Patients as Consumers in the Market for Medicine

The Halo Effect of Hospitality[1]

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ABSTRACT:

Consumer-driven health care is often heralded as a new quality paradigm in medicine. Patient satisfaction has become a central dimension on which hospitals and doctors are evaluated. However, patients-as-consumers face difficulties in judging the quality of their medical treatment. Drawing on a sample of 3,000 U.S. hospitals, we find that neither medical quality nor patient survival rates have much impact on patient satisfaction with their hospital. In contrast, patients are very sensitive to the 'room and board' aspects of care that are highly visible to them. Quiet rooms have a larger impact on patient satisfaction than medical quality, and communication with nurses affects satisfaction far more than the hospital-level risk of dying. Hospitality experiences create a halo effect of patient goodwill, while medical excellence and patient safety do not. Moreover, when hospitals face greater competition from other hospitals, patient satisfaction is higher but medical quality is lower. We emphasize that the visibility of a service is not necessarily connected to what matters for wellbeing, either in medicine or in other professional fields. The consumer-driven market for medicine creates pressures for hospitals to be more like hotels – which may not provide what patients want or need from their medical care.

Keywords: consumerism; health care; public policy; professions; economy

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Introduction

The health care system in the United States is increasingly based on market models in which patients are seen as consumers of health care (Reich 2014a, 2014b). The "consumer-driven health care" movement in the United States aims to "activate" patients into consumers in order to "drive a new quality paradigm" (Retchin 2007:173; Herzlinger 1997; 2004; Starr 2011: 129-58). Patients-as-consumers – especially those with higher out-of-pocket co-pays and deductibles – are expected to demand better and more cost-effective treatment. As market advocate Regina Herzlinger insists, "health care will not improve until consumers drive it" (Herzlinger 2004:XXIII). With the marketization of medical care, doctors and hospitals are encouraged to operate as business enterprises in which "patient / customer satisfaction" is the central objective. Consequently, patient satisfaction surveys have become a routine element of hospital management, with a growing view that "[having] satisfied patients means higher quality care" (Press 2006:12). Does the pursuit of patient satisfaction lead hospitals and doctors to provide better medical care? How well are patients-as-consumers able to observe the quality of their care?

The idea of markets for health care services has long raised concerns about quality uncertainty and asymmetries in knowledge between patients and medical providers (Parsons 1951; Arrow 1963). Markets tend to deliver what consumers can observe and reward, which may not be the same as what patients ultimately want or need from their hospital (c.f. Akerlof 1970). Scholars have begun to question whether the drive for patient satisfaction is ultimately doing more harm than good in medicine (Detsky and Shaul 2013; Sirovich 2012).

We highlight a problem of visibility for patients as consumers. Hospital medical care provides two different kinds of services, which differ in their visibility to patients: technical medical treatment, and 'room and board' care while patients undergo that treatment. Medical

treatment is the purpose of the hospital stay, and is the aspect of service expected to have a long-term benefit for health and longevity. Patients may have limited ability to observe the technical quality of their medical care. However, they can observe the room and board aspects of their care quite well. This ability to easily observe hospitality, but not medical quality, may lead to distinctive problems in how patients evaluate their hospitals, and what hospitals do to obtain higher evaluations from patients.

Alongside the growing focus on patient satisfaction in medicine has been the rise of hotel-like amenities and services in medical care (Goldman and Romley 2008; Reich 2014a, 2014b). Hospitals increasingly emphasize and invest in private rooms, 'healing gardens,' atriums, waterfalls and WiFi. Hospital management often aims to ensure there is "music playing and artwork and nice sofas" (Reich 2014a:1607). Nurses are given communication scripts telling them exactly what words to use with patients (Mikesell and Bromley 2012; Bromley 2012). There is a growing divergence between the front stage and the back stage of hospitals (Goffman 1959). Our concern is that hospitals are increasingly evaluated based on a front-stage presentation of caring, rather than on back-stage aspects of medical excellence and patient safety.

What drives patient satisfaction with hospital care? We test the relative importance of both medical quality and hospitality in shaping customer satisfaction, using a large sample of American hospitals ($N \approx 3{,}000$). Is patient satisfaction driven more by the 'hard' technical skills of medical staff, or the 'soft' skills of hospitality, private rooms, and hotel amenities? Past research suggests both aspects of a medical setting can influence patient satisfaction. Unfortunately, most research looks at these factors in isolation – studies of *either* hard medical skills and quality (Jha et al. 2008; Fenton et al. 2012) *or* studies of hospitality (Barr, Vergun, and Barley 2000). This does not match how medical treatment is experienced. We find that while

both factors play a role, patients give relatively minor aspects of hospitality greater weight than patient safety or medical quality. Patients rate their hospitals based on the things they can most easily observe, which are overwhelmingly hospitality features. The lens of 'customer satisfaction' focuses attention on aspects of quality that are most visible to patients, but less relevant to patients' health outcomes. We argue there is a halo effect of hospitality, in which patients take the front-stage accomplishments of room and board care as a proxy for hard-to-observe medical treatment.

In a follow-up analysis, we examine how market competition affects hospital care. When hospitals compete for patients and customer loyalty, they appear to focus on customer service and comfort aspects of care that are more visible to patients. Technical medical quality and patient safety, in contrast, are not sensitive to consumer-driven market pressure. Thus, we find that when a hospital is located in a more competitive market, patient satisfaction is higher but medical quality is lower. In a free market for medicine, patients may not be able to identify and reward the hospitals and doctors that best serve their medical needs or health outcomes, and instead create market pressure for hospitals to be more like hotels.

Two Campaigns for Quality in Health Care

The 21st century has seen two distinct campaigns and rallying cries for quality improvement in hospital treatment: one focused on patient safety, the other on patient satisfaction. The patient safety movement has been a professional project centered on measurable medical excellence, especially with regard to protecting patients from errors, injuries, accidents, and infections in the course of their treatment. The modern patient safety movement began in 1999, when the U.S. Institute of Medicine published a landmark report titled, *To Err is Human*

(Kohn, Corrigan, and Donaldson 1999). The report highlighted the troubling prevalence of preventable mistakes and injuries in medical practice: nearly 100,000 people in the U.S. die each year from mistakes in medicine, while many more experience serious injuries as a result of their treatment. Doctors frequently fail to undertake the appropriate diagnostic tests or apply the full recommended treatment for many classes of illness (McGlynn et al. 2003; RAND 2006). Review of medical records finds that about half of adults (55 percent) and fewer children (47 percent) receive the medical standard of care for their ailments (McGlynn et al. 2003; Mangione-Smith et al. 2007). Serious errors in diagnosis occur in roughly 5 to 15 percent of medical cases in the U.S. (Balogh, Miller, and Ball 2015). The direct cost of treating injuries from medical errors in the US is estimated at $17 billion annually (Van den Bos et al. 2011). As one report summarized, "patients should not assume that their physicians will remember all that needs to be done" (RAND 2006:5). Improving patient safety remains a complex and frustrating challenge (Landrigan et al. 2010; Longo et al. 2005; Wachter 2010). However, patient safety has been diminishing in prominence as an agenda item in health care discussions.

The goal of patient *satisfaction*, however, has been ascendant and successful in the world of hospital care (Press 2006; Junewicz and Youngner 2015).[2] Patient satisfaction is sometimes seen as reflecting a patient-centered care approach. However, it is perhaps better understood as an approach directly adopted from business. In the world of business, customer satisfaction is one of the most widely-used metrics across industries. Customer satisfaction is both a management tool and a forward metric of financial performance:

[2] Press (2006) – writing as one of the founders of the patient satisfaction survey in wide use today – argued that "no one – no hospital, no physician – can guarantee cure." But they can guarantee empathy and "concern for the patient's emotional and physical comfort," which unlike health outcomes is "totally within the hospital's control" (p 5-6).

> Within organizations, customer satisfaction ratings can have powerful effects. They focus employees on the importance of fulfilling customers' expectations. When these ratings dip, they warn of problems that can affect sales and profitability. (Farris et al. 2010: 56)

Patient satisfaction routinely focuses on two questions: (1) how satisfied a patient is with their hospital; and (2) would they recommend their hospital to others? Many expect the discipline of customer satisfaction to push hospitals towards better quality medical care. From a market perspective, the patient-as-consumer determines how well their medical expectations were met, and decides which medical provider should receive their loyalty and future health care dollars. Competition among doctors and hospitals drives medicine towards the treatments and practices that most successfully attract and retain patients. More broadly, patient satisfaction is often seen as an intrinsically laudable goal (Greaves and Jha 2014). Certainly, no one would object to having (or being) a satisfied patient. However, as a management tool, the growing focus on patient satisfaction comes with potentially serious downside risks.

