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Billing And Insurance–Related Administrative Costs: A Cross-National Analysis

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ABSTRACT Billing and insurance–related costs are a significant source of wasteful health care spending in Organization for Economic Cooperation and Development nations, but these administrative burdens vary across national systems. We executed a microlevel accounting of these costs in different national settings at six provider locations in five nations (Australia, Canada, Germany, the Netherlands, and Singapore) that supplements our prior study measuring the costs in the US. We found that billing and insurance–related costs for inpatient bills range from a low of $6 in Canada to a high of $215 in the US for an inpatient surgical bill (purchasing power parity adjusted). We created a taxonomy of billing and insurance–related activities (eligibility, coding, submission, and rework) that was applied to data from the six sites and allows cross-national comparisons. Higher costs in the US and Australia are attributed to high coding costs. Much of the savings achieved in some nations is attributable to assigning tasks to people in lower-skill job categories, although most of the savings are due to more efficient billing and insurance–related processes. Some nations also reduce these costs by offering financial counseling to patients before treatment. Our microlevel approach can identify specific cost drivers and reveal national billing features that reduce coding costs. It illustrates a valuable pathway for future research in understanding and mitigating administrative costs in health care.

Administrative costs have been estimated to consume approximately 25–31 percent of total health care spending in the United States,[1–6] with approximately 82 percent of these costs attributable to billing and insurance–related (BIR) tasks.[7] Because these transaction costs are deemed to add no value to health care delivery, and as other industries manage financial transactions at far lower costs (for example, paying for services with a commercial credit card adds only 2 percent to the cost of the transaction),[8] BIR costs offer prime targets for reducing wasteful health care spending.[9]

In a 2018 study, Phillip Tseng and colleagues measured BIR administrative costs at an academic health system in the US by carefully examining the processes required to perform physician BIR activities.[5] This study revealed that the estimated processing time and cost of billing for the health care provider studied varied from thirteen minutes and $20.49 per bill for a primary care visit to 100 minutes and $215.10 for an inpatient surgical procedure. These BIR costs represented 14.5 percent of the total professional revenue for primary care visits and 3.1 percent of total professional revenue for inpatient surgical procedures. The high BIR costs were comparable to

those found in studies conducted before the US health sector's widespread adoption of electronic health records (EHRs), suggesting that EHRs have not brought the widespread efficiencies that enthusiasts predicted.[5]

The study by Tseng and colleagues[5] raises as many questions as it answers and highlights the need for cross-national context. Are BIR costs of this magnitude an inevitable consequence of the US health care system's reliance on private insurance, as many single-payer advocates suggest, and thus do other national systems that rely on private insurance exhibit similarly high BIR costs? Or are BIR costs in the US shaped by other regulatory policies, and might the US reduce these costs without wholesale health care reform? To address these questions, and to pursue a deeper understanding of how specific BIR activities contribute to high administrative costs in the US, we assembled an international team that, from 2018 to 2020, replicated the costing methodology used by Tseng and colleagues to study one US site[5] at six additional sites in five high-income countries that represent a diversity of national systems: predominantly private insurance in Germany and the Netherlands, public insurance in Canada, Australia's mix of publicly and privately funded payers, and Singapore's combination of publicly subsidized providers and compulsory savings plans.

Prior Cross-National Comparisons Of Administrative Costs

Multiple studies have concluded that administrative costs in the US health sector are a significant source of waste,[6,7] and cross-national comparisons have documented that administrative and BIR expenses in the US significantly exceed those in Canada[1,10,11] and other Organization for Economic Cooperation and Development (OECD) nations.[2,4] For example, David Himmelstein and colleagues, using data from 2010 and 2011, calculated that the percentage of certain hospital activities consumed by administrative costs in the US was the highest (25.3 percent of total hospital expenses) among eight countries.[2] The authors concluded that hospital administrative costs were lowest where hospitals received fixed lump-sum funding (global budgets) from single-payer systems, such as Scotland (11.6 percent) and Canada (12.4 percent) and were intermediate in nations in which hospitals negotiate prices for a subset of health care services, as in the Netherlands (19.8 percent) and England (15.5 percent). A more recent analysis using data from the period 2013–16 compared health care spending in the US with that in ten other high-income countries and found that the administrative costs of managing health systems were 8 percent in the US compared with 1–3 percent in the other countries.[4]

