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Waste in the US Health Care System
Estimated Costs and Potential for Savings

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IMPORTANCE The United States spends more on health care than any other country, with costs approaching 18% of the gross domestic product (GDP). Prior studies estimated that approximately 30% of health care spending may be considered waste. Despite efforts to reduce overtreatment, improve care, and address overpayment, it is likely that substantial waste in US health care spending remains.

OBJECTIVES To estimate current levels of waste in the US health care system in 6 previously developed domains and to report estimates of potential savings for each domain.

EVIDENCE A search of peer-reviewed and "gray" literature from January 2012 to May 2019 focused on the 6 waste domains previously identified by the Institute of Medicine and Berwick and Hackbarth: failure of care delivery, failure of care coordination, overtreatment or low-value care, pricing failure, fraud and abuse, and administrative complexity. For each domain, available estimates of waste-related costs and data from interventions shown to reduce waste-related costs were recorded, converted to annual estimates in 2019 dollars for national populations when necessary, and combined into ranges or summed as appropriate.

FINDINGS The review yielded 71 estimates from 54 unique peer-reviewed publications, government-based reports, and reports from the gray literature. Computations yielded the following estimated ranges of total annual cost of waste: failure of care delivery, $102.4 billion to $165.7 billion; failure of care coordination, $27.2 billion to $78.2 billion; overtreatment or low-value care, $75.7 billion to $101.2 billion; pricing failure, $230.7 billion to $240.5 billion; fraud and abuse, $58.5 billion to $83.9 billion; and administrative complexity, $265.6 billion. The estimated annual savings from measures to eliminate waste were as follows: failure of care delivery, $44.4 billion to $97.3 billion; failure of care coordination, $29.6 billion to $38.2 billion; overtreatment or low-value care, $12.8 billion to $28.6 billion; pricing failure, $81.4 billion to $91.2 billion; and fraud and abuse, $22.8 billion to $30.8 billion. No studies were identified that focused on interventions targeting administrative complexity. The estimated total annual costs of waste were $760 billion to $935 billion and savings from interventions that address waste were $191 billion to $286 billion.

CONCLUSIONS AND RELEVANCE In this review based on 6 previously identified domains of health care waste, the estimated cost of waste in the US health care system ranged from $760 billion to $935 billion, accounting for approximately 25% of total health care spending, and the projected potential savings from interventions that reduce waste, excluding savings from administrative complexity, ranged from $191 billion to $286 billion, representing a potential 25% reduction in the total cost of waste. Implementation of effective measures to eliminate waste represents an opportunity reduce the continued increases in US health care expenditures.

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The United States spends more on health care than any other country, with costs approaching 18% of the gross domestic product (GDP) and more than $10 000 per individual.[1] In 2010 the Institute of Medicine (IOM) attempted to estimate the amount of waste in US health care spending and proposed 6 categories of potential sources of waste (**Table 1**).[2] In an updated analysis published in 2012, Berwick and Hackbarth[3] reported that approximately 34% of US health care spending in 2011 (according to the authors' midrange estimates) could be categorized as waste. Since then, there has been additional focus on the sources of excess spending identified by Berwick and Hackbarth, such as the cost of drugs in the United States[4-8] and administrative complexity.[9-11] Also, in the intervening years since the previously published estimates of waste in health care, a burgeoning body of research on low-value health care services has emerged.[12-14] In addition, initiatives to help control health care spending, including both payment reform (eg, accountable care organizations, bundled payments, and value-based payment arrangements with primary care physicians) and delivery reform (improved care coordination, patient-centered medical homes, and the Partnership for Patients initiative) have evolved since previous estimates of wasteful spending. However, despite efforts to reduce various forms of overspending and initiatives to replace volume-based reimbursement with value-based reimbursement, it is likely that substantial waste in US health care spending remains; elimination of that waste represents an opportunity to help reduce the continual increases in health care expenditures.

