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Health Policy Analysis

Illustrating Potential Efficiency Gains from Using Cost-Effectiveness Evidence to Reallocate Medicare Expenditures

James D. Chambers, MPharm, MSc, PhD[1,2,*], *Joanne Lord, MSc, PhD*[1], *Joshua T. Cohen, PhD*[2], *Peter J. Neumann, ScD*[2], *Martin J. Buxton, BA*[1]

[1]*Health Economics Research Group, Brunel University, Uxbridge, UK;* [2]*Center for the Evaluation of Value and Risk in Health at Tufts Medical Center, Boston, MA, USA*

ABSTRACT

Objectives: The Centers for Medicare & Medicaid Services does not explicitly use cost-effectiveness information in national coverage determinations. The objective of this study was to illustrate potential efficiency gains from reallocating Medicare expenditures by using cost-effectiveness information, and the consequences for health gains among Medicare beneficiaries. **Methods:** We included national coverage determinations from 1999 through 2007. Estimates of cost-effectiveness were identified through a literature review. For coverage decisions with an associated cost-effectiveness estimate, we estimated utilization and size of the "unserved" eligible population by using a Medicare claims database (2007) and diagnostic and reimbursement codes. Technology costs originated from the cost-effectiveness literature or were estimated by using reimbursement codes. We illustrated potential aggregate health gains from increasing utilization of dominant interventions (i.e., cost saving and health increasing) and from reallocating expenditures by decreasing investment in cost-ineffective interventions and increasing investment in relatively cost-effective interventions. **Results:** Complete information was available for 36 interventions. Increasing investment in dominant interventions alone led to an increase of 270,000 quality-adjusted life-years (QALYs) and savings of $12.9 billion. Reallocation of a broader array of interventions yielded an additional 1.8 million QALYs, approximately 0.17 QALYs per affected Medicare beneficiary. Compared with the distribution of resources prior to reallocation, following reallocation a greater proportion was directed to oncology, diagnostic imaging/tests, and the most prevalent diseases. A smaller proportion of resources went to cardiology, treatments (including drugs, surgeries, and medical devices, as opposed to nontreatments such as preventive services), and the least prevalent diseases. **Conclusions:** Using cost-effectiveness information has the potential to increase the aggregate health of Medicare beneficiaries while maintaining existing spending levels.

Keywords: cost-effectiveness, disinvestment, Medicare, resource allocation.

Introduction

It is well documented that US health care spending growth is unsustainable [1,2]. Compared with other developed countries, return on health care spending in the United States is poor, with a significant proportion of the American population lacking health insurance and the health care system performing poorly across key metrics such as life expectancy and infant mortality [3]. In many countries, cost-effectiveness analysis is used to prioritize scarce health care resources among competing interventions. Despite the immediate need to increase the value of health care spending, however, decision makers in the United States have resisted this approach [4].

More than 46 million Americans, including those 65 years and older and those with certain disabilities, receive health insurance through Medicare. The Centers for Medicare & Medicaid Services (CMS) does not operate with a fixed budget, and program cost has increased annually at a relatively rapid rate. The program's current annual cost is estimated at upwards of $600 billion, approximately 3.5% of the gross domestic product, and may reach $1 trillion by 2020 [5]. Research indicates that approximately 30% of Medicare spending may be inappropriate or unnecessary [6–10].

The CMS issues approximately 10 to 15 national coverage determinations (NCDs) each year for interventions deemed to have a significant impact on the Medicare program [11]. With respect to cost-effectiveness evidence, CMS states that it "is not a factor CMS considers in making NCDs" [12]. While research suggests that coverage decisions made in NCDs are broadly consistent with cost-effectiveness evidence—that is, technologies associated with favorable cost-effectiveness estimates tend to be covered—a number of covered interventions are not cost-effective by traditional standards, with incremental cost-effectiveness ratios (ICERs) greater than $250k per quality-adjusted life-year (QALY) gained [13]. Thus, efficiency gains are possible through disinvestments in cost-ineffective interventions and investments in relatively cost-effective interventions.

* *Address correspondence to:* James D. Chambers, Center for the Evaluation of Value and Risk in Health at Tufts Medical Center, 800 Washington St #63, Boston, MA 02111, USA.

E-mail: jchambers@tuftsmedicalcenter.org.

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The objective of this research was to estimate potential aggregate health gains from increasing utilization of dominant (i.e., cost-saving and health increasing) interventions, and from a hypothetical reallocation of expenditures among interventions subject to NCDs, through the use of a cost-effectiveness decision rule. We also sought to estimate the impact of reallocation on the distribution of expenditures across diseases and types of intervention. We acknowledge that this is an illustrative exercise, but we believe that it is important as the first of its kind to demonstrate the consequences of using cost-effectiveness information to inform resource allocation. We highlight the research challenges, particularly with regards to data limitations.

