Is the US Health Care System Wasteful and Inefficient? A Review of the Evidence

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Abstract This review critically evaluates perspectives on waste in the US health care sector. The conventional discussion of waste is often imprecise and blames factors outside the purview of the health care system. Taking an economic perspective, we propose that productive inefficiency is a more tractable concept than waste. We then review the literature on the efficiency of health providers. We discuss the evidence on whether supply- and demand-side policies, such as value-based payment and cost sharing, can raise efficiency, finding that many of these policies have effects that are meaningful but small. We then turn to the literature on variations, where we argue that the body of evidence suggests there are large efficiency gaps, though these gaps are smaller than the initial eye-catching results that began this strand of research. Ultimately, these findings provide a potential roadmap for efficiency gains, a process in which a diverse array of policies compound, over time, to bring the US system closer to the efficiency frontier.

Keywords health care, efficiency, waste, variations

The existence of waste in the US system is universally acknowledged. To much of the public, the signs of waste are intuitive: anyone who has set foot in a poorly sign-posted hospital, filled out a redundant reimbursement form, or waited for hours in a physician's office knows it is there. And it draws the attention of legions of green-eye-shaded analysts who peruse comparative health and spending statistics across the Organisation for Economic Co-operation and Development (OECD). Basic elements of the health care market surely allow waste to persist in the medical delivery system. In many health care markets, investing in costly and flashy new

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technologies that attract more patients is more profitable than relentlessly reengineering processes to reduce costs. Seeking healthier patients is often more lucrative than treating sicker ones. Negotiating with insurers and public payers trumps operations research at the bottom line. Health care providers can exploit their expertise to generate excessive use of lucrative services.

The potential for waste in the health care system is indisputable, and it makes sense to be ever vigilant in addressing it. But it is all too easy to overstate the potential savings from eliminating waste. While situations where things could work better—often labeled as waste—are omnipresent in the health care system, the steps needed to eliminate these instances of waste are often challenging, and in many cases, the cost of the cure is likely to be greater than the cost of the disease. The health care sector does not seem to be worse at eliminating waste than are other sectors, where many of the factors ostensibly generating excess health care waste are not in play. Supposedly pain-free treatments to raise the productivity of the health care sector are few and far between. The most commonly touted examples, like electronic medical records and care coordination, remain backed by scant evidence. Solutions are more likely to lie in the compounding effects of a variety of policies, and large gains in productivity will require changing the allocation of resources to and within the sector.

Why Waste?

The assault on waste is undeniably seductive, suggesting as it does that the system could be reformed almost painlessly, shrinking costs while improving quality, but without reducing prices paid to any stakeholder (White 2011). Peter Orszag (2009) argues that if the United States moved toward "the proven and successful practices adopted by lower-cost areas," then "some economists believe health care costs could be reduced by 30 percent . . . without compromising the quality of care." Donald Berwick and Andrew D. Hackbarth (2012) cite the sources of waste as failures of delivery of care, poor coordination of care, and overtreatment. Consulting firm reports claim an even broader territory; for example, Robert Kelley (2009: 24) flags "unwarranted use, preventable conditions and avoidable care, and fraud and abuse" as major sources of waste. PriceWaterhouseCoopers (2008: 1) identifies the top three sources as "defensive medicine, inefficient care processing, and care spent on preventable conditions related to obesity and overweight." So capacious a rubric is arguably itself seriously in need of slimming down.

Because the term *waste* has become a bin into which to toss all sorts of disagreeable items, policy purposes may be better served by a focus on *productive inefficiency* (hereafter simply *inefficiency*), a term that at least lends itself to definition and constraint. Economists use the term to describe situations in which, for a given condition (such as heart disease of specified severity in a patient of specified characteristics), a given quantity of physical inputs (doctors, hospitals, bread, jam, exercise) produces less of a given output (hospital days, healthy days, quality-adjusted life years, breakfast) than could currently be attained, holding all other outputs (including subjective ones like happiness, comfort, timeliness, convenience) constant. Physical inputs may be mixed in different proportions and then made to produce outputs by means of the application of a technology, which may be mechanical, organizational, managerial, chemical, or other. *Inefficiency* implies that the wrong combination of inputs or the wrong technology is being used and that application of a better combination and/or an available better technology could draw more output from the inputs.

Productive inefficiency, our principal focus here, corresponds to the way health care sector waste is most often characterized in news reports and consultant studies. At several points we mention a related concept, allocative efficiency, which considers whether society has reached the right trade-off in allocating resources between different uses, for example, between producing health care and producing other goods. Addressing allocative efficiency would emphasize changing (reducing) prices of health care services so as to divert resources away from health care and toward other sectors. (The causes and solutions underlying high health care prices in the United States are discussed at length in Gross and Laugesen's article in this issue.) It is also important to note that here, as in other contexts, inefficiency is only one metric on which to assess a health care system—inefficiency does not capture the effects of the system on the distribution of winners and losers.