This Special Communication provides an update to the IOM and the Berwick-Hackbarth reviews of the estimated levels of waste in the US health care system, using evidence from the intervening 7 years to improve understanding of the current sources of waste in health care spending. A unique contribution of this update is a review of the ability of the health care system to reduce waste, using recently reported estimates of potential savings from interventions

Table 1. Six Waste Domains With Cost and Intervention Components

Berwick and Hackbarth Definition[3]	Targeted Cost Components	Targeted Intervention Components
Failure of Care Delivery		
"[W]aste that comes with poor execution or lack of widespread adoption of known best care processes, including, for example, patient safety systems and preventive care practices that have been shown to be effective. The results are patient injuries and worse clinical outcomes."	Clinician- or hospital-related inefficiency: variability in care, inefficient use of high-cost clinicians or hospitals Practice- and system-based inefficiency: inefficient clinic processes, redundant testing Medical errors or adverse events Lack of adoption of preventive care practices	Clinical pathways, centers of excellence, physician/hospital benchmarking, bundled payment models Quality improvement initiatives Patient safety initiatives or hospital-acquired condition reduction Primary, secondary, and tertiary prevention initiatives
Failure of Care Coordination		
"[W]aste that comes when patients fall through the slats in fragmented care. The results are complications, hospital readmissions, declines in functional status, and increased dependency, especially for the chronically ill, for whom care coordination is essential for health and function."	Unnecessary ED visits or admissions Unnecessary readmissions Avoidable complications	Interventions focused on reducing admissions: urgent care, telehealth or retail clinics, observation units, ED co-pay increases, high-user interventions Transitions of care and readmission initiatives, hospital readmissions reduction program Effective care management for medically complex patients
Overtreatment or Low-Value Care		
"[W]aste that comes from subjecting patients to care that, according to sound science and the patients' own preferences, cannot possibly help them—care rooted in outmoded habits, supply-driven behaviors, and ignoring science. Examples include excessive use of antibiotics, use of surgery when watchful waiting is better, and unwanted intensive care at the end of life for patients who prefer hospice and home care."	Overtreatment or overuse of low-value treatments (medications and procedures) Overtesting or overdiagnosis Overuse in end-of-life care	Clinician facing: choosing wisely, clinician feedback, clinical pathways, stepped care, incorporating low-value care in quality measures, shared decision-making Insurance facing: prior authorization (for medications, testing, and procedures) Pharmacy focused: prior authorization, formulary design, exclusivity or closed classes, indication-based pricing, generics or biosimilars, early palliative care and hospice efforts
Pricing Failure		
"[W]aste that comes as prices migrate far from those expected in well-functioning markets, that is, the actual costs of production plus a fair profit. For example, because of the absence of effective transparency and competitive markets, US prices for diagnostic procedures such as MRI and CT scans are several times more than identical procedures in other countries."	Variability and inflation in pricing of medications, testing, procedures, devices, and durable medical equipment	Insurance facing: efforts to standardize prices of services; value-based benefit design; negotiations for services Pharmacy focused: drug price negotiations, value-based contracting for drugs and services Patient facing: cost transparency initiatives
Fraud and Abuse		
"[W]aste that comes as fraudsters issue fake bills and run scams, and also from blunt procedures of inspection and regulation that everyone faces because of the misbehaviors of a very few."	Costs of fraud and abuse	Interventions that address costs of fraud and abuse
Administrative Complexity		
"[W]aste that comes when government, accreditation agencies, payers, and others create inefficient or misguided rules. For example, payers may fail to standardize forms, thereby consuming limited physician time in needlessly complex billing procedures."	Billing and coding costs Physician administrative burden Insurance administrative burden, inefficiencies	Interventions to facilitate billing and coding Elimination of processes that do not improve quality and access to care and do not reduce costs Streamlining administrative personnel and processes

Abbreviations: CT, computed tomography; ED, emergency department; MRI, magnetic resonance imaging.

that address each domain of waste. This added context is essential to help guide system-based reform to reduce waste in the most efficient and effective manner.

Methods

This review used the framework of 6 domains of waste that guided previous work (failure of care delivery, failure of care coordination, overtreatment or low-value care, pricing failure, fraud and abuse, and administrative complexity)[2,3] and added estimates of the cost of low-value care to the "overtreatment" domain (Table 1). Low-value care was defined as services that provide no or minimal benefit to a patient in a specific clinical situation.[15] In addition to new evidence on the cost of waste, evidence regarding cost-saving interventions was reviewed to provide estimates of potential waste reduction in each domain if those successful interventions were scaled. A targeted literature search was conducted using these resources: (1) PubMed and (2) databases of national organizations (governmental and private), as listed in eTable 1 in the Supplement.

