The Effect of Physician Quality on the Health and Labor Supply of Older Americans
Proposal for the NBER Pre-Doctoral Fellowship Program on the Economics of an Aging Workforce

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Poor health is a major factor in determining labor force participation, particularly for workers near retirement. Moreover, researchers have documented a link between physician quality and short-term health outcomes.[1] However, little research investigates differences across providers in the probability that patients return to work following a hospitalization. Existing quality metrics, based mainly on short-term patient mortality and readmissions, may not be strongly predictive of long-term outcomes if physicians differed in, for example, their appetite for risk. Rigorous research evaluating provider quality using quality-of-life outcomes, such as ability to return to work, is of utmost importance as policy-makers continue to debate the best ways to design payment systems to promote high-quality care at reasonable costs.

In this project, I will look at the effect of provider quality on the probability of patients returning to work in for a particular population: surgeons performing high-risk procedures. High-risk surgery is an ideal setting for two reasons. First, existing studies have documented a relationship between surgeon quality and outcomes such as complication rates.[2] Second, many survivors of high-risk surgery drop out of the labor force, and there is suggestive evidence that those who suffer complications during their surgery are more likely to drop out of the labor force.[3] Together, these two factors make surgery an ideal setting to document the effect of provider quality on labor force outcomes. I will focus my analysis on aging patients who are close to or past their normal retirement age, because this is the population that is most likely to leave the labor force following a hospitalization event.[4] I will estimate both health and employment outcomes for this population using a unique all payer claims dataset that includes variables for both employment status and employer name, allowing me to track employment status over time.

Motivation

Amongst older Americans, adverse health events are a major reason for dropping out of the labor force. A recent study found that, amongst those near retirement but under age 65, a hospital admission was associated with an 11 percent drop in the probability of working.[4] For more serious conditions and for older workers, the decline in the probability of returning to work can be much greater.[5] One study found that patients who suffered complications during coronary artery bypass surgery were less likely to return to work than patients who did not suffer complications.[3] Physicians may play a major role in affecting their patients' capacity to return to work, though the evidence thus

[1] Fletcher, J. M., Horwitz, L. I., & Bradley, E. (2014). Estimating the value added of attending physicians on patient outcomes. (NBER Working Paper No. 20534). Cambridge, MA: National Bureau of Economic Research
[2] Birkmeyer, J.D., Stukel, T.A., Siewers, A. E., Goodney, P. P., Wennberg, D. E. et al. (2003) Surgeon volume and operative mortality in the United States. *The New England Journal of Medicine*, *349* (2), 2117-2127, doi: 10.1056/NEJMsa035205
[3] Hällberg, V., Palomäki, A., Kataja, M., Tarkka, M., Hallberg, V., et al. (2009). Return to work after coronary artery bypass surgery. A 10-year follow-up study. *Scandinavian Cardiovascular Journal, 43* (5), 277-284, doi: 10.1080/14017430802506601.
[4] Dobkin, C., Finkelstein, A., Kluender, R, & Notowidigdo, M. J. (2016). The economic consequences of hospital admissions. (NBER Working Paper No. 22288). Cambridge, MA: National Bureau of Economic Research
[5] Walter, P.J. (2012). *Return to work after coronary artery bypass surgery*: *Pyschosocial and Economic Aspects*. Berlin: Springer-Verlag.

far is only suggestive. In an analysis performed by ProPublica, physicians differ widely in their complication rates for a range of elective surgeries.[6] More research is needed to determine whether these relationships are causal, but these findings combined suggest physicians potentially have an important effect on patient employment following high-risk surgery.

There is also increasing evidence that differences in physician quality within a given hospital may be just as important as differences across hospitals in explaining patient outcomes. For example Silver (2015) finds large differences in productivity between physicians and physician-teams in emergency departments.[7] ProPublica also finds that it is common for two physicians in the same hospital to have drastically different complication rates for elective surgeries.[6] While neither of these studies is directly applicable to inpatient surgery for non-deferrable conditions, both support the hypothesis that physician quality could be an important factor determining patient survival and complication rates.