Substituting the economist's notion of productive inefficiency for *waste* immediately casts doubt on some of the culprits identified by pundits and consultants. PriceWaterhouseCoopers (2008), for example, identifies obesity and overweight as causes of inefficiency in the US system. These may be serious problems, but classifying them as sources of inefficiencies in the system merely muddies the water. Perhaps people should eat better and exercise more, but some derive happiness, comfort, and leisure from not doing so, and although their trade-offs may not maximize population health statistics, nothing is gained by dubbing them inefficient. Insofar as obesity derives from genetics, metabolism, social circumstances (for

instance, lack of easy access to fresh foods, and a built environment that discourages walking and biking), or cultural pressures (advertising, for example), ascribing it to inefficiency in the health care system is analytically misleading. By our definition, only obesity that was a byproduct of poor health care—including culturally incompetent advice about weight loss—would be a sign of inefficiency. Finally, even if one grants the implausible proposition that major drivers of obesity are somehow caused by "the" health care system, it is more doubtful still that this system, including its medical delivery component, has the capacity to change them.

These points argue in favor of treating obesity largely as an input to the health care system rather than an output. The US obesity rate is about twice the OECD average, and the US health care system therefore must expend resources to counteract obesity's health consequences—resources that its developed-nation peers can instead allocate to other uses (OECD 2017). This lens can also be applied to social determinants of health, where a large literature has made the case that such factors as economic instability, low-quality education, food insecurity, and other structural features of people's economic and social lives can harm health (Heiman and Artiga 2015). To the extent that these factors are inputs to the health system rather than outputs, US health spending might outpace that of other countries without necessarily making our health care system relatively inefficient.

Defining and Estimating Efficiency

The concept of efficiency is highly context dependent, that is, hard to divorce from the particular features of different types of markets. Under the approach we take, efficiency will also depend on the characteristics of patients, including both their health status and their values and preferences. In theory, competitive markets move constantly toward more efficient forms of production due to the relentless pressure of consumer demand, which, all else equal, favors goods with lower prices. As the story goes, producers that are less efficient than their competitors will be unable to operate profitably at the prices they charge and will be driven from the marketplace—or into the arms of consultants who suggest ways to improve efficiency. A coffee startup that fails to match the organizational efficiencies of Starbucks will not prosper. Dusty and inefficient small-town grocers will be overwhelmed by the efficiencies of a Wal-Mart. (To be sure, such "laggards" might survive by occupying a niche that caters to consumers who dislike Starbucks or Wal-Mart, but the scope of such a market, hence the number of such survivors, is inherently limited.) Bartelsman,

Haltiwanger, and Scarpetta (2013) find evidence that such a process plays out in industries typically thought to be competitive, such as the manufacturing sector in the United States and Western Europe, but not in areas with less competition, such as manufacturing in post-Soviet transition economies. A large literature finds evidence of this process of market selection and productivity improvement across US sectors, including cement and ready-mixed concrete, steel production, and telecommunications (Hortaçsu and Syverson 2007; Collard-Wexler and De Loecker 2014; Olley and Pakes 1996).

A key approach to studying efficiency in the US health care system—though certainly not the only one—is to ask whether it exhibits the same signposts of competition found in other industries. Where competitive forces operate, low-productivity health care providers should find themselves ignored by patients, experiencing concomitant losses in profits, shutting down, or making organizational changes to raise their performance. On the other hand, if competitive forces fail in the health care sector, low-productivity producers will not be penalized financially; they will continue their wasteful operations. There are ample reasons to take the latter view that the US health care system tolerates inefficiencies that would not survive in "normal" markets—that health care is "different." Indeed, the founding work of health economics outlined the features of the sector that set it apart from the rest of the economy (Arrow 1963). Health care consumers may lack information on quality, and reimbursement has historically done little to punish low-productivity producers (Cutler 2011; Skinner 2012). The predominance of nonprofit, government-owned or -subsidized institutions and small, provider-owned organizations could also prevent differences in efficiency from translating into entry and exit (Chakravarty et al. 2006). These features of the sector would seem to limit the scope for consumer demand to drive the sector to ever greater heights of productivity, stanching the potential for producing more health at lower costs.

Naturally, there are caveats to this line of thinking. These unique features of the health care sector may be operative in some contexts but not in others; even if competition could be fostered, it could drive more limited efficiency improvements for certain populations, conditions, or geographies. Moreover, this logic describes competition over health care providers, and competition over health insurers yields more ambiguous theoretical predictions. While we do not focus on insurer competition here, recent work has found that it typically (though not always) improves welfare for consumers (Ho and Lee 2017).

There are two key lines of research on health care provider efficiency in health economics. One line of research, called frontier analysis, makes comparisons among suppliers within a sector at a point in time and explores which characteristics of health care providers (usually hospitals) are associated with operating at maximum efficiency. Unfortunately, the results to date are inconclusive and not terribly useful for policy. Studies that examine structural characteristics consistently show ambiguous effects on performance. A review identified some studies that found for-profit hospitals to be more efficient than nonprofits, and others that found the opposite (Rosko and Mutter 2008). No consistent differences appeared in the efficiency of hospitals within versus outside larger systems, and comparisons of the efficiency of general and specialty hospitals yielded unclear results. Competition among hospitals sometimes improves efficiency, but sometimes it leads to excessive investment in high-cost technologies—an efficiency-reducing arms race (Rosko, Wong, and Mutter 2017). Many studies have reported that hospitals facing cost pressures, such as those with large shares of Medicare or Medicaid patients, are more efficient, but some have found the reverse (Rosko and Mutter 2010).