Study Selection Criteria

Reports and articles were included if published in English from January 1, 2012, to May 15, 2019 (since the Berwick and Hackbarth article was published in 2012); used data collected in 2009 or later (since the IOM report produced estimates for the year 2009); were based on US populations; and were focused on costs or savings related to any of the predefined components of the 6 waste domains (Table 1). Selection criteria also required that estimates could be translated to national cost data. For instance, if a study estimated annual costs for low-value services for a cohort of Medicare enrollees for 2016, the study was included because the cohort costs could be translated to the entire national Medicare population. However, if a study reported findings such as annual costs of low-value services for a cohort of Medicare enrollees who had at least 2 hospital admissions and 1 intensive care unit admission in 2016, the data were not included because of difficulty translating costs to a broader national Medicare population. Studies were excluded if they were performed at single sites (ie, 1 hospital or 1 clinic), focused only on pediatrics, or, with the exception of overtreatment or low-value care, focused on single disease states.

Search Strategy

PubMed Search

The PubMed search strategies were developed based on keywords and Medical Subject Headings (MeSH) terms related to the components within each of the 6 domains and terms such as *cost*, *waste*, and *savings*. Conceivable search strategies tended to be nonspecific and yielded large numbers of articles. Thus, various limits were sequentially applied as needed to keep search yields manageable and to balance sensitivity against specificity; limits included restriction of terms to title and abstract and/or restriction to systematic reviews, meta-analyses, and reviews (article types). In addition, PubMed's Similar Articles feature was applied to the IOM report,[2] to the Berwick and Hackbarth article,[3] to sources cited by those 2 publications, and to each article that met initial selection criteria. The Similar Articles feature uses a defined algorithm based on number of words in common with the source article.[16]

National Organization Database Search

This strategy involved searching for reports or articles from the following organizations, which were identified by the authors as valuable resources: Agency for Healthcare Research and Quality, Centers for Medicare and Medicaid Innovation, Centers for Medicare & Medicaid Services (CMS) Office of the Actuary, National Quality Foundation, National Academy of Sciences, Commonwealth Fund, RAND Corporation, Urban Institute, PriceWaterhouseCoopers Health Research Institute, and the *Health Affairs Blog*. The approaches used for these various websites differed based on the structure and organization of the site (listed in eTable 1 in the Supplement).

Study Screening and Data Extraction

Two authors and 3 acknowledged contributors participated in single-reviewer screening of articles/reports according to the inclusion and exclusion criteria. (T.L.R., N.P., Julie Hutchinson, and Elizabeth C.S. Swart met weekly to discuss article and report selection and resolve areas of uncertainty and disagreement.) Articles and reports were categorized according to the 6 domains and whether they assessed cost of waste, savings from interventions that address waste, or both.

The following data were extracted from each of the selected articles or reports by 1 author or contributor (T.L.R., N.P., and Elizabeth C.S. Swart): review source (ie, PubMed or organization name), title, journal, and year of publication; waste domain addressed (from the list of 6 domains); relevant domain component; description of source of waste or intervention targeting waste; population studied; estimated costs, savings or both; year of cost data; and notable caveats or details. When available, the calculated return on investment, in addition to cost savings, was captured from articles and reports describing interventions to reduce waste. The complete list of potentially useful articles and reports was then reviewed and selections were excluded if the results were redundant (less generalizable studies were eliminated) or if updated estimates using the same methods were available. For instance, the Department of Justice provided annual cost estimates for fraud and abuse from 2012 to 2018, but only the most recent estimates were included. (T.L.R., N.P., Elizabeth C.S. Swart, and Julie Hutchinson) met weekly to resolve areas of uncertainty and disagreement in data extraction.)