Two Aspects of Hospital Care

Hospitals face the challenge of balancing two general tasks: providing technical medical treatment, and 'room and board' hospitality care while the patient lives in the hospital. At a professional level, these tasks often run in an opposite direction. While some types of treatment provide immediate relief from suffering, medical intervention is often painful and unpleasant, deliberately sacrificing short-term well-being for long-term gains in health status, physical functioning and life expectancy. Sick and injured patients allow themselves to be cut open, radiated, exposed to toxins such as chemotherapy and other cocktails of potent medication; as Eliot Freidson once put it, patients are "palpated, poked, dosed, purged, cut into, probed, and

sewed" (1970:138). Medical treatment often makes patients worse before making them better. However, most of this treatment is delivered while the patient is sedated or incapacitated.

The other aspect of hospital treatment involves less-technical, more mundane care for the patient while they live in the hospital: the room and board aspect of care. Patients must be fed (is the food warm, tasteful?), they must sleep (is the room quiet or overrun?), they must cope with their immediate pain, anxiety, fears, and frustrations (are the nurses and staff kind and compassionate, generous with pain medication, quick to respond to problems?). Much of this is non-technical comfort work. As Strauss et al. (1985) once noted, "failure to do comfort work to the satisfaction of patients when they are hospitalized is a major source of [patients'] anger and frustration – leading often to bitter complaints and accusations of incompetence or negligence" (99).

After experiencing these two different aspects of treatment, patients face a difficult task of evaluating their hospitals. Unfortunately, the most critical aspects of hospital care are the hardest for patients to observe. For most patients, hospitals represent a context of limited knowledge and information. People can only judge what they can see, and medical services are often opaque. Patients generally lack expertise in medicine. Much technical medicine goes on behind the scenes, when patients are incapacitated or unconscious. Patients do not readily understand hospital organization and the organizational dynamics that protect patients, or the system breakdowns that put patients at risk (Kohn, Corrigan and Donaldson 1999). Hospital patients are usually anxious and fearful, and do not want to think about possible failures of technical quality. Indeed, hospital patients are not 'shopping,' but are in the midst of receiving serious non-reversible medical treatment that is expected to affect their lives for many years into the future. The most frequent illnesses in U.S. hospitals are typically quite acute, including

pneumonia, bloodstream infections, congestive heart failure, and heart attack (Pfuntner, Wier, and Stocks 2013). In short, hospital patients do not usually have the expertise, access, awareness, or disposition to critically evaluate the medical care they are receiving.[3]

In contrast, the quality of "room and board" care in hospitals is exceedingly visible to patients. They know when the food is cold and tasteless, when their room is loud and overcrowded, when the nurses and staff are too busy or indifferent to tend to their pains and frustrations. Hence, patients have some vivid information about the quality of their care, but this information mostly comes from their experiences with the hospitality aspects of care.

Under conditions of limited information, "auxiliary characteristics become proxies for quality" (Lynn 2006:1). Patients may think of the world as having good hospitals and bad hospitals, and then use whatever information they can observe to categorize their hospital. Unpleasant nurses and busy, noisy rooms, then, become evidence that one is in a "bad" hospital. Amenities and hospitality become proxies for the (less visible) medical quality that will most impact a patient's life.

This is a process of inferring from the observed to the unobserved – tacitly assuming that the visible aspect of a good or service is representative of the non-visible aspect. Inferences of this type can lead to systematic de-coupling of merit and status – in which highly-regarded things, services, or people may not have the highest intrinsic quality (Lynn, Podolny, and Tao 2009; Botelho and Abraham 2017). These are often cases of using form as a signal of content. In used car markets, buyers may consider the cleanliness of a car as evidence of its mechanical condition (Akerlof 1970). This is why used car dealerships subject cars to industrial cleaning before putting them up for sale – it makes the cars seem better cared for. In psychology, a large

[3] Even if patients had advanced medical training, they would still have to undergo treatment while sedated or unconscious, and if a problem occurred, would often not know why their treatment did not go as well as hoped.

body of research shows there is a halo effect of beauty, in which physically attractive people are regarded as robustly more intelligent, competent, and trustworthy (Feingold 1992; Langlois et al. 2000).[4] In these cases, individuals are using technically unrelated or extraneous information to fill in important gaps in their knowledge in order to make judgements.

In medicine, there may be a halo effect of hospitality. Hospitals that provide excellent bedside manner, comfort, amenities, convenience and emotional empathy may be seen as providing robustly excellent overall treatment and considered great hospitals even if technical medical quality is lacking or unknown. In this case, the pursuit of customer satisfaction in hospitals could become a hospitality contest that prizes form over content, or style over substance.

Market information regimes, such as satisfaction ratings, privilege certain kinds of information about quality (Sharkey and Bromley 2015; Espeland and Sauder 2007; Sauder and Espeland 2009). Patient satisfaction highlights the aspects of quality most visible to consumers, and encourages hospital competition on those dimensions. Our key concern is that customer satisfaction rankings can refocus attention away from patient safety and medical quality. Hospitality experiences are mostly tangential to patients' long-term well-being, but are a visible and memorable aspect of their hospital experience. Markets are driven by what consumers can observe, which ironically may not be what patients most need or want from their medical providers. The focus on patient satisfaction acts like an institutional spotlight, tuning the system's attention to what patients will write on their satisfaction surveys, and how to improve those scores.

[4] Cultural capital might be understood as having a similar kind of halo effect; people rich in cultural capital seem to be presumed competent in many (arguably unrelated) dimensions of ability (Rivera 2015).

Existing Evidence

There is a range of existing evidence on what drives patient satisfaction with medical care. In a study of routine medical office visits, Barr et al. (2000) found that the politeness and courtesy of front desk staff had a large and direct effect on how patients rated the quality of their doctor. They concluded that patients were often judging their medical encounter by non-medical frustrations associated with their office visit. In a study of hospitalized heart attack patients, satisfaction was high overall (92 percent satisfied), regardless of technical quality of treatment; moreover, satisfaction was not associated with long-term survival or the probability of recurrent heart attack (Lee et al. 2008). In a large-scale US panel study, patients with higher levels of satisfaction with their medical provider went on, in future years, to receive more discretionary (i.e., non-necessary) medical treatment, spent more on prescription drugs, but also had higher mortality rates (Fenton et al. 2012). In a classic experiment on health insurance, RAND found that patients tend to forego treatment and medications when co-pays are higher. While patients avoided treatments that are considered rarely effective (for example, seeking medical treatment for the flu), they equally reduced their medical care for life-threatening conditions in which treatments are highly effective (such as pneumonia or physical trauma) (Lohr et al. 1986; Brot-Goldberg et al 2017).

In the area of nursing, patients generally describe good nurses as providing personal warmth, comfort, and assistance; patients scarcely mention technical competence as a factor in nursing, despite nurses' central role in medical treatment and patient safety (Lynn, McMillen, and Sidani 2007; Larrabee and Bolden 2001). In large scale research on what patients regard as good nursing, the most common factors include spending time with patients, touching patients (e.g., on the arm for reassurance), talking with them, and "doing little things without being

asked" (Lynn et al. 2007:163; Larrabee and Bolden 2001). "Specific technical skills of the nurses were never mentioned because… patients perceived the technical competence of the nurses as a given" (Lynn et al. 2007:165). However, nurse shortages have been shown to increase patient mortality and medical complications – and particularly the risk of "failure to rescue": patients dying after hospital complications (Aiken et al 2002; Friedrich and Hackmann 2017). While nurses are a critical first-line defense of patient safety, patients generally evaluate nurses by the standards of a friendly and caring personal assistant, and give little conscious attention to their technical medical role. These studies suggest that patients indeed have trouble distinguishing between technical medical quality and hospitality.

On the other hand, a study using Medicare hospital data found that "care was consistently better in the hospitals that received high [patient] ratings" and concluded that "there is no need for tradeoffs between" technical quality and patient satisfaction (Greaves and Jha 2014; Jha et al. 2008:1930). In pediatric care, parents' dissatisfaction with their children's care was a significant marker of inappropriate medical treatment (Schempf et al. 2007). Further, HIV patients are more likely to switch away from doctors that test poorly in antiretroviral knowledge (Rodriguez et al. 2007), findings which, as the authors concluded, "challenge the notion… that patients are unable to assess the technical quality of care they receive" (Rodriguez et al. 2007: 194).

These studies fail to aggregate well, and to some degree, talk past each other. The critical issue is the *relative importance* of medical and non-medical factors in generating patient satisfaction. This relative importance is what will shape the incentives of doctors and hospitals in a consumer-driven market for medicine. It is not simply that there is mixed evidence. The existing studies are often testing different null hypotheses. Some studies test whether (a) medical quality affects patient satisfaction, while others test whether (b) hospitality affects patient

satisfaction. In existing research, the answer to both questions has tended to be, "yes," with little sense of which factor was more important overall. The current study, in contrast, provides large-scale evidence that directly compares the effects of hospitality and medical quality on patient satisfaction. We test the degree to which patients can identify (are more satisfied in) hospitals with better quality medical care and lower death rates, especially compared to hospitals with high levels of hospitality care. As a second analysis, we test whether greater competition among hospitals leads to higher levels of either patient satisfaction or medical quality.

