“Trillion Dollar Checkbook”
Reduce Waste and Cost in the US Health Care System

IHI Leadership Alliance
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Acknowledgments:
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Executive Summary

The IHI Leadership Alliance is a dynamic collaboration of US health care executives who share a goal to deliver on the full promise of the IHI Triple Aim: better care for individuals, better health for populations, and lower per capita health care costs. Alliance members believe that eliminating “waste” in health care — defined as resources expended in money, time, and/or personnel that do not add value for the patient, family, or community — is essential to providing care at an affordable cost. In some cases, this non-value-added waste can even harm patients, adding further cost.

This “Trillion Dollar Checkbook” compendium, developed by the Alliance, offers an in-depth analysis of significant and in many cases complex opportunities to reduce waste and cost in the United States health care system. The premise of the Checkbook is that successful waste reduction in the US health care system would, in effect, enable writing a “check” back to the American people or repurposing those savings to support essential patient-care services or meet community needs.

In the Checkbook, each of the specific improvement ideas for reducing waste includes:

- A summary of the literature scan;
- National estimates of total waste and potential savings across the US;
- Suggested resources to help organizations begin work in each area; and
- Calculations that describe how the estimated cost savings are derived, inflated to 2018 impact.

This Checkbook compendium provides additional detail to the accompanying IHI Leadership Alliance Call to Action.¹

A Framework for Reducing Waste

The IHI Leadership Alliance Waste Workgroup began its analysis of opportunities for waste reduction in health care, described in this “Trillion Dollar Checkbook,” by first developing a driver diagram. The diagram articulates an audacious aim — “**Systematically and proactively identify and eliminate 50 percent of non-value-added waste in the US health care system by 2025**” — along with seven primary drivers (noted as P1 through P7) that will lead to attaining this aim, and secondary drivers or tactics for each primary driver (see Figure 1). Together, the driver diagram and the Checkbook create a broad strategic framework for removing non-value-added waste in health care.

**Figure 1. Driver Diagram for Reducing Waste and Cost in the US Health Care System**

The primary and secondary drivers, as well as the specific improvement ideas described in this compendium, were sourced by Alliance members — derived from their own experience within their health systems — at several in-person meetings and during virtual roundtable sessions. Based on these definitions, members of the Leadership Alliance and the IHI Innovation team conducted targeted literature scans using Google Scholar on each specific improvement idea for waste reduction. Primary driver “P7: Engage Leadership to Provide Ongoing Sponsorship” is an essential component of the other six drivers; leadership commitment is needed to provide the resources and strategic prioritization to the overall waste reduction work.

The Checkbook organizes the specific improvement ideas to reduce waste by the six primary drivers (P1 through P6). Where possible, national estimates of total waste and potential savings are included. Otherwise, results from studies of one or several health systems were extrapolated nationally using hospital beds, number of cases, population, etc. The definition of “savings” for each improvement idea may vary, although most estimates are based on analyses of claims data, cost-accounting data, or adjusted claims data using cost-to-charge ratios. Costs were then adjusted to 2018 using an online inflation calculator.

In the Checkbook, each specific improvement idea for the six primary drivers includes:

- A summary of the literature scan;
- Key Literature Sources to Support Checkbook Estimates: National estimates of total waste and potential savings across the US;
- Getting Started: Suggested resources to help organizations begin work in each area; and
- Checkbook Calculations: Describe how the estimated cost savings are derived.

The Checkbook is a “living document” that needs to be refined over time as learning occurs, and as additional opportunities to reduce waste are identified and further quantified. In its current iteration, the Checkbook is focused on waste in the US health care system. However, members of the IHI Health Improvement Alliance Europe note that much of the same non-value-added waste also exists in other countries’ health systems, presenting an opportunity to collaborate and share solutions more globally.

*Note: The IHI Leadership Alliance Waste Workgroup understands that the potential cost savings cited herein constitute gross estimates and we strived to be conservative. These estimates are intended to be directionally informative in helping institutions prioritize their efforts based on the magnitude of potential savings and the varying complexity surrounding each of the forms of waste. In addition, we realize that there are other forms of waste that certainly could be added to the Checkbook, and we welcome further conversation on items for consideration.

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3 The Inflation Calculator. Morgan Friedman. [https://westegg.com/inflation/#]
P1: Reduce Harm and Safety Events

P1: Infections

A 2013 meta-analysis on the cost and financial impact of hospital-acquired infections (HAIs) identified five major HAIs — surgical site infection (SSI), central line-associated bloodstream infection (CLABSI), catheter-associated urinary tract infection (CAUTI), ventilator-associated pneumonia (VAP), and Clostridium difficile infection (CDI) — as the most common, costly, preventable, and well-tracked infections among hospitalized patients.4

Key Literature Sources to Support Checkbook Estimates

- A literature review on the most frequent HAIs found that between 50 and 70 percent5,6,7 of these infections were preventable with current evidence-based practices.
- Reducing these HAIs by the percentages described in the Checkbook Calculations table below would save approximately $6.2 billion in direct acute care medical costs to US hospitals in 2018 dollars over a one-year period.8

Getting Started


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8 Most studies included in the literature review reported attributable cost per case. For those that reported charges, cost-to-charge ratio of 0.5 was used. A total of 26 articles were in the review. Authors averaged the point estimates of each study (weighted by sample size) to arrive at per case cost of each HAI.
Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>SSI</td>
<td>158,639</td>
<td>$20,786</td>
<td>$3b</td>
<td>$3.6b</td>
<td>55%</td>
<td>$1.8b</td>
<td>$2b</td>
</tr>
<tr>
<td>CLABSI</td>
<td>40,411</td>
<td>$45,814</td>
<td>$1.2b</td>
<td>$2.6b</td>
<td>65%</td>
<td>$1.2b</td>
<td>$1.4b</td>
</tr>
<tr>
<td>CAUTI</td>
<td>77,079</td>
<td>$896</td>
<td>$18.8m</td>
<td>$37m</td>
<td>70%</td>
<td>$19.5m</td>
<td>$21.9m</td>
</tr>
<tr>
<td>VAP</td>
<td>31,130</td>
<td>$40,144</td>
<td>$2.8b</td>
<td>$3.4b</td>
<td>55%</td>
<td>$1.7b</td>
<td>$1.9b</td>
</tr>
<tr>
<td>CDI</td>
<td>133,657</td>
<td>$11,285</td>
<td>$1.2b</td>
<td>$1.8b</td>
<td>50%</td>
<td>$754m</td>
<td>$850m</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>$5.5b</strong></td>
<td><strong>$6.2b</strong></td>
</tr>
</tbody>
</table>
P1: Sepsis

In the US, sepsis occurs in more than 750,000 patients every year and is responsible for more than 210,000 deaths.\(^9\)

**Key Literature Sources to Support Checkbook Estimates**

- The AHRQ funded Healthcare Cost and Utilization Project (HCUP) reported sepsis to be the most expensive condition treated in US hospitals across all payers, totaling $23.6 billion in aggregate hospital costs across 1.3 million hospital stays in 2013.\(^10\)
- One 2010 study analyzed the Nationwide Inpatient Sample database to investigate healthcare-associated sepsis and found the attributable hospital cost per case to be $32,900 for surgical and $5,800 for non-surgical patients.\(^11\),\(^12\) Assuming 30 percent\(^13\) of cases are surgical, we can estimate a blended cost per case of $13,930.
- Applying this rate and a 20 to 25 percent reduction\(^14\) in cost per case to the 2013 hospital stay count yields estimated savings to acute care facilities of $4.6 billion to $5.7 billion in 2018 US dollars over a one-year period.

**Getting Started**

- Hour-1 Bundle. Surviving Sepsis Campaign. [http://www.survivingsepsis.org/Bundles/Pages/default.aspx](http://www.survivingsepsis.org/Bundles/Pages/default.aspx)

**Checkbook Calculations (in 2018 US dollars: m = million; b = billion)**

<table>
<thead>
<tr>
<th>Total Number of Sepsis Hospitalizations</th>
<th>Cost per Case (2006)</th>
<th>Total Cost Burden</th>
<th>Estimated Cost Savings Assuming 20% Reduced Cost per Case (2018 Inflation Adjustment)</th>
<th>Estimated Cost Savings Assuming 25% Reduced Cost per Case (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,297,000</td>
<td>$13,930</td>
<td>$18.1b</td>
<td>$4.6b</td>
<td>$5.7b</td>
</tr>
</tbody>
</table>

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\(^12\) Used National Inpatient Sample database to identify hospital-acquired sepsis cases among 59 million discharges from US hospitals in 40 states between 2001 and 2006. Sepsis identified in 494k cases. Hospital-specific cost-to-charge ratios used. Attributable hospital costs estimated using multivariate matching and regression analysis. Analyzed surgical and non-surgical patients separately.


\(^14\) Based on experience at MemorialCare Health System in reducing sepsis cost per case.
P1: Medication Safety

Medication reconciliation is the process of creating and validating an accurate list of medications to ensure the provision of correct medication use across the continuum of care. A systematic review of the literature on medication reconciliation during transitions of care found that the median proportion of patients with at least one clinically significant medication discrepancy to be 45 percent.\(^{15}\)

**Key Literature Sources to Support Checkbook Estimates**

- One academic medical center evaluated the results of a pharmacy-facilitated discharge counseling and medication reconciliation program and realized a 27 percent reduction in all-cause readmissions rate following implementation.\(^{16}\)
- **Applying these results to the national readmission rate of 13.9 percent and an average cost of readmission between $10,100 and $14,200 per HCUP,\(^{17,18}\)** we can estimate savings between $14.7 billion and $20.7 billion in 2018 US dollars to inpatient providers over a one-year period.