Cost Calculations and Data Categorization

After data extraction, 1 author (N.P.) translated costs and savings from included studies into national costs and savings. Although some studies reported national estimates for respective cost components, others required the study team to translate costs for the cohort of patients studied into national estimates by multiplying per-member costs or savings by an estimate for the current corresponding national population. For example, if a study focused on costs of overtreatment or low-value care among 50 000 Medicare enrollees in 2016, the per-enrollee cost was calculated, multiplied by 2018 Medicare enrollment (most recent enrollment figures available), and then converted the total to 2019 dollars. Many studies focused only on Medicare populations. Because this population is not representative of the entire US population, costs from Medicare-based studies were translated to national estimates using Medicare enrollment counts rather than total US population counts; thus, these sources yield conservative estimates of total waste. Once national estimates for costs and savings for the most relevant articles and

Table 2. Cost Estimates by Waste Domain

Domain	Costs, $US Billion	
	Annual Estimates	Total Range
Failure of Care Delivery		
Hospital-acquired conditions and adverse events[18-21]	5.7-46.6	**102.4-165.7**
Clinician-related inefficiency (variability in care, inefficient use of high-cost physicians)[26,27]	8.0	
Lack of adoption of preventive care practices (obesity, vaccines, diabetes, hypertension)[22-25]	88.6-111.1	
Failure of Care Coordination		
Unnecessary admissions and avoidable complications[18,28]	5.9-56.3	**27.2-78.2**
Readmissions[29,30]	21.25-21.93	
Overtreatment or Low-Value Care		
Low-value medication use[12,31-34]	14.4-29.1	**75.7-101.2**
Low-value screening, testing, or procedures[14,35,36]	17.2-27.9	
Overuse of end-of-life care[37]	44.1	
Pricing Failure		
Medication pricing failure[8]	169.7	**230.7-240.5**
Payer-based health services pricing failure[38,39]	31.4-41.2	
Laboratory and ambulatory pricing[40]	29.7	
Fraud and Abuse		
Fraud and abuse in Medicare[41-43]	58.5-83.9	**58.5-83.9**
Administrative Complexity		
Billing and coding waste[44]	248	**265.6**
Physician time spent reporting on quality measures[10]	17.6	
Total		**760-935**

reports were determined, costs and savings were converted to 2019 dollars using the Bureau of Labor Statistics Medical Services consumer price index.[17]

After conversion of national costs and savings from each study to 2019 dollars, the articles and reports within each domain were grouped according to the predefined cost and savings components of that domain. For example, within the "overtreatment or low-value care" domain, selected cost estimates could be grouped as follows: medications; screening, testing, and procedures; and end-of-life care. When multiple selected articles and reports provided estimates for the same component, a range was reported for that component. All component estimates were summed to yield total costs and ranges and total potential savings and ranges for each waste domain. When valid cost estimates were not available for a specific component, published estimates of savings from a proposed system-wide change in the health care system were counted in the calculations for both costs and savings, the rationale being that projected savings from such a change would represent the amount of current wasteful spending. To ensure accuracy and consistency, after completing calculations for each waste domain, 2 team members (T.L.R. or Rituparna Battacharya) who had not performed the cost calculations reviewed all cost data extraction from original sources, conversions, and calculations.

Results

The review yielded 71 estimates from 54 unique peer-reviewed publications, government-based reports, and reports from the "gray" literature (eTables 2-7 in the Supplement). The number of cost-plus-savings estimates identified for each of the 6 domains was as follows: failure of care delivery (21), failure of care coordination (11), overtreatment or low-value care (18), pricing failure (9), fraud and abuse (10), and administrative complexity (2).

Failure of Care Delivery

For the "failure of care delivery" domain, 10 articles[18-27] addressed costs of waste (**Table 2**) and 11 articles[24,25,45-53] addressed potential savings from interventions (**Table 3**) (2 articles were used for both costs and savings). Cost studies were classified into 3 subcategories: hospital-acquired conditions and adverse events, clinician-related inefficiencies, and lack of adoption of preventive care practices. (The identified examples of clinician-related inefficiencies included unnecessary costs resulting from variation in specialty payments despite the existence of clinical guidelines or in spite of a lack of association between higher intensity practices and outcomes.) The estimated annual cost of waste from these 3 components ranged from $102.4 billion to $165.7 billion. Articles that assessed savings from interventions that address this domain were categorized into the following 6 categories: initiatives targeting the reduction of adverse hospital events and hospital-acquired infections; programs to increase physician efficiency, bundled payment models to reduce unnecessary variability in care, and prevention initiatives; integrated physical and behavioral health programs; Partnership for Patients initiative, a CMS-funded activity that engaged a large proportion of the nation's hospitals and encouraged a wide array of improvement activities; standardized pathways in bundled payment models; and prevention initiatives to address diabetes, obesity, smoking, and cancer. The estimated potential annual savings ranged from $44.4 billion to $97.3 billion for these interventions,