The literature on frontier analysis does report a few less equivocal findings. Inefficiency is associated with subsequent closure of hospitals, especially nongovernment ones. Note that this pattern of closure or inefficient hospitals is consistent with the existence of an efficient health care system that operates through driving inefficient individual producers out of the market. Critical-access hospitals (a category created by the federal government in 1997 to channel extra Medicare payments to hospitals in areas where alternative facilities are lacking or cannot be reached easily) are less efficient than others, while hospitals in markets with higher penetration of managed care are more efficient. Like the obesity example noted above, however, these findings raise questions about what *inefficiency* means. Public hospitals and critical-access hospitals exist precisely to provide hospital services in areas where even an efficient provider could not do so, which is to say that their output goes beyond producing hospital days or even quality-adjusted life years to include, for example, the sense of security that accompanies timely access to a source of care and the social desirability of retaining facilities in small, remote communities.

The second line of research uses a different set of techniques, borrowed from a line of economic research on productivity of firms, to estimate the performance of health care providers as a set. Some of this work looks at health care productivity relative to that of other sectors. Chandra et al. (2016b) compare dispersion in productivity in the hospital industry to the

ready-mixed concrete industry. Theoretically, as consumer demand becomes a more powerful force in markets, lower-productivity firms should find it more difficult to survive, and dispersion should shrink. Thus, the finding of the study that hospital productivity dispersion is *lower* than that of concrete plants suggests, contrary to the popular wisdom, that market forces play a substantial role in health care.

Yet comparisons across sectors raise a thorny question about the comparability of outputs; for example, does a given percent change in survival days have the same social value as the same percent change in cubic meters of concrete? Regardless of whether the comparison across sectors is appropriate, the point remains that variations are ubiquitous. The benchmark should surely not be zero variation—even industries thought to be competitive would fail this test.

Still, to sidestep the difficulties of comparing health care to other industries, some research has kept the comparisons within the health care sector, looking across points in time or patient groups. Romley, Goldman, and Sood (2015) analyze the hospital sector from 2002 to 2011 and show that productivity grew significantly, consistent with the improvements in performance that one would expect in a competitive market. Likewise, Chandra et al. (2016a) show that, across most quality metrics, higher-performance hospitals tend to be bigger and are more likely to grow, results that are again consistent with competition and active consumer demand. They also find that these relationships tend to be stronger for patients with more scope for exercising choice. While these results are consistent with consumer demand raising the performance of the health care sector, it is possible that market failures and related features of the sector still prevent this force from having a bigger impact on efficiency.

Evidence from Demand-Side Policies

Even if competitive forces drove improvements in efficiency, demand-side policies to spur further efficiency improvements would have significant value. These policies have a long history in the health care sector, though results tend to be mixed. The classic demand-side instrument is cost sharing (i.e., deductibles, copays, and coinsurance). According to the RAND health insurance experiment of the 1970s, in which around eight thousand individuals were enrolled in plans of varying cost-sharing levels, the instrument is remarkably effective at reducing health care spending but perhaps not efficiency: with increased out-of-pocket costs, consumers cut back their expenditure on both high- and low-value services (Manning

et al. 1987). A more recent quasi-experimental study found similar results from imposing high deductibles (Brot-Goldberg et al. 2015). While RAND found little impact of cost sharing on health status, the reduction in high-value services raised the question of whether cost sharing was an excessively blunt instrument.

In response to these findings, value-based insurance designs (V-BIDs) seek to tailor the level of cost sharing to the value of the service, raising consumer payments for low-value services, reducing payments for high-value services, or both (Chernew, Rosen, and Fendrick 2007). The MI-FREEE study, for example, randomized some patients with heart attacks to receive free coverage of preventive medications. Medication adherence improved, adverse health events declined (though not for the main study outcome), and total expenditure held steady (Choudhry et al. 2011). Public and private insurers are currently experimenting with V-BIDs with the aim of improving the efficiency of these programs (National Conference of State Legislatures 2016).

The V-BID approach adds complexity to the coverage structure of health insurance. Though finely grained cost sharing may help direct patients to higher-value services, the literature on consumer behavior has found that the complexity of insurance contracts confuses consumers and confounds their choices of plans (Loewenstein et al. 2013; Ericson and Starc 2016). Future work on V-BIDs will thus have to acknowledge the limits of consumer attention and the potential for complex insurance designs to backfire. The behavioral evidence does not rule out improvements in efficiency from V-BIDs, but it does suggest that transformative gains will require other instruments.