Data Set

Our data combines hospital-level information on patient satisfaction, technical medical quality, patient safety, and hospitality aspects of care. Some 3,180 hospitals (65 percent of acute care / critical access hospitals in the US[5]) are included, for the three-year-period July 2007 to June 2010. The data were obtained from the Centers for Medicaid and Medicare Services. Simple inspection indicates that the sample over-represents the larger, more urban hospitals that service the majority of the population, and under-represents smaller rural hospitals. Missing data on mortality brings the final sample down to 3,019 (95 percent of the original sample). Descriptive statistics for the full data set are provided in Table 1.

[Table 1. Descriptive Statistics]

Patient satisfaction. The outcome variable in this study is patient satisfaction. Patients are asked whether they would recommend their hospital to friends and family, and to give an overall

[5] This excludes hospitals that do not provide treatment for acute physical illness: long term care hospitals and institutions for psychiatric illness, mental retardation, alcoholism and other chemical dependencies. Data on the number of such hospitals in the US is from the Kaiser Foundations's State Health Facts database [Link].

rating of their hospital. These are standard customer satisfaction questions used across many industries (Farris et al. 2010), and they provide two complimentary measures of patients' assessments of their hospitals. The data are aggregated at the hospital level, reporting the percentage of patients at each hospital giving a "high" rating (9 or 10 out of 10), moderate rating (7-8 out of 10), or low rating (0 to 6). It is clear from Table 1 that patients are quite favorable to their hospitals; the modal response is a 9 or 10 out of 10, with 65 percent giving this high rating. Only 10 percent of patients seem clearly dissatisfied. Likewise, 68 percent say they would "definitely" recommend their hospital, while only 6 percent say they would definitely *not* recommend. In other words, the great majority of patients clearly liked their hospital (which is likely part of the reason why these surveys have become so popular).

Hospital Mortality Rate. Patient mortality looks at how many Medicare patients died within 30 days of their hospital admission. This is our central measure of patient safety. The measure includes patients initially admitted for heart attack, heart failure, and pneumonia. Importantly, mortality rates are severity-adjusted to control for how sick patients were at their time of admission. For example, patients with more severe symptoms, a history of heart disease, who are older and arrive in the hospital with co-morbidities such as diabetes, malnutrition, or liver disease, are more likely to die regardless of the quality of medical care. This severity adjustment aims to reveal hospital-specific mortality – whether the hospital has a better or worse death rate than average controlling for its mix of patients. The hospital death rates are a three-year average, which serves to smooth out random year-to-year variation. The overall hospital death rate in these data is 13 percent (and ranges from 8 to 18 percent).

Technical Medical Quality. Medical quality is based on adherence to standards of care for heart attack, heart failure, pneumonia, and general surgical practice. Measures were selected by

the National Quality Forum, an independent advisory board made up of doctors, nurses, hospital administrators, and other stakeholders. The 24 measures of technical medical quality were selected for their relevance to health outcomes, reliable measurability, and need for national improvement in medical practice. The data provide important indicators of the hospital medical environment – how swiftly and reliably hospitals act to treat acute illness and uphold patient safety.

For heart attack care, the measures record whether and how quickly patients are given medication to dissolve blood clots or reduce blood pressure. If coronary surgery is needed, is it performed within two hours of admission? For pneumonia, the measures focus on the timeliness of treating with antibiotics, whether blood tests were taken prior to administering antibiotics, whether the patient's blood oxygen level was evaluated, and whether the most appropriate antibiotic was selected. Measures of surgical care focus on the prevention of infection, and the appropriate use and selection of preventative antibiotics. For heart failure, measures include whether a test was given for how well the heart is pumping blood (e.g., electrocardiogram, chest x-ray) and whether proper medication was given in the case of heart dysfunction.

The full list of quality measures appears in Appendix I. Many of these quality measures are being incorporated into new operating room checklists in an effort to ensure that the fundamentals are done correctly every time, without error (Gawande 2009).

Hospitality. The room and board aspects of hospital care are measured from a battery of items in the HCAPS patient survey. The quality of nurse communication is based on three items: treating the patients with courtesy and respect, listening carefully to them, and explaining things in ways patients can understand. Nurses have a central role in patient safety and medical quality, and their work is crucial to both technical medical quality and patient mortality. However, the

communication measures largely capture the quality of interpersonal relations between nurses and patients. The *medical role* of nurses is reflected in the technical quality and patient mortality measures, while their hospitality role is captured in the nurse communication measures. Other measures include pain control (did patients feel their pain was well controlled, and did staff do "everything they could" to help with pain management?), giving information about "what to expect during [the patients'] recovery at home," whether the rooms were kept clean and tidy, and whether the rooms were quiet at night. It is worth noting the medical implications of these measures. Pain control, for the most part, means steady administration of opioid painkillers, which should be administered at the minimum effective dosage, not to the maximum of patient satisfaction. Clean rooms sound like an important health concern, but the control of infectious diseases in hospitals has little to do with how often the trash can is emptied or how quickly meal trays are removed from patients' rooms. Quiet rooms at night during one's hospital stay are surely comforting, but should not be considered medical treatment for conditions such as bone fractures, cancer, pneumonia or bloodstream infections.

Methods

We estimate the relationship between the quality of medical care and patients' satisfaction with and willingness to recommend their hospital. Since the hospital death rate is a three-year average, we analyze the data as a single cross-section averaged over three years (2007 -2010). With two outcome variables, we have two equations:

$$Satisfaction_i = \delta_1 + \alpha_1 Quality_i + \boldsymbol{Z}\boldsymbol{\beta_1}' + \boldsymbol{X}\boldsymbol{\gamma_1}' + \upsilon_i \quad (1)$$

$$Recommendation_i = \delta_2 + \alpha_2 Quality_i + \boldsymbol{Z}\boldsymbol{\beta_2}' + \boldsymbol{X}\boldsymbol{\gamma_2}' + \eta_i \quad (2)$$

In each model the subscript *i* denotes the hospital. Quality$_i$ represents the technical quality of medical care at hospital *i*. **Z** is a vector of variables capturing the 'room and board' quality of hospitals. **X** is a vector of hospital- and state-level control variables. The terms υ_i and η_i are random disturbances associated with the respective outcome variables.

Given that both equations include the same set of right-hand side variables, they can be pooled and estimated jointly within one model.[6] Pooled regression is similar to a panel study in which hospitals are observed at two different time periods; in this case, however, hospitals are observed on two similar outcomes at one time. Technically, this creates a hierarchical data structure in which observations are nested within hospitals. As the error terms (υ_i and η_i) are likely to be correlated within hospitals, we use pooled OLS clustered on hospitals. Writing the above two equations as one jointly-estimated model,

$$Y_{io} = \delta + \alpha Quality_i + \boldsymbol{Z}\beta' + \boldsymbol{X}\gamma' + \varepsilon_{io} \quad (3)$$

where the subscript *o* denotes the specific outcome; when o=1, the outcome is patient satisfaction, and when o=2 the outcome is patient recommendation. The sample size for equation 3 is $N \times 2 = 6{,}038$.

We separately analyze high and low levels of patient satisfaction and willingness to recommend. Patient satisfaction is represented by three variables: the percent with high satisfaction (9-10 out of 10), the percent with medium satisfaction (7 – 8 out of 10), and the percent with low satisfaction (0 to 6 out of 10). These variables sum to one hundred percent for each hospital, and we use high and low satisfaction to analyze all the informative variation.[7] This

[6] Another approach could be to simply average the two outcome variables, although this has the effect of reducing the amount of analyzable information. The pooled analysis preserves the full information, allowing analysis of differences between outcome variables (i.e., differences across questions).

[7] Studying variation in moderate satisfaction is redundant, as the values for moderate satisfaction are fully determined by the values of the other two variables.

is a byproduct of hospital-level, rather than individual-level, measurement. This does, however, give a coherent way of testing whether *positive* evaluations are generated by the same basic process as *negative* evaluations. We report these as positive response models and negative response models. If the same processes that produce positive responses are also generating negative responses, the negative response models should yield approximately the same results as the positive response models, but with opposite-signed coefficients.

Finally, our outcome variables are not completely continuous, but rather are percentages bounded between zero and one hundred percent. Fractional regression is designed for this type of data. As Papke and Wooldridge (1996:620) note, "the drawbacks of linear models for fractional data are analogous to the drawbacks of the linear probability model for binary data." In robustness testing we applied fractional regression to these data, and found substantively equivalent results. For the main text, we focus on the linear models that offer clearer interpretation of results (Breen, Karlson and Holm 2018).

Findings

For an initial look at the data, Figure 1 graphs patient satisfaction by deciles of patient mortality, medical quality and nurse communication. This shows that patient satisfaction is higher in the deciles with the lowest patient death rate, but the difference is small. Hospitals with the very highest death rates have only 2.0 percentage points less patient satisfaction than those with very low death rates. A natural concern here might be that high-mortality hospitals are effectively 'burying the evidence': dead patients are unable to register their dissatisfaction with the hospital. These findings are limited to what surviving patients learned about their hospital. The evidence indicates that surviving patients do not have much awareness of their hospital's

patient safety standards. A similar pattern is seen with the data on technical medical quality. Patients in the hospitals with the highest decile of medical quality have only modestly higher satisfaction (3.3 percentage points higher than in the lowest decile of medical quality).

