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Physician division of labor and patient selection for outpatient procedures

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ABSTRACT

Little is known about the ability of incentives to influence decisions by physicians regarding choices of settings for care delivery. In the context of outpatient procedural care, the emergence of freestanding ambulatory surgery centers (ASCs) as alternatives to hospital-based outpatient departments (HOPDs) creates a unique opportunity to study this question. We advance a model where physicians' division of labor between ASCs and HOPDs affects the medical complexity of patients treated in low-acuity settings (i.e. ASCs). Analyses of outpatient surgical procedure data show that physicians working exclusively in low-acuity settings (i.e. ASCs) treat patients of significantly higher medical complexity in these settings than do physicians who also practice in higher-acuity settings (i.e. HOPDs). This discrepancy shrinks with increasing procedural risk and with increasing distance between ASCs and acute care hospitals.

1. Introduction

The motives and ability of physicians to influence the medical services used by their patients have received much attention in the health economics literature (Arrow, 1963; McGuire, 2000). Seminal work in this area has focused on demand inducement, where financial incentives may increase the *quantity* of services recommended and delivered by physicians beyond the point at which the medical benefits of such services justify their costs (Evans, 1974; McGuire and Pauly, 1991;Labelle et al., 1994; Gruber and Owings, 1996). Prior work on referrals by physicians for office- versus hospital-based care has highlighted the effects of financial incentives on decisions regarding the utilization of resources for the care of acute conditions (Marinoso and Jelovac, 2003; Blomqvist and Léger, 2005; Bian and Morrisey, 2007; David and Helmchen, 2011). However, little attention has been paid to incentives that may influence decisions regarding the choice of setting for otherwise identical medical procedures in cases where such choices may influence patient outcomes.

In the context of outpatient care in the United States, decisions regarding care settings are of increasing importance due to the rapid growth over time in alternatives to traditional hospital-based outpatient departments (HOPDs) for the provision of diagnostic and therapeutic procedures. In particular, patient visits to freestanding ambulatory surgery centers (ASCs), facilities physically separate from acute-care hospitals, increased by 300% between 1996 and 2006 (Cullen et al., 2006), with the number of ASCs in the U.S. growing from 240 in 1983 to 5174 in 2008 (Medicare Payment Advisory Commission, 2009). The increased prevalence of ASCs has created distinct responsibilities and incentives for physicians related to the choice of care setting (Lynk and Longley, 2002). Prior approaches to patient selection in procedural care have focused on balancing the anticipated benefits of a given procedure with the probability of a complication as determined by patient and procedural factors (Bryson et al., 2004). As ASCs and HOPDs differ in their access to hospital care, physicians must also decide on the appropriate care setting based on the probability of a surgical complication and the accessibility to hospital services that may be critical to the management of such a complication.

The decision of a physician regarding the location of care for a patient of a given risk profile should therefore be sensitive to incentive structures that vary according to patterns of physician division-of-labor. More specifically, we identify two groups of ASC physicians who differ in their access to HOPDs, distinguishing "splitters," those who perform outpatient procedures at both ASCs and HOPDs, from "non-splitters," those who work exclusively at ASCs. In our conceptual framework, physicians derive utility from both clinical appropriateness and monetary rewards, such that the opportunity cost of providing care in one location versus another depends on the physician's division of labor. Non-splitters face a

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relatively greater opportunity cost of referring high-risk patients to HOPD-based care. As a consequence, splitters would deliver care to higher-risk patients overall, but to lower-risk patients within ASCs, compared to their non-splitter counterparts. The first prediction stems from the appropriateness of HOPDs for patients with elevated surgical risk. The second prediction stems from the higher profitability of a self-referral compared with an out-referral. While previous examinations have focused on potential increases in health services utilization attributable to incentives created by physician ownership of ASCs (Mitchell, 2005; Hollingsworth et al., 2010), these patterns of division-of-labor may create distinct incentives to influence healthcare delivery separate from ownership status.[1]

To test these predictions, we examine the outpatient surgical risk profiles of 1,326,337 ASC and 464,568 HOPD patient visits for two common outpatient procedures performed in Florida between 2004 and 2007. We use the patient-level Charlson Comorbidity Index (Charlson et al., 1987; Quan et al., 2005), a common measure of medical severity, to quantify the patient-level operative risk observable to the physician.[2] We use a rich set of area, facility, patient, physician, and procedure variables to study the relationship between physician splitter status and patients' setting selection on risk.

As risk selection behaviors may be endogenous to splitter status, we instrument for splitter status using an indicator variable that equals one if the physician completed medical training in Florida and zero if the physician completed medical training in a different state in the U.S. Medical training in Florida is highly correlated with retaining admitting privileges in HOPDs, which we hypothesize may be due to preservation of professional networks and affiliations established at the time of training. Hence, we observe a higher likelihood of splitter status among former in-state trainees. At the same time, controlling for foreign medical graduate status, completion of medical education in Florida is likely to be uncorrelated with other variables affecting patient selection on risk, as we hypothesize the quality of medical training within Florida will be similar to the average quality of training available in other U.S. states.