Evidence from the Supply Side

Managed Care Organizations and Accountable Care Organizations

The classic source of supply-side interventions to raise efficiency is managed care. Insurers that engage in managed care may integrate more closely with providers to facilitate monitoring of their utilization, use payment methods like capitation that encourage frugal expenditures, and limit (or closely review) service renderings, medical testing, and referrals. The clearest difference between managed and unmanaged care was historically the selection of patients—lower-cost patients typically pick plans with more aggressive management, which means at least part of the managed

care cost advantage has nothing to do with efficiency (Glied 2000). Yet there is also some evidence that managed care succeeded at reducing the growth in costs, and it may be partly responsible for the historically exceptional flat path of health care costs during the late 1990s (Pinkovskiy 2014). The extent of penetration of markets by managed care is amenable to policy, but this is not a variable the value of which a hospital can choose for itself. Insofar as managed care plans enter and succeed in markets for reasons that go beyond putting pressure on prices, comparing the efficiency of hospitals in areas with diverse levels of managed care penetration amounts to comparing apples and zucchini, though it may help address the question of whether policy should encourage managed care expansion.

More recently, policy has shifted to foster accountable care organizations (ACOs). Where managed care involved greater oversight of care by insurers, accountable care aims to raise efficiency by adjusting the incentives faced by providers. Historically, providers have been paid on the basis of volume of care. When providers join an ACO, these volume-based payments are partially (or wholly) replaced by capitation payments to the organization, like per-member per-month payments, or spending targets in which the ACO shares savings when spending is under target and (potentially) is at risk when spending is over target. The capitation rate or target typically depends on quality-of-care metrics, giving ACOs an incentive to increase quality scores. Through this payment approach, ACOs hope to raise the value of care while reducing the volume of it.

Initial evidence in favor of ACOs came from Massachusetts, where an early private insurance ACO contract yielded reductions in cost and improvements in quality (Song et al. 2014). Since then, ACOs have expanded, particularly in Medicare and Medicaid. Evaluations of these programs typically find statistically significant improvements in efficiency, though these effects tend to be modest in magnitude (Colla and Fisher 2017). Medicare ACOs appear to reduce overall spending and improve quality measures, especially patient satisfaction (McWilliams et al. 2014, 2016). One way ACOs achieve these gains is by targeting wasteful care; for example, the Medicare Pioneer ACO program was found to reduce spending on low-value services by about 5 percent (Schwartz et al. 2015). Still, whether ACOs can drive more substantial gains in efficiency remains an open question. For example, given evidence that physicians provide unwarranted care because they have beliefs that contradict with evidence (e.g., Cutler et al. 2017), it may not be realistic for ACO incentives to override those beliefs. Moreover, these policies could have unintended

deleterious effects, such as encouraging provider consolidation with concomitant increases in market power and prices.

Payment for Performance

Related to ACOs, one strategy aimed at improving the quality of providers is paying for performance (P4P)—tying payments not to the provision of services but to the results achieved. At the provider level, over the past decade the federal government has instituted an alphabet soup of P4P programs: HACRP (Hospital-Acquired Conditions Reduction Program), HRRP (Hospital Readmissions Reduction Program), HVBP (Hospital Value Based Purchasing), and so on. In general, these programs involve tracking indicators of hospital quality and seek to reward high performers and penalize poor performers. Yet results to date have been mixed. Evidence is clearest for the HRRP, which was associated with a meaningful decline in readmissions, albeit one that leveled off once the incentives were fully phased in (Zuckerman et al. 2016). Research has failed to demonstrate any such benefits for HVBP, which sought to incentivize a broad set of evidence-based practices and patient experience measures (Figueroa et al. 2016). P4P has also sparked fears that hospitals are changing their treatment or billing patterns to improve quality measures without actually improving quality of care—the classic multitasking problem in economics, otherwise known as "teaching to the test." For HRRP, this could have meant keeping returning patients in the emergency department under observation to avoid triggering an inpatient readmission. Zuckerman et al. (2016) show that these fears were not realized. More recently, research has suggested that changes in hospital coding of patients in billing may be leading to overstated reductions in readmission (Ibrahim et al. 2018). The "gaming" of measures is a potential issue for any performance pay scheme.

Those who point to payment mechanisms as the source of inefficiencies must contend with the failures of payment reforms to robustly improve overall quality (even if some measures improve) and reduce costs. All in all, Figueroa et al. (2016: 336) summarize the literature as follows: "Many pay for performance programs are largely ineffective in improving patient outcomes" and so "policymakers should consider new approaches to achieving better outcomes." Still, surely there are lessons to be learned from the success of HRRP in comparison to HVBP. The two programs differed in the complexity of incentives, which may have proved pivotal: for HRRP, avoiding payment reductions depended on constraining readmissions, whereas for HVBP, the incentives applied to a host of metrics

with improvements that translated to payoffs of varying magnitudes (Norton et al. 2016). Readmission reduction is also a relatively narrow, well-defined goal, and improvements in this quality measure may be straightforward to detect and thus reward (though as recent literature on HRRP suggests, straightforward goals may also be easier to manipulate with billing). As policy makers iterate, they may find that P4P programs that acknowledge these lessons lead to more reliable efficiency gains, though this remains an untested proposition.