The methods employed in these studies to measure and compare BIR costs varied significantly, but none used direct microlevel measurements. Lawrence Casalino and coauthors, for example, used surveys to assess how much time physicians and other health care workers devote to BIR activities and then estimate the cost of that labor.[11,12] Alexis Pozen and David Cutler tabulated the number of employees dedicated, in whole or in part, to BIR activities and then estimated total costs on average wages.[10] And Himmelstein and coauthors estimated BIR expenditures from cost data reported by health care providers to national databases.[1–3]

Our study adds to this literature by calculating costs based on the activities and personnel actually used to perform BIR activities at specific sites and for specific processes. This method, in addition to calculating BIR costs directly rather than indirectly, offers opportunities to identify and compare specific drivers of these costs across nations and to connect cost drivers to particular institutional or policy environments of a home country. This granular assessment of administrative costs can both inform policy solutions and suggest business innovations to reduce BIR expenses in all nations' health systems.

Study Data And Methods

SITE SELECTION We recruited an international team to employ time-driven activity-based costing to estimate provider billing costs at six sites in five nations between 2018 and 2020, before the COVID-19 pandemic. We selected providers that varied in size, specialties, and location to explore billing processes in different settings and national payment models. Site selection was, obviously, limited to organizations that agreed to participate in the study, and thus our data rest on what is best described as a convenience sample. At each site, we trained local providers and administrators in time-driven activity-based costing techniques and supervised them to obtain consistent measurements across all sites. We restricted our analysis to billing and insurance–related costs for inpatient stays to compare common activities across facilities. We then compared the findings from these six sites to findings from the US site studied by Tseng and colleagues.[5] Greater detail about each site is in exhibit 1 and online appendix A4.[13]

TIME-DRIVEN ACTIVITY-BASED COSTING Time-driven activity-based costing uses techniques from industrial engineering to estimate the personnel, equipment, and space costs used to per-

EXHIBIT 1

Health systems in six countries represented in a time-driven activity-based costing study of billing and insurance-related costs, 2018–20

Country	Site overview	General payer model	Hospital billing	Separate physician bill?[a]
United States	Physician practice academic health system	Private, multipayer	DRG codes for per patient, rates negotiated individually with each payer	Yes; physicians bill separately but rely on hospital billing infrastructure
Canada (Ontario)	Two specialties within an academic community hospital	Universal coverage, single payer	Hospitals are funded by the government, via global budgets and "targeted" funding to selected services	Yes; physicians are not hospital employees and manage their own billing separately
Germany	Single specialty inside an academic health system	Universal coverage; multipayer, public and private[b]	DRG codes for per patient. Hospitals have uniform rates with payers	No; physicians are hospital employees
Singapore	Public health system (2 sites)	Government subsidies and mandatory health savings accounts	Case mix codes (ICD-10) for per patient billing, uniform rates, plus lump sum annual government funding	No; physicians are hospital employees.
Australia	Single specialty service inside a large private hospital	Universal coverage; multipayer, public and private	DRG codes (based on ICD-10); global budgets.	Yes; physicians bill separately
The Netherlands	Academic medical center	Universal and compulsory multi-private-payer coverage	DOT/DBC system (similar to DRGs); uniform rates for most DBCs, negotiated rates for a fraction of DBCs	No; physicians are hospital employees

SOURCE Authors' interviews with partner sites in five countries; US data (for 2017) are from Tseng P, et al. Administrative costs associated with physician billing and insurance-related activities at an academic health care system (see note 5 in text). **NOTES** More details on each country's billing system are in appendix A4 (see note 13 in text). DRG is diagnosis-related group. ICD-10 is International Statistical Classification of Diseases and Related Health Problems, Tenth Revision. DOT is a recent attempt to further simplify Dutch health care billing (DBC) codes (which number more than 30,000). [a]"Separate physician bill" means that as with most hospitals in the US, patient encounters incur separate physician (professional) and hospital (facility) bills for services provided. For countries with no separate physician billing, typically a single global bill is generated that effectively covers services provided by both the physicians and the hospital. [b]This site analyzes cost of billing for privately insured patients only; billing for publicly insured patients was not performed.