Table 3. Estimates of Savings From Interventions That Address Waste

Domain	Savings, $US Billion	
	Estimates	Total Range
Failure of Care Delivery		
Interventions to address adverse hospital events and hospital-acquired infections[45-47,49]	5.4-9.4	44.4-97.3
Incentives to increase physician efficiency[48]	47.5 million	
Integration of behavioral and physical health[50]	31.5-58.1	
Partnership for patients campaign[53]	3.4	
Standardized pathways in bundled payment models[51,52]	97.9-555.5 million	
Prevention initiatives to address diabetes, obesity, smoking, and cancer[24,25]	4.0-25.8	
Failure of Care Coordination		
Emergency department–based strategies[49,54]	3.8-7.4	29.6-38.2
Care coordination in accountable care organizations[55,56]	8.3-13.1	
Health Information Exchanges[57]	205-410 million	
Transitional care programs[58]	9.2	
Effective care management for medically complex patients[59]	8.0	
Overtreatment/Low-Value Care		
Optimizing medication use[33,34]	8.8-21.9	12.8-28.6
Prior authorization procedures[60]	250 million	
Pioneer accountable care organizations strategies to reduce overuse[13]	199.7 million	
Shared decision-making tactics to reduce unnecessary procedures[61]	3.2	
Expanding hospice access[62]	395 million-3.0 billion	
Pricing Failure		
Drug pricing interventions[63,64]	20.3	81.4-91.2
Insurer-based pricing interventions[38,39]	31.4-41.2	
Laboratory and office visit pricing transparency[40]	29.7	
Fraud and Abuse		
Recovery from convictions and fraud settlements[42,43,65]	2.1- 5.1	22.8-30.8
Legislative, administrative, and integrity strategies[65,66]	20.6-25.6	
Administrative Complexity		
Not applicable		
Total		191-286

based on extrapolating the most generalizable results to the entire US population.

Failure of Care Coordination

The 4 studies[18,28-30] that assessed costs from failure of care coordination were classified into 2 subcategories (Table 2): unnecessary admissions or avoidable complications and readmissions. The estimated annual cost of waste from these 2 components ranged from $27.2 billion to $78.2 billion. The 7 studies[49,54-59] that focused on intervention savings were classified into 5 categories (Table 3): emergency department–based strategies (includes video consultations and shift to primary care and retail clinics), care coordination within accountable care organizations (ACOs), health information exchanges, transitional care programs (focused on hospital-to-home transitions), and effective care management for medically complex patients. The estimated total savings from these care coordination interventions ranged from $29.6 billion to $38.2 billion.

Overtreatment or Low-Value Care

The 9 articles (11 estimates)[12,14,31-35,37,67] that addressed costs of waste from overtreatment or low-value care were classified into the following categories (Table 2): low-value medication use (branded vs generics or biosimilars and antibiotic resistance costs); low-value screening, testing, procedures; and overuse of end-of-life care. The estimated total cost of waste from overtreatment or low-value care ranged from $75.7 billion to $101.2 billion. The 6 articles (7 estimates)[13,33,34,60-62] on savings from interventions that address overtreatment or low-value care were divided into the following categories (Table 3): optimizing medication use, prior authorization, ACO interventions that address overtreatment or low-value care, use of shared decision-making to reduce unnecessary procedures, and savings from expanding hospice access (2 articles were used both for costs and for savings). The estimated amount that could be saved annually if these successful interventions could be scaled nationally ranged from $12.8 billion to $28.6 billion.

Pricing Failure

The 4 articles[8,38-40] that assessed costs of pricing failure were classified into the following categories (Table 2): medication pricing; payer-based health services pricing; and laboratory-based and ambulatory pricing. The estimated cost of waste from pricing failure ranged from $230.7 billion to $240.5 billion. The 5 articles[38-40,63,64] that assessed savings from interventions that address pricing

failure (3 articles were used both for costs and for savings) were categorized as drug pricing interventions, payer-focused interventions (including all-payer models), and pricing transparency strategies for laboratory orders and office visits (Table 3). The estimated total savings from interventions that address pricing failure ranged from $81.4 billion to $91.2 billion.