**Getting Started**

- *Medication Reconciliation Review.* IHI. [http://www.ihi.org/resources/Pages/Tools/MedicationReconciliationReview.aspx](http://www.ihi.org/resources/Pages/Tools/MedicationReconciliationReview.aspx)
- *Medication Reconciliation Tracking Tool.* IHI. [http://www.ihi.org/resources/Pages/Tools/ReconciliationTrackingTool.aspx](http://www.ihi.org/resources/Pages/Tools/ReconciliationTrackingTool.aspx)

**Checkbook Calculations (in 2018 US dollars: m = million; b = billion)**

<table>
<thead>
<tr>
<th>2013 Readmission Rate</th>
<th>Total Number of Readmissions</th>
<th>Total Number of Readmissions Avoided Assuming 27% Reduction</th>
<th>Lower Bound Cost per Readmission (2013)</th>
<th>Upper Bound Cost per Readmission (2013)</th>
<th>Lower Bound Total Cost Savings (2018 Inflation Adjustment)</th>
<th>Upper Bound Total Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.139</td>
<td>4,887,092</td>
<td>1,319,515</td>
<td>$10,100</td>
<td>$14,200</td>
<td>$14.7b</td>
<td>$20.7b</td>
</tr>
</tbody>
</table>


\(^{18}\) Total hospital charges were converted to costs using HCUP Cost-to-Charge Ratios based on hospital accounting reports from the Centers for Medicare & Medicaid Services (CMS). Costs reflect the actual expenses incurred in the production of hospital services, such as wages, supplies, and utility costs; charges represent the amount a hospital billed for the case.
P1: Opioid Use

One study estimated the total burden of opioid abuse on the US health care system — accounting for costs related to research, prevention, and absenteeism — at $25 billion in 2007.\textsuperscript{19}

Key Literature Sources to Support Checkbook Estimates

- Estimated direct medical costs of opioid drug overdoses are based on applying the average cost per overdose of $4,006\textsuperscript{20} to the estimated 1.3 million opioid poisoning events (inpatient admissions and ED visits) per HCUP.\textsuperscript{22} Between 2006 and 2013 the Oregon Health Authority (OHA) saw a 22 percent decrease in morphine milligram equivalents (MME) per person after the implementation of a prescription monitoring program. During this same period OHA also experienced a 38 percent reduction in opioid poisoning events.\textsuperscript{22} Assuming a 38 percent reduction to the 1.3 million annual poisoning events and applying the $4,006 cost per case, potential savings are estimated at $2.3 billion in direct medical, ambulatory, and naloxone costs in 2018 dollars over a one-year period.

- In addition to opioid poisoning events, chronic opioid therapy also contributes to excess costs to the health care system. One study analyzed all-cause medical costs in chronic opioid users between one year prior to initial opioid prescription and one year following initial prescription, finding increased costs of $15,935 per patient.\textsuperscript{23} Current prevalence studies estimate roughly 8 million Americans take opioids for chronic pain management.\textsuperscript{24} Another study evaluating adult opioid prescribing in Massachusetts found that between 6 percent and 11 percent of adults prescribed opioids received at least one potentially inappropriate prescription. Assuming between 6 percent and 11 percent of the 8 million chronic opioid users could have been avoided or received an alternative treatment, estimated savings are between $8.8 billion and $16.1 billion in 2018 US dollars over a one-year period.

Getting Started

- Accelerating Opioid Safety Ambulatory Care Toolkit. California Health Care Foundation. \url{http://www.calquality.org/storage/documents/Toolkits/AcceleratingOpioidSafety_Ambulatory_Care_Toolkit.pdf}
- Opioid Safe Hospital Designation. Cal Hospital Compare. \url{http://calhospitalcompare.org/about/opioid-safe-hospital-designation-program/}

Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
<th>Total Number of Opioid Poisoning Events</th>
<th>Cost per Poisoning Event (2011)</th>
<th>Total Number of Opioid Poisoning Events Avoided Assuming 38% Reduction</th>
<th>Total Cost Savings (2011)</th>
<th>Total Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,299,831</td>
<td>$4,006</td>
<td>493,900</td>
<td>$2b</td>
<td>$2.3b</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Number of Chronic Opioid Users</th>
<th>Lower Bound Number of Chronic Opioid Users Receiving Inappropriate Prescriptions</th>
<th>Upper Bound Number of Chronic Opioid Users Receiving Inappropriate Prescriptions</th>
<th>Added All-Cause Medical Cost per Chronic Opioid User (2011)</th>
<th>Lower Bound Potential Cost Savings (2018 Inflation Adjustment)</th>
<th>Upper Bound Potential Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8,000,000</td>
<td>480,000</td>
<td>880,000</td>
<td>$15,935</td>
<td>$8.8b</td>
<td>$16.1b</td>
</tr>
</tbody>
</table>
P1: Overdiagnosis

In addition to wasting resources, overdiagnosis can cause a wide range of physical and psychological patient harm, from minor to fatal.

Key Literature Sources to Support Checkbook Estimates

- *C. difficile* infection, breast cancer screening, hypertension, pre-diabetes, and asthma were all highlighted by *The BMJ* as conditions or tests that are commonly overused or overdiagnosed. Reducing the rates of diagnosis/usage of all six conditions/tests by 25 percent would yield total estimated savings of $33.7 billion over a one-year period.

Getting Started

- Improving Value: Putting a Strategic Focus on Overdiagnosis. Memorial Care. [http://app.ihi.org/FacultyDocuments/Events/Event-3135/Presentation-17764/Document-14234/Presentation_C21_Improving_Value.pdf](http://app.ihi.org/FacultyDocuments/Events/Event-3135/Presentation-17764/Document-14234/Presentation_C21_Improving_Value.pdf)

Number needed to treat (NNT) for benefit and harm of many common conditions are commonly overused or overdiagnosed.

Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

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<tbody>
<tr>
<td>Breast Cancer Screenings</td>
<td>$345&lt;sup&gt;26&lt;/sup&gt;</td>
<td>22,600,000&lt;sup&gt;27&lt;/sup&gt;</td>
<td>25%</td>
<td>$2b</td>
</tr>
<tr>
<td>Hypertension</td>
<td>$410&lt;sup&gt;28&lt;/sup&gt;</td>
<td>77,900,000&lt;sup&gt;29&lt;/sup&gt;</td>
<td>25%</td>
<td>$8b</td>
</tr>
<tr>
<td>Pre-Diabetes</td>
<td>$511&lt;sup&gt;30&lt;/sup&gt;</td>
<td>86,000,000&lt;sup&gt;31&lt;/sup&gt;</td>
<td>25%</td>
<td>$11b</td>
</tr>
<tr>
<td>Asthma</td>
<td>$4,166&lt;sup&gt;31&lt;/sup&gt;</td>
<td>12,000,000&lt;sup&gt;32&lt;/sup&gt;</td>
<td>25%</td>
<td>$12.5b</td>
</tr>
<tr>
<td>C. difficile Infection</td>
<td>$2,376&lt;sup&gt;33,34&lt;/sup&gt;</td>
<td>453,000&lt;sup&gt;35&lt;/sup&gt;</td>
<td>25%</td>
<td>$269m</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>$33.7b</td>
</tr>
</tbody>
</table>

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<sup>26</sup> Too much medicine. *The BMJ*. [https://www.bmj.com/too-much-medicine](https://www.bmj.com/too-much-medicine)


<sup>32</sup> Cost of Asthma on Society. Asthma and Allergy Foundation of America. [https://www.aafa.org/cost-of-asthma-on-society/](https://www.aafa.org/cost-of-asthma-on-society/)

<sup>33</sup> Vital Signs: Asthma in the US. Centers for Disease Control and Prevention. [https://www.cdc.gov/vitalsigns/asthma/index.html](https://www.cdc.gov/vitalsigns/asthma/index.html)


P1: Staff Injuries

On average, US hospitals report 6.8 workplace injuries/illnesses per 100 full-time employees, nearly double the national average.\(^{36}\) Interventions like the use of patient lifts have demonstrated reduction in musculoskeletal injuries among nursing staff, with some hospitals reporting injury rate reductions of as much as 40 percent.\(^{37,38,39}\)

Key Literature Sources to Support Checkbook Estimates

- A report by UL Environmental Health & Safety (EHS) estimates that health care workplace injuries cost hospitals $6.2 billion and estimates hospital costs (in lost work time) of $73,000 per employee with an injury.\(^{40}\)
- Per the Occupational Safety and Health Administration (OSHA), nearly 59,000 health care workers had an injury causing at least 2 days of lost work in 2011.\(^{41}\)
- Assuming 30 percent reduction in workplace injuries and using the EHS and OSHA estimates, hospitals could save approximately $1.4 billion in 2018 US dollars over a one-year period.

