, the patient and the doctor sit, with their own individual and social identity, cultural and cognitive biases, and the cumulative influence of the forces surrounding them. These individuals also bring their experience, emotion, transference, and countertransference to the encounter.3

Numerous additional variables exist within this relationship, including the clinical calculation of benefits and harms, patient preferences, physician preferences, provider training and competence, available infrastructure, financial incentives, trust and understanding between patient and clinician, and the influences of others, both individually and through social networks. Clinical decision making emerges from this complex interaction. In this Series paper, we describe the major drivers of care and how they operate.

Key messages

- The biomedical model of the past century has been valuable for some aspects of medicine and is a necessary, but not a sufficient, component for the proper care of patients
- The biological, psychological, and social needs of patients and informed preferences must define desirable outcomes and appropriateness of care
- Greed, competing interests, and poor information are universal drivers of poor care that occur across all systems and settings
- Inaccurate knowledge and information of all stakeholders regarding effective and ineffective care is a key driver of poor care
- The levers for knowledge dissemination and adoption of health technologies are too often distorted by a fascination with innovation, which is reinforced by vested interests
- Systemic factors, cognitive frameworks, and cultural influences, particularly regarding health, health care, science, and technology, are important drivers of care and have to be understood to improve health-care decisions at all levels
- The way in which each health system is organised and financed, and how resources are allocated towards facilities and workforce, allows each of these drivers to have more or less influence
- The substantial economic interests of the health-care industry and the alignment of incentive structures within health services are major drivers of potentially biased knowledge generation and health-care delivery worldwide
- Failure to reinforce professional ethics and protect the therapeutic relationship from financial concerns distorts medical care
- Regulatory capture, disempowerment of communities and citizens, and a political aversion to priority setting all drive poor care

Understanding these drivers and the various ways in which they act across systems provides opportunity to increase the social and individual value of care.
Money, finance, and organisation

Health coverage, resource allocation, and the organisation of care delivery

Overuse and underuse of care exist in all types of health-care systems. However, financing arrangements influence the relative strength of the various drivers and how they contribute to poor care (figure 1).

Inadequate health coverage is a primary cause of poor care. For example, people who are uninsured or underinsured often forego or are denied essential care because of an inability to pay. Decisions about what is covered and accountability for appropriate clinical decisions influence health-care delivery. When coverage focuses on truly effective or cost-effective care, it can encourage the use of appropriate care, but coverage decisions are a blunt instrument that have broad effects and lack precision, so cannot alone prevent poor care.

Financing and configuration of health systems

The financing and configuration of health systems vary widely and are key drivers of care. At one extreme, market-based—systems rely on private insurers and self-employed providers, with public intervention limited to consumer protection and helping people at high risk of catastrophic illness or those with low-income gain coverage. At the other end are government-led schemes whereby entire populations are entitled to uniform health coverage and salaried providers deliver care.

When health-care spending is publicly funded, governments often exert control over expenditures, but few distribute resources uniformly across regions or populations according to health needs. When they exist, allocation formulas usually combine crude indicators of health (eg, age, sex, prevalence of disability or mental disorders) with socioeconomic indicators of need (deprivation indices). Matching of needs and capacity is a continual concern.

In both private and publicly financed systems, misallocation of resources, including the health workforce, can lead to both overuse and underuse. For example, a high density of either general practitioners or specialists leads to an increased number of visits, often initiated by physicians. Similarly, a high density of intensive care unit beds is associated with increased rates of admission. By contrast, low availability of primary care professionals can lead to underuse of essential services and increased hospital admissions and specialty care. In systems in which providers influence investment in capacity (eg, hospital beds per capita), especially if they have the ability to retain operating surplus, there is often overinvestment in high-margin revenue-enhancing capacity (eg, catheterisation laboratories), and underinvestment in less profitable services (eg, palliative care).

Integration across levels of care

The degree of integration across levels of care is a key system feature that influences the quality of care. Many health-care systems’ financial flows promote fragmentation: the poor coordination of services delivered to any individual patient often leads to duplication of services (eg, catheterisation laboratories) and failure to deliver needed services (eg, preventive or palliative care).

Economic incentives can drive poor care

Influence on clinicians’ behaviour

Systems of payment influence the behaviour of health-care professionals. Fee-for-service or volume-based payments encourage the provision of covered services in contrast to capitation or salaries for health professionals that do not. Standards of professionalism alone cannot ensure that services delivered serve patients’ interests.

Physicians routinely act in conformity with their financial interests. Under fee-for-service payment, many specialties deliver higher volumes of services, distorted referral rates, and lower prevention activity than with fixed payment schemes, such as, capitation and salary. Moreover, physicians react to fee reductions by increasing their activity and have incentives to induce demand—ie, to provide services that a fully informed patient would not choose.
Pay-for-performance schemes have been proposed to encourage evidence-based and preventive services through add-on payments linked to specific targets. However, effects of these schemes on the quality of care are inconsistent, and they can paradoxically encourage overprovision of unnecessary services and underprovision of needed services. Another economic incentive that influences doctors’ behaviour is ownership of ancillary services facilities, which encourages overuse.

Influence on hospital behaviour

Payment per day to hospitals encourages long lengths of stay, and potentially, higher volumes of inpatient care; conversely, hospitals under global budgets produce lower volumes of care, which can lead to underuse and long waiting times. Many countries have switched to payment per case (known as diagnosis-related group [DRG]). Depending on the overall context and the initial payment method, this change increased (Australia, Denmark, England, France, Norway, Spain) or decreased (USA) service activity. Payments per case can incentivise hospitals to encourage more admissions if the price for that particular DRG is set high relative to production costs. In France, DRG payments led to increases in the provision of cataract surgery and endoscopies, which were profitable for hospitals. In contrast, incentives for provision of alternatives to conventional hospital admission seem to be on the rise following the financial crisis. Thus, price setting, permitted profit margins, and the appropriateness of fee or reimbursement schedules are all key elements to promote the right levels of care. These elements are often hidden from public scrutiny.

Patients’ behaviour

Patients’ behaviour also responds to economic factors. Insurance enables the use of medical services; although, how much it increases use beyond necessary care is not clear. The theoretical risk of abuse has generally been addressed by private health insurers through user charges or copayments—which are much less common in national health services. The introduction of copayments reduces inappropriate use of services (ie, overuse). However, it also reduces use of necessary or essential services. Some studies show that increased cost-sharing on pharmaceuticals decreases compliance and increases use of non-pharmaceutical interventions, such as potentially avoidable hospital admissions due to worsening of the condition, or emergency visits to obtain medication in acute episodes in patients with chronic diseases. Copayments reduce demand for preventive services, because people tend to overestimate present costs and underestimate future health benefits.

Commercial interests

Commercial interests shape the availability and use of novel therapies. Pharmaceutical and medical devices industries target their research, development, and marketing strategies towards the most profitable opportunities, typically the health problems of large populations that can pay, or rare life-threatening conditions affecting small numbers of patients in wealthy countries, while often neglecting the health needs of poor populations. This unequal distribution of purchasing power can embed a long-term structural stream of distorted care.

Research activities, measured in randomised controlled trials, do not reflect the worldwide research needs as defined by the global burden of disease. Industry focus on marketable medical interventions, coupled with the regulatory regime of a country and its health-care resources, constrain the therapeutics available to practitioners and patients, thereby exerting a considerable influence on the amount and type of care provided. After regulatory approvals, industry uses a range of strategies to sell products and expand markets and market share. Such marketing efforts are often successful at increasing sales, but might not improve the health of either individual patients or populations.

Intellectual property regimes legitimise monopoly pricing based on the need to encourage further investments in research and development, while holding out the promise of competition after patents expire. Meanwhile, the rising prices enabled by such patents can strain budgets and force administrative or other forms of rationing, which can drive underuse.