This project is relevant in the context of policy reform proposals to restructure hospital and physician payment systems, such as incentive bonuses based on quality metrics. Because physicians who are good at keeping patients alive may not be the same as physicians who are good at helping patients fully recover, using quality metrics based mainly on survival may have an unintended consequence of reducing the chances of full recovery from an illness. As a result, it is valuable to test whether existing quality measures based mainly on mortality and readmission rates are strongly correlated with quality measures based on the chance of a full recovery and a return to the labor force.

Data

This study will use two datasets: The primary analysis will use Utah's hospital inpatient claims and All Payer Claims Database (APCD). I will also perform a secondary analysis using a 20% sample of the Medicare claims dataset. I have extensive experience working with both of these datasets from ongoing projects with Amitabh Chandra, Ben Handel, Jon Kolstad, and Kurt Lavetti.

The Utah data include the APCD for the years 2013-2015, which contains detailed data on insurance status, demographics and claims for all insurance companies except fee-for-service Medicare. This is linked to the universe of hospital inpatient claims from 1993-2015, which also includes claims for Medicare and the uninsured. My main outcome of interest will be the change in employment status of individuals 1, 2, and 3 years post-surgery. Pre-surgery employment status is reported on hospital inpatient claims, including both employer name and whether the worker's status is full-time, part-time, or self-employed. Employer names post-surgery are available both on inpatient claims for those with a subsequent hospital admission, and from insurance records in the APCD for all those with private insurance. Using employer name, I can also classify employers by sector, and look at transitions to different types of employment post-hospitalization. Since I see the full hospital claims history and mortality for all patients (including those who are uninsured), this data also allow me to construct traditional quality measures such as 30-day mortality, readmission rates, and use of skilled nursing facilities. Finally, I will also construct a number of medium-term outcomes from claims data, including indicators for conditions associated with reduced ability to perform activities of daily living.

[6] Allen, M. & Pierce, O. (2015, July 31). Making the Cut: Why choosing the right surgeon matters even more than you know. *ProPublica*. Retrieved from: https://www.propublica.org/article/surgery-risks-patient-safety-surgeon-matters

[7] Silver, D. (2016). Haste or waste? Peer pressure and the distribution of marginal returns to health care. Retrieved from: http://bit.ly/1RQ5pDn

While the richness of the Utah data makes it the best available dataset for this study, Utah's medical system is arguably unique in the US, with a younger population and more vertically integrated healthcare providers than the rest of the country. To account for this shortcoming, I will validate my findings using the 20% sample of the Medicare claims. While I do not observe employment status in the Medicare claims, I am still able to construct all other short- and medium-term quality metrics listed above. This analysis will test whether the surgeon quality variation in Utah is comparable to or different than surgeon quality variation in the US as a whole.

Empirical Strategy

To estimate the impact of physicians on patient outcomes, I will first identify patients admitted to a hospital for a non-deferrable condition who are then treated in the first two days of their hospital stay with a risky high-mortality procedure. To identify surgeons, I will use the physician identifier (NPI) listed on the claim form for surgery payment. I choose surgery linked to a non-deferrable condition to focus on non-elective surgeries, because this set of procedures is less likely to be affected by physician selection.[8] I also focus on high-risk procedures, because this is a setting where I believe I have the power to detect an effect of physician quality if there is one.

My preferred research design uses of a few sources of variation in order to identify surgeon quality. First, to separate the effect of physicians from that of hospitals, I will take advantage of physicians practicing at multiple hospitals, which occurs frequently in my setting. The methods used will be closely related to a rich literature in labor economics that separately estimates worker and firm effects on wages.[9] I will augment these methods with a comprehensive set of risk adjusters based on age, gender, previous claim history, and insurance status to control for pre-existing patient risk factors and access to healthcare. The data also includes patients home-address census block, which allow me to construct detailed regional controls to proxy for health access and income. Under the assumption that assignment of patients to surgeons is as good as random conditional on these controls and risk adjusters – an assumption which is more plausible when I focus on surgeries linked to non-deferrable hospital admissions – my research design identifies the distribution of average surgeon quality in my sample. To validate my identification strategy, I will use diagnostics based on estimated residuals,[10] and will supplement my core estimates with natural experiments based on surgeon movers.[11]