form medical services. It has been employed to estimate costs in anesthesia care;[14] pediatric aerodigestive treatments;[15] and neuro,[16] orthopedic,[17] and cardiac surgeries;[18] and for international comparisons.[19] Tseng and colleagues[5] were the first to apply it to estimate the costs of administrative activities.

This method of estimating BIR costs starts by developing a process map that portrays the path of a bill through the revenue cycle, from the time a patient checks in to the point when final payment is received by the hospital or, in the case of Ontario, Canada, when the physician receives payment directly. The process map identifies each operational task in the billing cycle, the various personnel involved in each task, and the approximate time (in minutes) required by each person at each task. Cost per minute of each step, based on the type of personnel involved, is multiplied by the time each type of personnel spends during the BIR cycle and is summed across all personnel types to obtain total BIR personnel costs. Finally, overhead costs are allocated to obtain estimated total administrative costs for each patient encounter. Further methodological details are in appendix A1.[13]

A local team at each site constructed process maps by interviewing and collaborating with managers responsible for business units involved in billing. Interviews were guided by a prespecified, although open-ended and flexible, structure, with follow-up questions posed on the basis of the responses received at each location. Results from these interviews are included in the results and discussion sections below in cases where they can illuminate the quantitative findings and help formulate possible lessons for the US. Both direct and indirect labor costs were calculated from data provided by the accounting staff at each location, using anonymized payroll figures and, when necessary, local market–rate salaries for corresponding job classifications. Time estimates were derived from interviews with administrative team members and physicians, survey responses to average daily time allocation among the administrative staff, and average productivity data based on the total number of bills generated per team per month.

LIMITATIONS Our study had several limitations. First, the time-driven activity-based costing approach used expert estimations of activities and average timing. This restricted the analysis to a deterministic cost model instead of using a statistical analysis of the activities and process times for a large sample of actual patient bills. The estimates also did not include

High US costs are caused primarily by expensive and extensive coding activities, not higher wages paid to US personnel.

the additional costs incurred when insurers require changes to submitted bills (except for the Dutch facility, as insurance bills in the Netherlands are routinely sent back to the provider for review), nor did they include the specific processes associated with global budgets (for Singapore) and with training teammates on new billing systems and processes.

Second, we could not confidently generalize our results at the country level. Because of the intense demands of conducting microlevel time-driven activity-based costing measurements, our sample of providers represented a coalition of those willing to provide access to our international research team. We typically had only one site per country, and we cannot assert that each was representative of their nation's facilities. For multipayer systems, such as in Germany and the Netherlands, the payer mix could vary from one health care provider to another. BIR costs within a given country could also vary with the volume and mix of clinical treatments offered at a given hospital. For example, most German hospitals would likely have higher billing costs than the highly specialized site we studied in Germany. Our sample also did not include BIR costs for performance- or value-based pricing systems.

Third, this study did not include billing-related costs incurred by payers, which may be as high as those for providers.[3,7] The administrative burden on the patient affects the comparability of our data across countries, especially, as in Germany and Singapore, when patients pay providers directly.

Because of these significant limitations, we are hesitant to offer general conclusions or policy recommendations. Nonetheless, our microlevel study offers a new framework for calculating BIR costs, assessing the processes that generate these costs, and exploring proposals to achieve BIR efficiencies.