By contrast, subsidies can accelerate adoption. How price is determined in health-care innovation varies widely, and is partly a policy choice. In many countries, prices are regulated or determined by the largest purchaser, usually the national government. In countries with market-based pricing, where the seller has a monopoly and buyers have minimal power, often little direct association exists between price and value to patients; neither governments nor private health plans appear able to effectively negotiate a price, especially in the face of a political mobilisation of patients. Describing these prices as market-based is thus problematic. Sofosbuvir and biologic cancer drugs are recent examples of this point.

In reality, because truly novel compounds are rare and new drugs get approved in most countries without proof of superiority to incumbents, companies can compete for revenue share through marketing campaigns for pre-existing compounds more easily than they can invent new ones. Hurdles for the approval of medical devices are lower than for pharmaceuticals, raising both safety and efficacy concerns.

Knowledge, beliefs, assumptions, bias, and uncertainty

Thinking frameworks influence decision making

Thinking frameworks are determined by social and cultural contexts and the interplay between cognitive, emotional, and motivational thought processes.
Thinking frameworks lead to beliefs that strongly influence cognition, judgments, and decisions, and exert a powerful influence on decision making in health care. More is better, new is better, more expensive is better, and technology is good, are examples of deep and often intuitive beliefs about the benefit of interventions. These beliefs affect many areas: research agendas, product development, market opportunities, and regulatory control or tolerance (for example, an intracerebral stent system was provisionally approved because of biological plausibility, but without adequate safety data). Together, these beliefs affect patients, their families, clinicians, administrators, policy makers, and political leaders, often leading to overestimation of benefit and underestimation of harm (figure 2).

Panel 1 lists patients’ and doctors’ beliefs that can drive use of services. For example, many patients’ false belief that chemotherapy can cure advanced cancer regularly leads to overuse of chemotherapy, and some patients’ fears of surgery will lead them to decline potentially beneficial procedures if not well informed, leading to underuse.

Physicians’ awareness of evidence and attitudes towards guidelines have been identified as shaping behaviour. Practitioners might disagree with guidelines, especially if evidence seems to contradict their preconceptions and experiences. Such conflicts could be a result of imprinting during training, which has a mixture of cognitive and emotional effects (the so-called hidden curriculum).

**Heuristics shape thinking frameworks**

Beyond these general frameworks, psychological research has empirically identified strategies of cognition, termed heuristics, that influence decisions in situations of uncertainty.

Because rapid, high-volume clinical decision making is part of the everyday routine of physicians, and requires combining and synthesising diverse data and performing complex trade-offs between benefits and risks, such heuristics are probably important. These mostly unconscious mental shortcuts often lead to accurate results, but can also be dysfunctional and lead to skewed judgments.

Several heuristics and biases have been described and investigated, but few studies have been done in medicine; a 2015 systematic review found 19 different types of cognitive heuristics and biases in clinical decision making, four of which are presented in panel 2.
This model of disease has resulted in remarkable successes (antibiotics, vaccines, organ transplantation, heart surgery, cures for some cancers) as well as expensive, marginally useful, or even useless interventions. The prestige earned by the successes of this model elicits a presumption of rigorous scientific efficacy from the public. This illusion can drive suboptimal care when reductionist thinking, sometimes coupled with the commercial imperatives of product development, triggers a search for single optimum solutions that yield questionable benefits at increasing expense.

This focus on deviations from biological norms instead of patients’ needs is one of many factors that underpin the widespread lack of patient involvement in decisions and treatment goals. Such a focus can lead to the neglect of patients’ cognitive and emotional needs, underuse of counselling and behavioural therapies, and neglect of social and public health strategies for disease prevention. Medical care—a visit to a physician, a day in hospital, or a surgical procedure—comes to be seen as an intrinsic good in itself rather than a means to help individuals achieve the goals important to them. Failure to honour such goals can result in overuse of disease-focused treatments at the end of life, such as chemotherapy in advanced cancer, and stenting in stable coronary heart disease.

Panel 2: Examples of heuristics and biases in medicine

**Availability heuristic**
Relates to judgment on the basis of the ease with which information, such as a diagnosis, come to mind, rather than the validity or relevance of the information. For example, thoracic pain in a 60-year-old patient interpreted as a thoracic spine problem by the orthopaedist and a heart problem by the cardiologist.

**Representativeness heuristic**
Describes the judgment of a clinical situation on the basis of the similarity to a category, eg, chest pain in a 34-year-old patient, without regard to the underlying base-rate of myocardial infarction, thereby missing causes that could be more likely. Similarly, clinicians might overestimate the benefit of cancer screening in people aged 35–55 years, unaware of the low incidence of cancer in this age group.

**Confirmation bias**
A tendency to search primarily for confirmatory information and generally giving more weight to information that confirms one’s expectations than to contradictory information. Confirmation bias is evident when authors with a conflict of interest relating to a certain drug judge this drug more favourably than authors without a conflict of interest. Tamiflu and rosiglitazone are recent examples.

**Commission and omission bias**
Omission bias results from the belief that harmful intervention is worse than inaction, whereas commission bias results from the belief that prevention of harm requires active intervention.

Common assumptions of modern medical culture

Health care is assumed to be the main determinant of health. Although the contribution of health care to life expectancy and quality of life cannot be quantified precisely, improvements in living conditions and public health interventions have contributed more than medical intervention to the gains in health in the 20th century. Less than 20% of the health status of populations is attributable to health-care delivery systems.

**Dominance of the biomedical model**
Modern medicine has successfully applied biomedical science through a model that construes disease as the disruption or deviation of biological variables. This model shapes conceptions of diagnosis, treatment, and prevention as ever more detailed understanding of ever smaller biological units, which is one aspect of the proliferation of therapeutic options available for the care of patients, eg, with stable coronary disease.

The isolated clinical relationship

The isolated clinical relationship is assumed to be the sole driver of care, which ignores the effects of system configuration. This scenario can drive underuse through failure to adopt systems of reliability of care (such as reminders or checklists) or through lack of staff support. Patient care is further degraded when comprehensive primary care is weak, coordination is poor, and systems are fragmented. Efforts to ensure the right care are usually left to practitioners and their professional societies. Specialty societies elaborate treatment protocols for diseases of their isolated organ system, while ignoring the eventual role played by other specialists in meeting patients’ needs. Thus it is common for each specialist to add drugs or interventions to a long list; although each might seem sensible in isolation, as a combination they can be irrational, if not harmful, for a patient to follow.

Flawed production and dissemination of knowledge: the price of innovation

A core driver of both overuse and underuse is ignorance of the evidence and its failure to change practice. The impact of evidence-based medicine campaigns has been hindered by the considerable volume of information production, and dilution of good studies by bad ones. Contradictory results increase confusion.

Although medical science research is presumed to ask questions and examine areas of interest that matter to patients and citizens, 85% of the global investment in...
biomedical research—US$240 billion in 2010—is wasted on research that fails in that mission.7,11,12,26 Many trials are underpowered; study endpoints chosen by professionals often are of low priority for patients; questions of functional, social, and emotional wellbeing, adverse reactions, and long-term outcomes are disregarded; and academia rewards short-term successes and newsworthy results at the expense of results that are meaningful to health.27 Industry-sponsored trials might ask questions that are of little or no clinical value, or that are destined to yield results that are favourable to the sponsor’s product.27,129,130 These tendencies naturally lead researchers and industry to seek widened denominators (so-called indication creep) for tests or treatments proven effective in one disorder.