Nurse communication has a much stronger relationship with patient satisfaction. When nurse communication is poor (lowest decile), patient satisfaction averages just over 50 percent. When nurse communication is excellent (highest decile), patient satisfaction is over 75 percent. The difference between the top and bottom deciles of nurse communication is 26.7 percentage points of patient satisfaction. The quality of interaction with nurses has far greater influence on patient satisfaction than does technical medical quality or the hospital death rate. This strongly supports the hypothesis that the visible aspects of care are primarily what shape patient satisfaction.

[Figure 1: Patient Satisfaction by Deciles of Hospital Mortality, Medical Quality, and Nurse Communication]

On this background, we apply our full models relating both medical quality and hospitality to patient satisfaction. The left half of Table 2 (models 1 to 4) shows the *positive response* models, which estimate the determinants of a hospital receiving positive evaluations from patients. Model 1 shows the simple linear relationship between patient satisfaction and the hospital mortality rate. Patient satisfaction declines as the mortality rate rises, though the effect is small as seen in Figure 1. Specifically, a one standard deviation increase in the hospital death rate leads to a 0.08 standard deviation drop in satisfaction. Model 2 adds in hospitality variables as well as hospital-level and state-level controls. The effect of hospital mortality is unchanged. The beta coefficient for nurse communication (0.33) is more than four times as large in absolute

magnitude as the effect of the hospital mortality rate (0.08). The other hospitality variables (the quietness and cleanliness of the rooms, pain management, and information about recovery at home) all have effect sizes larger in magnitude than the mortality rate. For example, the quietness of the rooms (0.13) has an 86 percent larger effect on satisfaction than the hospital death rate.

Models 3 and 4 replace hospital mortality with technical medical quality, based on adherence to national standards of treatment.[8] In model 3 without controls or hospitality measures, patient satisfaction rises with technical medical quality. The beta coefficient indicates that a one standard deviation increase in medical quality leads to a 0.15 standard deviation increase in patient satisfaction. Once controls and hospitality measures are introduced (model 4) the effect of technical quality is reduced but remains significant (0.10) – and is very close in magnitude to the effect of hospital mortality. We continue to see that patient satisfaction is much more sensitive to the quality of nurse communication; the beta coefficient (0.29) is roughly three times the magnitude of the coefficient for medical quality. The other hospitality variables (the quietness and cleanliness of the rooms, information about recovery at home, and pain management) have standardized coefficients that are the same or larger in magnitude as medical quality. The quietness of the rooms has a 40 percent larger effect on patient satisfaction than medical quality.

[Table 2: Regressions for Patient Satisfaction]

The right half of Table 2 (models 5 to 8) reports on the negative response models: the chance of hospitals receiving negative evaluations from patients. Recall that the coefficients in

[8] In other specifications, we include hospital mortality and medical quality in the same model, and find substantively equivalent results.

the negative response models are expected to have the opposite signs as in the positive response models. In models 5 and 6, the hospital mortality rate has a very weak link to patient dissatisfaction. A one standard deviation increase in the death rate leads to only a .02 standard deviation increase in dissatisfaction (in model 6). In contrast, increasing the quality of nurse communication by one standard deviation leads to a large drop in dissatisfaction (.49 standard deviations). This effect size is many times greater than the effect of the hospital death rate. The effects of clean room or pain management are also several times larger in absolute magnitude as the death rate. When patients complain about their hospitals, it is primarily due to the room and board aspects of their stay - and especially about the personal interaction with nurses.

The technical quality of medical care has a similar effect on negative responses as on positive responses. In model 8, a one-standard-deviation increase in quality leads to a 0.08 standard deviation drop in negative feelings about a hospital. The effect of nurse communication (-0.46) is almost six times the magnitude of the effect of medical quality.

Overall, the main conclusion is that standard-unit increases in the hospitality of care have much greater effects on patient satisfaction than standard-unit increases in patient safety or technical medical quality.[9] Hospitality is the fast track to customer satisfaction in medicine.

Model Uncertainty and Robustness Testing

Empirical estimates are often sensitive to model specification, so that small changes in specification may have large and surprising influence on empirical conclusions (Young 2009;

[9] Auxiliary regressions on medical quality itself (not reported) reinforce this picture. For example, hospitals with 10 percent higher quality of nurse communication have 1.5 percent higher medical quality, but 6.6 percent higher patient satisfaction. Hospitality is not a negative signal for medical quality (as, for example, if bad hospitals compensate by investing in greater hospitality), but it is a distracting signal for patients that leads to exaggerated swings in evaluations of care.

Young and Holsteen 2017). We provide computational model robustness testing to show the sensitivity of our main results to the choice of model specification, particularly the selection of control variables. The panels in Figure 2 show the modeling distribution of estimates for three key coefficients of interest: the effect of hospital mortality, the effect of medical quality, and the effect of nurse communication. Each panel estimates 8,192 unique model specifications based on all possible combinations of variables included in the model 2 and 4 specifications (Young and Holsteen 2017). For example, model 2 focuses on hospital mortality as the key variable of interest, but includes 13 other control variables; all possible combinations of those controls gives $2^{13} = 8{,}192$ distinct models. Each panel also shows the relevant estimate reported in Table 2 as a vertical dashed line.

[**Figure 2. Modeling Distribution of Patient Satisfaction Effects (Positive Response)**]

The results show there is a very tight distribution of estimates for hospital mortality. All estimates are statistically significant and tightly clustered around the (very small) model 2 estimate. (In Figure 2 we reverse the sign of hospital mortality coefficients to emphasize the magnitude of the effect relative to the other determinants of satisfaction.) In other words, this result holds regardless of which specific estimate is selected from the model space. For the effect of medical quality, the modeling distribution is somewhat larger: the estimates range from 0.0 to 0.30, and it is possible to find estimates larger than the model 4 estimate (and larger than the model 3 estimate as well) but an estimate greater than 0.20 is an outlier estimate dependent on a knife-edge model specification. Finally, the effect of nurse communication varies much more widely across the model specification. However, the model 4 estimate is on the low-end of the

modeling distribution – almost any other model specification yields a larger effect size, with estimates as high as 0.60 or 0.70 occurring frequently. Taken together, the panels in Figure 2 show that if an analyst or reader selected a different model specification among these 13 controls, the conclusion that hospitality drives patient satisfaction would be even stronger.

In Figure 3, we show model robustness testing for the negative response models (the determinants of dissatisfaction). The results here are even more stark: some of the models report no effect of the hospital death rate on dissatisfaction, and nurse communication definitively stands out as the driver of patient complaints about their hospitals. Medical quality and patient safety (the hospital death rate) have much smaller effect on patient dissatisfaction in every model specification.

Overall, when we relax our assumptions about which possible model is best to report, and report the results from over 8,000 possible model specifications, we see little model dependence in the conclusions – alternative models mostly show even larger effects of hospitality than our preferred estimates reported in Table 2.

[Figure 3. Modeling Distribution of Patient Satisfaction Effects (Neg. Response)]

Hospital Competition

We have so far examined the demand side of the market for medicine – the role of patients as consumers. Next, we consider the supply side: *hospitals as competitors*. The relative visibility of hospitality and medical excellence also shapes what hospitals must do to compete for patient satisfaction (Sharkey and Bromley 2015; Sauder and Espeland 2009; DiMaggio and Powell 1983). In a consumerist model of medicine, hospitals face an incentive to provide forms of care that are more visible to patients. This could mean investing less in hard-to-observe

medical quality, and focusing more on hospitality care. Technical quality and patient safety may be deprioritized or partially crowded out by market forces that reward hospitality more than medical quality. Nevertheless, in consumer-driven health care theory, competition for customer loyalty and patient dollars is the central diffusion mechanism by which market-driven health care is expected to improve quality (Herzlinger 1997; 2004). Hence, it is important to ask how hospital market competition itself shapes medical care.

In many places in the country, there is a high local concentration of hospitals which are all potentially serving the same patients. In many cases, "hospitals have found themselves in a fierce fight… pitted against other hospitals, pulling out all stops to maintain market share" (Griffin 2006:217). The McKinsey Institute estimates that about 40 percent of patients with private insurance have asked their doctor for a specific hospital at which to undergo treatment. McKinsey also finds that nearly a third of doctors say they would honor patient requests for a lower quality hospital that was known for comfort and hotel amenities (Grote, Newman, and Sutaria 2007). Moreover, prolific direct-to-patient hospital advertising floods the market for medicine, with some $1.2 billion spent on advertising each year (Newman 2009). Hence, there is significant scope for consumer-driven competition among hospitals: health care providers vie for the economic assets of patient satisfaction and loyalty (Herzlinger 2004:110).

At the same time, local market competition tends to raise costs, create excess capacity, and reduce economies of scale (with fewer patients per hospital). For these reasons, competition can also have a negative impact on hospital care (Starr 1982; Gaynor 2006; Mutter, Wong, and Goldfarb 2008). On the other hand, competition may provide effective incentives and pressures to perform better. In more competitive hospital markets, is medical quality higher? Is customer satisfaction higher?