Study Results

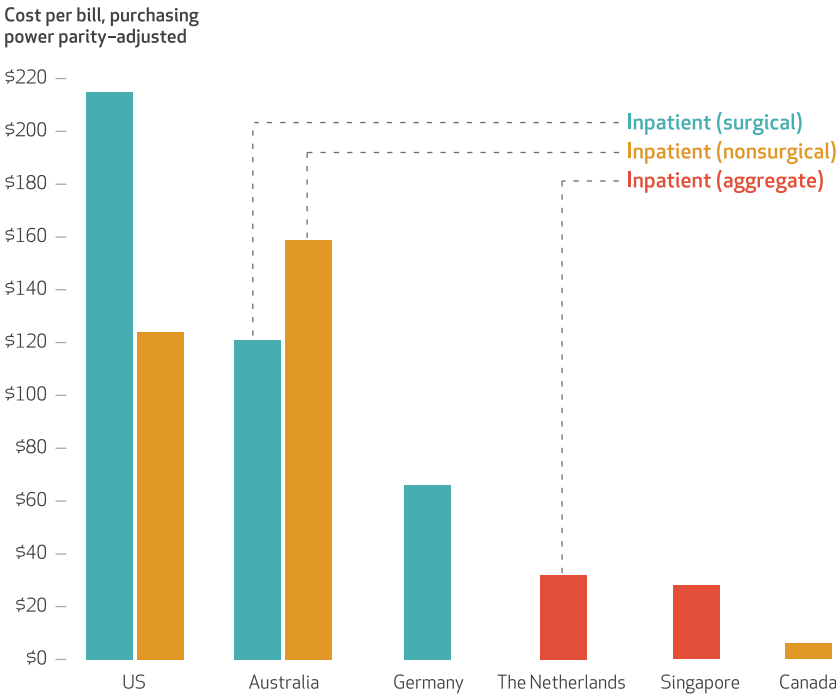
The process maps revealed that billing processes at each site conform to a common pathway, and we thus were able to construct a taxonomy of billing and insurance–related activities. For each patient encounter at each site, BIR costs can be classified into four general categories: eligibility, coding, submission, and rework. *Eligibility* refers to the initial patient-provider interactions, including the gathering of patient records, tagging of payer codes, and verification of insurance or other payers (we note that providers in Germany and Singapore offer patients "financial counseling" while administering their other eligibility procedures, whereas providers in Australia, Canada, the Netherlands, and the US do not; we grouped financial counseling within the bucket of eligibility, even though we measured it separately). *Coding* refers to documenting the provided care and inputting appropriate payment and service codes into the relevant payment systems. *Submission* refers to the preparation of an invoice for the appropriate payer and includes the review and revision of bills after coding. *Rework* represents the processes required to correct any billing error or adjudicate any dispute between a payer and provider. We describe each of these major "life of a bill" categories in greater detail in appendix A1, and process maps from each site are in appendix A2.[13]

The presence of these four BIR categories allowed for comparison across sites and across national payer models. In tabulating total BIR costs for each site, we found, consistent with previous studies, that the US exhibits BIR costs that are significantly higher than those of all other sampled nations. Exhibit 2 shows the purchasing power parity, in 2020 US dollars, of adjusted BIR costs per inpatient bill for each site. Billing costs range from a low of $6 in Canada for a nonsurgical inpatient bill to a high of $215 in the US for an inpatient surgical bill. The range of total BIR costs is revealing as well: Only Australia exhibits BIR costs that resemble the magnitude of those in the US; Canada exhibits significantly less than any of the other nations; and Germany, Singapore, and the Netherlands all have BIR costs comparable to each other yet substantially far from the high and low outliers.

We further broke down BIR costs according to billing activity, with the purchasing power parity–adjusted per bill costs listed by bucket (exhibit 3). The results indicate significant cross-national variation in the sources of BIR costs. In Australia, the Netherlands, and the US, coding, which involves translating the medical services provided to a patient into billing codes for submission to a payer, is the largest BIR cost. Eligibility and financial counseling, which are ser-

EXHIBIT 2

Estimated cost per bill for inpatient encounters in six countries derived from a time-driven activity-based costing study, 2018–20