Such flawed knowledge can increase adoption rates of new practices beyond the factors such as relative advantage, compatibility with existing systems, and ease of learning that were documented by Rogers131 in the 1950s; when coupled to revenue opportunities for the relevant actors (industry, physicians, hospitals), adoption accelerates, no matter how meaningless to patient outcomes, whereas important research conclusions, such as the efficacy of lumpectomy, sometimes diffuse slowly when the prospect for revenue is absent. Thus, flawed science and incentives can become powerful drivers of flawed adoption and of resistance to the de-adoption of useless interventions.74,112–115

Society has a legitimate interest in health-care innovation and technology development to the extent they carry an implicit promise of improved wellbeing. This outlook creates widespread public interest in the latest medical developments.5,6,14 However, science and technology are frequently at odds with one another. Science essentially involves the ongoing refutation of error75 whereas technology seeks a positive end, even if imperfect, and expects gradual improvement through product cycles.26 This tussle plays out on a daily basis in the construction of narratives about health and medicine, whether in the pages of medical journals or newspapers, or on television and computer screens.26

Dissemination of knowledge depends on practitioners to read, absorb, understand, and critique studies; to separate high-quality and low-quality information; and to use this approach to change practice patterns. Systematic reviews and evidence-based guidelines are intended to help in this process, but have been only marginally successful, mitigated by the proliferation of guidelines from multiple authorities, many contradictory, and often influenced by conflicted stakeholders, sponsors, and authors.107–139 Nevertheless, guideline development remains an important method of promoting the right care, provided certain crucial criteria are met.140 A new effort to define appropriate use criteria has emerged in several specialties, implicitly acknowledging the inadequacy of outcomes of previous guidelines.140 Efforts to include lay members on guideline panels are in their infancy.142

An additional issue in knowledge dissemination is the growing popularity of web-based searches, online decision-support tools, and social media advertising. These techniques not only affect patient knowledge and alter practice patterns in new and unpredictable ways that offer great opportunity, but also warrant considerable scrutiny. Such methods have the potential to substantially amplify both knowledge and errors in decision making.

**Panel 3: Factors in the therapeutic relationship known to affect the quality of interaction and care**

- Imbalances of power or trust can prevent shared decision making.143
- Providers do not have time to convey complex information in an understandable format, which precludes mutually respectful decision making and promotes a transactional culture.144
- Race, class, or other distinctions can lead to selective offering of tests and treatments, unrelated to insurance coverage or ability to pay.145
- Barriers including education, language, and cultural mismatches between providers and patients.39,40,45

Increasingly common with global migrations across national borders, these barriers also occur with internal migrations in low-income and middle-income countries in the midst of the epidemiological transition.150–152

**Power and human relationships**

**Strength or weakness of the therapeutic relationship**

At the centre of the ecosystem is the patient–clinician relationship at the point of care. The quality of that relationship is a central element of the clinical encounter and an independent driver of the quality of care (panel 3).153

A poor relationship can drive both overuse and underuse. Adherence to proven, cost-effective therapy, although low in most studies of patient behaviour, is highly dependent on the relationship.154–156 In the absence of mutual respect and trust, an inadequate history can facilitate suboptimal or even harmful treatment147 (figure 3).

A mismatch in the worldview of the patient and clinician can cause problems.148 For example, young people might not have the accumulated life experience to understand the reality of unintended harms, or they might allocate the value of quantity versus quality of life very differently: thus, a young clinician with an older patient could have very different assessments of risk and value. A patient with a low income could realistically have far greater concerns for the economic trade-offs of a course of action than would the well-to-do prescribing clinician. Results can be detrimental for both patients and physicians when trust is eroded.150

Collectively, most health-care systems have failed to optimise these factors, resulting in dissatisfaction among both professionals and the public that has led
to the tremendous growth of so-called concierge medicine worldwide as a private sector solution to a clear human need.

**Flawed decision making**

The involvement of patients in treatment decisions is an ethical imperative that might be desired, but the ability of practitioners to implement this step is still limited by time, their own resistance to changing power dynamics, and systemic constraints.

Ideally, the consent of the patient is obtained after informing, explaining, deliberating, and considering the potential benefits and harms of various treatment choices. If more than one option is available, a preference diagnosis, which incorporates the patient’s values, has to be made. In reality, patients are rarely involved in a shared decision-making process, even when the procedure in question is elective; often physicians act according to what they consider the patient’s interest to be. This scenario leaves ample space within which self-interested motives can influence decisions, however unconsciously, and subsequently overuse or underuse can result.

Patients’ sense of mutuality in decision making can drive both underuse and overuse. Poor decision quality reduces subsequent adherence to treatment plans. Poor decision quality also drives both underuse and overuse; randomised trials of shared decision-making aids consistently find that, on average, 20% of elective procedures would be unwanted if patients had unhurried access to understandable, relevant clinical information.

**Contest for political control**

Health and health care represent areas of contest for political control. Care delivery is the net result of the relative power of various stakeholders to influence the process of decision making in the doctor–patient relationship.

Professional societies, academic medical centres, commercial interests, patient advocates, and the scientific and mass media all shape the way citizens view health care. They do so by creating and reinforcing powerful categories of meaning, such as professional autonomy, self-regulation, innovation, science, value, individual patients’ right to best care, while remaining silent on opportunity costs or marginal benefits and using loose definitions of life-saving treatments. For example, the routine labelling of new technologies as innovation tags positive feelings and expectations to the table to the other. These personal relationships that naturally develop can advance private interests without coercion or bribery.

Stakeholders with sufficient economic capital can use that ability to financially support and influence others, and reinforce terms most favourable to their interests. This contest occurs primarily in the process of establishing consensus on what represents the best scientific evidence. Regulatory and government agencies then hold, in theory, the power of compulsion, acting as principal agents of citizens and the common good.

However, selection of national policy leaders in health care is itself subject to the competing demands of stakeholders—ie, industry, hospitals, professional societies, health unions, and the general public—and once in positions of public power, they are influenced by other self-interested actors. For example, large hospital systems and pharmaceutical and device companies often capture regulators.

A career in health care at the highest positions might entail switching from one side of the table to the other. These personal relationships that naturally develop can advance private interests without coercion or bribery.

**Political mobilisation and demand for care**

Excessive or inadequate political mobilisation can increase or decrease demand for care and thwart attempts to achieve the right care. Certain sectors, ideas, and messages can yield inordinate influence,
particularly when they coincide with industry interests. Others that have fewer resources, such as public health institutions or advocates for addressing the social determinants of health, typically have a smaller voice and less power.2,16,17 Because political and economic power are closely linked, effective mobilisation often depends on financial ability to influence mass media, affecting cultural norms and public policy.16,18,19 Together, these processes drive both overuse of some services and underuse of others.79 For example, mobilisation can influence regulatory and pricing negotiations, when companies fund patient groups that push to accelerate the availability of drugs unapproved for the market,180 or when patient platforms are created ad hoc during negotiations with authorities to support inclusion of a drug in insurance benefits (hepatitis C and sofosbuvir in Spain).72

Where private insurance companies exist, they have enormous potential power within this ecosystem. In theory, these companies have an interest in reducing costs in the short term, potentially curbing overuse, but driving underuse. In the long term, their incomes rise with increasing health-care costs because their revenues are a percentage of the total premium, and their interest in curbing waste is therefore lessened. Moreover, like all stakeholders, the behaviours of private insurance companies are subject to the distribution of power in the system—for example, the ability of pharmaceutical companies to overcome insurers’ imposition of copayments through patient assistance programmes.183

Similarly, other actors in the health-care sector maintain their own political mobilisation by creating alliances with key opinion leaders,184 medical society societies, and patient groups, while participating in defining standards of care, widening definitions of diseases,185 and creating new disease labels.186–188

In some countries (eg, New Zealand, USA) marketing involves direct-to-consumer advertising.189,190 This approach encourages consumers to demand drugs and other medical products by increasing awareness (and concerns) about diseases—examples being erectile dysfunction (sildenafil), baldness (finasteride),189 blood clotting (enoxaparin),190 and atrial fibrillation (dabigatran etexilate).191

In countries where direct-to-consumer advertising is not allowed, companies sometimes promote new drugs through disease-awareness-raising campaigns, which are alliances between industry and consumer groups.190 For example, self-help groups that are sponsored by pharmaceutical companies are associated with the uncritical support of drugs such as celecoxib, rofecoxib, and donepezil.190

These campaigns often inflate the prevalence of diseases, such as social anxiety disorder,190 restless leg syndrome,190 and female sexual dysfunction;191 increase public fear of illness; and thus increase markets for manufacturers.190

