Quantifying Productivity Growth in Health Care Using Insurance Claims and Administrative Data

The Bureau of Labor Statistics uses a rigorous and consistent methodology to quantify productivity growth across sectors of the economy. Unfortunately, this methodology is not well suited to health care. Estimates of productivity growth in the health sector are likely to be confounded by changes over time in the underlying health status of patients and by improvements in the health outcomes that are achieved through treatment. Romley, Goldman and Sood (2015) found substantial improvement in the productivity of hospital care for heart attack, heart failure and pneumonia over 2002-2011 when heath status and health outcomes are taken into account.(Romley, Goldman et al. 2015)

This study will produce a more comprehensive perspective on productivity growth in U.S. health care. First, we will consider a wider and more representative range of acute treatments. In addition to heart attack, heart failure and pneumonia, we will analyze stroke, hip fracture, knee replacement, hip replacement, and gastrointestinal hemorrhage. Second, we will study a longer timeframe, specifically, 2001 through 2016. Third, for heart attacks, we will assess the contribution of improvements in specific treatments (percutaneous coronary intervention and coronary artery bypass graft surgery) to overall productivity growth in treating this condition. Most importantly, we will investigate episodes of care involving not only the initial hospital stay but also office visits, skilled nursing and other post-acute care, and subsequent admissions after a patient's initial discharge. To investigate episodes of care, we will identify and link all of the insurance claims associated with a patient within ninety days (and alternative windows) of an admission for any of the eight episodes we will study.

We will study a sample of 20% of all elderly Medicare fee-for-service beneficiaries, or nearly 5 million individuals. To do so, we will combine a set of research-identifiable databases on beneficiary enrollment and medical and pharmacy claims from the Centers for Medicare and Medicaid Services (CMS); these databases include the Master Beneficiary Summary Files, Medicare Provider Analysis and Review Files, Carrier (Physician / Supplier) Files, Part D Drug Event Files, Minimum Data Set Files, and others. Encrypted beneficiary IDs in the research-identifiable data make it possible to track the spectrum of a beneficiary's care.

As in prior work, we will specify and estimate production functions in which the unit of analysis is a hospital-year. We will define output by the number of "high-quality" episodes. Our benchmark definition of a high quality episode will be that the patient is alive ninety days after the initial admission and has returned to the community as of that date. Return to community is an important outcome which has been adopted as a quality metric under the Improving Medicare Post-Acute Care Transformation Act of 2014. Because Medicare claims do not include custodial nursing home stays financed by the Medicaid program, we will follow prior work in using patient status assessments reported in the Minimum Data Set to determine a beneficiary's place of residence each day after discharge.(Sood, Buntin et al. 2008, Buntin, Colla et al. 2010) A less stringent definition of high quality will use initial discharge to home (reported on Medicare claims); a more stringent measure will treat any episode with an acute readmission within the time window as low quality.

We will summarize production inputs using the total cost of providing episodes of a particular type. As in prior work, we will measure inpatient costs for each stay by applying cost-to-charge ratios to charges reported on hospital claims; these ratios are reported annually with the Inpatient Prospective Payment System Rule, and can be linked by Medicare provider number. In addition, we will measure other facility costs using annual cost ratios from the Healthcare Cost Report Information System.(Sood, Buntin et al. 2008, Buntin, Colla et al. 2010) Costs for care from physicians and other professionals will be measured using the relative value units associated with the services reported on the claims. In addition to treatment costs, we will consider productivity from the perspective of the Medicare program using actual payments (with and without Part D drugs.)

The underlying health of a patient is an important input into the care that is received and the outcome that is achieved. For all episode types, we will account for patient characteristics from Medicare enrollment files (demographics, comorbidities and dual enrollment) and also for socioeconomic factors by linking the 5-digit zip codes reported in the research-identifiable data to Census information on small-area income, poverty and education. Finally, for seven of the eight episode types studied here, the Agency for Healthcare Research and Quality has tasked clinical experts with developing risk adjustment models based on administrative data (e.g., specific diagnoses on medical claims), and we will use these models to measure the underlying health status of the patients initiating an episode at each hospital in each year.(Romley, Jena et al. 2011, Romley, Goldman et al. 2015) For knee replacement, we will use administratively derived risk measures from our prior work.(Sood, Buntin et al. 2008, Buntin, Colla et al. 2010)

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