As expected, we find that, compared to non-splitters, splitters treat more medically complex patients overall, with the most complex patients being concentrated in the HOPD setting; within ASCs, we find risk profiles to be lower among patients treated by splitters when compared to those treated by non-splitters. We find case selection by splitters to be related not only to the site of care (i.e. ASC versus HOPD), but also to the distance between the ASC and the nearest hospital. Finally, we find a growing similarity in case-level risk for non-splitters and splitters as the distance between the ASC and the nearest acute-care hospital increases.

All results are consistent for cross-sectional regressions and for those using county fixed-effects, which account for potential confounding of the relationship between splitter status and risk selection by variation across individual ASCs in given geographical regions. Our results persist under our instrumental variable strategy, which account for potential endogeneity of risk selection to splitter or non-splitter status. Further robustness checks include the use of alternate definitions of splitting, the use of alternative dependent variables, and alternate instruments.

Our findings are consistent with the argument that patient selection by physicians for care in ASCs is sensitive to differences in the opportunity cost of sending a patient to the alternate, more resource-intensive setting of the HOPD. This effect persists despite adjustment for procedure factors, secular time, physician factors, county fixed effects, and potential omitted variable bias. Such observations provide a clear illustration of deviation from perfect agency in medical decision making that extends beyond the quantity of care.

The paper proceeds as follows: Section 2 presents a simple conceptual framework, in which asymmetric information regarding surgical risk and variation in division of labor for providers dictates the site of care for patients. Section 3 describes the data and estimation, Section 4 discusses the results, and Section 5 concludes.

2. Conceptual framework

In this section we study a "downstream" medical decision, in which patients have already been determined to need a given outpatient procedure. Rather than exploring induced utilization, as much past research has, we focus on the setting of care and the context in which that procedure is provided. Physicians act as agents for patients in that they help patients make decisions regarding the site of care, as they posses superior medical information regarding each patient's risk of surgical complications and hence the most appropriate site for care. Information asymmetries allow physicians to act as imperfect agents for their patients, deriving utility from both clinical appropriateness and the monetary rewards associated with each setting. In particular, the opportunity cost of out-referral in the case of non-splitters exceeds the cost of self-referral in the case of splitters, as non-splitters face lost income from the patients they refer out. Hence, we expect the risk level above which a physician would not treat a patient in an ASC to be higher for non-splitters.

To the degree that a physician's choice of operative setting is driven by factors unrelated to patient outcomes, such a choice may constitute a deviation from perfect agency that may influence patient outcomes through inappropriate patient risk selection. To fix ideas, assume a risk level, θ_C for which $\theta \leq \theta_C$ constitutes a risk level that is clinically appropriate for ASCs, while patients with risk level $\theta > \theta_C$ should be directed to an HOPD. To the extent that treating patients in ASCs is more profitable, both splitters and non-splitters will deviate from θ_C; however, the risk cutoff points for splitters will be below that of non-splitters, such that $\theta_C < \theta_S < \theta_{NS}$.

Fig. 1 summarizes this relationship graphically.[3] When $\theta \leq \theta_C$, both splitters and non-splitters would treat the patient in the ASC; however, when $\theta > \theta_C$, splitter physicians face the choice between treating the patient in an HOPD at a lower margin (the dotted line) or treat the patient in an ASC, incurring a disutility from deviating from the clinically appropriate setting. Hence, the splitter's utility function is the external envelope (i.e. the solid line up to θ_C and the dotted line from θ_C to θ_H), while the solid line maps the level of surgical risk to the utility of a non-splitter. The splitter would, therefore, treat patients in an HOPD if $\theta > \theta_S$.[4] On the other hand, a non-splitter's utility from out-referring a patient to an HOPD is zero, and therefore the non-splitter would refer patients to an HOPD only

[1] Physician ownership status of ASCs is not directly observable, and prior studies defined a physician *owner* as one performing 30% or more of her cases at an ASC. In our sample, and based on this definition, the bulk of physicians would be considered "owners". Therefore, our study can be interpreted as demonstrating a deviation from perfect agency that occurs within a pool of physicians likely to have similar incentives for case referral due to ownership status.

[2] The Charlson Comorbidity Index has been demonstrated to predict adverse outcomes following a range of common inpatient and outpatient procedures (de Groot et al., 2003; Fleisher et al., 2004). In addition, as a summary measure of patient complexity, the Charlson Score may feasibly reflect components of patient risk likely to influence decisions regarding the appropriate location for an outpatient procedure.

[3] Fig. 1 corresponds to a formal model presented in Appendix A.

[4] The level of disutility grows with $(\theta - \theta_C)$ and the physical distance to the nearest acute-care hospital.