SOURCE Authors' calculations based on data collected for the study from Australia, Canada, Germany, the Netherlands, and Singapore. US data (from 2017) are from Tseng P, et al. Administrative costs associated with physician billing and insurance-related activities at an academic health care system (note 5 in text). **NOTES** Values are 2020 purchasing power parity–adjusted US dollars. Sites in Canada, the Netherlands, and the US did not offer financial counseling. Financial counseling at the German site included eligibility activities. The Canadian site did not expend any resources determining eligibility. Canada inpatient admissions include an estimate of the cost per bill by a third-party billing clerk.

vices that consumed a relatively small fraction of total BIR costs in the Australia, Canada, and the US, represent a much larger share of BIR costs in Germany and Singapore. Germany's and Singapore's investment in financial counseling is even clearer in appendix A3,[13] which reveals that the German site spent more time (thirty-five minutes) on financial counseling than on any other billing step and that the Singapore sites invested similar amounts of time (from twenty-six to thirty minutes). During financial counseling, a patient services team meets with the patient to explain their insurance coverage and expected charges. Management at both country sites believed that spending time on financial counseling lowered costs downstream in the billing process, particularly in the reduced time required and costs for rework (rework costs in Singapore are about one-fifth those in the US, and those in Germany are less than one-tenth those in the US).

Our BIR cost data also allowed us to execute a quantitative variance analysis, which identified the cost drivers (compensation rates, efficiencies, and personnel mix) that explain differences between BIR costs in the US and the other nations.[20] These results are shown in exhibit 4. "Rate difference" refers to wage differences between countries for similar jobs; "total quantity difference" refers to how much time (in minutes) one country takes to handle a BIR task compared with the others and thus is a good reflection of a system's overall efficiency; and "mix difference" refers to savings one country achieves by assigning a task to a lower-compensated employee.

The variance analysis revealed that only some of the cost differences are attributable to higher wages in the US for similar jobs. Singapore's total cost per bill is 17 percent that of the US. Nearly half (40 percent) of the 83 percent cost differential between the US and Singapore is a result of Singapore paying lower compensation to its personnel, about a third (26 percent of 83 percent) of the difference is due to Singapore's use of a lower-cost mix of employees (such as using physician extenders or clerks rather than physicians) to perform BIR processes, and approximately one-fifth (16 percent of 83 percent) is due to reducing the total time required to process bills. Australia's total costs are 80 percent those of the US, even though it uses 43 percent more personnel minutes to process a bill (thus, unlike the other sites, which require less labor time than the US, Australia exhibits a negative total quantity difference). The additional use of personnel is almost entirely counteracted by its average compensation being 42 percent lower than in the US. With compensation levels and productivity neutralizing each other, Australia achieves its 20 percent net cost advantage by using a lower-cost (21 percent) mix of personnel.

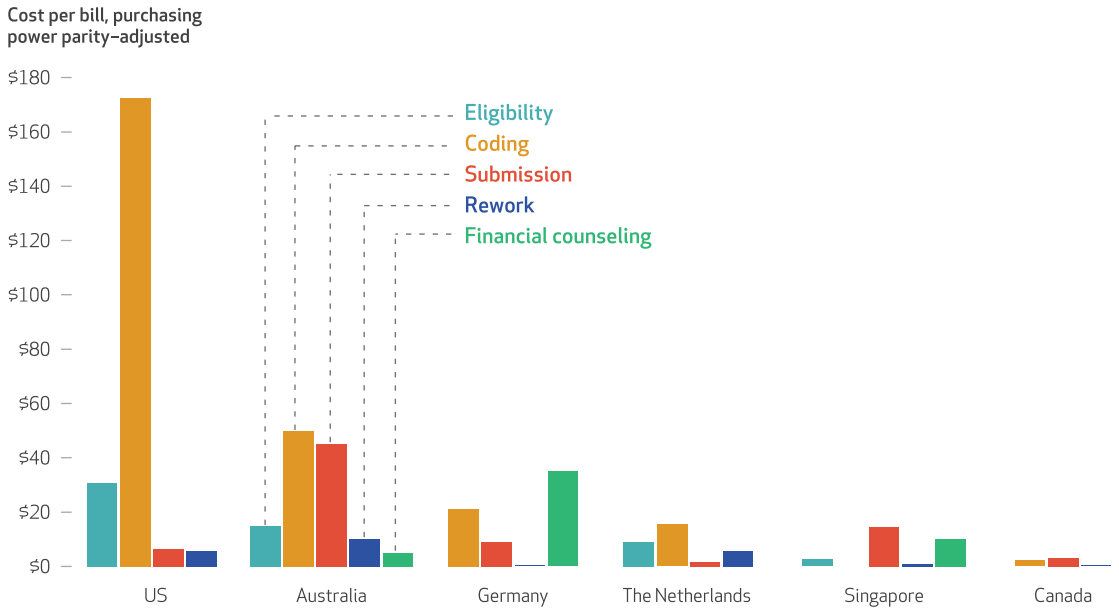
The feature that separates the US from nearly all of the other five countries, and the most significant finding in exhibit 4, is the much higher quantity of minutes spent by US personnel on billing tasks. As is reflected by "Total quantity difference" in exhibit 4, US providers require much more time to perform BIR processes, even though they spend no time on financial counseling.