Getting Started


Checkbook Calculations (in 2018 US dollars: \(m = \text{million}; b = \text{billion}\))

<table>
<thead>
<tr>
<th>Cost per Employee with Lost Work Days (2013)</th>
<th>Total Number of Employees with 2 Lost Work Days</th>
<th>Number of Avoidable Injuries Assuming 30% Reduction</th>
<th>Estimated Cost Savings (2013)</th>
<th>Estimated Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$73,000</td>
<td>58,860</td>
<td>17,658</td>
<td>$1.3b</td>
<td>$1.4b</td>
</tr>
</tbody>
</table>

\(^{36}\) [Worker Safety in Your Hospital: Know the Facts](https://www.osha.gov/dsg/hospitals/documents/1.1_Data_highlights_508.pdf). Occupational Safety and Health Administration.


\(^{41}\) [Facts about Hospital Worker Safety](https://www.osha.gov/dsg/hospitals/documents/1.2_Factbook_508.pdf). Occupational Safety and Health Administration; September 2013.
P1: Hospital-Acquired Conditions

Falls, pressure ulcers, and venous thromboembolism (VTE) are among the most prevalent hospital-acquired conditions (HACs) in the US.

Key Literature Sources to Support Checkbook Estimates

- A meta-analysis of the additional costs attributable to these three HACs found an estimated cost per case of $14,506 to $18,537 for pressure ulcers, $6,694 to $7,888 for falls, and $8,723 to $17,367 for VTE. Additional costs are defined as the incremental costs to the hospital for the inpatient stay attributable with the HAC.
- A “Stop the Pressure” campaign implemented by NHS Midland and East in the United Kingdom saw a 50 percent reduction in the rate of pressure ulcers during the campaign’s first year. A seven-hospital collaborative sponsored by The Joint Commission Center for Transforming Healthcare demonstrated aggregate reductions of 62 percent in the falls with injury rate and 35 percent in total falls rate. Evidence-based strategies and risk assessments for VTE prevention by various collaboratives has demonstrated nearly 40 percent reduction in VTE rates.
- Estimates of HAC annual prevalence suggest that there are 670,767 patient admissions with at least one pressure ulcer, 547,596 adult VTE hospitalizations, and approximately 850,000 hospital falls per year. Using these cost and prevalence estimates and assuming a 30 percent reduction across all three conditions, estimated savings are between $6.4 billion and $9.1 billion in 2018 US dollars over one-year period.

Getting Started


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42 Stop the Pressure: NHS Improvement. [http://www.nhs.stopthepressure.co.uk/](http://www.nhs.stopthepressure.co.uk/)
Checkbook Calculations (in 2018 US dollars: \( m = \text{million}; b = \text{billion} \))

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</tr>
</thead>
<tbody>
<tr>
<td>Pressure Ulcers</td>
<td>$14,506</td>
<td>$18,537</td>
<td>670,767</td>
<td>30%</td>
<td>201,230</td>
<td>$3.1b</td>
<td>$4b</td>
</tr>
<tr>
<td>VTE</td>
<td>$8,723</td>
<td>$17,367</td>
<td>547,596</td>
<td>30%</td>
<td>164,278</td>
<td>$1.5</td>
<td>$3b</td>
</tr>
<tr>
<td>Falls</td>
<td>$6,694</td>
<td>$7,888</td>
<td>850,000</td>
<td>30%</td>
<td>255,000</td>
<td>$1.8b</td>
<td>$2.1b</td>
</tr>
<tr>
<td>Total</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>$6.4b</td>
<td>$9.1b</td>
</tr>
</tbody>
</table>
P1: Maternal and Child Health

An obstetric adverse event (OBAE) is an adverse maternal or fetal outcome that occurs during labor and/or birth. OBAEs can include eclampsia, infection not present on admission, injury to other body part, and fetal or maternal death, among others.

As more than one third of births in the US are delivered through C-section, appropriate use of C-sections is an increasingly important patient safety and cost consideration. Nulliparous, term singleton, vertex (NTSV) C-sections are those performed on women with first-time, low-risk pregnancies and have been targeted by California as a source of variation in California hospitals.46

Key Literature Sources to Support Checkbook Estimates

- A meta-analysis of the additional costs attributable to OBAEs found an estimated cost per case of $602.47 Additional costs are defined as the incremental costs to the hospital for the inpatient stay attributable to the OBAE. The same report estimated a total of 27,372 OBAEs occurred in 2015. Assuming a 30 percent reduction in the incidence of OBAEs, we can estimate potential savings of $5.2 million in 2018 US dollars over a one-year period.
- A 2016 University of Minnesota study evaluated the association between improved safety practices and perinatal medical malpractice costs.48 The 13 included hospitals were taking part in a quality improvement Collaborative focusing on reducing perinatal harm between 2006 and 2009. One year following the safety interventions, OB claims paid per 10,000 deliveries decreased from 1.9 to 1.2, and average losses paid per OB claim decreased from $1.2 million to $175,000. Extrapolating these reductions nationally to the nearly 4 million deliveries yields estimated cost savings of approximately $1.1 billion in 2018 US dollars over a one-year period.
- A C-section adds between $2,861 and $7,000 in cost to a birth and carries higher risk of negative outcomes to both the mother and child.50 Nationally the percent of all deliveries by C-section is 31.9 percent.51 As of 2017 California’s rate is at 24.5 percent, and HealthyPeople 2020 set a target to reduce their C-section rate to 23.9 percent from their 2012 baseline of 27 percent. An initiative at Virginia Hospital Center successfully reduced their C-section rate from 33 percent to 20 percent using a combination of monthly C-section case reviews, daily safety huddles, and increased transparency efforts.52 Assuming a national rate of 25 percent, reducing NTSV C-section rates to 23.9 percent across all 1.3 million C-sections performed annually is estimated to save payers between $87.1 million and $222.2 million in 2018 US dollars over a one-year period.

### Getting Started

- Maternal Quality Improvement Toolkits. California Maternal Quality Care Collaborative. [https://www.cmqcc.org/resources-tool-kits/toolkits](https://www.cmqcc.org/resources-tool-kits/toolkits)

### Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
<th>Cost per OBAE (2015)</th>
<th>Total Number of OBAEs</th>
<th>Total Cost Impact</th>
<th>Assumed Percentage Reduction</th>
<th>Estimated Cost Savings (2018 Inflation Adjustment)</th>
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</thead>
<tbody>
<tr>
<td>$602</td>
<td>27,372</td>
<td>$16.5m</td>
<td>30%</td>
<td>$5.2m</td>
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</tbody>
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<td>1.2</td>
<td>$175k</td>
<td>$834.3m</td>
<td>$1.1b</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Number of C-Sections</th>
<th>Total Number of Avoidable C-Sections Assuming 2% Absolute Reduction (from 26% to 24%)</th>
<th>Lower Bound Added C-Section Cost (2009)</th>
<th>Upper Bound Added C-Section Cost (2009)</th>
<th>Lower Bound Estimated Cost Savings (2018 Inflation Adjustment)</th>
<th>Upper Bound Estimated Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,272,000</td>
<td>25,430</td>
<td>$2,860</td>
<td>$7,300</td>
<td>$87.1m</td>
<td>$222.2m</td>
</tr>
</tbody>
</table>
P1: Delirium

Delirium, a sudden onset of stress and confusion complicates hospital stays for 20 percent of the 11.8 million annual hospital stays among patients 65 years of age and older. A delirium episode in an elderly patient increases mortality, increases likelihood of discharging to nursing home care, and can linger for weeks or months.\(^3\)

Key Literature Sources to Support Checkbook Estimates

- One 2005 study estimated the total attributable cost for a patient that experienced delirium up to one-year post-discharge and found added costs between $16,000 and $64,000 per patient.\(^4\)
- Evidence from randomized control trials testing multi-component approaches have demonstrated delirium can be prevented in up to one third of high-risk patients.\(^5\)
- Assuming a 30 percent reduction in delirium stays, we can estimate savings between $14.8 billion and $59.1 billion in 2018 US dollars over a one-year period.

Getting Started

  https://healthy.kaiserpermanente.org/health-wellness/health-encyclopedia/he.delirium-pdq®-supportive-care-health-professional-information-nci.ncicdr0000062772#ncicdr0000062772-06

Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

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</thead>
<tbody>
<tr>
<td>$16,000</td>
<td>$64,000</td>
<td>2,360,000</td>
<td>30%</td>
<td>$14.8b</td>
<td>$59.1b</td>
</tr>
</tbody>
</table>


P2: Reduce Non-Value-Added Operational Workplace Waste

P2: Drug Expiration Dating

There are two major sources that contribute to drug expiration dating waste: 1) discarding expensive new supplies in hospitals and 2) discarding medications after patients are discharged or pass away in nursing homes.

Key Literature Sources to Support Checkbook Estimates

- A case study of Newton-Wellesley Hospital in Massachusetts shows how this type of waste can manifest in hospital settings, finding that the 240-bed hospital destroyed $200,000 worth of expired drugs in one year.\textsuperscript{56} Similar findings were observed at Tufts University Medical Center.\textsuperscript{57} Extrapolating these estimates to hospitals nationwide yields annual waste estimated at $790.1 million in 2018 US dollars over a one-year period.

Getting Started

Another case study explores drug expiration dating waste is in the US Military Health System. The Department of Defense has roughly $13.6 billion in stockpiled expired drugs. In 2016 the Shelf Life Extension Program (SLEP) was implemented, yielding an estimated $2.1 billion in savings from drugs that would have been replaced. The following policy suggestions may allow other health care sectors to achieve similar savings:

- Require pharmaceutical manufacturers to do long-term stability testing.
- Conduct independent testing using an outside agency that follows the protocols used by the SLEP.
- Use the data gleaned from the drugs tested by SLEP and apply them to hospital drugs, pharmacies, home medications, etc.

Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
<th>Cost of Drug Expiration Waste per Hospital Bed (2015)</th>
<th>Total Number of US Hospital Beds</th>
<th>Estimated Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$833</td>
<td>894,574</td>
<td>$790.1m</td>
</tr>
</tbody>
</table>


P2: Billing Systems

The average hospital in the United States spends roughly one quarter of their budget on billing.58

Key Literature Sources to Support Checkbook Estimates

- A synthesis of billing and insurance related (BIR) micro-costing studies across health care sectors found $471 billion in total BIR costs to the US health care system in 2012. The same study estimated that 52 percent of BIR work is considered “added” (excess) by comparing these costs to those seen in US and Canadian Medicare.59
- Another study examined BIR work in the California health care system specifically, and measured BIR as a percentage of total revenue among different health care sectors.60 The researchers found that BIR work in hospitals and commercial insurers accounts for between 7 percent and 11 percent of revenue. Annual revenue for US community hospitals is approximately $826 billion.61
- Applying the rates from the California-focused study, we can assume BIR-related costs between $58 billion and $91 billion. Assuming between 52 percent of this cost is “added” (or waste), we can estimate potential savings between $30.6 billion and $48.1 billion in 2018 US dollars over a one-year period.

Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

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</thead>
<tbody>
<tr>
<td>$826b</td>
<td>$57.8b</td>
<td>$90.9b</td>
<td>52%</td>
<td>$30.6b</td>
<td>$48.1b</td>
</tr>
</tbody>
</table>

P2: Team-Based Care

An optimized care team provides the expertise and resources to deliver care and jointly plan and support individuals and families to better manage their own health. In designing primary care services to address prevention, health promotion, and chronic disease management, there is significant opportunity to improve outcomes and reduce costs.\(^6^2\)

Key Literature Sources to Support Checkbook Estimates

- One study assessed the impact of team-based care in five primary care practices. While outcomes improved, the implementation of team-based care was not revenue neutral, leading to a 2.5 percent loss in overall primary care revenue.\(^6^3\)
- The average primary care physician (PCP) generates approximately $1.4 million in primary care revenue per year.\(^6^4\) Extrapolating to the total number of primary care physicians nationally (233,403), we can estimate total PCP revenue of roughly $327 billion.\(^6^5\)
- Assuming a 2.5 percent reduction in annual PCP revenue, we can estimate approximately $8.5 billion in annual savings to payers from large-scale implementation of team-based care in primary care settings in 2018 US dollars over a one-year period.

Getting Started

- Optimize the Care Team. Institute for Healthcare Improvement. [http://www.ihi.org/resources/Pages/Changes/OptimizetheCareTeam.aspx](http://www.ihi.org/resources/Pages/Changes/OptimizetheCareTeam.aspx)
- The Primary Care Team Guide. Improving Primary Care. [http://www.improvingprimarycare.org/](http://www.improvingprimarycare.org/)

Checkbook Calculations (in 2018 US dollars: \(m = \text{million}; b = \text{billion}\))

<table>
<thead>
<tr>
<th>Revenue per Primary Care Physician (2016)</th>
<th>Total Number of US Primary Care Physicians</th>
<th>Total Primary Care Physician Revenue</th>
<th>Estimated Cost Savings Assuming 2.5% Reduction (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1.4m</td>
<td>233,403</td>
<td>$327.3b</td>
<td>$8.5b</td>
</tr>
</tbody>
</table>

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\(^6^2\) Optimize the Care Team. Institute for Healthcare Improvement. [http://www.ihi.org/resources/Pages/Changes/OptimizetheCareTeam.aspx](http://www.ihi.org/resources/Pages/Changes/OptimizetheCareTeam.aspx)


P2: Price Variation
Reducing price variation for similar or identical health care services represents a significant opportunity to reduce waste.

Key Literature Sources to Support Checkbook Estimates
- In 2011 out-of-pocket health spending among the commercially insured population totaled $80.8 billion in the US. Of that total, $37.7 billion was spent on “shoppable services,” or non-emergency services that could be scheduled in advance (e.g., hip and knee replacements, colonoscopies, flu shots, blood tests). An analysis by the American Academy of Actuaries estimates that implementing reference pricing broadly could result in between a 3 percent and 28 percent reduction in spending on shoppable services. Applying this percentage reduction range to 2011 out-of-pocket health spending translates to an estimated reduction of between $1.3 billion and $12.1 billion in out-of-pocket payments for shoppable services in 2018 US dollars over a one-year period.

Getting Started

Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

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<tbody>
<tr>
<td>$37.7b</td>
<td>$1.3b</td>
<td>$12.1</td>
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</tbody>
</table>

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P2: Burden of Measurement

There is a key opportunity to reduce waste by ensuring that the quality and efficiency measures used in various payment and public reporting programs are meaningful to improving patient care while also minimizing undue administrative burden.

Key Literature Sources to Support Checkbook Estimates

- On average, 1 percent of hospital net revenue is dedicated to measurement. The average net revenue per US community hospital is $170 million.\(^6^9\) Extrapolating these estimates to hospitals nationwide yields a total hospital net revenue of roughly $826 billion, and total measurement burden of $8 billion. **Don Berwick, IHI President Emeritus, has called for a 50 percent reduction in all measures being used.**\(^7^0\) Doing so would generate estimated savings of $4.2 billion in 2018 US dollars over a one-year period.

Getting Started


Checkbook Calculations (in 2018 US dollars: \(m = \text{million; } b = \text{billion}\))

<table>
<thead>
<tr>
<th>Total Hospital Net Revenue (2017)</th>
<th>Percentage of Revenue Dedicated to Measurement</th>
<th>Total Revenue Dedicated to Measurement</th>
<th>Estimated Cost Savings Assuming 50% Reduction (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$826.5b</td>
<td>1%</td>
<td>$8.3b</td>
<td>$4.2b</td>
</tr>
</tbody>
</table>


P2: Electronic Health Record Redesign
As electronic health record (EHR) systems have become more pervasive, physicians must increasingly split their time between EHR documentation and patient care, potentially driving physician burnout.71

Key Literature Sources to Support Checkbook Estimates
- After the Veterans Administration rolled out an initiative to remove “low-value” EHR notifications, physicians across the health system saw a reduction of 1.5 hours per week in EHR-related work.72 Extrapolating these results nationally, assuming primary care physician costs of $10073 per hour and approximately 209,000 practicing primary care physicians nationwide, we estimate approximately 14.1 million hours saved per year, and estimated annual savings of $1.5 billion in 2018 US dollars over a one-year period.

Getting Started

Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
<th>Primary Care Physician Cost per Hour (2018)</th>
<th>Total Number of Avoidable EHR Work in Hours per Week</th>
<th>Total Number of US Practicing Primary Care Physicians (2010)</th>
<th>Total Physician Hours Available per Year</th>
<th>Estimated Cost Savings (2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100</td>
<td>1.5</td>
<td>209,000</td>
<td>14,107,500</td>
<td>$1.5b</td>
</tr>
</tbody>
</table>

P2: Supply Chain Standardization

Reducing pricing variation and unnecessary use of drugs and products represent an opportunity for hospitals to safely reduce supply costs.

Key Literature Sources to Support Checkbook Estimates

- An analysis of 2,300 US hospitals by Navigant found that if all analyzed hospitals could match the performance of the top quartile of hospitals for supply chain budget efficiency decency, $25.3 billion could be saved annually on supply chain products and related operations, processes, and procedures. Total supply costs include medical and implantable device costs, medical/surgical and pharmaceutical supplies charged to patient care departments, and supplies related to buildings/fixtures, maintenance, and plant operations.

Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

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<tr>
<td>2,300</td>
<td>$11m</td>
<td>$25.3b</td>
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*Note: $25.3 billion is an updated figure from October 2018. The original article published in Supply Chain Dive indicated $25.4 billion. The calculation methodology remains consistent.*
P3: Reduce Non-Value-Added Clinical Workplace Waste

P3: Antimicrobial Stewardship

Between 20 percent and 50 percent of prescribed antimicrobials in the US are unnecessary or inappropriate, contributing to antibiotic-resistant bacteria that infects 2 million people and causes more than 20,000 deaths per year.75

Key Literature Sources to Support Checkbook Estimates

- One study estimated the cost to the health system is $13 per antibiotic prescription, including costs of hospitalization, inpatient/outpatient antibiotic use, and running hospital antimicrobial stewardship programs.76 Assuming annual ambulatory antibiotic prescriptions of between 213 million and 263 million,77 we can estimate a total cost burden of between $2.8 billion and $3.5 billion in 2018 US dollars over a one-year period.
- One study of 2010–2011 ambulatory antibiotic prescriptions estimates that as many as 30 percent were inappropriate.78 Assuming a 30 percent reduction nationally, we can estimate savings to the health system between approximately $917 million and $1.1 billion in 2018 US dollars over a one-year period.
- These cost savings estimates do not include added savings and reduced harm from improved inpatient antimicrobial de-escalation practices and evidence-based earlier antibiotic therapy cessation.

Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

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<tbody>
<tr>
<td>$13</td>
<td>213,000,000</td>
<td>263,000,000</td>
<td>$917.7m</td>
<td>$1.1b</td>
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</table>

P3: Blood Use

The major sources of waste related to blood use are adverse events such as allergic reactions, fever, immune suppression, and iron overload. Infection rates declined by 20 percent when hospitals performed fewer red blood cell transfusions. A 2015 analysis found that the overuse of blood transfusions was one of the most common medical errors in the US. More than 14 million units of blood were used in the US in 2013, or for 1 in 10 hospitalizations.

Key Literature Sources to Support Checkbook Estimates

- Blood transfusions cost about $1,000 per unit when direct and indirect costs are accounted for. In 2013, hospital respondents to an American Association of Blood Banks (AABB) survey reported an average cost of $218.87 per unit of red blood cells. In addition, providers also absorb indirect expenses like transport and overhead that can raise the cost of blood from $726 to $1,183 per unit — up to 4.8 times higher than the actual cost of the physical unit of blood.

- One study estimated that approximately 60 percent of blood transfusions are unnecessary. Vanderbilt University Medical Center saved $2 million over three years with a 30 percent reduction (reducing utilization from 675 units per 1,000 discharges in 2011 to 432 units per 1,000 discharges in 2016).

- Applying the 30 percent reduction rate to the 14 million units of blood used annually yields estimated savings between $3.6 billion and $5.9 billion in 2018 US dollars over a one-year period.

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Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

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<tbody>
<tr>
<td>14,000,000</td>
<td>$726</td>
<td>$1,183</td>
<td>4,200,000</td>
<td>$3.6b</td>
<td>$5.9b</td>
</tr>
</tbody>
</table>
P3: Diagnostic Error

According to the Society to Improve Diagnosis in Medicine, more than 12 million Americans per year are affected by diagnostic errors.\(^{88}\)

**Key Literature Sources to Support Checkbook Estimates**

- While definitive cost statistics are not available, with over 12 million Americans affected each year by diagnostic error, the Society to Improve Diagnosis in Medicine estimates that **improving the accuracy and timeliness of diagnosis will potentially save in excess of $100 billion each year in annual costs from inappropriate testing, wrong treatments, and malpractice lawsuits.**\(^{89}\)

**Getting Started**

- Graber ML. The incidence of diagnostic error in medicine. *BMJ Qual Saf.* 2013;22(Suppl 2):ii21-ii27. [https://qualitysafety.bmj.com/content/22/Suppl_2/ii21](https://qualitysafety.bmj.com/content/22/Suppl_2/ii21)

**Checkbook Calculations (in 2018 US dollars: m = million; b = billion)**

<table>
<thead>
<tr>
<th>Total Estimated Cost Savings from Reduced Diagnostic Error</th>
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<tbody>
<tr>
<td>$100b</td>
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</table>


P3: Overuse of Medical Tests, Treatments, and Procedures

Choosing Wisely is a national campaign initiated by the ABIM Foundation to encourage physicians to engage with patients to avoid unnecessary medical tests, treatments, and procedures.90

Key Literature Sources to Support Checkbook Estimates

- The Virginia Center for Health Innovation (VCHI) used the state’s All-Payer Claims Database and the MedInsight Health Waste Calculator to estimate the cost of wasteful health care utilization among 5.6 million public and privately insured residents.91 Using Choosing Wisely and other recommendations from government and industry, VCHI estimated that approximately 35 percent of services were considered wasteful. This potential waste translates to approximately 2.6 percent of total health care spending, or roughly $11.94 per member per month (or $143.28 per member annually).
- Applying the per member per month estimate to the insured US population of 294.9 million92 yields potential estimated cost savings of $45.9 billion across all payers in 2018 US dollars over a one-year period.

Getting Started

- Getting Started. Choosing Wisely. [https://www.choosingwisely.org/getting-started/](https://www.choosingwisely.org/getting-started/)

Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
<th>Annual Cost (per Member per Year) of Unnecessary Medical Tests, Treatments, and Procedures (2014)</th>
<th>Total US Insured Population</th>
<th>Estimated Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$143.28</td>
<td>294,900,000</td>
<td>$45.9b</td>
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P3: Generic Drug Substitution

On average, the retail price of a generic drug is 75 percent lower than the retail price of a brand-name drug. Cases where brand-name drugs are prescribed in the place of appropriate generics represent a significant opportunity to reduce waste.93

Key Literature Sources to Support Checkbook Estimates

- One 2005 study estimated the economic impact in the US of substituting the generic version for 39 percent of the multisource drugs dispensed as brand name.94 The authors found generic drug substitutions reduced annual drug expenditures by $45.89 per person (under age 65) and by $78.05 per person (ages 65 or older). The same study found that the total savings comprised 11 percent of national drug expenditures in 2005. In 2016 national drug expenditures totaled $328.6 billion.95
- **Assuming this same rate, substituting generic brands for all multisource drugs would save an estimated $37.6 billion per year in 2018 US dollars over a one-year period.**

Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
<th>Estimated Annual Cost Savings per Person Under Age 65</th>
<th>Estimated Annual Cost Savings per Person Age 65 or Older</th>
<th>Estimated Total Cost Savings as a Percentage of National Drug Expenditures</th>
<th>Total Cost of National Drug Expenditures (2016)</th>
<th>Estimated Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$45.89</td>
<td>$78.05</td>
<td>11%</td>
<td>$328.6b</td>
<td>$37.6b</td>
</tr>
</tbody>
</table>

P3: Direct-to-Consumer Drug Advertising

The literature has shown that direct-to-consumer drug advertising has significant effects on patient demand and prescriptions. One study estimates the effect of patient requests for specific medications, finding as much as a 20 percent increase in prescription rates when brand names were mentioned.96 A survey by the Kaiser Family Foundation found that 28 percent of consumers report asking doctors about drugs they saw in television ads.97

Key Literature Sources to Support Checkbook Estimates

- Another study attempted to estimate the effect of advertising on demand using aggregated sales and prescription data. The authors found that between 13 percent and 22 percent of growth in annual prescription drug spending was attributable to direct-to-consumer drug advertising.98
- In 2016 pharmaceutical spending in the US reached $450 billion, with an estimated compounded annual growth rate of 7 percent through 2020.99
- Assuming annual growth in spending of roughly $31.5 billion, applying a reduction rate of between 13 percent and 22 percent we can estimate national savings between $4.3 billion and $7.2 billion in 2018 US dollars over a one-year period.

Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

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<tbody>
<tr>
<td>$450b</td>
<td>7%</td>
<td>$31.5b</td>
<td>13%</td>
<td>22%</td>
<td>$4.3b</td>
<td>$7.2b</td>
</tr>
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P4: Actively Solicit Staff and Clinician Ideas

P4: Operational Waste

Everything health care providers do can be divided into two categories: the first adds value for the customer that they would be willing to pay for, and the second does not add value. The pursuit of reducing operational waste focuses on this second category.

Key Literature Sources to Support Checkbook Estimates

- A study by Intermountain Healthcare and AHRQ developed an observational tool to categorize waste based on Toyota Production System activities. An observer shadowed 61 staff for 72 hours in a 46-bed medical unit. Staff observed included 8 physicians, 26 nurses, and 10 other staff. The average cost of waste per hour per worker across all staffing groups was between $7.40 and $18.98.
- Using the most conservative estimate and focusing specifically on caregiving activities, the study authors estimated the hospital’s annual cost of waste to be $843,000. Extrapolating this waste estimate to the nearly 900,000 US acute care hospital beds yields estimated total costs of waste of $20.9 billion in 2018 US dollars over a one-year period.

Getting Started

- Lean Health Care Improvement. Virginia Mason Institute. [https://www.virginiamasoninstitute.org/](https://www.virginiamasoninstitute.org/)

Checkbook Calculations (in 2018 US dollars: \( m = \text{million} \); \( b = \text{billion} \))

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<tbody>
<tr>
<td>$843,000</td>
<td>$18,326(^{101})</td>
<td>894,574</td>
<td>$20.9b</td>
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</tbody>
</table>


\(^{101}\) The Intermountain Healthcare study was conducted in a 46-bed unit; estimated cost of annual waste per hospital bed calculated as: $843,000 / 46 beds = $18,326 per bed.
P4: Workforce Burnout and Turnover

Burnout is extremely common among health care workers. Characteristics of the health care environment (e.g., time pressure, lack of control over work processes, role conflict, emotional intensity of clinical work) put clinicians at a particularly high risk of burnout. Clinicians with burnout are more likely to subjectively rate patient safety lower within their organizations and to admit to having made mistakes or delivered substandard care.\(^\text{102}\)

Key Literature Sources to Support Checkbook Estimates

- The annual turnover rate for nurses is estimated at 30 percent, with a cost per turnover between $23,000 and $31,000.\(^\text{103}\) The annual turnover rate for physicians is estimated at 7 percent, with a cost per turnover in excess of $1 million when accounting for recruiting and lost revenue.\(^\text{104,105}\)
- Case studies of hospitals that have been successful in this area have demonstrated more than a 30 percent reduction in staff turnover rates.\(^\text{106}\)
- Extrapolating these costs nationally and assuming a 30 percent reduction in turnover yields potential estimated savings between $7.4 billion and $9.9 billion for nurses, and $22.5 billion for physicians in 2018 US dollars over a one-year period.