Professional societies and other mediators

Professional societies, which have a privileged status in most countries, play a key role in defining disease, expanding definitions of disease, and defining appropriate treatment thresholds. These societies are viewed as authoritative sources of scientific medical judgment on the presumption that the public benefits, even though they primarily serve the interests of their members.192–194 This dual role of medical societies creates conflicts of interest that can influence both overuse and underuse. An example is a professional society writing guidelines that advocate for a certain intervention on the basis of expert opinion, against or without existing evidence (eg, prostate cancer screening and treatment in France).195

Interaction between professional bodies, industry, and entrepreneurs is frequent and natural, because new technologies must pass through a process of validation and legitimisation in which professional bodies play a crucial role.196 However, such interaction creates opportunities for additional potential conflicts of interest, as relevant expertise is inevitably associated with opportunities to enhance income of individual members, sections, and the professional society itself.14,184,188,200

Many medical specialty societies accept support from industry and have become financially dependent to a considerable degree. In many countries, continuing medical education systems are funded largely by industry,197 creating conflicts of interest that bias educational content.196 Other effective means to influence physicians’ practice are sales representatives, distribution of drug samples, and journal advertising.198,199 These tactics tend to promote the use of more expensive brands over generics, often directly subverting practice guidelines and formulary policies.200 Total promotional spending of the ten largest companies worldwide amounted to $98 billion in 2013, presumably realising a return on this investment.201

Given the outsized role professional societies can play in regulatory approvals and reimbursement decisions, whether directly or through informal networks of influence, they have become central domains for all actors seeking to influence medical practice.202 Peer effects can amplify the wrong care, as doctors follow leaders, doing what everybody does, even if misguided.181,203

Fear of litigation

Fear of litigation is a recognised driver of overuse. A 2013 study204 shows that physicians’ fear of malpractice lawsuits, independent of actual risks or of tort reform, leads them to prescribe excessively advanced imaging tests to patients with headaches and back pain. However, estimates suggest only about 2% of care is attributable to defensive medicine.189,210 Fear of litigation has not yet become a driver of underuse; however, this is theoretically possible.
Conclusion
The provision of care is initiated by decision making within the doctor–patient relationship, but is substantially influenced by the resources available for health care within the society, its social and political contract, the state of global and local scientific knowledge, the configuration and capacity of the delivery system, and financing mechanisms.\(^3,12,21,24\)

Achievement of the right care requires an understanding of and attentiveness to all these dimensions in the development of policy choices for promotion of care that is safe, effective, sensitive to personal preferences, and just.

Although no one factor results in the provision of right care, universal health coverage should be recognised as essential at the population level. Each factor can be deemed as equally necessary but equally insufficient by itself. Reducing the role of greed by structuring financial incentives to maximise true clinical benefits and social value is key. Ensuring vigilance against error and bias, broadening research aims, and a focus on meaningful outcomes are key goals in the production of knowledge. Therefore, re-addressing imbalances of knowledge and power, not only within the clinician–patient relationship but also within delivery systems, and more broadly in society, is equally crucial. There are potentially many levers to remedy poor care, but evidence of effectiveness is very modest.

Finally, as biological creatures conscious of our susceptibility to injury, illness, and death, deep concerns about health are universal. Public support is therefore inevitably susceptible to manipulation for private gain. Active public education, engagement, and empowerment are crucial to ensure that the forces that shape health-care delivery worldwide are truly focused on delivering the right care.

Contributors
VS drafted the outline; all authors contributed to its redrafting. All authors led a section of the manuscript and cross-contributed to sections and examples throughout the paper, provided substantial revisions, and approved the final version of the manuscript.

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Right Care 4

Levers for addressing medical underuse and overuse: achieving high-value health care

Adam G Elshaug, Meredith B Rosenthal, John N Lavis, Shannon Brownlee, Harald Schmidt, Somil Nagpal, Peter Littlejohns, Divya Srivastava, Sean Tunis, Vikas Saini

The preceding papers in this Series have outlined how underuse and overuse of health-care services occur within a complex system of health-care production, with a multiplicity of causes. Because poor care is ubiquitous and has considerable consequences for the health and wellbeing of billions of people around the world, remediing this problem is a morally and politically urgent task. Universal health coverage is a key step towards achieving the right care. Therefore, full consideration of potential levers of change must include an upstream perspective—ie, an understanding of the system-level factors that drive overuse and underuse, as well as the various incentives at work during a clinical encounter. One example of a system-level factor is the allocation of resources (eg, hospital beds and clinicians) to meet the needs of a local population to minimise underuse or overuse. Another example is priority setting using tools such as health technology assessment to guide the optimum diffusion of safe, effective, and cost-effective health-care services. In this Series paper we investigate a range of levers for eliminating medical underuse and overuse. Some levers could operate effectively (and be politically viable) across many different health and political systems (eg, increase patient activation with decision support) whereas other levers must be tailored to local contexts (eg, basing coverage decisions on a particular cost-effectiveness ratio). Ideally, policies must move beyond the purely incremental; that is, policies that merely tinker at the policy edges after underuse or overuse arises. In this regard, efforts to increase public awareness, mobilisation, and empowerment hold promise as universal methods to reset all other contexts and thereby enhance all other efforts to promote the right care.

Introduction

In this final paper in the Right Care Series on medical underuse and overuse,3,5 we address two complementary approaches to achieving the right care: so-called bottom-up approaches, whereby patients, clinical professionals, and system leaders take a proactive lead with little interference from managerial authorities; and so-called top-down policies, which have arisen as governments, medical societies, or private third-party payers face the challenge of improving the safety and quality of health care amid growing pressure to control spending.4

Additionally, we suggest a more far-reaching perspective than is typical of micro-meso level reform initiatives, that includes a longer-term strategy for cultural change, which has been scant to date.3 In 2014, Dickson and colleagues3 outlined principles and strategies to accelerate the scale-up of high-value interventions known to be underused. We will not retrace those steps in detail, and instead focus our attention on remedies for overuse—a side of the equation that has received less attention.

Setting the context: being clear about what we want to achieve

Most countries across the economic development spectrum aspire to high-performing, universally accessible health-care systems. The shared challenge is ensuring the right care is received by the right patients, in the right setting, at the right time, at the right cost. As
the previous papers in this Series emphasise, many health systems that provide near or universal health-care coverage (UHC) face a dual challenge: the underuse of high-value services, and the overuse of no-value or low-value health-care services. With UHC adopted as a target under the UN Sustainable Development Goals in 2015, more of the world’s attention will now focus on delivering the right care—not only in countries making the first steps towards UHC, but also in those that have been engaged in the process for some time.

Interpretations of UHC vary. As previously reported, these interpretations include publicly funded and provided universal, free, or affordable public health and curative services; mixed funding or mixed provision of services by the public and private sectors; UHC plans that would reduce coverage content to minimum-benefits packages or alternative systems of stratified health-care delivery; and other UHC plan structures that would primarily identify coverage with market-based or private insurance-based decision making. Furthermore, some of these definitions in practice are not the same as health care for all, because the aim is not necessarily to continually expand coverage to enable care for everyone, and in fact can present barriers to it. For example, some approaches, such as tiers of differing benefit packages for rich and poor individuals, can risk maintaining or worsening access barriers as costs and corporate profits expand.

The WHO definition of UHC is the widely accepted framework for understanding UHC: UHC is defined as ensuring that all people have access to needed promotive, preventive, curative, and rehabilitative health services, of sufficient quality to be effective, while also ensuring that people do not suffer financial hardship when paying for these services. We believe this definition should be one of the first guiding moral principles used when applying the proper levers for achieving high-value health care. Achieving optimum delivery of health care for the optimum health of populations is hard to imagine without considering this definition.