Electronic Medical Records

Inefficiency also stems from failing to invest in efficiency-enhancing technology, which would allow more or better output from the same inputs. In principle, for example, the electronic medical record (EMR) is an efficiency-enhancing technology. Rather than spending the valuable (and expensive) time of the doctor and patient reviewing the latter's medical history, the course of the present illness, allergies to medications, and so forth, whenever the patient enters a new institution, sees a specialist, or is admitted to the hospital, the EMR allows an instant survey of the situation. It works something like Wikipedia—an editable document that can be constantly corrected and updated—wherein anything the patient left out the first time can be added the next time. As the story goes, it improves quality, allowing information on incapacitated patients to be drawn on the fly, for instance, and can remind the physician that the drug he or she prescribed is a bad choice because the patient is allergic. The EMR should also help the physician in difficult diagnostic circumstances, suggesting more useful laboratory tests or more cost-effective treatments. At least it can do all this in theory.

In contrast to the great hopes assigned to EMRs, there is limited evidence that these systems have improved efficiency. Agha (2014: 28) used a quasi-experimental approach and concluded that "installations between 1998 and 2005 made little progress towards improving the quality and efficiency of the American healthcare system." McCullough et al. (2016), studying 2002–7 data, also found no impact on health outcomes for the average patient, though they show that quality improved for the subset of patients with complex, high-severity conditions. Even if EMRs do improve quality, they may also facilitate hospitals' use of revenue-raising billing practices, increasing costs. Li (2014) shows that when hospitals adopt EMRs, they subsequently tend to bill Medicare for higher-paying diagnoses, raising

Medicare payments and thus the cost of providing care (a result also found in Agha 2014, albeit with a smaller magnitude).

A limitation of these studies is that their data largely predate the recent wave of EMR adoption following the 2009 Health Information Technology for Economic and Clinical Health (HITECH) Act, which incentivized EMR take-up. Between 2008 and 2011, the EMR adoption rate rose by 29 percentage points (Dranove et al. 2015). It is possible (though not yet shown) that more recent EMR acquisitions were more effective at raising quality and lowering costs. In addition, the efficiency payoffs from EMRs may appear only after long lags, as hospitals may be slow to learn how to use the platforms effectively. With more recent data becoming available, research will be able to investigate whether EMRs are now having a clearer effect on efficiency.

Lastly, even if the empirical evidence on the most recent wave of EMR adoption finds null effects, alternative EMR policies may still yield efficiency improvements. For example, barriers to interoperability remain, and the gains from adoption may appear when systems allow providers to seamlessly share records (Adler-Milstein 2017). Given the absence of clinical gains from EMRs in systematic reviews, including studies in unitary health insurance systems (for a review of reviews, see, e.g., Black et al. 2011), this argument, while plausible, is still speculative—though the drive to improve the system through better medical record systems is sure to persist.

Administrative Waste

Much of the literature on waste emphasizes the idiosyncrasies of health care itself as the source of inefficiency. Another, parallel literature, however, situates the source of waste with administrators, not with health care providers. This line of argument suggests that the Byzantine US health insurance system leads to excessive expenditures both in the provision of insurance and in the offices of health care providers who must cope with all the variation in insurance provision.

It is certainly true that the costs of insurance administration are higher in the United States than in countries with more unified health insurance systems, especially those that take advantage of other existing tax and enrollment mechanisms to collect revenue and administer payment. It is less clear that these savings in administrative costs (at both the insurer and provider levels) generate a more efficient system overall. While the United States has high administrative costs and high overall costs, there are very

substantial variations in administrative costs among countries with universal health insurance, which do not translate directly into variations in overall costs (Glied 2009).

Moving to a single-payer health insurance system would entail many changes to the US health care system and would require political action. But many more modest changes to the administrative costs of the system could be achieved without government intervention yet do not occur because the parties involved find other costs exceed the administrative savings. For example, if there were substantial economies of scale in the administration of insurance, larger insurance companies would operate at less cost than smaller ones. The literature to date, however, suggests that larger insurers have few cost efficiencies over smaller ones and there has been continued entry of new insurance companies over time (Blair, Jackson, and Vogel 1975; Engberg et al. 2004). There are clear and persistent cost efficiencies of selling insurance to larger employers rather than smaller groups (Gruber and Madrian 2004; Buchmueller, Carey, and Levy 2013). Unfortunately, there is little evidence that these economies of sales costs can be reproduced through selling to groups of smaller employers or to individuals organized outside of employment groups, or that these savings exceed the gains large companies achieve in buying other goods and services (Glied 1997; Brown, Hamilton, and Medoff 1990). If provider administrative costs were an important component of spending, integrated staff model health maintenance organizations, which have low internal administrative costs, would gain market share. Again, there is little evidence of such market share growth. The administrative cost savings of managed care may not be sufficient to offset other features of these contracts that providers and patients do not like. Finally, if providers found insurer fragmentation very costly to address, they would achieve many of the provider-side savings of managed care by contracting with a small number of insurers. Instead, most providers contract with multiple insurers, and this strategy appears to increase providers' net revenues (Ly and Glied 2014).