Discussion

The microlevel time-driven activity-based costing approach provides insights into specific drivers of billing and insurance–related costs in health care and potential actions that might alleviate them. We observed that high US costs are caused primarily by expensive and extensive coding activities, not higher wages paid to US personnel. Comparing different national coding

EXHIBIT 3

Billing and insurance-related costs in six countries, by activity category, derived from a time-driven activity-based costing study, 2018–20



SOURCE Authors' calculations based on data collected for the study from Australia, Canada, Germany, the Netherlands, and Singapore. US data (for 2017) are from Tseng P, et al. Administrative costs associated with physician billing and insurance-related activities at an academic health care system (see note 5 in text). **NOTES** Values are 2020 purchasing power parity–adjusted US dollars. Bills from Australia, Germany, and the US represent inpatient surgical bills; those from Singapore represent combined surgical and nonsurgical inpatient bills; those from Canada represent nonsurgical inpatient bills; and those from the Netherlands do not distinguish processes among surgical and nonsurgical billing. Coding in the Netherlands is done by physicians; procedure codes also serve as billing codes, so there is no need for a separate team of coders.

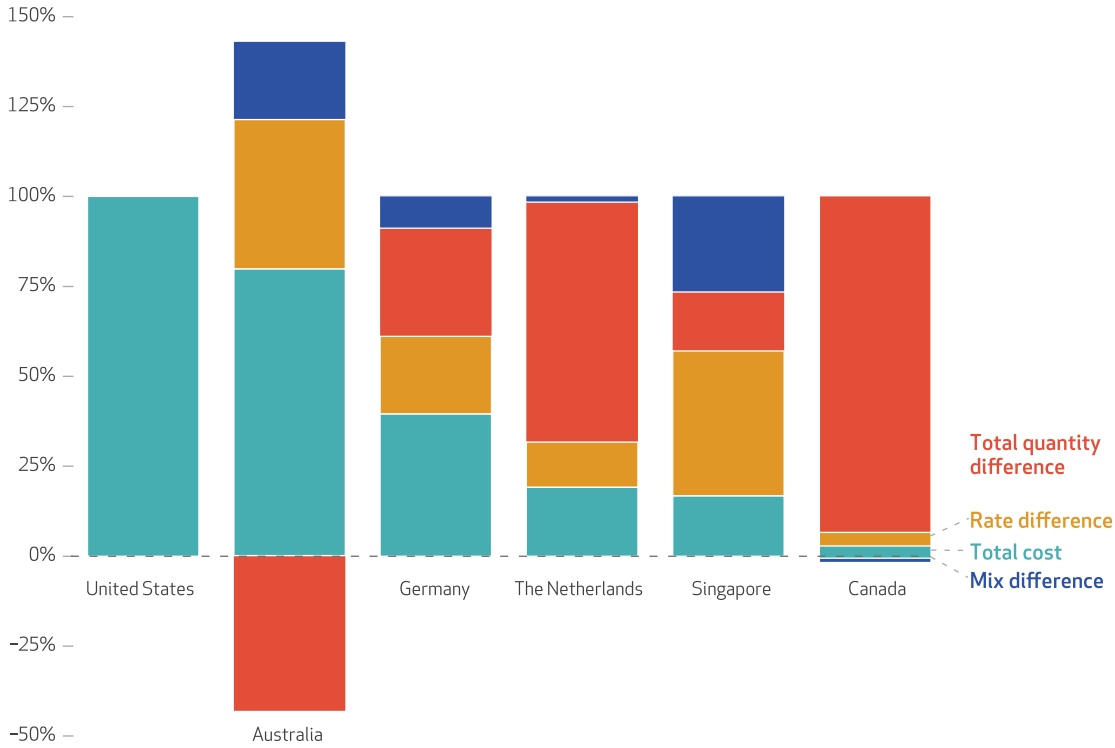
processes might offer some policy lessons for the US.