We merged in data from the Health Care Cost and Utilization Project using the hospital market structure files from 2006 to obtain data on the competitive environment facing hospitals. Competition is measured with a lag relative to other hospital characteristics (2007-10). Matching hospitals across data sets proved difficult, as the two data files do not use the same hospital identifier. Only 331 hospitals could be matched with competition data. We tested the sub-sample representativeness by checking whether our main findings (from the previous section) can be replicated on the sub-sample (shown in Appendix II; virtually none of the coefficients show a statistically significant difference between the full sample and the sub-sample). This analysis indicates that the smaller sample is representative of hospital dynamics observed in the full data set.

The market competition among hospitals can be measured in numerous different ways. Indeed, the data include 18 different measures of local hospital competition. All of the measures are anchored around "the spatial density of hospitals" (Scott et al. 2000:127), including different ways of defining local market areas (political boundaries, fixed radius, variable radius, and patient flow) and different measures of the intensity of competition within the local area (number of hospitals, or the Herfindahl index) (Wong, Zhan, and Mutter, 2005). Rather than trying to select one or two preferred measures, we use all measures, testing them one at a time, and consider the weight of the evidence.

There are 18 measures of competition, and three outcome variables (positive response, negative response, and medical quality). Appendix III shows the key coefficients of interest from 54 regression models, while Figure 4 graphs these results.

For positive satisfaction responses, the signs on competition are positive in all 18 measures, and are statistically significant for 15. Overall, hospital competition seems to raise

patient satisfaction. Looking at negative responses, when people are explicitly unhappy with their hospital, the signs indicate that competition reduces patient discontent for 17 measures, though the coefficients are small and only significant for six measures. In sum, the weight of the evidence supports the expectation that competition improves patient satisfaction scores.

For medical quality, the signs on competition are negative in 14 out of 18 coefficients, and significantly negative for 8 of those. Though there are some null estimates, the balance of evidence suggests that medical quality is *lower* in areas with more competition among hospitals.

Additional results (not reported) show that the interaction effect of competition and medical quality has a clear zero coefficient, indicating that patients' ability to identify the quality of their hospital does not depend on the level of market competition. In other words, more intense market competition does not improve the flow of information in hospital markets, nor lead the best hospitals to more effectively signal their quality to patients.

In summary, local competition among hospitals leads to higher patient satisfaction, but seemingly lower medical quality. There seems to be a relatively strong feedback loop between hospitality, patient satisfaction, and market competition. This feedback loop is a natural focal point for hospitals-as-competitors, as hospitality is readily converted into patient satisfaction. In contrast, there are only weak connections between medical quality, patient satisfaction, and competition. Together these patterns and priorities incentivize consumer-driven health care to continuously improve its hospitality without a strong mechanism for improving technical medical quality. Neither consumerism nor competition provides a mechanism that strongly supports technical medical quality.

[Figure 4. Estimates of the Effect of Competition on Satisfaction and Quality, Across 18 Measures of Hospital Competition]

Conclusion

Drawing on a sample of over 3,000 American hospitals, this research finds that patients have limited ability to observe the technical quality of their medical care, but are very sensitive to the quality of room and board care. Higher medical quality has a weak effect on patient satisfaction. In contrast, the quality of interaction with nurses has a positive effect size three or four times larger than medical quality. Even relatively minor customer service aspects, such as the quietness of rooms, have as much or more impact on patient satisfaction than medical quality or hospital survival rates.

Hospitals balance two aspects of patient care. First is technical medical quality, which represents the reason why patients are under their care. The second is hospitality care – maintaining patients' comfort during their stay. This room and board care is a secondary service, not a goal in itself, and is needed only as a byproduct of the medical treatment. However, when evaluating the overall hospital experience, patients can find that the non-medical, hospitality aspects of their experience are more visible, visceral, and memorable.

The hospital experience can be understood in a classical Goffmanian sense of having front-stage and back-stage elements (Goffman 1959). Front-stage aspects are highly visible to patients, and these mostly relate to the hospitality or hotel amenities of the experience. The back-stage aspects are highly technical medical services and operations, which are mostly invisible to patients. In a sense, form is more visible to patients than content. Visibility is not necessarily well-connected to importance. The things patients can see are not necessarily those that matter for their well-being. Indeed, the skew in what is visible means that consumer satisfaction responses focus on hotel aspects of their stay, with little conscious attention placed on the quality of medical treatment they received, or how well the hospital protected them from risk of

accidental injury, illness, or death. Patients end up using the non-medical aspect of their hospital stay as a marker of quality on all dimensions (both seen and unseen) – what we term a *halo effect of hospitality*.

Today, patient satisfaction is becoming a central dimension on which hospitals and doctors are evaluated. This carries great potential to redirect both patients and hospitals from the core mission of medical excellence. In a medical market with more high-charged incentives, competition for patients may lead hospitals to focus on what their consumers can immediately observe, and economize on what they cannot. In a truly consumer-driven health care system where what matters most is patient satisfaction, we expect to see developments such as 24-hour room service, gourmet meals, HBO channels, designer hospital gowns, non-medical staff to tend to patient comfort, hospital executives recruited from the service industry, and growing capital investments in private rooms, 'healing gardens,' atriums, WiFi and waterfalls. Patients suffering through the pains and discomforts of medical treatment will appreciate a higher standard of hospitality. However, this same movement may lead to cutbacks in or crowding out of what medical consumers cannot readily observe: the provision of excellent medical treatment and vigorous commitment to patient safety. Over time, hospitals may become increasingly comfortable places to stay, but less ideal places to undergo medical treatment. This is a market driven health care system that turns hospitals into hotels where our caregivers play concierge (Bromley 2012; Goldman and Romley 2008). Deluxe accommodation in hospitals may come to set the gold standard of what good medicine 'looks like' (DiMaggio and Powell 1983; Meyer and Rowan 1977).

This is the theme of a prominent book, *If Disney Ran Your Hospital: 9 ½ Things You Would Do Differently* (Lee 2004). Hospitals, the author argues, must recognize that, like Disney,

they are providing an "emotional experience." In this, perceptions are more important than reality, and the perceived experience of the visit is more important than the medical services provided. Drawing on the principles of a Disney production, Lee focuses on how hospitals can cultivate a competitive advantage in hospitality.[10]

As a business strategy, investing in hospitality and amenities likely offers a higher return than medical quality. If hospitality and medical care had the same per-unit costs, hospitality investments would generate far more patient satisfaction and loyalty than would better medical care. This is because hospitality generates a halo effect of patient goodwill, while the performance of medical excellence does not. In regions where hospitals compete more intensively for patients, there is greater patient satisfaction but lower medical quality. This shifting of priorities can be seen in how some hospital planners in competitive markets talk about their facilities: "[the hospital] looks like you're in a country club… I think it gives people hope" (quoted in Bromley 2012:1062). It seems unlikely that the fundamental needs and desires of patients are better served by this shift in focus.

The gradual marketization of medicine is part of a broader trend towards making professions more like business (Matthews 1991). Concerns about how to balance professional commitments with market incentives are as old as the professions themselves (e.g., Parsons 1939). However, we are overdue for a serious sociological reflection on the difference between a professional commitment and a business incentive – and how these motivations serve patients and customers in different ways. This is particularly salient in the case of hospitals, which have traditionally been conceived as an essential service to a community, but are becoming more like products in a consumer marketplace.

[10] *If Disney Ran Your Hospital* won the 2005 best book award from the American College of Healthcare Executives, and claims to have sold over 250,000 copies.

In the world of business, consumers are expected to be prudent buyers; businesses accept little ethical responsibility for the things that consumers choose to purchase. In contrast, a profession's mandate is to serve the *fundamental* interests of clients, and embrace fiduciary responsibility. While professions do not always live up to this goal, the growing focus on business interests and the framing of patients-as-consumers moves hospitals and doctors away from the obligation to act in the best interests of their clients. Organizational mandates can have unintended consequences for the amount of fiduciary responsibility felt within an organization (Pernell, Jung, and Dobbin 2017). The central problem of making professions like businesses is the risk of diminishing commitment to serve the ultimate interests of patients. If better quality medicine and patient safety add little to the patient experience, hospitals-as-hotels have no obligation to provide it. An interesting direction for future research would be understanding what types of hospitals are less likely to invest in false quality signals (Reich 2014a).

Similar challenges appear in the world of journalism, where professional standards are eroding in an online "market for clicks" (Christin 2018). Increasingly, journalists are under pressure write whatever attracts the most clicks, with diminishing regard to standards of truth and newsworthiness. At the extreme, traditional journalism is being displaced by profit-seeking entertainment companies, which aim only to maximize attention and alarm from readers.[11] Even the most principled journalists are under growing pressure to write sensationalist click-bait that can vie for attention in a media world of hyper-partisan hysteria and exotic conspiracy theories.