Fraud and Abuse

The 3 articles[41-43] that addressed costs of waste from fraud and abuse (Table 2) focused on the Medicare population, and total estimated costs ranged from $58.5 billion to $83.9 billion. Four additional articles[42,43,65,66] (5 estimates; 2 articles were used both for costs and for savings) that assessed savings from government-based (Department of Justice, Office of the Inspector General, and CMS) interventions (Table 3) were categorized into those that addressed recovery from convictions and fraud settlements and those that focused on legislative, administrative, and integrity strategies. The estimated annual savings from these interventions ranged from $22.8 billion to $30.8 billion.

Administrative Complexity

Two articles[10,44] addressed cost of waste from administrative complexity (Table 2), and no articles were identified that addressed savings from interventions. The estimated total annual cost of waste in this category was $265.6 billion.

Discussion

This review of the current literature of the cost of waste in the US health care system and evidence about projected savings from interventions that reduce waste suggests that the estimated total costs of waste and potential savings from interventions that address waste are as high as $760 billion to $935 billion and $191 billion to $286 billion, respectively. These estimates represent approximately 25% of total health care expenditures in the United States, which have been projected to be $3.82 trillion for 2019.[68] These estimates are lower than the estimates provided by the IOM report (31%)[2] and by Berwick and Hackbarth[3](34%, using authors' mid-range cost estimate), although those estimates included savings from administrative costs. However, the best available evidence about the cost savings of interventions targeting waste, when scaled nationally, account for only approximately 25% of total wasteful spending. These findings highlight the challenges inherent in rapidly changing the course of a health system that accounts for more than $3.8 trillion in annual spending, 17.8% of the nation's GDP.[68]

The administrative complexity category was associated with the greatest contribution to waste, yet there were no generalizable studies that had targeted administrative complexity as a source for waste reduction. Some of that complexity results from fragmentation in the health care system. Recent proposals by CMS and the Office of the National Coordinator of Health Information Technology to foster data interoperability and government initiatives such as Blue Button 2.0 will hopefully alleviate some burden as information flows more freely and billing and authorization processes become more automated. The greater opportunity to reduce waste in this category should result from enhanced payer collaboration with health systems and clinicians in the form of value-based payment models. In value-based models, in particular those in which clinicians take on financial risk for the total cost of care of the populations they serve, many of the administrative tools used by payers to reduce waste (such as prior authorization) can be discontinued or delegated to the clinicians, reducing complexity for clinicians and aligning incentives for them to reduce waste and improve value in their clinical decision-making. As more clinicians transition into value-based payment arrangements with financial risk, administrative burden and oversight could be reduced for all health care constituencies, including payers, hospitals, and physician practices; adoption of global prepayment mechanisms for patients and populations rather than fee-for-service payments would be expected to accelerate reductions in administrative complexity. Moreover, there is a need for better methods of assessing strategies to reduce administrative complexity while maintaining quality and without increasing spending. Presumably, all health systems, clinician practices, and payers have efforts underway to simplify processes and explore digital solutions to reduce administrative complexity. The science describing the success of these interventions is limited and more evidence is needed to quantify the waste in this category that could be reduced and the resulting savings.

The category that represents the second largest contributor to waste in the United States is pricing failure. In many ways, the evolution to value-based care would be expected to produce the least savings in this category since pharmaceutical pricing represents a major component of this waste domain and would not be affected by new approaches to care delivery and reimbursement. New high-cost specialty drugs, which will soon exceed 50% of pharmaceutical spending, are raising new questions about how to maintain affordability.[69] Over the next decade, CMS projects that prescription drug spending will be the fastest-growing cause of rising health care expenditures.[68] This topic has thus received considerable attention from policy makers, and numerous proposals are currently under consideration. These proposals advocate enhanced market competition, reimportation of drugs from less expensive nations, leveraging pricing negotiated by other nations, and greater transparency of pricing and return of rebates to patients at point of sale. Some efforts are under way to address the price of care delivery. Numerous policies are under consideration to improve cost transparency for hospital services and to eliminate out-of-network surprise billing, which can lead to substantial pricing increases for those affected. Importantly, these pricing-related sources of waste have arisen in the existing competitive US health care marketplace, and likely result, at least in part, from the complex regulatory framework that governs the health care system. Policy interventions are needed to drive meaningful reductions in waste in this domain. Additionally, in the dynamic health care marketplace, where profit-motivated firms will respond to any new policy with strategies to protect their margins, no single policy is likely to suffice; a coordinated policy effort is likely needed to create long-standing change that will meaningfully reduce waste resulting from pricing failure.