The fundamental ethical, economic, and political challenge arising from this situation is that as long as pooled funds are devoted to low-value care, the potential for health gain elsewhere in the system is unnecessarily restricted. This issue is the thrust of this Series paper. To maximise these health gains, all health systems must determine the efficacy of a given health service (can it work in principle?), effectiveness (does it work in practice?), technical efficiency (can it be produced at lower resource cost?), cost-effectiveness (is it the least expensive way to achieve an outcome, such as increasing health-related quality of life?), and allocative efficiency (is the outcome worth it compared to everything else that we can do to improve wellbeing generally, for people who use and pay for the intervention?). Focusing on care that is clinically effective, and produced in a way that is technically efficient and cost-effective, will make possible both gains towards UHC (by freeing up resources) and increase the gains achieved by investing health-care resources where they can have the greatest effect. Concentrating on allocative efficiency acknowledges that wellbeing, rather than delivering some quantum of health-care services, is the goal of health systems. Before we discuss various potential remedies to underuse and overuse, it is useful to outline a set of overarching principles, which ought not be heavily contested, and serve as a backdrop for the reform levers, as shown in panel 2.

Learning from past experiences

Attempts to remedy underuse and overuse have been ongoing since the mid-1970s with the Blue Cross Blue Shield Medical Necessity Project to today’s Choosing Wisely campaigns. Many of these programmes have been plagued by barriers related to their acceptance and implementation. Factors contributing to these barriers range from a general lack of systematic priority setting (eg, reliable, evidence-based administrative mechanisms to identify and prioritise technologies and practices that are both clinically effective and cost-effective) to the clinical, social, and political challenges of identifying winners (services being underused) and losers (services being overused). As we discussed in papers 1 and 3 of
Panel 2: Background principles that underpin reform levers to remedy underuse and overuse

First principles:22
- Citizens of all countries value optimum wellbeing
- Universal health coverage that ensures effective and affordable health care for all is one important means to this end
- Health-care professionals are morally committed to improving the health of their patients and they, alongside system leaders and government policy makers, should be morally committed to the health and broader wellbeing of communities and nations

Collectively, health systems must:23
- Get the right—effective and cost-effective—care to the right patients in the right setting at the right time
- Be affordable for patients and consumers, employers, and tax payers
- Maximise the number of people with access to effective and affordable health care that meets their needs

Specific components (individual services, devices, or drugs) must:23
- Be safe (ie, not do harm)
- Be effective
- Be cost-effective
- Be valuable compared with alternative expenditures
- Be wanted by informed patients

In a transformed health system, patients can expect to:24
- Have access to effective and affordable care that meets their needs
- Be informed and involved in choices about their care
- Be protected from commercial interests acting contrary to their health needs

In a transformed health system, clinicians can expect to:25
- Have the time they need to care for their patients
- Make clinical judgments in the best interests of their patients and of the broader community from which their patients are drawn
- Feel supported by health, political, and legal systems when they do so

this Series, one major driver of overuse is delivering a service to more and more patients who lie outside of the population for whom the service is clearly beneficial (so-called indication creep). When that service is targeted as being overused, clinicians might resist efforts to restrict use if they believe the service might be removed completely, rather than limited to the appropriate populations or clinical indications.26 Although some services should not be covered at all (eg, vertebroplasty), usually a better clinical definition of the patient subgroups that will and will not benefit from any given intervention is needed. This more nuanced understanding, together with an acknowledgment of grey zones of uncertainty, has bolstered support for contemporary efforts at optimising appropriate care.27

Policy makers must choose their methods carefully so as to arrive at a theoretical midpoint of appropriateness between the tails of underuse and overuse. Levers that target underuse can easily have the unintended consequence of exacerbating overuse and vice-versa. For example, more than a decade ago efforts were made in numerous countries to increase testing for vitamin D deficiency in primary care. In Australia, testing rapidly gained popularity with a 4800% increase over 10 years, much of which was clinically inappropriate and at a cost that could have achieved much greater health benefits if spent elsewhere. Furthermore, in 2014 Bhatia and colleagues28 observed that efforts to decrease hospital admission rates for patients with heart failure led to increases in repeat emergency department visits and hospital admissions after previous emergency department discharge. Such examples show that the quest for appropriate medical intensity, and the consequences of overestimating or underestimating such intensity, are ongoing challenges.

With these challenges and other considerations in mind, we can begin to compile a list of potential remedies, noting that no single lever is a universal remedy and many have only a small (albeit growing) evidence base as to their effectiveness.29 As we will highlight in this section, achieving the right care will require levers targeted from the patient level up to the government policy maker level, and all require careful attention to contextual factors. A key element of efforts to address overuse will be the prospective evaluation of levers used, either before widespread adoption or as part of a broad rollout. Cluster randomised trials and interrupted times-series could assist with understanding benefits and possible harms, cost-effectiveness analysis could assist with appreciating value-for-money considerations, process evaluations could assist with understanding how and why levers achieve their goals (and the implications for adaptations that can be made for local contexts without jeopardising the effectiveness of the strategy), and qualitative studies can assist with understanding stakeholders’ views and experiences. Constant monitoring and evaluation is equally important to ensure that levers continue to achieve the desired goals, both alone and in combination with other levers. Although policy makers work under many institutional constraints, face considerable interest-group pressure, and juggle competing values, research evidence can and should be a key input regarding decisions about whether to introduce, scale-up, adapt, adjust, or stop using a lever.30

Levers through which high-value health care could be achieved

Patients, community, and civil society organisations
Democratic engagement is both an intrinsic value and a crucial lever for change. Patients and the wider public should be involved in the effort to achieve the right care
<table>
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<th>Delivery arrangements</th>
<th>Definition</th>
<th>Examples, including evaluations (system context most suited)</th>
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<tr>
<td>Matching allocation of supply-sensitive resources (such as hospital beds and health-care labour) to meet population needs</td>
<td>Certificates of need ( wording varies between countries) are principled such that the construction of health-care facilities (eg, new hospital beds) avoids excess capacity and supplier-induced demand for hospital-based services. Most countries regulate the number of physicians and other health-care professionals, often through subsidised training. Use of Six Sigma, the lean production method, and other methods to improve process efficiency and reduce waste, allowing excess capacity to be cleared or allocated to reduce underuse.</td>
<td>Do-not-dos(^\text{15}) (All)</td>
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<tr>
<td>Include inappropriate use recommendations in CPGs</td>
<td>Guideline developers are encouraged, when appropriate, to specify recommendations against the use of specific practices, technologies, and pharmacueticals (including for patient subgroups) when formulating guidance. However, the evidence on which to base definite do and do-not-recommendations is often scarce.</td>
<td>(^*\text{15}) (All)</td>
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<tr>
<td>Development of appropriate-use criteria with measurement</td>
<td>Evidence-based, consensus-driven development of appropriate-use criteria aid in articulating the patient populations for whom any given practice is high-value vs low-value. These criteria assist clinicians at the point of care (including via HITs); feed in to (and from) CPGs; facilitate SDM; direct indication-specific payment parameters, and set the groundwork for measurement of high-value and low-value care in routinely collected datasets.</td>
<td>(^*\text{15}) (All)</td>
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<td>Audit and feedback</td>
<td>Audit and feedback includes a summary of clinical performance of health care over a specified period of time aimed at providing information to health professionals to allow them to assess and adjust performance. A Cochrane systematic review reported a 6.3% increase in health-care professionals’ compliance with desired practice, which could be as much as a 16% increase if baseline adherence is low and key design features are used. Provider level reporting and feedback has shown success even when it was not public as seen in Canada in the case of cardiac care revascularisation and harmonisation of clinical practice for caesaean section in Belgium.</td>
<td>(^*\text{12}) (All)</td>
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<tr>
<td>HIT and EHR</td>
<td>HIT and EHR now include decision tools, clinical reminders, cost data, pharmacy records, and outpatient data—all of which could be used to restrict the use of marginally effective medical interventions, ranging from real-time flagging to improved auditing processes.</td>
<td>EHR flags (All)</td>
</tr>
<tr>
<td>Education and other support for patients and citizens regarding effective self-management and SDM</td>
<td>Many treatment choices patients face are preference sensitive in that each choice offers a different set of potential benefits and harms.(^\text{11,12}) Evidence in communicating evidence-based benefits and harms in the SDM process can reduce overdiagnosis, overtreatment, and undertreatment, and align informed patient preferences with treatment choices.(^\text{11}) This process benefits from the use of patient decision aids.</td>
<td>(^*\text{3}) (All)</td>
</tr>
<tr>
<td>Education and other supports for professionals about SDM, guideline implementation, and high-value care delivery</td>
<td>Several high-quality reviews found that educational materials, educational meetings, educational outreach visits, local opinion leaders, tailored interventions, audit and feedback, and computerised reminders had beneficial effects on optimisation of clinical practice. The effect sizes found for each of these interventions are similar, but have large variability, suggesting that the probable effects of interventions vary in relation to the degree to which the causal mechanisms of action for the intervention address the specific barriers identified. The variability also reinforces the importance of diagnosing the underlying cause of why low-value care is being used or why high-value care is not being used and then, on the basis of the diagnosis, selecting from the array of candidate strategies and iteratively refining, tailoring, and combining them in a way that maximises the effect of efforts to optimise clinical practice.</td>
<td>(^*\text{1}) (All)</td>
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### Financial arrangements