Getting Started


Checkbook Calculations (in 2018 US dollars: \(m = \text{million}; b = \text{billion}\))

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<thead>
<tr>
<th>Staff Type</th>
<th>Lower Bound Cost per Turnover</th>
<th>Upper Bound Cost per Turnover</th>
<th>Total Number of Annual Turnovers</th>
<th>Total Number of Avoidable Turnovers Assuming 30% Reduction Rate</th>
<th>Lower Bound Estimated Cost Savings (2018 Inflation Adjustment)</th>
<th>Upper Bound Estimated Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician</td>
<td>$1m (2012)</td>
<td>$1m (2012)</td>
<td>66,759</td>
<td>20,028</td>
<td>$22.5b</td>
<td>$22.5b</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$29.9b</td>
<td>$32.4b</td>
</tr>
</tbody>
</table>


P5: Involve Patients in Identifying What Matters Most to Them

For this primary driver, “what matters most” means the value-added steps in the care processes from the patients’ perspective. Health care organizations are encouraged to solicit ideas from patients and families on waste reduction opportunities (i.e., identifying the non-value-added steps in care processes) and engage them in co-design.

P5: Palliative Care

In 2015, 4.8 percent of all US hospital admissions received palliative care. Palliative care programs typically consist of 3 to 8 full-time equivalent (FTE) staff, often varying based on number of hospital beds.107 Approximately 22 percent of palliative care patients die in the hospital. In hospitals with more than 500 beds, palliative care programs provided an average of 1,242 initial inpatient consults and 2.2 billable subsequent visits per consult. In hospitals with fewer than 150 beds, they provided an average of 353 consults and 1.3 billable subsequent visits per consult.108

Key Literature Sources to Support Checkbook Estimates

- Palliative care consultation was associated with a reduction in direct hospital costs of almost $1,700 per admission ($174 per day) for patients who were discharged and of almost $5,000 per admission ($374 per day) for patients who died in the hospital. For an average 400-bed hospital containing an interdisciplinary palliative care team that sees 500 patients per year (300 discharges and 200 hospital deaths), these figures translate into a net savings of $1.3 million per year after adding physician revenues ($240,000) and subtracting personnel costs ($418,000).109 These savings account for ICU days saved, and pharmacy and lab reductions. However, savings are a conservative estimate and do not incorporate savings from length of stay (LOS) reduction, readmissions, mortality, and improving patient and family satisfaction. In 2016 there were nearly 6 million hospital admissions with a LOS between 7 and 30 days for the population screened in the palliative care program noted above.110,111

Applying the $1.3 million annual cost savings to the national population yields estimated cost savings of $5.5 billion to $7.3 billion in direct medical costs to acute care facilities in 2018 US dollars over a one-year period.

- Another study evaluated the effectiveness of palliative care referrals among patients with advanced cancer, COPD, and congestive heart failure in outpatient settings, finding $7,552 in savings in total cost of care per terminally ill patient.112 Most savings resulted from a decreased likelihood of ED visits and hospitalizations compared to patients receiving usual care. A 2016 cost-effective analysis of palliative care programs by the Institute for Clinical and Economic Review estimated a target national population of terminal cancer and mixed diagnoses patients of 787,000.113 Using these estimates we can approximate national cost savings of $7.4 billion in 2018 US dollars over a one-year period.

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110 Understanding Length of Stay Benchmarks. Truven Health Analytics. 2012. [https://truveonhealth.com/Portals/0/assets/HP_11514_0812_LOSBenchmarks_SS_WEB.pdf](https://truveonhealth.com/Portals/0/assets/HP_11514_0812_LOSBenchmarks_SS_WEB.pdf)
Getting Started

- National Seminar: Tools and Training for Clinicians: Palliative Care Programs. Center to Advance Palliative Care. [https://www.capc.org/](https://www.capc.org/)

Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

Direct Medical Costs, In-Hospital Palliative Care Program:

<table>
<thead>
<tr>
<th>Total Number of Hospital Admissions with LOS 7 to 30 Days</th>
<th>Lower Bound Percentage Outcomes of Hospital LOS 7 to 30 Days</th>
<th>Upper Bound Percentage Outcomes of Hospital LOS 7 to 30 Days</th>
<th>Percentage of Hospital Live Discharges Eligible for Palliative Care</th>
<th>Percentage of Hospital Deaths Eligible for Palliative Care</th>
<th>Estimated Cost Savings per Live Discharge (2004)</th>
<th>Estimated Cost Savings per Hospital Death (2004)</th>
<th>Lower Bound Total Estimated Cost Savings (2018 Inflation Adjustment)</th>
<th>Upper Bound Total Estimated Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,987,500</td>
<td>80% patients discharged alive</td>
<td>70% patients discharged alive</td>
<td>12.5%</td>
<td>52%</td>
<td>$1,700</td>
<td>$4,908</td>
<td>$5.5b</td>
<td>$7.3b</td>
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</table>

Ambulatory Service Costs, Utilization of Palliative Care Services:

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>$7,552</td>
<td>787,000</td>
<td>$5.9b</td>
<td>$7.4b</td>
</tr>
</tbody>
</table>
P5: Telehealth

A 2014 case study estimates that the Veterans Health Administration (VHA) averaged annual savings of $6,500 in 2012 for each patient that participated in their telehealth program, or nearly $1 billion in estimated total annual savings.114 In Vermont, savings of $63,804 per patient were created through the use of home-based telehealth and telemonitoring that eliminated expenses related to time and travel expenses during 2013.115 Another study indicated that hospitalizations among nursing home patients decreased by 4.4 percentage points when telehealth was utilized.116 Applying this savings rate to an average size nursing home (106 beds in 2013) indicates that regular use of telehealth in nursing homes could save the Medicare program about $151,000 annually per nursing home due to reduced inpatient admissions. However, a barrier to increased adoption is that the nursing home must invest in the technology required to offer telehealth services—estimated at $30,000 per facility—while almost all savings would accrue to Medicare.

Key Literature Sources to Support Checkbook Estimates

- A review of the telehealth vendor market found that there is an average cost savings of $126 per telehealth appointment among the commercially insured population compared to an office visit.117 An Advisory Board report estimates approximately 20 percent of current outpatient visits could be appropriate for telehealth appointments.118
- Applying this 20 percent rate to the nearly 64 million annual outpatient visits among the commercially insured population, use of telehealth for outpatient visits could yield estimated cost savings of $1.8 billion in 2018 US dollars over a one-year period.

Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
<th>Total Number of Outpatient Visits among Commercially Insured</th>
<th>Average Cost Savings per Visit Using Telehealth</th>
<th>Total Number of Appropriate Telehealth Visits Assuming a 20% Rate</th>
<th>Estimated Cost Savings (2013)</th>
<th>Estimated Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>63,623,000</td>
<td>$126</td>
<td>12,724,600</td>
<td>$1.6b</td>
<td>$1.8b</td>
</tr>
</tbody>
</table>

P5: Emergency Department Visits

Emergency department (ED) visits resulting from patients seeking non-urgent care or ED care that could have been treated in alternate settings represent a significant opportunity for waste reduction in the US health care system.

Key Literature Sources to Support Checkbook Estimates

- In 2012 the Healthcare Cost and Utilization Project (HCUP) estimated the rate of preventable treat-and-release emergency department (ED) visits to be 2,618 per 100,000 population. A national study investigating non-emergent ED visits between 2006 and 2010 found a similar estimate, categorizing roughly 10 percent of US ED visits as non-urgent.
- Retail clinics and urgent care centers are two lower levels of care that can treat many non-urgent needs. Prior studies have estimated that retail clinic and urgent care center per case costs are between $279 and $228 less than ED costs, respectively.
- Applying these per case savings to the rate of preventable ED visits estimated by HCUP, we estimate cost savings between $2.5 billion and $3 billion. These savings are in line with one study examining potential cost savings from treatment in lower levels of care, with estimated health system savings of $2.5 billion to $3 billion in 2018 US dollars over a one-year period.

Getting Started

- Mate K. “Reducing the Impact of Low-Acuity ED Visits.” Institute for Healthcare Improvement. Presentation November 1, 2016. [Link]

Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
<th>Total Number of Annual Preventable ED Visits</th>
<th>Estimated Cost Savings per Diversion to Urgent Care (2006)</th>
<th>Estimated Cost Savings per Diversion to Retail Clinic (2006)</th>
<th>Estimated Cost Savings Assuming All Diverted to Urgent Care (2018 Inflation Adjustment)</th>
<th>Estimated Cost Savings Assuming All Diverted to Retail Clinic (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8,526,826</td>
<td>$228</td>
<td>$279</td>
<td>$2.5b</td>
<td>$3b</td>
</tr>
</tbody>
</table>

References:

122 Weinick RM, Burns RM, Mehrotra A. Many emergency department visits could be managed at urgent care centers and retail clinics. Health Aff (Millwood). 2010;29(9):1630-1636.
P6: Redesign Care to Achieve the Triple Aim

The IHI Triple Aim is a framework that describes an approach to optimizing health system performance by simultaneously pursuing three dimensions, which IHI calls the “Triple Aim”: improving the patient experience of care (including quality and satisfaction); improving the health of populations; and reducing the per capita cost of health care.123

P6: Skilled Nursing Facility Utilization

The Healthcare Cost and Utilization Project (HCUP) presents data on hospital discharges to post-acute care (PAC) settings in 2013 from an all-payer view, finding that nearly 8 million hospital stays were discharged with PAC services, accounting for 22.3 percent of all hospital discharges in 2013. Over 11 percent of inpatient stays were discharged home with home health agency services, and 9 percent of inpatient stays were discharged to skilled nursing facilities (SNFs). Only 1.6 percent of all hospital discharges went to inpatient rehabilitation facilities. Long-term care hospitals were the least used PAC setting and represented only 0.5 percent of all discharges. Of the 8 million discharges to PAC, more than 40 percent (or 3.2 million) were discharged to SNFs.124