Fragmentation

The fragmentation of the US health care system may also contribute to inefficiency by making it more difficult to implement quality improvement strategies (Cebul et al. 2008). Health care providers typically contract with multiple insurers, and these insurers may vary in their strategies for payment and for improving the quality of care. Providers facing divergent

incentives may muddle through, following a path that does not fully respond to any of these incentives (Glied and Zivin 2002; Frank and Zeckhauser 2007). If fragmentation reduces incentives for quality improvement, however, US markets with dominant insurers should exhibit higher quality or lower costs. Research on insurer consolidation does not support this hypothesis—while dominant insurers are able to reduce prices, the gains are not passed along to consumers (Dafny, Duggan, and Ramanarayanan 2012).

Fragmentation can also occur on the provider side: for a given episode of care, patients may receive treatment from a small number of practitioners who work closely together, or they may be treated by many providers who take on more specialized roles. As the story goes, specialization makes coordination difficult, leading to fragmented care. Fragmentation is associated with high spending at both the practitioner and geographic level (Frandsen et al. 2015; Agha, Frandsen, and Rebitzer 2017). Patients treated by primary care physicians who practice medicine in a fragmented style have relatively poor outcomes (Frandsen et al. 2015). Yet even if one accepts provider fragmentation as a cause of inefficiency, efforts to address it through coordination have yielded cost savings and quality improvements inconsistently at best. A federally mandated randomized evaluation of fifteen care coordination programs declared that care coordination "holds little promise of reducing total Medicare expenditures for beneficiaries with chronic illnesses" (Peikes et al. 2009: 613). Reviewing the evidence, McWilliams (2016: 2219) calls the focus on care coordination "magical thinking that we can spend less by doing more" and urges those seeking to raise efficiency to "change the conversation" to other reforms.

Summing Up

All told, even when the loaded term *waste* is replaced by *inefficiency*, generalizations about the sources and amounts of it should be approached circumspectly. Even inefficiencies worthy of the name may derive from forces that lie beyond the scope (or occupy mainly the outer perimeters) of "the" US health care system, and even those rightly attributed to the system may evade an easy resolution.

Evidence from the Literature on Variations

The most arresting versions of the inefficiency critique draw, as Orszag (2009) points out, on comparisons of Medicare spending and outcomes

across different regions. These studies reveal variations that are large and—given that outcomes do not vary systematically with costs—seemingly unjustified (aka wasteful and inefficient). Not long ago, few Americans doubted that what mainly drives the delivery of medical care, and the resources devoted to it, is the objective, scientific judgment of well-trained medical professionals (Starr 1982). Since the early 1970s, however, John Wennberg and other researchers challenged this reassuring proposition by documenting extensive variations in the supply of services delivered to populations, living in areas both small and larger, the demographic and other characteristics of which fail to explain the discrepant patterns.

These studies are the main source of the eye-popping—and ubiquitous—estimate that at least 30 percent of US spending on health care is wasted because doctors do not uniformly practice according to proper (evidence-based) standards of care. Variations research, perhaps more than any other body of work, has corroded the confidence of policy makers that what the nation pays for health care reflects a defensible matching of treatments to needs and has catalyzed the quest for evidence-based medicine and for guidelines, protocols, algorithms, standards, and other correctives designed to discipline the decisions of physicians. And this critical spirit now extends beyond analysts and makers of health policy to the general population and the generalist politicians who represent it. A famous case in point is an article by Atul Gawande (2009) in the *New Yorker*, which spotlighted much higher Medicare spending in McAllen, Texas, than in outwardly similar El Paso—a riveting revelation that prompted President Barack Obama to echo Wennberg's long-standing admonition that policy makers should find ways to bring "high rollers" closer to the average and to emulate "high-performing" systems such as the Mayo Clinic.[1]

Comparisons of Medicare spending across regions are in some ways well suited for identifying inefficiencies. Prices, established centrally, vary little across the country, so differences in spending can plausibly be read as differences in use of resources. The populations studied face similar coverage constraints and are relatively similar in age, income, and work status. Nonetheless, the variations literature has come under criticism.

There are some signs that the basic facts—that practice patterns vary hugely, unjustifiably, and wastefully—while preserved, are not as stark as the initial Dartmouth work suggested (Wennberg et al. 2002). Since the key

1. Gawande 2015 is a coda to this case study, noting that cost differences between the two regions have since narrowed. This work points to the role of ACOs in McAllen, Texas. However, the body of evidence that we cite finds relatively small impacts of ACOs—the results of Gawande's case study do not seem to be playing out more generally.