<table>
<thead>
<tr>
<th>Definition</th>
<th>Examples, including evaluations (system context most suited)</th>
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<tr>
<td>Complete removal from coverage schedules</td>
<td>For some technologies or practices, the evidence for safety and effectiveness is convincingly negative yet the practice persists. In these instances complete removal from funding schedules might be appropriate.</td>
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<tr>
<td>Tighten or restrict indications associated with coverage or reimbursement</td>
<td>Often evidence mounts about the population subgroups who achieve the most, and least, benefit from particular technologies or practices. Reimbursement indications can be tightened to target those with the greatest capacity to benefit. Also, frequency rules have the effect of permitting a set number of tests or treatments in a given timeframe.</td>
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<td>Reduction in third party payment due to technological advances</td>
<td>In non-health markets, when technology develops on its promise and becomes safer, faster, and easier to use, the reduction in the cost of supply can drive the price down in response, provided the barriers to entry are few. Such cost reduction rarely occurs in the health-care sector, but some examples are appearing.</td>
</tr>
<tr>
<td>Partial reimbursement or coverage (sits within value-based insurance designs)</td>
<td>For a practice known to deliver less value than its comparators (albeit still with some benefit in a subgroup of individuals), the level of reimbursement or coverage can be tiered in accordance with the anticipated health outcomes.(^\text{34,35}) For example, patients could be required to pay the full cost of a low-value practice if they choose it when a better-value alternative is available. Supplier-induced demand can raise ethical challenges here.</td>
</tr>
<tr>
<td>Reference coverage to rate of least costly provider (meeting quality standard)</td>
<td>In the USA, particularly, wide variation exists in the cost structures between provider institutions for the same or similar service. The payer agrees to cover the fee structure set by the least costly provider (whereby quality of outcome is matched). Clients are permitted to use more costly providers but must pay the difference.</td>
</tr>
<tr>
<td>Reference coverage to rate of least costly alternative for given condition</td>
<td>For a given condition multiple treatment options might exist that deliver similar health outcomes (ie, one or more treatments is equivalent or non-inferior to a comparator) yet costs vary for each. Coverage can be referenced to the least costly alternative. In cases whereby one treatment is deemed to be not inferior to the main comparator, no basis exists in terms of health outcomes ( safety profile included) to justify a higher price, unless cost are offset as a result of a different method of administering the proposed treatment.</td>
</tr>
<tr>
<td>Sunset clauses (coverage with evidence development)</td>
<td>In cases whereby a health-care intervention has uncertain effectiveness, and insufficient evidence exists for decision making (ie, substantial uncertainty exists) funding could be guaranteed only for a set time period and, where appropriate, be conditional upon compulsory patient enrolment for evidence generation.</td>
</tr>
</tbody>
</table>

(Table continues on next page)
not only because they are both the recipients and ultimate payers, but also because actively engaging these individuals can increase legitimacy of efforts to determine the relative value of various investments in health care, from infrastructure to specific services that are covered. Three principal methods of involving patients and the public are as follows: shaping environments that help reduce demand for low-value services through adequately informed consumers; effective patient engagement in clinical decision making to maximise value (especially when care is preference sensitive); and public engagement to improve priority setting at the highest policy level. There are many reasons to involve patients and the public in decision making. First, expectations or demands from uninformed or misinformed patients can result in pressure on clinicians to provide low-value care. This pressure is exacerbated by direct-to-consumer marketing.

Additionally, hospitals frequently exaggerate the medical utility of advertised services, such as proton beam therapy for prostate cancer. The provision of evidence-based information from trustworthy organisations that have no conflicts of interest is especially crucial in such settings (Table). Second, evidence-based shared decision making (SDM) between patients and clinicians is important on both clinical and ethical grounds. Many treatment choices patients face are preference sensitive in that each choice presents a different set of potential benefits and harms. Excellence in communicating evidence-based benefits and harms in the SDM process can reduce overdiagnosis, overtreatment, and undertreatment, and align informed patient preferences with treatment choices. This process benefits from the use of patient decision aids. A 2011 Cochrane review showed that well informed patients...
are less likely to choose to undergo surgery, in favour of less invasive procedures, although this is not always the case.\textsuperscript{23} However, even if less care is not always the result of SDM, broader acceptance of remedies for overuse among patients and the public is crucially important, given the threat of rationing that often looms in the background of limit-setting decisions: SDM can ensure that decisions are made with, and not against patients.

Third, patient and public engagement is widely regarded as useful at the policy level, although robust evaluations about its benefits are rare.\textsuperscript{55} Many countries increasingly involve patients and the public in health technology assessment (HTA) and coverage decisions. Commonly cited rationales focus on incorporating shared values, improving the legitimacy or acceptability of policy, and disseminating knowledge about decisions and processes.\textsuperscript{56} However, despite considerable enthusiasm among policy makers for public and patient involvement, no consensus appears to exist about the priority among these rationales, and there is no consensus about which members of the public should be involved in which processes, the weight these individuals should have in influencing decisions, and how potential conflicts of interests should be addressed.\textsuperscript{19} Although public and patient involvement in decision making has clear potential, evidence that public engagement lives up to the rationales advanced for it is required.\textsuperscript{16}

Clinical professionals and professional associations
Clinical professions must engage in robust, evidence-based guideline development and implementation. Clinical practice guidelines (CPGs) are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances.\textsuperscript{37} The majority of CPGs are developed by medical professional organisations, government agencies, and non-profit organisations. When guideline recommendations are developed through a structured, evidence-based process and applied by clinicians accurately, the expected effect would be an increase in the use of appropriate services and reduction in the use of inappropriate or unnecessary services, thereby improving outcomes, and potentially reducing net spending.

Several studies have assessed the impact of CPGs, and systematic reviews of these studies have generally concluded that CPGs improve both process and outcomes of care, with substantial variability in the magnitude of these improvements.\textsuperscript{38,39} Although some results are encouraging, others are not,\textsuperscript{40} and the evidence also strongly suggests that considerable variation exists around the point estimates, which contain clues as to where to focus remedial efforts. For example, audit and feedback offers an average 4·3% improvement in adherence to the guidelines, but an upper range of 16% when key considerations are addressed.\textsuperscript{40} CPG implementation strategies must be customised to the individual guideline and clinical conditions, with attention to the barriers to change identified in each context.\textsuperscript{55,56} Overall, the evidence shows that none of the approaches for transferring clinical guideline recommendations to practice is effective across all possible situations.\textsuperscript{26} Additionally, patients with multiple comorbidities can trigger recommendations from multiple CPGs, without providing clear guidance on how best to prioritise the interventions, potentially leading to overtreatment.\textsuperscript{45}

Perhaps the most important limitations to the potential for CPGs to reduce both underuse and overuse are the substantial gaps in evidence on which to base recommendations, biased evidence, and biased guideline producers. A review of 16 CPGs from the American College of Cardiology\textsuperscript{46} showed that only 314 of 2711 recommendations (median 11%) are classified as level of evidence A (ie, multiple randomised trials or meta-analyses), whereas 1246 (median 48%) are level of evidence C (ie, expert opinion, case studies, or standards of care). Moreover, many guidelines offer advice of questionable value to patients, as a result of industry influence.\textsuperscript{54,65} The shortage of good quality evidence suggests that a crucial strategy to reduce the prevalence of inappropriate care will be at least two-fold, involving substantial expansion of efforts to address these gaps in evidence through more relevant and higher quality clinical research,\textsuperscript{26,40} and closer adherence to best practices for reducing bias due to conflicts of interest.\textsuperscript{70}

Closely related to bias due to conflicts of interest, and poor quality research, is the ever-expanding number of, and definitions for, diseases that then require additional research. An urgent need exists for unbiased, evidence-based generation and consensus for creating and modifying disease definitions. No global rules or referees have been identified to oversee the development of new disease and predisease definitions, including the so-called threshold creep of disease classifications.\textsuperscript{7} Such a body is required to modulate the rise of overdiagnosis and resultant overtreatment, which might include revisions to treatment recommendations based on risk profile of treatment versus no treatment, and prognosis.