First, although the countries boasting lower BIR costs (Canada, Germany, Singapore, and the Netherlands) exhibit widely different national health systems, they each contain national structures that standardize how payers compensate providers. Billing specialists in the Canadian province of Ontario, Germany, and the Netherlands explained during qualitative interviews that their countries have a standard list of charges (similar to Medicare's diagnosis-related groups [DRGs]) that enables the use of consistent billing codes across all payers. Contract terms for German and Dutch payers are the same for most billing codes, with only a small fraction of billing code prices determined through negotiations between individual hospitals and insurers. German and Singaporean national price transparency and clear administrative guidance, including standardized price lists, encourage administrative efficiencies and other forms of nonprice competition, instead of encouraging monopolistic advantage or tailored payment strategies. Ontario's single-payer system also has a single coding schedule. In contrast, each US payer typically imposes its own forms and documentation requirements onto providers. The multiplicity of forms and systems creates significant administrative burdens on providers.[5] The Singapore government spares hospitals from multiple payment contracts by reimbursing hospitals with an annual lump-sum payment, in effect operating a global budget payment system that alleviates the need for tailored payment contracts. Singapore's regulatory body also generates administrative savings by offering standardized and simplified procedures for additional per encounter reimbursement requests.

Second, certain national features appear to reduce billing costs by making coding simpler. In the US, billing procedures often require providers to carefully document patient conditions and diagnoses to justify treatment and payment, and sophisticated coders then translate the diagnoses and service codes into billing codes (often manipulated to enhance revenue). In contrast, the Netherlands has its own version of DRG codes, the Diagnose Behandeling Combinatie (DBC), that serve both documentation and billing functions. As a consequence, Dutch providers do not need coders to translate services

EXHIBIT 4

Cost drivers of billing and insurance-related (BIR) costs, US compared with five other nations, derived from a time-driven activity-based costing study, 2018–20



SOURCE Authors' calculations based on data collected for the study from Australia, Canada, Germany, the Netherlands, and Singapore. US data (for 2017) are from Tseng P, et al. Administrative costs associated with physician billing and insurance-related activities at an academic health care system (see note 5 in text). **NOTES** Mix, total quantity, and rate differences are defined in the text. The figure presents the results of a variance analysis that explains the differences between the US and each other country in BIR costs. Total costs in the US are set to 100 percent by definition, and the teal bar for each country indicates total cost in that country compared with the US. The colored bars indicate contributions to the cost differences across the three categories. The height of any bar in positive space indicates how much a country's total cost would increase if that country were comparable to the US on that category. Bars in negative space indicate that for that factor in that country, the differences between the US and that country contribute to lower costs in the US. The sum of the positive and negative values for these three categories for any country will always equal the difference in total cost between the US and that country.

into payments. Ontario physicians also input service codes themselves, and billing requires little time because the majority of clinical activity relies on a small number of codes. Singapore has a highly automated billing system to record and process its DRG codes, based on the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, and its separate list of approximately 70,000 charge codes. Little physician time is spent entering billing-related information into the EHR system, as charge codes are either generated automatically or entered manually by a lower-wage or nonclinical teammate. As a consequence these countries' billing systems either require fewer labor resources or require far less costly labor and physician time than the one in the US.