According to Medicare beneficiary data125 in 2014, 1.7 million fee-for-service (FFS) Medicare beneficiaries were cared for in 15,000 SNFs, costing Medicare $28.6 billion, with an average stay of 28 days. This represents 2.4 million SNF stays: 20 percent of all hospitalized FFS Medicare beneficiaries are discharged to a SNF. The majority of these facilities are the same institutions as those providing residential long-term care; 95 percent of SNFs provide both kinds of care. The average payment to SNF was between $12,400 and $15,000 per discharge. The site of discharge has a profound effect on hospital costs. According to the HCUP report, stays discharged to PAC were much longer and costlier than those with routine discharges (7.0 days vs. 3.6 days; $16,900 vs. $8,300 on average).126

Key Literature Sources to Support Checkbook Estimates

• A literature review on patient outcomes after the implementation of Home-Based Primary Care Programs found that long-term care admissions decreased between 10 percent and 25 percent.\textsuperscript{127}

• A randomized controlled trial examining the effect of Guided Care, a team-based care model for chronically ill adults, realized 24 percent fewer hospital days, 37 percent fewer nursing facility days, and 15 percent fewer emergency department visits.\textsuperscript{128} Accounting for 2009 Medicare payment rates and these differences in utilization, annual net savings were achieved of $1,364 per patient per year. Applying these savings to the 14 percent to 32 percent of Medicare beneficiaries with between 2 and 6 chronic conditions, annual cost savings to the Guided Care program are estimated at between approximately $12.6 billion and $28.9 billion in 2018 US dollars over a one-year period.

Getting Started

• Viewing Post-Acute Care in a New Light: Strategies to Drive Value. Deloitte; 2017.
  

Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
<th>Estimated Cost Savings per Patient with 6+ Chronic Conditions (2009)</th>
<th>Total Number of Medicare Beneficiaries</th>
<th>Lower Bound Percentage of Beneficiaries with 6+ Chronic Conditions</th>
<th>Upper Bound Percentage of Beneficiaries with 6+ Chronic Conditions</th>
<th>Lower Bound Estimated Cost Savings (2018 Inflation Adjustment)</th>
<th>Upper Bound Estimated Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,364</td>
<td>55,300,000</td>
<td>14%</td>
<td>32%</td>
<td>$12.6b</td>
<td>$28.9b</td>
</tr>
</tbody>
</table>


P6: Skilled Nursing Facility 3-Day Rule

For nearly 50 years, Medicare has required patients to have at least a three-day hospital stay before they are eligible for coverage of care in a skilled nursing facility (SNF) following hospital discharge. A more recent study, however, finds that the main consequence of waiving the three-day rule, as Medicare Advantage plans commonly do, has meant less days in the hospital.

Key Literature Sources to Support Checkbook Estimates

- One Pioneer accountable care organization (ACO) participating in the SNF 3-Day Rule program reported $308,000 in savings, but the exact period over which these savings were realized or how they were calculated was not specified. To assess the implications of eliminating the three-day qualifying stay requirement, another study compared hospital and post-acute skilled nursing facility utilization among Medicare Advantage enrollees in matched plans that did or did not eliminate that requirement between 2006 and 2010. Among hospitalized enrollees with a SNF admission, the mean hospital length of stay declined from 6.9 days to 6.7 days for those no longer subject to the qualifying three-day stay, but increased from 6.1 days to 6.6 days among those still subject to the rule, for a net decline of 0.7 day when the three-day stay requirement was eliminated. The elimination was not associated with more hospital or skilled nursing facility admissions or with longer lengths of stay in a SNF.

- Assuming one day of inpatient care costs between $700 and $2,271, a 0.7-day reduction would translate into an estimated cost savings between $490 and $1,500 for every inpatient admission that concluded with a discharge to a skilled nursing facility. Applying this rate to the share of 9.5 million Medicare acute discharges yields estimated cost savings between $1 billion and $3.4 billion in 2018 US dollars over a one-year period.

Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
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<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>$490</td>
<td>$1,590</td>
<td>2,124,700</td>
<td>$1b</td>
<td>$3.4b</td>
</tr>
</tbody>
</table>

132 Estimate of cost of last day of inpatient care provided by MemorialCare Health System.
P6: Behavioral Health

Between 2011 and 2015, total US spending on behavioral health reached $213.6 billion, a 13.4 percent increase. One potential opportunity for cost savings lies in the rise of integrative care models, care delivery systems designed to integrate physical and behavioral health to improve outcomes and reduce costs.

Key Literature Sources to Support Checkbook Estimates

- One report by Milliman analyzed 2016 Medicare, Medicaid, and commercial claims data to find the additional health care costs incurred by patients with medical and behavioral comorbidities. The Milliman Research Report authors also conducted a literature review of integrated care models and found that between 9 percent and 17 percent of costs among these patients could be saved through effective integration of care.

- Assuming a savings rate of 12 percent, the report gives per member per month (PMPM) savings of $133, $234, and $205 among commercial, senior, and Medicaid populations, respectively. Incorporating a $73 PMPM cost of operating an integrated behavioral health program and extrapolating nationally, we can estimate net cost savings of approximately $38.1 billion in 2018 US dollars over a one-year period.

Getting Started

- Unutzer J, Harbin H, Schoenbaum M, Druss B. The Collaborative Care Model: An Approach for Integrating Physical and Mental Health Care in Medicaid Health Homes. Centers for Medicare & Medicaid Services; May 2013. [https://www.chcs.org/media/HH_IRC_Collaborative_Care_Model_052113_2.pdf](https://www.chcs.org/media/HH_IRC_Collaborative_Care_Model_052113_2.pdf)


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136 Average cost to operate integrated program, at full-functioning operation; includes staffing from LCSW, psychiatrist consultant, PCP. Assumes implementation of telehealth to scale the program. Assumes 8 locations servicing 1,600 patients per year with behavioral health diagnosis. Model imbedded within clinic. Assumes 200 patients per location on average supported by 5 LCSWs, 1 psychiatry resource. Based on costs at MemorialCare Health System in Southern California.
Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Commercial</td>
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<td>$60</td>
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<td>Senior</td>
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<td>$161</td>
<td>23,000,000</td>
<td>$3.7b</td>
<td>$3.8b</td>
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<tr>
<td>Medicaid</td>
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<td>$132</td>
<td>144,000,000</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$37.4b</strong></td>
<td><strong>$38.1b</strong></td>
</tr>
</tbody>
</table>
P6: Alternative Payment Models

A study found that community hospitals saw increased revenue under ACO programs. Evidence from RAND indicates that bundled payments can result in savings to both payers and providers. Payers benefit from discounts negotiated with providers, and providers benefit from practice changes such as decreased use of intensive care nursing. At the same time, most hospital executives expect that value-based contracts will result in a decrease in operating profits, more now than in the earlier years of the Affordable Care Act.

Key Literature Sources to Support Checkbook Estimates

- Another article estimates the potential savings if episode-based and patient-based bundled payments were applied across the Medicare Fee-for-Service (FFS) population. The authors observed significant variation after averaging the costs for 245 episode types in over 300 hospital referral regions. They found that in each region if the average costs above the 25th percentile were brought down to that level, Medicare would realize $29 billion in annual savings. Using a more conservative 50th percentile standard, $15 billion could be saved nationally.
- At MemorialCare Health System in California, participating ACOs reported realizing a 6 percent to 10 percent reduction in monthly premium costs among commercially insured populations. Assuming a national commercially insured population of 175 million and average monthly premium costs between $393 and $1021, extrapolating these results nationally results in estimated cost savings between $49.7 billion and $82.9 billion in premium payments in 2018 US dollars over a one-year period.

Getting Started

### Checkbook Calculations (in 2018 US dollars: \( m = \text{million}; \ b = \text{billion} \))

<table>
<thead>
<tr>
<th>Policy Type</th>
<th>Average Annual Premium Costs</th>
<th>Total Number of Beneficiaries</th>
<th>Percentage of Assumed Cost Savings</th>
<th>Estimated Cost Savings (2018)</th>
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</thead>
<tbody>
<tr>
<td>Individual</td>
<td>$4,716</td>
<td>85,588,200</td>
<td>6% to 10%</td>
<td>$24.2b to $40.4b</td>
</tr>
<tr>
<td>Family</td>
<td>$12,252</td>
<td>34,666,200</td>
<td>6% to 10%</td>
<td>$25.5b to $42.5b</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$49.7b to $82.9b</strong></td>
</tr>
</tbody>
</table>
P6: Health Equity

Addressing the adverse impact of social determinants of health and racial disparities comprise a significant opportunity to reduce waste in the health care system.

Key Literature Sources to Support Checkbook Estimates

- Evaluations of the Housing First model targeting homeless adults with behavioral health conditions achieved net savings between $9,000 and $30,000 per person per year.\(^\text{142}\) The Oregon Bud Clark Commons pilot, a housing complex integrating health and social services, achieved more than a $13,000 reduction in annual Medicaid spending per person among previous homeless residents one year after move in.\(^\text{143}\) Applying the savings seen in the Bud Clark Commons program to the estimated national homeless population of between 193,000 and 554,000 individuals yields estimated national annual savings to Medicaid between $3 billion and $8.7 billion in 2018 US dollars over a one-year period.