In the failure of care delivery, failure of care coordination, and overtreatment or low-value care categories, the data from this review suggest that more than $200 billion in waste remains in the US health care system. There is compelling empirical evidence in all 3 categories that interventions can produce meaningful savings and may reduce waste by as much as half. Many of these interventions have arisen in settings where payers are collaborating with clinicians

and health systems, either to align payment models with value or to support delivery reform to enhance care coordination, safety, and value. Some experts have noted that the move to value-based care arrangements has produced less savings than had been anticipated and that care transformation has been slower than they had hoped for. However, in the setting of broader adoption of value-based care, there is growing evidence to suggest that some interventions are improving care and reducing downstream costs. While it is not realistic to expect to eliminate all waste in these categories, the evidence base to guide future interventions is growing. As value-based care continues to evolve, there is reason to believe such interventions can be coordinated and scaled to produce better care at lower cost for all US residents.

It is notable that, as there is greater adoption of value-based care models in the United States, there is increasing interdependency between these waste categories. Administrative complexity is the greatest source of waste in the United States today and can be a result of payers' efforts to reduce waste by reducing overtreatment and low-value care. In value-based arrangements, improvements could be expected to reduce waste in both categories. Similarly, payer-health system collaboration to improve care coordination and transitions in care could be expected to improve safety and reduce failures in care delivery. Additionally, greater alignment between payers and clinicians should assist in efforts to reduce fraud and abuse, while simultaneously reducing low-value care.

Limitations

This analysis has several limitations. First, a broad review like this is meant to be more directional than precise. Considering that the data sources applied to a variety of populations (defined by type of insurance, clinical factors, or both), the ability to carefully assess and sum waste across all populations was incomplete in all categories reported. Similarly, included studies may not represent all cost and savings components pertinent to each waste domain. Furthermore, reductions in total cost of care that result from investments in improving chronic disease have been challenging to demonstrate. Because few sources took the cost of interventions into account when calculating savings, it was not possible to report estimates of the return on investment (ROI), ie, the actual cost-savings that can be expected. More realistic estimates of the potential for reducing wasteful spending would be possible if more ROI data were available. The findings of this review are presented as broad ranges to offer reasonable bounds for estimated waste and potential cost savings.

Second, much of the research on waste and improvement has been conducted in Medicare populations. While estimates from cohorts of Medicare enrollees were translated to the broader national Medicare population, data derived from analyses of waste and waste reduction interventions in traditional Medicare or Medicare Advantage may not have been fully generalizable to the entire Medicare population. Importantly, there was no attempt in these analyses to generalize Medicare costs or savings to other insurance populations, rendering the findings conservative.

Third, when national samples were not available, studies involving multiple sites were used to make national estimates. Data derived from these studies may not be generalizable to the US population. Fourth, the estimates for waste do not include wasteful spending for pediatric health care, a domain with limited systematic research. Fifth, wide ranges were derived from the results of studies reviewed; variability could result from differences in populations studied, modeling approaches, and even publication bias. This variation might lead to inflated estimates of waste or savings. Sixth, interventions to improve advanced illness and end-of-life care have demonstrated mixed results in reducing total costs, despite improving quality of care, and estimates are necessarily imprecise.

Conclusions

In this review based on 6 previously identified domains of health care waste, the estimated cost of waste in the US health care system ranged from $760 billion to $935 billion, accounting for approximately 25% of total health care spending, and the projected potential savings from interventions that reduce waste, excluding savings from administrative complexity, ranged from $191 billion to $286 billion, representing a potential 25% reduction in the total cost of waste. Implementation of effective measures to eliminate waste represents an opportunity to reduce the continued increases in US health care expenditures.

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Concept and design: Shrank, Parekh.
Acquisition, analysis, or interpretation of data: Rogstad, Parekh.
Drafting of the manuscript: Shrank, Parekh.
Critical revision of the manuscript for important intellectual content: Rogstad, Parekh.
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