Dartmouth findings pertain to individuals over age sixty-five covered by the fee-for-service Medicare program, they say little about variations outside this population. Studies analyzing the under-sixty-five population with private insurance data find different results. Exploration of insurance records for health care institutions in McAllen and El Paso showed that the pattern of high use and high costs in the former city was reversed for younger patients (Franzini, Mikhail, and Skinner 2010). Systematic studies of the region-level correlation between Medicare over-sixty-five spending and private-insurance under-sixty-five spending find coefficients that are small in absolute value, sometimes negative (Chernew et al. 2010) and sometimes positive (Cooper et al. 2015). That said, this research also shows that prices of services, rather than the quantities of services rendered, are the main driver of variations in spending for the privately insured. Focusing on quantity variation alone makes the Medicare and private insurance variations positively correlated: Cooper et al. (2015) found a coefficient of 0.4 for overall utilization, while Chernew et al. (2010) found a coefficient of 0.6 for inpatient utilization. There is thus evidence that geographic regions have practice patterns that carry across patient populations, even if their practice style for Medicare patients is an imperfect predictor of their approach for other patient groups.

Another line of attack has questioned whether the observed variations can reasonably proxy for inefficiency. If McAllen and El Paso shared the same health care "production function" that transforms inputs like patients, physicians, and hospitals into outputs like survival, it would be fair to say that McAllen is inefficient: it uses more inputs than El Paso but gets about the same level of output. However, as Garber and Skinner (2008) describe, such variations could arise even under productive efficiency, the form of efficiency we focus on throughout this review. One story is that the regions share production functions, but McAllen expends its additional inputs on health care services that have limited health payoffs and thus fails to raise output much above that of El Paso. Perhaps few high-value services remain beyond those already performed in El Paso. This scenario is productively efficient because both regions are realizing as much health as possible considering their service utilization. However, it raises questions of allocative efficiency—the additional resources that McAllen deployed for health care should more appropriately be allocated to other sectors.

The two regions may utilize different levels of inputs because their production functions are different, too. Perhaps McAllen's high utilization is optimal, and policies to reduce its utilization to El Paso's level would reduce health output (e.g., survival) to a level below that of El Paso. This

scenario is another in which variations occur alongside productive efficiency. Regions could have different production functions because they specialize in different treatment approaches. Chandra and Staiger (2007) look at specialization in heart attack treatment and derive variations in health care utilization across regions that are productively efficient because they reflect differing production functions.

In production function parlance, the Dartmouth literature (Wennberg et al. 2008) has pointed to differences in input utilization across regions, while Chandra and Staiger (2007) highlight differences in technology.[2] The argument of Chandra and Staiger does not preclude gains in efficiency, but it does suggest that achieving them will be more difficult than simply reducing spending. If high-cost regions like McAllen are spending money on care that has no clinical payoff, improving efficiency is an exercise in identifying the wasteful care and barring it. But if McAllen is a costly region because its health care production function has evolved to rely on costly treatments, reducing its costs without harming patients will require practitioners and facilities to make fundamental changes in how they practice medicine.

The policy conclusions taken from the variations literature generally (explicitly or implicitly) assume that variations are driven by suppliers. Variations have been tied to differences in the underlying supply of services, to differences in the training of providers, or to uncertainty about the best medical strategies. Such supply-driven variations suggest that more attention to equalizing the supply of services or to increased evidence development would reduce variations. If reductions in variation drove providers to practice in lower cost ways, efficiency might be improved. Of course, this is a big "if"—the optimal level of supply and the optimal evidence-based practice might drive care in more costly directions.

There is also, however, the possibility that differences in demand, not just in supply, drive variations, suggesting that the variations say less about the potential efficiency frontier and more about the wide heterogeneity in patient preferences and needs across the United States. For example, areas with lower costs and higher quality are also home to fewer obese, diabetic, and sedentary people (Sheiner 2014). In response to concerns like these, the research has sought to account for potential differences in the characteristics of patients in order to isolate variations that are due solely to

2. In a development that unites these views, new research by Chandra and Staiger (2017) suggests a role for both inputs and technology. This work shows that providers differ both in their ability to correctly allocate resources between treatment options and in their productivity at performing these treatments.

supply-side factors. One approach is to use regression adjustment to control for differences in health status across patients. Yet the markers of poor health that researchers typically use are derived from bills for medical services, leading to the criticism that increased use of services leads to more frequent coding of these conditions (Song et al. 2010). Indeed, regions appear to have their own variations in diagnostic coding intensity irrespective of the health status of their patients (Finkelstein et al. 2017). There is also the question of whether a marker of health status is a confounding factor in spending or an output of spending itself (Skinner 2012). Debates about what should and should not be taken as given rage on.

Research has sought to sidestep this thorny statistical issue by analyzing how health care utilization changes when patients move across regions. A recent analysis comparing people who move to regions with more and less intense patterns of practice suggests that about half of the variation in Medicare health care utilization across regions can be attributed to the supply side, with the remainder due to differences in patient characteristics, preferences, or needs (Finkelstein, Gentzkow, and Williams 2016). To the extent that patients form habits based on the health care systems they experience through their lives, this research strategy could be thought of as a lower bound on the role of the supply side, making it notable that it still attributes half of variations to supply (the study does not find clear evidence of habit formation but cannot rule out habits that develop earlier in life).

