Completing Costs

Patients’ Time

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Objectives: To show the importance of patients’ time as a cost of health and medical care and to explain how to include it in costing studies without greatly increasing the work required for such studies.

Background: Despite the decade-old recommendation of the Panel on Cost-Effectiveness in Health and Medicine, patients’ time is rarely included in costing or cost-effectiveness analyses (CEAs). Studies of cancer care, smoking cessation, and diabetes self-management show that it can be a large part of an intervention’s costs, sometimes larger than direct medical costs, and can potentially affect patients’ willingness to undertake the intervention.

Measuring and Valuing Time: Good costing practice follows 2 principles: measure all important uses of a resource; and value it appropriately and in a way that is consistent with the valuation of other resources. Counts of formal medical services, already measured in most studies, can serve as the starting point for valuing patients’ time, and would be a major step toward recognizing time costs, even when analysts cannot measure other uses of time. The concept of opportunity cost, often approximated by a market price, is the basis for valuing all resources. The reasons why the wage is a reasonable proxy for the value patients place on their own time are explained. Wage data are well measured and readily available.

Conclusions: Ignoring patients’ time underestimates disease burden and biases cost-effectiveness results toward interventions that use more time. The tools and data to include patients’ time are available and will improve if they are routinely used.

Key Words: costing studies, cost-effectiveness, patient time, time costs

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Institute, are net time: they value the extra time spent by patients with 11 major types of cancer compared with control subjects who did not have cancer, matched for age, sex, and geographic area. They omit types of care that could not be easily measured as service frequencies, such as home health and hospice care, and uses of time for which there were no data, such as time spent recovering at home.

Diabetes self-management is another example of a large, but unrecognized, use of patients’ time. Asked to estimate the time required by the American Diabetes Association’s self-care recommendations, diabetes educators concluded that experienced patients with type 2 diabetes controlled by oral agents would spend more than 2 hours daily. New patients, elderly patients, and those with physical limitations would need more time. Exercise and dietary tasks took the most time. If all the nearly 15 million people in the United States who have been diagnosed with diabetes conscientiously followed the recommendations, they would spend more than 10 billion hours annually, worth $186 billion at the 2007 average wage ($17.41), substantially more than the $116 billion spent on diabetes-related medical expenditures the same year.

### TIME COSTS VARY ACROSS INTERVENTIONS

Patients’ time is not only a major cost of maintaining health and seeking medical services, but different interventions, and variants of the same intervention, differ substantially in their time requirements. Although providers and payers do not consider patients’ time, since they do not pay for it, patients do consider it and it affects their choices, making interventions preferred by payers and providers less successful for it, patients do consider it and it affects their choices, making interventions preferred by payers and providers less successful.

TABLE 1. Cost-Effectiveness of Three Interventions Without, and With, Patient Time Costs

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Cost Per Quality-Adjusted Life-Year</th>
<th>Without Patient Time</th>
<th>With Patient Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking cessation</td>
<td>1995 dollars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group intensive counseling, no nicotine replacement</td>
<td>1108</td>
<td>3446</td>
<td></td>
</tr>
<tr>
<td>Full counseling by physician, no nicotine replacement</td>
<td>1515</td>
<td>1975</td>
<td></td>
</tr>
<tr>
<td>Screening colonoscopy</td>
<td>2005 dollars*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinic and travel time only</td>
<td>13,100</td>
<td>15,400</td>
<td></td>
</tr>
<tr>
<td>Beginning of prep to back home</td>
<td>13,100</td>
<td>22,000</td>
<td></td>
</tr>
<tr>
<td>Beginning of prep to back to routine</td>
<td>13,100</td>
<td>28,000</td>
<td></td>
</tr>
<tr>
<td>Total time</td>
<td>13,100</td>
<td>42,600</td>
<td></td>
</tr>
<tr>
<td>Self-monitoring of blood glucose</td>
<td>2006 dollars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once daily</td>
<td>7856</td>
<td>41,720</td>
<td></td>
</tr>
<tr>
<td>3 times daily</td>
<td>6601</td>
<td>38,619</td>
<td></td>
</tr>
</tbody>
</table>

*Cost per life-year includes time of required companion to and from the clinic.

The analysis of smoking cessation considered interventions ranging from individual counseling by primary care physicians to individual or group counseling by smoking cessation specialists, with and without nicotine replacement. Group interventions are popular with payers because they make efficient use of paid staff. When patients’ time was ignored, group intensive counseling, without nicotine replacement, was the most cost-effective, at $1108 per quality-adjusted life-year (QALY) (Table 1). Delivered to groups of 10, group intensive counseling involved 7 one-hour sessions. Full individual counseling by a primary care physician, which required an initial visit of 15 minutes and 2 follow-up visits of 10 minutes each, cost $1515 per QALY. But when patients’ time was included, group intensive counseling became one of the most expensive interventions, at $3446 per QALY. Full counseling by a primary care physician rose much less, to $1975 per QALY. These results suggest why, as the authors noted, “only 5% of smokers appear willing to undertake” group intensive counseling.