If higher BIR costs in the US are products of both the complexity and the heterogeneity of payment agreements, then two potential policy lessons might be to simplify and standardize payment contracts. These conclusions are consistent with the model described by David Scheinker and colleagues, which estimated that BIR cost savings could be achieved in the US through contractual reforms alone, without comprehensive health reform.[21] Scheinker and colleagues suggest that simplification and standardization strategies in the US could generate between $900 and $2,100 in savings on a $22,000 annual insurance premium.

Interviews with health care leaders in Ontario suggested that BIR costs can also be too low. Canadian physicians submit bills to a provincial insurer on what is best described as an honor system, with little oversight, and until recently without a meaningful threat of audits or penalties. The Auditor General of Ontario[22] warned in 2018 that the provincial government has inadequately policed and punished physician fraud,

US policy makers and industry leaders should explore simplifying and standardizing payment procedures.

and the government responded in December 2019 by instituting a new physician payment review process.[23] The impact of these reforms has yet to be scrutinized, but they do serve as an admission that oversight was too low. Infrequent price negotiations (about every four years) between the government and the provincial physician association also lead to price distortions over time and motivate a suboptimal mix of offered health care services. These qualitative findings suggest that Ontario, which has the lowest BIR costs in our sample, might be underinvesting in administrative processes instead of representing an efficiency benchmark for other countries. And even if Canadian physicians perform scrupulously without meaningful oversight, it does not mean that physicians in other countries will.

Last, our results identified an additional BIR process—financial counseling—that both benefits patients and could reduce overall BIR costs. Singaporean patients see the full cost of care through their use of health savings accounts to pay for medical services. In response, administrators in Singapore's hospitals offer detailed financial counseling to patients before admission for day surgeries and inpatient procedures. Privately insured patients in Germany, who pay the hospital directly and then seek reimbursement from their insurer, are also exposed to the total bill. The German site conducts a detailed coverage evaluation known as Kostenklärung (cost clarification) before finalizing plans for inpatient surgical admissions. The representative of that site believed that the cost of pretreatment financial counseling was more than offset by a lower incidence of high-cost, post-encounter "rework" administrative activities. Confirming prices in advance of care might also commit providers to a specific amount, thereby preventing ex-post recoding that can inflate both BIR and payer costs. Financial counseling could prove valuable to US patients, who too frequently are surprised by the multiplicity and magnitude of the bills they receive, especially from out-of-network providers.[24]

Conclusion

A time-driven activity-based costing study of billing and insurance–related processes in six health systems across five countries showed costs ranging between $6 and $215 per inpatient admission, with significantly lower BIR costs at the six sites than in the US comparison site. Variability in cost across these countries was the result of a wide range of site-specific, local, and national factors. Coding activities were the primary driver of high BIR costs in both Australia and the US. Hospitals in Canada, Germany, Singapore, and the Netherlands incurred much lower burdens for both coding activities and overall BIR costs, which suggests that US policy makers and industry leaders should explore simplifying and standardizing payment procedures. Finally, providers in Germany and Singapore routinely offered pretreatment financial counseling that not only reduced posttreatment BIR costs but also revealed concern for their patients' financial security and dignity.

Our findings should inform further efforts to examine the sources of, and thereby reduce, wasteful BIR costs. We created a taxonomy for these costs that can structure future investigations. We identified several national policies that appear to reduce administrative burdens in both single-payer and multipayer systems, several of which could be considered by the US to reduce its heavy administrative burdens.[25]

In the US, the health care debate has focused largely on who pays for health care, rather than how health care is paid for. This study highlights the value of the latter question. Knowledge of how billing processes burden health care providers with administrative costs, and knowledge of how they add costs in diverse settings across multiple countries, should inform discussions of any effort to economize the purchase of health care. Of course, alternative systems introduce inevitable trade-offs, but our study shows clearly that other nations, with both single- and multipayer systems, have structures that result in lower BIR costs than the US model and thus offer fruitful lessons for US leaders. ■

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