In higher education, universities face similar pressures in the competition for student applications. In *US News and World Report* rankings, the best universities are those that admit

[11] In the world of journalism, the fiduciary responsibility is to ensure that reporting is truthful and worthwhile – in some sense, that news stories serve the public good, and that reading these articles will make a person an "informed citizen." University professors have a similar fiduciary responsibility: to ensure that their teaching supports useful knowledge and insight that contributes to the intellectual vibrancy and capabilities of students.

the smallest share of their applicant pools. The fast track to a lower acceptance rate is to attract more and more student applicants without admitting them. Such metrics nudge colleges towards a public face of college-as-country-club or summer camp, giving greater leeway to a party culture and sports programs while often downplaying the academic rigor of their programs (Armstrong and Hamilton 2015; O'Neil 2016, Chapter 3). Moreover, college teaching evaluations appear to have a minimal or even negative relationship with student learning, but a strong connection with the easiness of courses (Uttl et al 2017; Braga et al 2014; Wallish and Cachia 2018). These two customer satisfaction metrics are not pushing colleges towards the best interest of students – high quality, affordable education that can change their life course – but rather towards student experiences that are more immediately likable.

In these domains of medicine, journalism and higher education, the competitive pressure is on to provide satisfying consumer experiences that make clients happy but not necessarily better. These institutions face less competitive pressure to uphold their professional commitments: nurturing healthy, informed, or knowledgeable citizens in the long run.

In medicine, the institutional shift towards consumer-driven health care suggests a future that is more comfortable than helpful, and more expensive than effective. The U.S. health care system is already very expensive by international standards, even while it yields relatively poor health care outcomes compared to other western nations (Schneider et al 2017). Even high-income Americans with health insurance have poorer health outcomes than their peers in other Western countries (Woolf and Aron 2013). The paradox of U.S. health care is having more expensive treatments with comparably lesser health benefits. Greater focus on patients-as-consumers, which drives hospitality more than medical quality or patient safety, is unlikely to address this fundamental challenge.

Table 1. Descriptive Statistics

Variable	N	Mean	s.d.	Minimum	Maximum
Dependent Variables					
Overall ratings (9 or 10, high, %)	3180	64.53	8.94	25.33	96.00
Overall ratings (6 or lower, low, %)	3180	10.23	4.59	0.00	43.67
Recommendation (yes, definitely, %)	3180	67.77	9.96	25.33	97.00
Recommendation (no, not, %)	3180	6.05	3.50	0.00	36.67
Quality of Medical Care					
Technical medical quality (%)	3180	90.69	7.02	29.45	99.53
Mortality rate	3019	12.76	1.35	7.90	17.73
Hospitality					
Nurse communication	3180	73.89	6.12	35.00	98.33
Quiet room	3180	55.84	10.19	30.33	93.67
Clean room	3180	68.65	7.17	41.33	94.33
Pain management	3180	68.09	5.33	36.00	95.00
Information about recovery at home	3180	80.59	4.77	45.33	96.33
Responsiveness of hospital staff	3180	61.37	8.40	31.67	96.67
Communication about medicine	3180	58.63	5.96	26.33	90.33
Hospital Characteristics					
Price($)/1000	3180	12.26	3.84	2.48	32.21
Ownership					
Government	3180	0.19	0.39	0	1
Nonprofit	3180	0.62	0.48	0	1
Profit	3180	0.19	0.39	0	1
Emergency service (yes=1)	3180	0.94	0.24	0	1
Response rate (%)	3180	32.94	9.26	6.33	91.00
State Characteristics					
Education (% of population with bachelor's or higher degree)	3180	27.04	4.48	17.30	49.20
GDP Per Capita (logged)	3180	10.56	0.13	10.33	11.15
Population density (logged)	3180	4.97	0.96	0.18	9.17

Source: Medicare Hospital Data, July 2007 to June 2010. State characteristics data from American Community Survey by the U.S. Census Bureau (Education from the 2006-2010 five year estimates data; GDP Per Capita and Population density from 2008-10 data).

Table 2: Regressions for Patient Satisfaction

	Positive Response MODEL				Negative Response MODEL			
	Model 1 BETA (se)	Model 2 BETA (se)	Model 3 BETA (se)	Model 4 BETA (se)	Model 5 BETA (se)	Model 6 BETA (se)	Model 7 BETA (se)	Model 8 BETA (se)
Technical Quality								
Mortality rate	-0.08***	-0.07***			0.02	0.02**		
	(0.02)	(0.01)			(0.02)	(0.01)		
Quality of medical care			0.15***	0.10***			-0.13***	-0.08***
			(0.02)	(0.01)			(0.02)	(0.01)
Hospitality								
Nurse communication		0.33***		0.29***		-0.49***		-0.46***
		(0.03)		(0.03)		(0.03)		(0.03)
Quiet room		0.13***		0.14***		0.06***		0.09***
		(0.02)		(0.01)		(0.01)		(0.01)
Clean room		0.12***		0.14***		-0.08***		-0.09***
		(0.01)		(0.01)		(0.01)		(0.01)
Information about recovery at home		0.14***		0.11***		-0.18***		-0.15***
		(0.01)		(0.02)		(0.01)		(0.01)
Pain management		0.14***		0.17***		-0.09***		-0.13***
		(0.03)		(0.03)		(0.03)		(0.03)
Other Hospital Characteristics								
Ownership								
Government-Owned (reference category)		…		…		…		…
Private, non-profit		0.12***		0.09***		-0.03		-0.00
		(0.02)		(0.03)		(0.02)		(0.02)
Private, for-profit		0.08**		0.03		0.09***		0.16***
		(0.03)		(0.03)		(0.03)		(0.03)
Price ($) / 1000		0.29***		0.25***		-0.14***		-0.11***
		(0.01)		(0.01)		(0.01)		(0.01)
Emergency service		0.01		-0.11*		-0.02		-0.03
		(0.05)		(0.05)		(0.04)		(0.04)
Survey response rate		0.21***		0.20***		-0.15***		-0.10***
		(0.02)		(0.01)		(0.01)		(0.01)
State-Level Controls Included?	N	Y	N	Y	N	Y	N	Y
R^2	0.007	0.654	0.023	0.691	0.000	0.578	0.018	0.589
Observations	6,038	6,038	6,360	6,360	6,038	6,038	6,360	6,360

Notes: *p≤.05, **p≤.01, ***p≤.001 (two-tailed tests). Cluster-robust standard errors in parentheses.

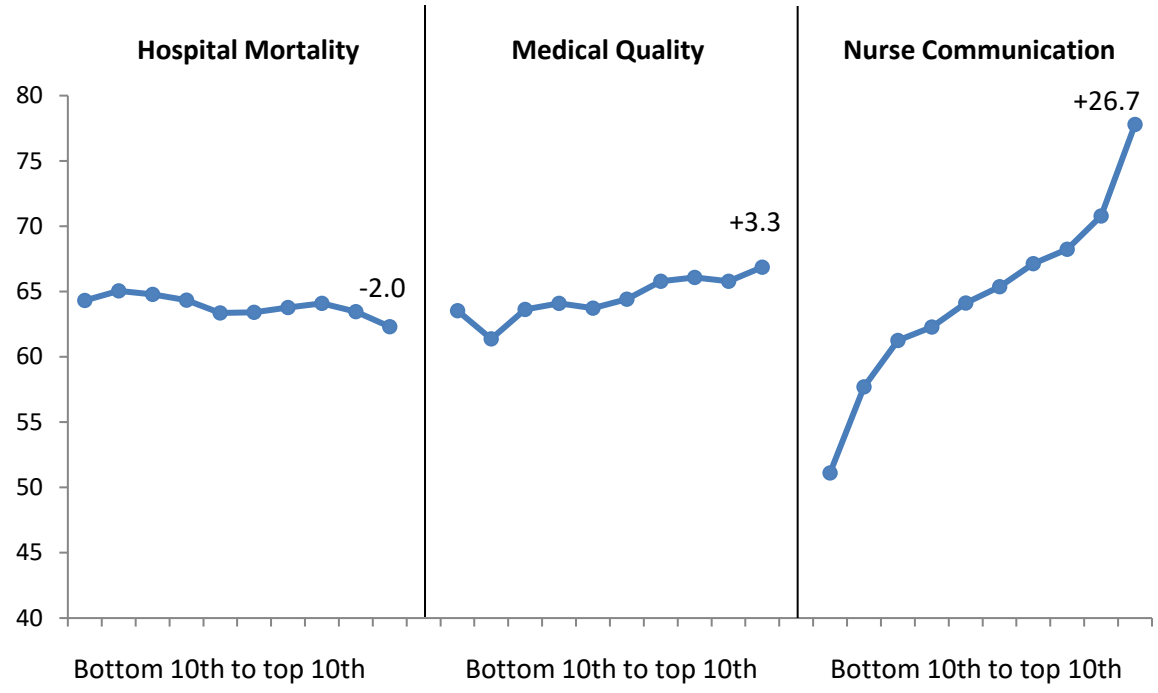

Figure 1: Patient Satisfaction by Deciles of Hospital Mortality, Medical Quality, and Nurse Communication

Source: Medicare Hospital Data, 2007-10. N = 3,019.