Some nuanced variations studies examine the use of specific treatments and procedures. Skinner and Staiger (2015) look at the adoption of beta-blockers, aspirin, and reperfusion across hospitals and show that the adoption of these interventions can explain large variations in survival improvements across hospitals. Studies at the region level have analyzed the underuse of beta-blockers and overuse of back surgery in different regions (Skinner 2012). This growing literature shows, however, that patterns of overuse are not consistent across regions, and high-utilization regions are also more likely to underuse evidence-based treatments (Baicker and Chandra 2004). It is apparently not the case that some places do too much of everything while others do too little. Moreover, as Chandra and Staiger (2007) point out in their analysis of heart attack treatment, patterns of care themselves within a region shape efficiency in the use of given technologies. As their model proposes, in areas where cardiologists frequently place stents to treat heart attacks, providers get better at placing stents and can usefully perform it on a broader range of patients. In areas that specialize in medical management, the quality of that treatment is better and giving these patients stents would worsen their outcomes.

Summing up, the body of evidence suggests that supply-side variations are real and meaningful, though likely muted relative to the eye-catching numbers that originally made headlines. These variations are indicative of meaningful differences in efficiency across regions that could be the target of policy. Yet even if one concedes that variations are excessive, unjustified, and a prime source of high health care costs, it remains unclear how to fix the problem, at least without worrisome side effects. What Vladeck (1984) found most striking about variation thirty years ago remains no less striking today: "How much of it there is, how unsystematic it appears to be, and how much of it remains unexplained by even the longest and most complicated regression equations." Now as then, analysts and policy makers ought therefore to resist the temptations to demand uniformity (Vladeck 1984), which may detract from quality by shrinking the necessary scope of creative professional judgment as providers wrestle with the specifics of the cases individual patients present.

The variations literature continues to be refined, and analysts' understanding of what varies and why continues to expand. There remains, however, a gap between evidence (however well developed) of variations and evidence of inefficiency; the latter term implies that some managerial or organizational technology could systemically improve the use of resources. Focused as it is on the regional level, the variations literature cannot easily identify what this "secret sauce" might be. Efficient regions are composed of efficient providers, and leveraging that efficiency implies scaling up the practices of these providers. Do health systems in Minneapolis know how to deploy better managerial and organizational technologies than health systems in Miami? Perhaps, but what little evidence there is suggests that this is not the case. When efficient systems enter new markets, they apparently do not take their efficiencies with them (Wennberg et al. 2008). The performance of the Mayo Clinic in Jacksonville, Florida, more closely resembles that of other Jacksonville hospitals than that of other Mayo Clinics. It is hard to create policies that encourage the efficient practice of medicine when the sauce that flavors the efficiencies remains secret.

Conclusion

There is little question that the United States is an international outlier in terms of its health spending. Conventional wisdom views this spending as evidence enough that the system is wasteful, and we have taken a critical

view of that wisdom. By sharpening the distinction between waste and inefficiency, we claim that the conventional wisdom faults the health care system for factors at least partly outside its purview, such as obesity. Still, there is evidence that the US system fails to achieve levels of efficiency seen elsewhere. The Dartmouth literature, despite its caveats, implies that there are plausible models of care provision that operate at lower cost. Comparisons across the OECD, in turn, suggest that it is possible to provide high-quality care while spending less than we do.

Recognizing the presence of inefficiencies, however, is not the same thing as addressing them. Variations in preferences and needs, the disparate insurance coverage and social circumstances of patient populations, and the many unmeasured dimensions of quality make it challenging to pinpoint and eliminate inefficient practices, at least through continued incremental changes. The complexities of health care management cannot be distilled into an instruction manual. Health care policy makers and managers surely ought to work to identify and encourage efficiency-enhancing standards and inducements, but they should not expect to find foolproof strategies and to score easy victories. In this respect health care is not so different from other less idiosyncratic economic sectors. Chandra et al. for example, found that, contrary to the conventional wisdom, which holds that hospitals exhibit variations in productivity higher than those in the rest of the economy, productivity differences in the treatment of heart attacks across hospitals were smaller than variations in "narrowly-defined manufacturing industries" such as ready-mixed concrete (2016b: 99).

Competitive markets move continuously toward efficiency, but this progress is a process, not an outcome. The high cost and importance of health care, and its large share in both private and public expenditures, justify taking a more stringent look at the sources of inefficiency at every point in time and developing strategies to accelerate our progress toward efficiency. There is surely plenty of scope for efficiency-enhancing improvements. Indeed, this process may have already begun as policy makers have started to experiment with supply- and demand-side tactics, such as P4P, V-BID, and ACOs. Our review suggests that none of these approaches alone will transform US health care. Perhaps as these policies play out, their beneficial effects compounding, the US system will evolve toward the efficiency frontier. But the evidence suggests that getting more from less in our health care system will be challenging, time consuming, and even potentially painful. Even the most potent and effective medicines, unlike quack panaceas, often have side effects.

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