Trends are also shifting internationally with professionals now being explicitly directed to consider the cost of interventions, with a responsibility to reduce waste and improve the value of care. This shift is occurring via many of the financial incentive levers presented throughout this Series paper, but also through efforts such as the Lean method\textsuperscript{72} to improve process efficiency; education at the graduate level;\textsuperscript{73} and explicit guidance—eg, from The National Institute for Health and Care Excellence\textsuperscript{74} and Choosing Wisely.\textsuperscript{18}

System leaders
System leaders are defined as civil service administrators and those in executive positions at arm’s-length government organisations (eg, safety and quality commissions), non-government organisations, and third party payers or insurers. The role for system
leaders in achieving the right care is extensive. In this section, we discuss potential leverage points in the delivery, financial, and governance arrangements within which care is provided.

Foremost at the delivery level is a robust primary care system. International comparisons of health outcomes in various health-care systems have shown the importance of primary care for driving appropriate care. The provision of ready access to robust high-quality primary care underpins many of the leverage options discussed in this Series paper, from bolstered SDM to integrated care. All levels of care could benefit from a comprehensive, regionally integrated health information technology (HIT) infrastructure, complete with electronic health records (EHRs), and computerised physician order entry (CPOE) systems. EHRs with CPOE designs can include algorithms, clinical pathway analysis, utilisation and cost information, vetting of orders, and restriction of tests to ensure an appropriate test repertoire. Many HITs and EHRs now have such decision tools, all of which could be used to prompt appropriate high-value care. To date, individual studies have shown little effect of EHRs for elements of quality improvement, but knowledge is building of the conditions through which single-component versus multifaceted interventions are more or less effective in changing clinical behaviour. A systematic review identified 19 studies of the impact of CPOE on laboratory testing. The CPOE systems (both with and without decision support) showed an overall trend towards reduced test volume and cost, when compared with no CPOE. Overall, fewer tests, fewer inappropriate tests, and a considerable reduction in the median time to appropriate treatment occurred in the decision support group. These positive results must also be viewed against concerns that first generation EHRs focus excessively on revenue enhancement in some health systems, are too rigid to allow appropriate individualisation of care, and detract from other, equally important aspects of the right care—eg, eye contact and empathic listening. These issues require urgent research to help inform the incorporation of human design factors and the evolution of more intelligent algorithms.

The structuring of financial incentives and payment rules to support the right care is undergoing renewed attention internationally, with explicit endorsements to link payment with some aspects of quality. For example, a 2013 US Institute of Medicine review of cancer care in the USA called for Medicare and other insurers to recognise and compensate providers that follow the Choosing Wisely recommendations. Many countries are implementing financial incentives for patients (eg, co-payments and conditional cash transfers), as well as rewards or penalties for clinicians, clinics, and hospitals. A set of financial leverage options are listed (the table).

Furthermore, system leaders are exploring initiatives intended to promote rapid adoption of high-value innovations, particularly those that have the potential to displace existing lower-value interventions. The MaRS EXCITE programme is one example whereby the needs of patients, as well as the evidence requirements of regulators and funders, are prioritised at the development phase, rather than later when a product or service has diffused through a system only to be deemed inadequate on the grounds of safety, effectiveness, or cost-effectiveness and when considerable risks to patients and wasted resources could have already been incurred. This programme sets a vision for nations to fund large patient-relevant clinical trials to balance those dominated by product development cycles of industry, to establish regulatory standards attentive to superiority when patent protections are sought, and where equivalence or non-inferiority triggers downward pricing pressures; and to fund research to investigate services without prospect for short-term profit.

To avoid both overuse and underuse, system leaders must also appraise their systems’ investment in such resources as per capita clinical labour and hospital beds. It is widely understood that underuse can occur when availability of resources is inadequate. If a country does not have enough doctors and nurses, citizens’ health-care needs will not be adequately addressed. The effect that excess capacity can have on overuse is less well recognised, particularly of services that are delivered at the physician’s discretion, such as follow-up visits and treatment in hospital.

Geographical variation in supply-sensitive services poses a problem for all system leaders who would aim to match the capacity of their delivery system to the needs of the population. Many of the methods used to detect a need for increasing per capita supply of resources, such as hospital occupancy rates, and primary care physicians who are able to accept new patients, do not always provide an accurate indication of need for additional beds and personnel. Some efforts to curb excess hospital capacity, such as certificate of need legislation, have had highly variable effects by region, depending upon the political power of existing hospitals to either gain permission to expand or to exclude competitors. Perhaps the best way for system leaders to determine the right capacity to meet local health needs is by looking to systems that have good outcomes using the least resources.

Government policy makers

Mobilising system leaders (eg, bureaucrats) often requires high-level political will and permission, support, or mandate from politicians specifically. This mobilisation is crucial for the scoping of any structural reforms through to their implementation, particularly when broad-based stakeholder commitment, large-scale infrastructure investments, or legislative change is required.

We advocate for systematic priority-setting processes as a core requirement for countries to purchase high-value,
appropriate care. HTA, for example, is now firmly engrafted worldwide in the health-care resource allocation infrastructure (with the notable exception being the USA), but HTA is not a lever per se, but rather a priority-setting feeder for leveraging safe, effective, and cost-effective health care. In many countries, the government must endorse this approach, support its capacity, and follow through on its evidence-based findings.\(^{80}\)

Although HTA and associated economic evaluation processes have become indispensable, especially regarding the value-based purchasing of pharmaceuticals, these processes have predominantly focused their attention on new and emerging health services and technologies. Little capacity exists for assessing services and technologies that are already established within health systems, but that nevertheless offer no or low-value. This situation has been referred to as being “stuck with the old and overwhelmed by the new”.\(^{29}\) Many countries are realising this shortfall, and expanding the focus of HTA to include reviews of well established services (health technology reassessment [HTRA]).\(^{30}\) Both Canada (Ontario) and Australia, for example, have developed successful HTRA initiatives within their fee-for-service systems.\(^{30,31}\) For other countries, the introduction of robust HTA and HTRA processes represent a key step towards encouraging the prevention of underuse and overuse.\(^{31}\) In recognising this potential, particularly for low-income and middle-income countries (LMICs), the Bill & Melinda Gates Foundation has provided a grant to the International Decision Support Initiative, supporting governments of LMICs and donors in making resource allocation decisions for health care, guiding options for the design, adjustment, and assessment of health benefit plans in the context of UHC.\(^{32}\) Some leverage points (table) have considerable potential for implementation to support UHC, as a result of robust HTA and HTRA processes.

An extension of HTA processes would see health systems incorporate public reporting, such as the increasing trend in several countries to publish atlases of variation for the first time.\(^{33}\) Some Organisation for Economic Cooperation and Development countries are becoming quite sophisticated in how information is presented, as seen in England through the National Health Service Atlas, Outcomes benchmarking support packs, and the Commissioning for value data pack.\(^{34}\) For other countries, the introduction of robust HTA and HTRA processes represent a key step towards encouraging the prevention of underuse and overuse.\(^{31}\) In recognising this potential, particularly for low-income and middle-income countries (LMICs), the Bill & Melinda Gates Foundation has provided a grant to the International Decision Support Initiative, supporting governments of LMICs and donors in making resource allocation decisions for health care, guiding options for the design, adjustment, and assessment of health benefit plans in the context of UHC.\(^{32}\) Some leverage points (table) have considerable potential for implementation to support UHC, as a result of robust HTA and HTRA processes.