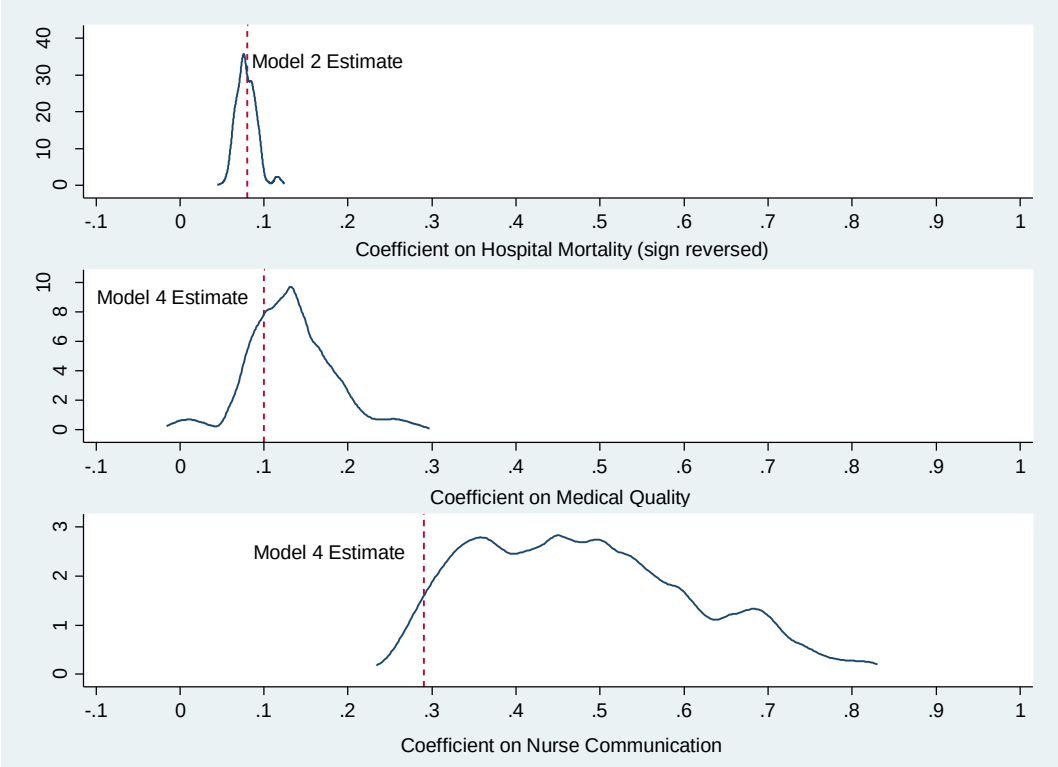

Figure 2. Modeling Distribution of Patient Satisfaction Effects (Positive Response)
Note: Density graph of estimates from 8,192 models. Vertical axis indicates the kernel density of estimates. Horizontal axis indicates the standardized coefficient estimates. The sign of the coefficients on hospital mortality is reversed, to emphasize the magnitude of the effect.

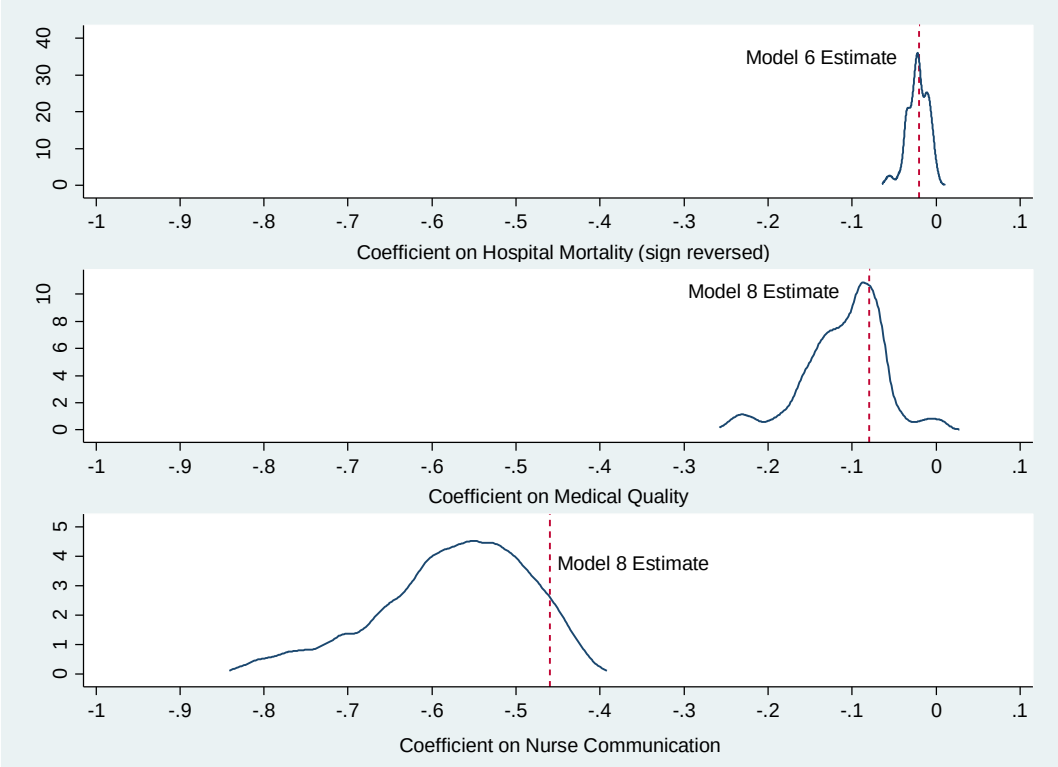

Figure 3. Modeling Distribution of Patient Satisfaction Effects (Neg. Response)
Note: Density graph of estimates from 8,192 models. Vertical axis indicates the kernel density of estimates. Horizontal axis indicates the standardized coefficient estimates. The sign of the coefficients on hospital mortality is reversed, to emphasize the magnitude of the effect.

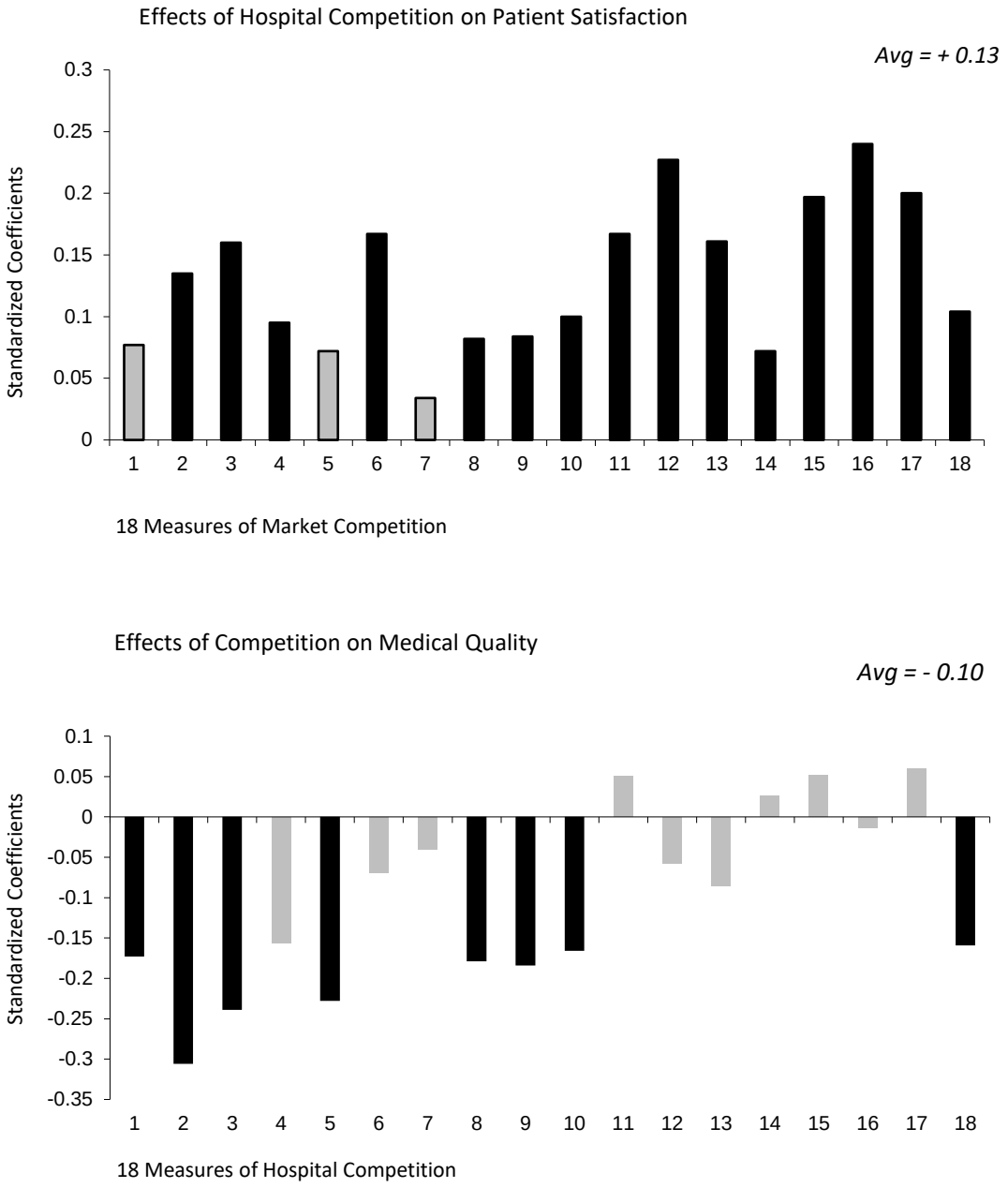

Figure 4. Estimates of the Effect of Competition on Satisfaction and Quality, Across 18 Measures of Hospital Competition

Note: Coefficients that are significant at least at the 5% level are shown in black. Non-significant coefficients are shown in grey. See appendix III for complete results.