A study of screening colonoscopy found that patients spent a median 21 hours on preparation, round-trip travel, waiting, the colonoscopy itself, and recovery at the clinic; time at the clinic accounted for only 2.8% of those hours. Median time after the colonoscopy until patients could return to routine activities required another 17.7 hours. The authors incorporated the value of various lengths of time into a previously-published study of colonoscopy screening that had omitted time (Table 1). When only clinic and travel time was valued, the cost per life-year was $15,400, compared with $13,100 without patient’s time. Time from the beginning of preparation to returning to routine activities brought the cost to $28,000 per life-year. Total time, which included time during which the patient had to make dietary changes, raised the cost per life-year to $42,600. The large time commitment required by screening colonoscopy could help explain why screening rates in the target population, persons 50 and older, are only around 30%. As the authors noted, “advances in preparation and sedation practices could reduce the time” patients spend on the screening process.

When an intervention requires only a few minutes a day, it is easy to forget how that time adds up over days and years. Consider self-monitoring of blood glucose. Monitoring once daily takes only 3 minutes. Yet, summed over a year, once-daily monitoring requires 18.25 hours per patient, $306 annually per patient at the 2006 average wage. When time is added to the costs of self-monitoring, it makes a huge difference. The cost per QALY of once-daily monitoring rises from about $8000 to $42,000 (Table 1). Monitoring 3 times a day, which is more effective, costs $6600 per QALY when patients’ time is ignored, $39,000 per QALY when it is included.

### MEASURING AND VALUING PATIENTS’ TIME

Time costs measure the value of patients’ time consumed by health and medical services, including travel and...
Measuring Patients’ Time

Except when an analysis borrows an aggregate cost from another source, formal medical services are usually already measured in costing studies and CEAs. These counts of visits and stays can serve as the starting point for estimating patients’ time. Valuing the time spent on medical services (eg, doctors’ visits, visits to other practitioners, hospital stays, nursing home stays) would be a major step toward recognizing patient time costs, even when analysts are unable to include other uses of time.

Counts of medical services may have been drawn from a clinical trial, from a survey, or from an administrative data. For hospital and nursing home care, the time spent by patients—the length of stay—may be available as well. Some have suggested that hours spent sleeping during a stay should not be counted, although patients who have tried to sleep in the hospital might disagree; if institutional time is an important component of costs, sensitivity analyses can address this issue by testing alternative lengths of time, such as 24 h/d and 16 h/d. Where length of stay has not already been measured, national averages are readily available from sources such as the National Hospital Discharge Survey, which reports lengths of stay in the United States by diagnosis and age.11 Public data files available online allow researchers to calculate more specific admission rates and lengths of stay to suit their analyses. The Appendix to this supplement lists nationally representative, public sources of data for estimating time costs.

The American Time Use Survey (ATUS), an annual, nationally representative, survey of more than 26,000 Americans 15 or older from the Bureau of Labor Statistics, provides estimates of the time patients spend on outpatient visits. For 2003 to 2004, the first 2 years of the survey, the ATUS shows that, on an average day, time spent traveling, waiting, and receiving services for outpatient visits averaged 123 minutes and was similar for different age-sex groups.12 (About 8% of respondents who reported outpatient visits appeared, from the pattern of their activities, to have had 2 visits on the same day; if so, the average per individual visit would be about 10 minutes less.) Time spent in receiving services was considerably longer than time face-to-face with the physician, which is reported annually by the National Ambulatory Medical Care Survey, so that survey’s times should not be used. The ATUS also records who was accompanied during a visit, and by whom, so that unpaid caregiver time associated with outpatient visits can be calculated.13 Time spent by patients, and by unpaid caregivers, by age, sex, and other characteristics, could be calculated from the ATUS and would be a useful resource for cost analyses.

Valuing Patients’ Time

The economic principle on which valuation is based is that each resource should be valued at its opportunity cost.14,15 A resource can be put to different uses and each use brings something of value. The opportunity cost of using a resource one way is the value lost because it cannot then be used another way. When the resource is put to its best use, its opportunity cost is the value of its next-best use, and will be less than its value in its best use.

Under many conditions, the market price of a resource is a reasonable approximation to its opportunity cost. The Panel recommended that market prices serve as the first source of evidence about the opportunity cost of a resource and as a basis for valuing it.2 When the requirements for perfectly competitive markets are met, market prices are good approximations. As the discussion in other workshop articles has indicated, when those requirements are not met, as with the plethora of hospitals’ charges to different payers, it can be more difficult to identify a market price that represents opportunity cost.