- Food accessibility and nutrition programs were also identified as potential sources of savings. One study found that increased spending on home-delivered meals of $25 per older adult was associated with a 1 percent decline in nursing home admissions.\(^\text{144}\) Another study analyzed the impact of Supplemental Nutrition Assistance Program (SNAP) benefits on older adults in Maryland. The authors found that enrollees were 14 percent less likely to be hospitalized and 23 percent less likely to enter a nursing home compared to non-enrollees. Overall, they estimated Medicare savings of $2,120 for every low-income senior enrolled in SNAP.\(^\text{145}\) Nationally there are 5.5 million eligible seniors who are not enrolled in SNAP, yielding potential annual cost savings of $13.1 billion in direct health care spending to Medicare in 2018 US dollars over a one-year period.\(^\text{146}\)

- The costs of racial disparities in care and outcomes to the health care system are well documented in the literature. For example, one study in Virginia estimated the costs of racial disparities in stroke, heart disease, cancer, injury, and low birth weight babies among adult nonelderly inpatients to be $160.3 million.\(^\text{147}\) Using data from the Medical Expenditure Panel survey, another national study estimated that eliminating racial disparities could save $66.2 billion in out-of-pocket and third-party payments to providers.\(^\text{148}\) After dividing their sample into age/gender cohorts and developing a model of estimated health expenditures by health status, the authors re-estimated the model assuming all had the health status of the healthiest cohort.

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\(^{144}\) Thomas KS, Mor V. Providing more home-delivered meals is one way to keep older adults with low care needs out of nursing homes. Health Aff (Millwood). 2013;32(10):1796-1802.


Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>$13,300</td>
<td>554,000</td>
<td>193,000</td>
<td>$3b</td>
<td>$8.7b</td>
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<table>
<thead>
<tr>
<th>Cost Savings per Low-Income Senior in SNAP</th>
<th>Total Number of SNAP Eligible Seniors Not Enrolled</th>
<th>Estimated Cost Savings (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2,120</td>
<td>5,500,000</td>
<td>$13.1b</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annualized Estimated Reduced Indirect Costs to Economy from Reducing Racial Disparities (2003 to 2006)</th>
<th>Annualized Estimated Reduced Direct Medical Care Expenditures from Reducing Racial Disparities</th>
<th>Annualized Estimated Reduced Direct Medical Care Expenditures (2018 Inflation Adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$252b</td>
<td>$57.3b</td>
<td>$66.2b</td>
</tr>
</tbody>
</table>
P6: Use of Dialysis Days

There is a growing emphasis on advancing kidney health in the US with improved management of end-stage renal disease (ESRD) and chronic kidney disease. While there is more to be studied here, the Presidential Executive Order published in 2019 puts forth three broad goals: 1) reduce the number of Americans developing ESRD by 25 percent by 2030; 2) 80 percent of new ESRD patients in 2025 will either start dialysis at home or start with a transplant; and 3) double the number of organs available for transplant by 2030.149

Key Literature Sources to Support Checkbook Estimates

- A coordinated care program run by Optum realized $15,133 in savings per year per patient among end-stage renal disease patients.150 Exaggerating these savings to 20 percent of the national population of 500,164151 Medicare ESRD beneficiaries would yield estimated cost savings to providers of $1.5 billion in 2018 US dollars over a one-year period.
- Other estimates are needed for key populations to add to this number, noting global estimates of starting dialysis at home can be as high as 60 percent to 70 percent in Hong Kong, 30 percent in Europe, and 52 percent in Colombia.

Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
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<tr>
<td>$15,133</td>
<td>500,164</td>
<td>20%</td>
<td>$1.5b (Medicare only)</td>
</tr>
</tbody>
</table>

151 State Health Facts: Medicare Beneficiaries with End-Stage Renal Disease (ESRD). Kaiser Family Foundation; 2016. https://www.kff.org/medicare/state-indicator/enrollees-with-esrd/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22%22sort%22:%22asc%22%7D
P6: Optimizing Inpatient Psychiatric Days

Hospitals often face challenges in finding appropriate community-based resources for patients who are ready to be discharged from inpatient psychiatric units. These delays inhibit the optimal provision of care, may cause stress for patients and families, and often lead to patients staying in more expensive hospital settings longer than necessary.152

Key Literature Sources to Support Checkbook Estimates

- Per the Healthcare Cost and Utilization Project (HCUP), the cost of an inpatient psychiatric stay is roughly $5,200, with an average length of stay (ALOS) between 4.8 days and 8 days.153
- According to the National Association of State Mental Health Program Directors, in 2014 there was approximately 254,000 inpatient psychiatric days at general hospitals with separate psychiatric units.154
- In 2016 the Minnesota Hospital Association ran a study of delays in discharge among behavioral health patients in 20 hospitals with an inpatient psychiatric unit. They found that nearly 20 percent of inpatient psychiatric days were potentially avoidable and cited the top three reasons for delay as unavailability of state psychiatric hospitals beds, chemical dependency treatment beds, and intensive resident treatment services.155
- Extrapolating a 20 percent reduction in bed days nationally using the cost and ALOS data estimated by HCUP yields an estimated cost savings between $42.4 million and $70.7 million in 2018 US dollars over a one-year period.

Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

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<tr>
<td>252,743</td>
<td>50,548</td>
<td>$575</td>
<td>$1,083</td>
<td>$42.4m</td>
<td>$70.7m</td>
</tr>
</tbody>
</table>

P6: Ambulatory Care-Sensitive Hospital Admissions

Ambulatory care-sensitive admissions are hospital admissions that could have been avoided with optimal primary care.\textsuperscript{156} Dehydration, adult asthma, hypertension, and urinary tract infections are some examples of ambulatory care-sensitive conditions.

Key Literature Sources to Support Checkbook Estimates

- A 2006 study by the University of South Carolina estimated total hospital costs for preventable conditions at $30.8 billion.\textsuperscript{157,158}
- A report by Milliman estimates that 14 percent of total Medicare inpatient admissions are ambulatory care sensitive.\textsuperscript{159} As inpatient claims account for nearly half of total Medicare spending, reducing potentially preventable admissions presents a significant cost savings opportunity. A variety of interventions — including expansion of managed care, increased availability of primary care physicians, and improved chronic disease management — have realized reductions in ambulatory care-sensitive hospital admissions by 7 percent to 43 percent.
- Applying these rates to the total national expenditures yields an estimated cost savings between $1.6 billion and $4.9 billion in 2018 US dollars over a one-year period.

Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

<table>
<thead>
<tr>
<th>Total Cost Burden from Ambulatory Care-Sensitive Admissions (2006)</th>
<th>Total Number of US Hospital Admissions</th>
<th>Total Number of Medicare FFS Admissions</th>
<th>Lower Bound Estimated Cost Savings Assuming 7% Reduction (2018 Inflation Adjustment)</th>
<th>Upper Bound Estimated Cost Savings Assuming 43% Reduction (2018 Inflation Adjustment)</th>
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<td>10,000,000</td>
<td>$1.6b</td>
<td>$4.9b</td>
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</table>


\textsuperscript{157} Decreasing Hospital Admissions for Ambulatory Care Sensitive Conditions: A $31 Billion Opportunity. Network for Excellence in Health Innovation. \url{https://www.nehi.net/bendthecurve/sup/documents/ACSC_Brief.pdf}


P6: Site-Neutral Payment

Historically in the US, a procedure performed at a hospital-owned outpatient department is reimbursed at a higher rate than the same procedure performed at an ambulatory surgical center (ASC) or physician office.\textsuperscript{160} In 2015, MedPac recommended closing the gap between these disparate rates, known as site-neutral payment.\textsuperscript{160} That same year Congress passed a budget bill that began to enact site-neutral payment for certain Medicare services.\textsuperscript{162} These policies have also gained popularity among commercial payers. Health insurance plan provider Anthem announced that, by March 2018, it would no longer pay for outpatient MRIs and CT scans performed in hospital settings in 13 of the 14 states in which the company operates.\textsuperscript{163}

Key Literature Sources to Support Checkbook Estimates

- According to a Healthcare Bluebook report, only half of procedures that can be performed in ASCs are actually performed in these settings.\textsuperscript{164} The report estimates that if the remaining half of procedures were actually performed in ASCs, assuming 3 percent of cases are ineligible (i.e., patients with complex needs), estimated annual savings between $38.2 billion and $55.6 billion could be achieved among commercial payers.
- Another study by UC Berkeley estimated the potential savings to Medicare from surgeries being performed in ASCs as opposed to hospital outpatient departments (HOPDs).\textsuperscript{165} Assuming the number of procedures per 1,000 Medicare beneficiaries stays constant as the lower bound, and assuming a 3 percent annual increase as the upper bound, the authors estimated annual cost savings to Medicare between $3.3 billion and $5.8 billion in 2018 US dollars over a one-year period.

Getting Started


Checkbook Calculations (in 2018 US dollars: m = million; b = billion)

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<thead>
<tr>
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<tr>
<td>Commercial</td>
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<tr>
<td>Total</td>
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\textsuperscript{165} Study: Medicare Cost Savings Tied to ASCs. Ambulatory Surgery Center Association; 2013. http://www.advancingsurgicalcare.com/medicarecostsavings