Summary

For older Americans, adverse health events frequently trigger retirement, but we do not yet know how physicians differ in their ability to make patients healthy enough to return to the workforce. In this project, I propose using two datasets, including the uniquely rich Utah APCD, to directly estimate surgeon quality using the change in employment status among workers near their normal retirement age as my outcome variable. I will then see whether any physician characteristics are associated with quality, and will compare surgeon quality estimates based on employment status to estimates of surgeon quality based only on short-term mortality and readmission rates.

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[8] Card, D., Dobkin, C., & Maestas, N. (2009). Does Medicare save lives? *Quarterly Journal of Economics, 124* (2), 597-636.

[9] Abowd, J., Kramarz, F, & Margolis, D. (1999). High wage workers and high wage firms. *Econometrica, 67* (2), 251-333.

[10] Card, D, Heining, J., & Kline, P. (2013). Workplace heterogeneity and the rise of West German wage inequality. *Quarterly Journal of Economics, 128* (3), 967-1015.

[11] Chetty, R., Friedman, J., & Rockoff, J. (2014). Measuring the impacts of teachers I: Evaluating bias in teacher value-added estimates. *American Economic Review, 10* (9), 2593-2632.

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Education

University of California, Berkeley: Ph.D., Economics 2014-Present
- Fields: Health Care, Labor Economics

Queen's University: M.A., Economics 2011-2012
- Adviser: Stephen Lehrer

The University of Ottawa: B. Soc. Sci. (Hon) 2007-2011
- Summa Cum Laude, With Specialization in Economics

Academic Employment

Graduate Student Researcher May 2015-Present
PIs: Ben Handel and Jonathan Kolstad (2016-Present); Alex Gelber (2015-2016)

Graduate Student Instructor Fall 2016
Econ 131 (Public Economics)

Research Fellow September 2012 to June 2014
John F. Kennedy School of Government, Harvard University
PIs: Amitabh Chandra (2012-2014) and Rema Hanna (2012-2013)

Publications

[1] Chandra, Amitabh, **Jonathan Holmes**, and Jonathan Skinner. 2013. "Is This Time Different? The Slowdown in Health Spending." *Brookings Papers on Economic Activity* 47(2): 261-323.

[2] Chandra, Amitabh, Maurice Dalton, and **Jonathan Holmes**. 2013. "Large increases in spending on postacute care in Medicare point to the potential for cost savings in these settings." *Health Affairs* 32(5): 864-72.

Conference Presentations

- 2016: Health and Industrial Organization Lunch (UC Berkeley)
- 2012: Canadian Economics Association Annual Conference (Calgary)

Media

[1] **Holmes, Jonathan**. "Those Proton Beams Don't Come Cheap." *Slate*. October 11, 2013.

Professional Service

Volunteer Coordinator, *Canadian Economics Association Annual Conference* (Ottawa, ON), June 2-5, 2011.

Awards

The Social Sciences and Humanities Research Council of Canada's Doctoral Award (2014-2018)

The Social Sciences and Humanities Research Council of Canada's Joseph-Armand Bombardier CGS Master's Scholarship (2011-2012)

The Loran Award, the Canadian Merit Scholarship Foundation's National Award (2007-2011)

The Governor General's Bronze Academic Medal (Highest mark in school on the Alberta diploma exams) (2007)

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December 10, 2014

Dear Colleague:

I am writing to recommend **Jonathan Holmes** for the NBER Pre-Doctoral Fellowship on the Economics of an Aging Workforce. Jonathan has an impressive track record at an early career stage and a clear and demonstrated interest in labor market and health care issues in aging populations. I believe that Jonathan is a fantastic match for the fellowship, honestly as strong a match as I could imagine.