Panel 3: Caesarean (c)-section approaches that show promise with regard to reducing overuse of care\(^{32}\)

- In 2012, Italy set regional targets for c-section incidence, which probably helped reverse the trend in c-section incidence in provinces with the highest rates.
- In Spain, some hospitals used a clinical support tool to assess the need for c-sections, which led to a small reduction in use.
- Hospitals in Belgium received feedback on variations in c-section incidence, which led to a convergence in rates among hospitals with both high and low incidence.
- Several countries have introduced financial incentives. France reduced the gap between the prices paid by health insurance for c-sections and normal delivery. Similarly, England decided to align the prices of the two procedures. Korea implemented a pay-for-performance scheme for hospitals, which slightly reduced c-section rates.

C-sections represent a tale of two extremes: a considerable underuse problem in the lower-income and lower-middle-income countries coexisting with overuse. On the one hand, skilled resources and infrastructure might not be available in rural and remote areas in which they are needed to prevent maternal mortality; on the other hand, urban and higher-income contexts face similar overuse issues as high-income countries.
the health system. A spectrum of approaches exists to
fund the delivery of health care from global budgets
attached to a specific structure (such as a hospital),
whereby payment is completely detached from the
delivery of services, to fee-for-service or cost-based
reimbursement, in which payment is strictly linked to
the number and intensity of services. Many health systems
rely on fee-for-service to pay for physician and ancillary
services and research has shown that related pricing
distortions (specifically, differential profit margins across
services) can drive both underuse and overuse. Moreover,
even in health systems that rely more heavily on block
funding, isolated payment arrangements that prevent the
funds from following patients across sites of care can lead
to both underuse and overuse. As a result, many countries
are looking to create organised networks of providers
with financial accountability for quality (including
outcomes), patient experience, and the total cost of care.

The US Affordable Care Act introduced the option for
Medicare to pay so-called accountable care organisations
on the basis of a virtual global budget for all patients who
use the primary care services of the system.5,15 Some
accountable care organisations share both upside and
downside risk relative to a spending target for
the population, and payments are also affected by per-
formance on a set of quality measures. In England,
clinical commissioning groups and other new entities
foreshadowed by the 2014 National Health Service 5-year
Forward View adopt a similar role as the nexus of health-
care prioritisation at the local level. Similar accountability
models can also be designed around a narrower set of
services, such as those indicated for the treatment of a
condition or related to an acute episode, such as a hip
fracture. The Netherlands have introduced episode-based
payment for diabetes care, prepaying for a defined set of
recommended services to encourage local care groups of
general practitioners to reduce costs.39 Furthermore,
more than 300 million new insurance beneficiaries in
publicly funded health insurance programmes in India
are now covered for hospital costs through single, pre-
agreed grouped payments, which even include
transportation and medicines provided at discharge.40

In theory, global payment—at either the population
(also known as capitation) or episode level—encourages
the accountable provider to consider both the costs and
benefits of every service and thus increase the value of
care delivered. Indeed, burgeoning research shows
that global payment can reduce cost relative to fee-for-service
contracts and disproportionately diminishes low-value
services.113 However, whether global payments could
also reduce the use of high-value services is unclear.

In European countries, efforts to introduce bundled
payment for services closely linked to clinical guidance
are showing promise,41 leading to better protocols and
standards of care (Netherlands, Portugal, Sweden).55
However, episode-based payments could have some
downside relative to population-based global payment
because providers can induce unnecessary episodes of
care or push care outside of the funded group, resulting
in the appearance of savings at one level, but not from
the broader payer’s perspective.105–109 Incremental changes
to systems that rely heavily on fee-for-service are a
necessary part of addressing overuse and underuse.108
Evidence suggests that the level of fees both in absolute
and relative terms affects the frequency of use of
individual services, suggesting that adjustments to fee-
for-service that shift the emphasis from low-value to
high-value care is a policy worth pursuing.109

Furthermore, reducing the fear of litigation through
so-called no fault systems provides important
opportunities to enable clinical decision making to be
about the patient and nothing else.132

Implementation considerations and fit-for-purpose change
As we have noted in paper 3 of this Series,1 key drivers of
care operate at the global level. These drivers include
trade agreements, international aid, media networks,
multinational corporations, and, increasingly, pro-
fessional societies. Traditional intergovernmental global
health organisations have to date played a small role in
efforts to improve quality of care delivery. Much work is to
be done by international institutions to develop adequate
frameworks for promoting the right care around the
world, such as establishing international guidelines to
ensure high-quality standards for biomedical research,
open access to clinical data, and widely accepted codes of
conduct for health-care professionals.

The international initiatives discussed within this
Series paper are instructive. An analysis of these
initiatives highlights numerous shared challenges.
Comprehensive and lasting reform requires the following
approaches: collective acknowledgment of the concurrent
problems of overuse and underuse; the generation of
will—political, professional, and social—for broader
stakeholder support and the process of carrying reform,
with ongoing stakeholder consultation and participation;
high-level commitment to ensure that priority setting is
part of an explicit, formal, and well resourced policy
agenda beyond short-term political timelines; transparent
decision making frameworks removed from vested
interests; clear objectives and nomenclature, articulating
an ethic of waste reduction, and minimising opportunity
costs rather than rationing; and the allocation of resources
for data collection, monitoring, analysis, and sharing. We
must acknowledge that research evidence in this domain
is a necessary, but not sufficient ingredient for change.
Research waste, bias, and residual uncertainty is simply
too prevalent to assume that the evidence alone will steer
the course towards the right care.109 One key tenet should
be that the burden of evidence for safety, effectiveness,
and cost-effectiveness rests with the product developer or
sponsor, not patients and payers (including tax payers) of
health care. An important perspective would hold that
entrenched legacy services ought to also be subjected to
the rigorous standards that are increasingly applied to new and emerging technologies and practices. If, after years of use, evidence is not balanced in favour of a practice (and some doubt exists) then a precautionary perspective appears warranted. Restoring the burden of proof is one possibility—placing the inferred expectation for scientifically robust demonstrations of safety, effectiveness, and cost-effectiveness back on the sponsor of a product. Overcoming political, professional, and social resistance to change is a key implementation consideration. However, a shift is undoubtedly occurring in this regard internationally, posing a wonderful opportunity for effective change.

Conclusions
The modern history of health care is littered with policy and practice inaction in the face of inappropriate care, often justified by an absence of evidence or uncertainty about what might result—Machiavelli’s “new order of things”.

This lack of action should no longer be acceptable. Although the scale of the problem is vast and complex, a range of potentially effective remedies are available, with many more needed. Evidence-based medicine, HTA, shared decision making, and countless other movements have surely nudged health systems to a point whereby we must ultimately acknowledge that a decision not to act is still a decision, and one with implications for people’s health. As efforts to improve the delivery of care continue worldwide, we must recognise that if the objective is to improve health, delivery systems need to be properly scaled and adapted to local needs and socioeconomic conditions to be maximally effective. Furthermore, delivery system leaders should remain humble about their systems’ contributions to health and should be unburdened from the task of substituting less effective medical spending for social spending. Transitions from the norm invariably cause conflict, but if efforts to achieve the right care are able to capture the full opportunity in front of us, the benefits to the wellbeing of patients, professionals, and the public as a whole are too great to condone inaction.

Contributors
AGE, SB, MBR, PL, JNL, HS, ST, and VS drafted the outline. AGE led the redrafting; first draft construction of panels were led by AGE, JNL, MBR, VS, and SB (panel 2); VS, SB, and AE (panel 1); AE (table first draft); AE, SN, HS, and PL (table second draft); and DS (panel 3), with subsequent input from all authors on all panels. All authors led a section of the manuscript and cross-contributed to sections and examples throughout the paper, provided substantial revisions, and approved the final version of the manuscript.

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