Patients’ time should also be valued at its opportunity cost. And, here too, it is useful to look for an appropriate market price. Economic reasoning shows that the hourly wage can represent the opportunity cost of time. One textbook author explains: “The wage rate is not only the price of labor, it is also the price of leisure (and other unpaid activities). After all, if your wage rate is $10 an hour and you decide to consume an extra hour’s leisure, how much does it cost you? The answer is that it costs you $10 in foregone income—that’s the price of that extra hour’s consumption of leisure. Economists sometimes say that the wage rate is the opportunity cost of leisure.”16 A guide for valuing environmental resources puts the idea more formally: “... the individual maximizes utility (satisfaction) by allocating time among alternative activities to equate the marginal values of time in these activities with the wage rate. Thus, the wage can be taken as an indicator of the shadow value or marginal opportunity cost of time.”17

Use of the wage to value time has caused confusion because the wage represents 2 distinct perspectives. From the employer’s perspective, the labor demand side, the wage represents the value of the product an employee produces, which is why the employer is willing to pay that much. From the employee’s perspective, the labor supply side, the wage represents the value the employee places on his or her time. If the employee values the wage, and what it can buy, more than the benefits of unpaid activities, he or she will choose to work. If not, he or she will choose not to work, or to work fewer hours. The 2 perspectives meet in the wage because “the firm, to
secure the services of resources, must pay them amounts equal to what they can earn in those alternative uses.”

The former role, value of product to the employer, is often emphasized in discussions of the human capital approach, but it is the latter role, value of time to the individual, which earns the wage its place in the valuation of people’s time. The wage represents the value a person who works places on his or her time, the opportunity cost of that time. Distinguishing the 2 roles helps resolve several points. First, friction cost—the cost an employer incurs when a sick worker must be replaced temporarily (or permanently)—which has been proposed by some as a way to value patients’ time, is not an appropriate method of valuation. Friction cost represents a legitimate cost to employers, useful in the right context, but not a measure of the value patients place on their time. Second, time as a cost should be kept distinct from the benefits which use of that time may bring, including pleasure or displeasure. The Panel noted that pleasure/displeasure should be captured, along with health effects, in the QALYs.

The wage has support in theory and in empirical research. Using the national average wage to value patients’ time would be a reasonable starting point. Wage data are readily available and of good quality, not subject to the kinds of problems mentioned for other health and medical costs (different costs reported to different payers, problems of allocating joint and overhead costs, etc). The Panel recommended that age-sex specific wages be used to value patients’ time, but not all analysts, or policy makers, are comfortable that wage differences by age and sex truly reflect how different groups value their time. Responding to these concerns, the Panel suggested a sensitivity analysis using the average wage if patients’ time was an important component of costs. Use of the national average wage reflects the societal perspective and is appropriate for analyses designed to inform policy decisions in the public interest. Individual patients will, of course, put their own valuations on their time as they make their individual decisions.

There are interesting and challenging issues in the valuation of time. For people who could work and choose not to, the wage represents a lower bound; they value unpaid activities more highly than the wage they could earn. For people who hate their work, the wage overestimates the value of leisure time, since it compensates for the disutility of work as well as the time. Conversely, for those who love their work, the wage underestimates the value of time. Some people can choose their hours of work, bringing the wage into close agreement with their valuation of time, others cannot. It is important to keep in mind, however, that these issues are less important for the societal perspective, which requires a time value representative of large groups of people, not specific to a few. The average wage, which averages out these individual differences, is a reasonable approximation to the value of time for this purpose.

The Panel discussed how to value the time of people not in the labor force—children, disabled people, and retired people. For teenagers and the retired elderly, it is reasonable to use the wage for those who work. Moreover, laws prohibiting child labor and mandating school attendance are evidence that younger children’s potential wages undervalue their time. Again, however, these are second-order issues. The national average wage is a reasonable first approximation to the value of patients’ time and better than the current practice of treating it as though it were worth nothing.

The willingness-to-pay method, which seeks “the dollar amount that one would have to compensate the individual for expending time on the intervention,” could, in principle, be used to measure the opportunity cost of time directly. There are circumstances in which research along these lines would be particularly valuable: for example, in exploring how to value partly-occupied time, such as time preparing for a colonoscopy, versus fully-occupied time, or the value of time in circumstances with broader or narrower sets of alternatives, such as time spent on preventive interventions versus time spent in the hospital as the result of a serious car accident.

Measuring and valuing patients’ time would draw attention to many other issues worthy of research as well. To what extent, for example, and under what circumstances do providers consider patients’ time when they provide services and recommend treatment? How are patients’ choices about following treatment recommendations affected by their time costs? Since patients pay the full time costs of an intervention, but monetary costs are often covered by third-party payment, in part or in full, are patients’ choices biased away from time-intensive interventions and toward interventions that make greater use of other resources? How do the time costs of health and medical care affect other choices—about jobs, where to live, and so on? The literature on unpaid caregivers has addressed some of these latter issues, especially the conflict between work and caretaking, but little attention has been paid to the role these time costs play in patients’ decisions.

CONCLUSION

Time spent on health and medical care is drawn from other uses and is a cost to the individual and to society. Ignoring patients’ time underestimates the burden of disease and biases cost-effectiveness results toward using more of their time and less of other resources. Providers and payers can find that interventions judged cost-effective when patients’ time was ignored do not work out as expected because patients do not comply with the recommendations. This article has explained how to include patients’ time among the costs of disease and care. The tools and data to do so are available and will improve if they are routinely used.

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REFERENCES