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Appendix I. Technical Medical Quality Indicators (Process of Care Quality Measures)

Heart Attack

Aspirin at Arrival
Aspirin Prescribed at Discharge
ACEI or ARB for LVSD
Adult Smoking Cessation Advice/Counseling
Beta Blocker Prescribed at Discharge
Beta Blocker at Arrival
Median Time to Fibrinolysis
Fibrinolytic Therapy Received Within 30 Minutes of Hospital Arrival
Median Time to Primary PCI
Primary PCI Received Within 90 Minutes of Hospital Arrival

Heart Failure

Evaluation of LVS Function
ACEI or ARB for LVSD
Adult Smoking Cessation Advice/Counseling
Discharge Instructions

Pneumonia

Oxygenation Assessment
Pneumococcal Vaccination
Blood Cultures Performed Within 24 Hours Prior to or 24 Hours After Hospital Arrival for Patients Who Were Transferred or Admitted to the ICU Within 24 Hours of Hospital Arrival
Blood Cultures Performed in the Emergency Department Prior to Initial Antibiotic Received in Hospital
Adult Smoking Cessation Advice/Counseling
Antibiotic Timing (Median)

Surgical Care

Prophylactic Antibiotic Received Within One Hour Prior to Surgical Incision
Prophylactic Antibiotic Selection for Surgical Patients
Prophylactic Antibiotics Discontinued Within 24 Hours After Surgery End Time
Surgery Patients with Appropriate Hair Removal

Appendix II: Regressions for Patient Satisfaction, Using Sub-sample Data

	Positive Response MODEL				Negative Response MODEL			
	Model 1 BETA (se)	Model 2 BETA (se)	Model 3 BETA (se)	Model 4 BETA (se)	Model 5 BETA (se)	Model 6 BETA (se)	Model 7 BETA (se)	Model 8 BETA (se)
Technical Quality								
Mortality rate	-0.13*	-0.06*			0.05	0.01		
	(0.06)	(0.03)			(0.05)	(0.03)		
Quality of medical care			0.21*	0.10*			-0.22*	-0.12*
			(0.09)	(0.04)			(0.10)	(0.05)
Hospitality								
Nurse communication		0.46***		0.38***		-0.53***		-0.36**
		(0.11)		(0.10)		(0.10)		(0.13)
Quiet room		0.06		0.07		0.08*		0.09**
		(0.04)		(0.04)		(0.03)		(0.03)
Clean room		0.10*		0.14***		-0.07		-0.12**
		(0.04)		(0.04)		(0.04)		(0.04)
Information about recovery at home		0.08		0.08		-0.13***		-0.15***
		(0.04)		(0.05)		(0.04)		(0.04)
Pain management		-0.01		0.04		0.01		-0.15
		(0.09)		(0.08)		(0.08)		(0.12)
Other Hospital Characteristics								
Ownership								
Government-Owned (reference category)		…		…		…		…
Private, non-profit		0.08		0.01		0.02		0.02
		(0.09)		(0.09)		(0.07)		(0.08)
Private, for-profit		-0.05		-0.11		0.29**		0.33***
		(0.12)		(0.13)		(0.10)		(0.10)
Price ($) / 1000		0.26***		0.23***		-0.14***		-0.13***
		(0.03)		(0.03)		(0.02)		(0.03)
Emergency service		-0.11		-0.30		0.14		0.18
		(0.20)		(0.19)		(0.11)		(0.16)
Survey response rate		0.27***		0.24***		-0.18***		-0.11**
		(0.04)		(0.04)		(0.04)		(0.04)
State-Level Controls Included?	N	Y	N	Y	N	Y	N	Y
R^2	0.018	0.681	0.043	0.696	0.003	0.631	0.046	0.638
Observations	600	600	622	622	600	600	622	622

Notes: *p≤.05, **p≤.01, ***p≤.001 (two-tailed tests). Cluster-robust standard errors in parentheses.

Notes to appendix II: The goal of this appendix is to test the representativeness of the sub-sample of hospitals that could be matched with the competition data. If the sub-sample is representative, we should find roughly the same results in the sub-sample as in the full sample. The appendix II table shows the results from running the same model specifications reported in Table 2 in the main results, using the sub-sample data. The basic regression model is shown in equation 3 (page 16) that jointly models satisfaction and recommendation scores. The findings from this analysis are equivalent in substance to those of Table 2, with only small differences in the magnitudes of the estimates. Significance levels are lower in the sub-sample analysis because of the smaller sample size. However, few of these coefficients are outside the confidence intervals of the respective estimates in Table 2. We conclude from this that the sub-sample is fully representative of the hospital dynamics observed in the full data set.

Appendix III: Effects of Competition Measures on Patient Satisfaction and Medical Technical Quality

Number of Hospitals	Positive response *BETA* *(se)*	Negative response *BETA* *(se)*	Overall quality *BETA* *(se)*
Core-Based Statistical Area	*0.077* *(0.041)*	*-0.050* *(0.031)*	*-0.173** *(0.068)*
County	*0.135**** *(0.038)*	*-0.054* *(0.031)*	*-0.306**** *(0.081)*
Health Service Area	*0.160**** *(0.036)*	*-0.058* *(0.030)*	*-0.239*** *(0.078)*
Metropolitan Statistical Area	*0.095** *(0.045)*	*-0.079** *(0.034)*	*-0.156* *(0.083)*
Fixed Radius	*0.072* *(0.042)*	*-0.009* *(0.028)*	*-0.228**** *(0.069)*
Variable Radius 75%	*0.167**** *(0.039)*	*-0.070*** *(0.025)*	*-0.069* *(0.065)*
Variable Radius 90%	*0.034* *(0.025)*	*0.003* *(0.013)*	*-0.040* *(0.055)*
Patient Flow 75%	*0.082** *(0.036)*	*-0.019* *(0.029)*	*-0.179** *(0.082)*
Patient Flow 90%	*0.084** *(0.038)*	*-0.017* *(0.027)*	*-0.184*** *(0.071)*
Patient Flow 95%	*0.100*** *(0.038)*	*-0.045* *(0.026)*	*-0.166** *(0.073)*
Herfindahl Index			
Core-Based Statistical Area	*0.167**** *(0.033)*	*-0.051** *(0.025)*	*0.050* *(0.075)*
County	*0.227**** *(0.034)*	*-0.055** *(0.027)*	*-0.058* *(0.070)*
Health Service Area	*0.161**** *(0.031)*	*-0.034* *(0.022)*	*-0.085* *(0.068)*
Metropolitan Statistical Area	*0.072** *(0.032)*	*-0.045* *(0.027)*	*0.026* *(0.052)*
Fixed Radius	*0.197**** *(0.033)*	*-0.038* *(0.029)*	*0.052* *(0.094)*
Variable Radius 75%	*0.240**** *(0.029)*	*-0.095**** *(0.023)*	*-0.013* *(0.071)*
Variable Radius 90%	*0.200**** *(0.030)*	*-0.072*** *(0.025)*	*0.060* *(0.095)*
Patient Flow	*0.104**** *(0.032)*	*-0.003* *(0.022)*	*-0.159** *(0.070)*

Note: *p≤.05, **p≤.01, ***p≤.001 (two-tailed tests). Cluster-robust standard errors in parentheses for satisfaction models, and robust standard errors in parentheses for quality models.

Notes to appendix III: The satisfaction models include all variables in main models (models 4 and 8 in Table 2). The medical quality models include variables for all hospital characteristics include teaching status, region, urban/rural, ownership, and bed size. To save space, full results are not reported here, but available from the authors on request. The Herfindahl Index is reverse coded (1 – index), so that larger values show greater (not lesser) intensity of competition. This transformation only affects the signs of the coefficients. All measures of competition are standardized. Table reports standardized coefficients with cluster-robust standard errors in parentheses for satisfaction models, and robust standard errors in parentheses for quality models. Hospital competition is measured in 2006. N = 331.