Jonathan is currently a third-year student in the Ph.D. program at Berkeley. I have known him since he entered the program, and have interacted with him in a number of different capacities. Since he arrived at Berkeley over two years ago, we have met frequently to discuss his research goals in health economics and labor economics. I must say, for being a third year student, Jonathan shows remarkable research and personal maturity on a number of dimensions. First, he is clearly and fully committed to topics in health and labor economics. This is not just a passing phase: he worked as a research assistant for Amitabh Chandra prior to joining the program, and has worked for myself, Jon Kolstad, and Kurt Lavetti on a health related project this year. He already has two short health care publications with Amitabh in this space.

Of all students at his phase in the program I have advised, I have the most confidence in Jonathan's abilities and desire to follow through on his areas of interest. He will certainly be a very successful job market candidate and faculty member in several years. I am now happy to be Jonathan's primary dissertation advisor as he enters the latter phase of the Ph.D. program at Berkeley. I should note that, in addition to his interest in health and labor, Jonathan excelled in my graduate industrial organization class last year, and is a skilled applied microeconomist broadly, with many "tools" in his toolkit. Jonathan has also been a very active participant in the health economics reading group I run in the department.

Let me now turn to the research assistant work Jonathan has done for me this year: this relates both to my opinion of his potential, as well as to his proposal for the Fellowship.

About eight months ago, in April 2016, Kurt Lavetti, Jon Kolstad, and I began empirical work on a large-scale research project using an all-payer claims database from the state of Utah. I should note up front that these data are truly unique, which is why we were excited about beginning this project. The data have almost all medical claims / insurance enrollments for the entire state of Utah, across all types of coverage, from 2010-2015 (with extensions past that point in progress). The data not only contain these key pieces of health / insurance information, but also contain information on who the employer is for all employers providing insurance to employees (most people who are insured in the state). We also observe where employees live (to some reasonable degree of specificity) and a range of demographics.

Our research team quickly highlighted the need for a very skilled RA to work with these data. They required substantial processing, e.g. to merge in census data and process employer and claims data. More importantly, we have explored several potential topics already, because the data have so much potential for health and labor research on a number of dimensions. Jonathan has been instrumental to our progress in this project, and is clearly in the top set of RAs I have ever had. He has creative ideas at every turn on our research topics as well as on the data issues we inevitably encounter. He takes many actions without needing input from us. He has proven to me that he will certainly be a very successful researcher on his own.

While working on these projects, to entice Jonathan to continue on as our primary RA for the long haul, we allowed him to think up his own topics for his own research. The fact that we allowed him to use the data for his own projects (as long as they don't conflict with our own) should be the strongest signal in this letter about his potential: we would almost never do this with such a new unique data set unless the student clearly had substantial promise, as Jonathan does.

We have discussed a number of health / labor related topics that he is currently in the process of exploring. His proposal is the most exciting, and a great example of the work he will be doing. He intends to use these granular linked data to study the labor market impact of differential health quality, which could occur for myriad reasons, including "exogenous" health shocks or related to use or access to specific physicians. Access to physicians in the data could be determined by network status, insurance status, distance to providers, and several other factors. With its granular employment, location, and health data, the Utah all-payer claims data set will give Jonathan many options to pursue this exceptionally important topic. Most health economics study that think about outcomes use mortality as an outcome because it is the easiest one to clearly record with data. It is absolutely crucial for health and labor market policies that research moves beyond mortality as an outcome to develop these kinds of detailed, nuanced, studies of the impact of different health experiences on labor market outcomes. We are also working on merging these data with IRS tax data: if we succeed in that, Jonathan's paper / project will sail into a top journal (which it might anyway). We fully support his project and use of these data, and will be continuing to advise him throughout the Fellowship.

In sum, I think Jonathan is an extremely impressive candidate for the Pre-Doctoral Aging Fellowship and that he deserves the strongest possible consideration. He is one of the most talented students I have worked with and is devoted to topics in health and labor that speak exactly to the Fellowship's aims.

Please don't hesitate to contact me with any additional questions about Jonathan.

Best regards,



Benjamin Handel
Associate Professor of Economics
University of California at Berkeley