Methods

National Coverage Determinations

We created a database of NCDs issued by the CMS from 1999 through 2007. We excluded incomplete NCDs or those pertaining to minor coding or language changes, as well as those pertaining to off-label treatments, coverage in clinical trials, coverage with evidence development policies, or treatment facilities. Frequently, NCDs include multiple coverage decisions, often for different interventions or patient populations. Furthermore, on occasion coverage is permitted only for patient subgroups that meet certain conditions and restrictions. An entry was made in the database for each separate coverage decision implied within each NCD. We have previously used this database to evaluate factors that predict positive CMS coverage decisions for interventions [14].

Reallocation of Expenditures

To facilitate our analysis, we limited our sample to NCDs in which we could find available estimates of: cost-effectiveness; incremental cost; cost of intervention and comparator in the first year of use; incremental health gain; number of Medicare beneficiaries currently receiving the intervention; and the size of the unserved patient population, that is, Medicare beneficiaries who were eligible for the intervention but did not receive it. Each parameter will be discussed further.

Cost-Effectiveness

On occasion we were able to identify the cost-effectiveness estimate from CMS's decision memo, which comprises the agency's public communication about the NCD, including the evidence featured in its review. In the majority of the cases, we identified cost-effectiveness evidence through a literature search by using the PubMed database, the Tufts Medical Center Cost-Effectiveness Analysis Registry, the Health Economic Evaluations Database, and the National Health Service Economic Evaluation Database [15–18]. The findings of the literature search have been published elsewhere [13]. Most frequently, the reported ICER was in the form of a cost per QALY gained. On occasion, the ICER was presented in the form of a cost per life-year (LY) gained, and we adjusted incremental survival gain with a utility weight for Americans aged 65 to 69 years to create an estimate of incremental QALY gained [19]. This adjustment may underestimate the incremental QALY gain as only the years of life extended by the treatment (incremental LYs gained) are accounted for when adjusting for quality of life, not prior years of treatment during which patient quality of life may have been improved. In sensitivity analyses, we included cost-effectiveness studies that estimated the intervention to be "dominant"—that is, more effective and less costly than the comparator—even if the study reported health outcome using disease-specific units, for example, tumors detected, rather than QALYs or LYs. The majority of cost-effectiveness studies were performed in a US health care system setting (26 of 34, 67%), and of those 63% (15 of 26) incorporated Medicare costs. Occasionally, a US study was unavailable and we included a non-US study. In these instances, we converted the ICER into US dollars by using purchasing power parities, and indexed to the year the coverage decision was made by using the health component of the consumer price index [20,21].

Utilization Rate—Served and Unserved Population

We estimated intervention utilization rates by using a database of Medicare inpatient and outpatient claims [22]. We used *International Classification of Diseases, Ninth Revision* (*ICD-9*) diagnostic codes reported in the database to identify Medicare beneficiaries eligible for an intervention, as defined by the parameters of the NCD. The database also includes Common Procedural Terminology (CPT) codes used for physician reimbursement. We estimated utilization rates by calculating the number of beneficiaries who had matching relevant *ICD-9* diagnostic and CPT codes. We estimated the size of the unserved eligible population by calculating the difference between the number of beneficiaries who were a match for both *ICD-9* diagnostic and CPT codes and those who were a match solely with *ICD-9* diagnostic codes.

Incremental Cost Data

We extracted incremental cost data, that is, the net present value of future expenditures (the numerator of the ICER), from the included cost-effectiveness study, and when necessary adjusted it to 2007 USDs.

Cost of Intervention and Comparator in First Year of Use

We included the cost of the intervention and the comparator in the first year of use when it was reported in the cost-effectiveness study (64% of cases). When not reported, we estimated the cost of the intervention and the comparator in the year following first use from Medicare and physician reimbursement codes (36% of cases). Pertinent reimbursement codes were identified from Medicare documentation, the included cost-effectiveness study, or the manufacturer's website. For interventions subject to non-coverage decisions, we obtained the relevant information from the cost-effectiveness study.

Categorization of Interventions

To analyze the effect of the reallocation exercise on the distribution of expenditures, we categorized interventions with respect to disease (cardiology, oncology, and other), type of intervention (treatment, diagnostic, and other, i.e., education, preventative care, and mobility assistive equipment), and size of the eligible population (>1 million beneficiaries, 50,000–1 million beneficiaries, and <50,000 beneficiaries).

Reallocation of Expenditures

In the first analysis, we illustrated the effects of increasing the utilization of dominant interventions, while maintaining the existing utilization of nondominant interventions. That is, for dominant interventions we decreased by 50% the size of the unserved population, that is, Medicare beneficiaries who were eligible for the intervention but did not receive it. We assumed a 50% shift for the reallocation, reasoning that shifting *all* beneficiaries from one intervention to another would be infeasible in practice. To illustrate the possible range of aggregate health gains, we repeated this analysis by adjusting utilization by 10% and 90%, respectively.

In the second analysis, we reallocated existing resources by using an iterative process. First, we ranked interventions in order