

# Patients as Consumers in the Market for Medicine

## The Halo Effect of Hospitality<sup>1</sup>

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### ABSTRACT:

Consumer-driven health care is often heralded as a new quality paradigm in medicine. However, patients-as-consumers face difficulties in judging the quality of their medical treatment. With 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. 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. Consumer-driven health care creates pressures for hospitals to be more like hotels. These findings lend broader insight into unintended consequences of marketization.

Keywords: marketization; consumers; health care; organizations; public policy; economic sociology

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## **Introduction**

The health care system in the United States is increasingly based on market logics in which patients are seen as consumers of health care (Reich 2014). The “consumer-driven health care” movement 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 treatment? 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. The hospital experience can be understood in a classical Goffmanian sense of having front-stage and back-stage elements (Goffman 1959). Hospitals provide 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. However, patients have limited ability to observe the technical quality of their medical care, but 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 2014). 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 2014:1607). Nurses are given communication scripts telling them exactly what friendly words to use with patients (Mikesell and Bromley 2012; Bromley 2012). One 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 medical quality or

the patient survival rate. We find 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.

A halo effect of hospitality may, in turn, shape how hospitals operate and what patient outcomes they prioritize. In competitive settings, hospitals face strong pressure to attract new and repeat patients. We examine the competitiveness of hospital markets to gain insight into how hospitals perform when under greater consumer-driven pressure. We find that when a hospital is located in a more competitive market, patient satisfaction is higher but medical quality is lower. Treating patients as consumers in a competitive market for medicine creates pressure for hospitals to be more like hotels. These findings give broader insight into how market logics can have unintended consequences for consumers.

## **Two Campaigns for Quality in Health Care**

The U.S. health care system is very expensive by international standards, even while it yields poor health care outcomes compared to other western nations (Schneider et al 2017; National Research Council 2013). Health care spending runs over \$10,000 per person a year in the U.S. – roughly twice as much as other high income countries. At the same time, Americans have significantly lower life expectancy and higher rates of illness than in other countries.<sup>2</sup> Even high-income Americans with insurance have poorer health outcomes than their peers abroad (Woolf and Aron 2013). The paradox of U.S. health care is one of being a double outlier: having much more expensive treatments with notably lower health benefits. An enduring question is

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<sup>2</sup> For example, teenagers in the U.S. are less likely to survive to age 50, and arrive at age 50 in poorer health, compared to those living in most other Western countries.

how to address this dual problem: how best to provide affordable, effective health care for Americans.

In the field of hospital care, the 21<sup>st</sup> century has seen two distinct campaigns and rallying cries for quality improvement: 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, infections, and death in the course of their treatment. Some 100,000 patients in the U.S. die each year from serious mistakes in medicine, while many more experience injuries as a result of their treatment (Kohn, Corrigan, and Donaldson 1999). 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 only about half of adults (55 percent) or 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). 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 remarkably ascendant in the world of hospital care (Press 2006; Junewicz and Youngner 2015). At the turn of the century, patient satisfaction surveys barely existed. Today, essentially all hospitals conduct extensive patient surveys, and the satisfaction scores influence Medicare reimbursement rates as well as the compensation of hospital executives. Indeed, “patient satisfaction is top of mind today for most

health care organizations” (Siegrist 2013). Patient satisfaction is sometimes seen as reflecting a patient-centered care approach. However, it is better understood as an approach directly adopted from business. In the world of business, customer satisfaction is the most widely-used metric across industries (Farris et al. 2010). Customer satisfaction is both a management tool and a forward metric of financial performance. Customer satisfaction metrics in business “focus employees on the importance of fulfilling customers’ expectations” and “warn of problems that can affect sales and profitability” (ibid: 56).

Many see customer satisfaction as a metric that will push hospitals towards better quality medical care. Irwin Press, a sociologist who pioneered satisfaction surveys in hospitals, writes that “as the patient becomes ever more a consumer, patient satisfaction becomes increasingly relevant... [and] satisfied patients mean higher quality care” (Press 2006:12). 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. Patient satisfaction as an overarching standard of care is seen to drive medicine towards better treatments and practices. In this view, medical quality is well reflected in what patients can hear, see, and feel.

### **What Drives Patient Satisfaction?**

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. These two tasks differ greatly in their visibility to patients. At a professional level, these tasks often run in an opposite direction. Medical intervention is often painful and unpleasant, deliberately sacrificing short-term well-being of patients 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 busy?), 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 customers ‘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 acute, including pneumonia, bloodstream infections, congestive heart failure, and heart attack (Pfundner, 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.<sup>3</sup> Technical medical treatment is the back stage of a hospital, mostly beyond the view or critical scrutiny of the audience of patients (Goffman 1959).

In contrast, the quality of “room and board” care in hospitals is the front stage and 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 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.

### **Halo Effects**

The asymmetric visibility of front stage and back stage aspects of hospitals may lead to a kind halo effect of hospitality. Halo effects can occur in situations of asymmetric visibility - when there is an underlying quality that is hard to observe, but other attributes are visibly salient. Displaying excellence on a visible quality creates an aura of infallibility that spills into judgements about unobserved qualities. The front stage serves as a proxy for what happens back stage.

A large body of research shows there is a halo effect of beauty, in which physically attractive people are regarded as robustly more intelligent, competent, cooperative, and

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<sup>3</sup> 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.

trustworthy (Feingold 1992; Langlois et al. 2000; Mulford et al 1998; c.f. Kuwabara and Thébaud 2017). Cultural capital might be understood as having a similar kind of halo effect; people rich in cultural capital are often presumed to be competent in many (arguably unrelated) dimensions of ability (Rivera 2015). In used car markets, buyers often consider the cleanliness of a car as evidence of its mechanical condition (Akerlof 1970).<sup>4</sup>

Halo effects can lead to the de-coupling of merit and status – in which highly-regarded people, things, or services may not have the highest intrinsic quality (Lynn, Podolny, and Tao 2009; Botelho and Abraham 2017). Hospitals that provide excellent bedside manner, comfort, amenities, convenience and emotional empathy may be seen as providing robustly excellent treatment and considered great hospitals even if technical medical quality is lacking or unknown. Hotel amenities and hospitality become proxies for the less visible medical quality that will most impact a patient’s life.

### **Hospital Competition**

In many places in the country, there is a high local concentration of hospitals which are competing for and striving to serve the same pool of patients. Such hospitals “have found themselves in a fierce fight... pitted against other hospitals, pulling out all stops to maintain market share” (Griffin 2006:217). In competitive regions, hospitals advertise directly to patients, and patients with private insurance frequently ask their doctor for a specific hospital at which to undergo treatment (Newman 2009; Grote, Newman, and Sutaria 2007). Hence, there is significant scope for consumer-driven competition among hospitals: health care providers vie for the economic assets of patient satisfaction and goodwill. In simple models of health care services, competition for patients should drive hospitals towards providing the best possible

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<sup>4</sup> In other words, there is an incentive / return to investing in false quality signals.

medical care (Herzlinger 2004). However, if patient satisfaction and medical quality are weakly coupled, the highest quality medical care may not be the focal point for hospital competition.

In *Conflict and the Web of Group Affiliations*, Georg Simmel (1955) emphasized that competition is inherently a contest for the favor and loyalty of a third party – in modern parlance, the consumer. Competitors seek to understand the “innermost wishes” of the consumer, even before “[the consumer] himself becomes aware of them. Antagonistic tension with his competitor sharpens the businessman's sensitivity to the tendencies of the public, even to the point of clairvoyance...” (1955:62). Competitive dynamics bring about a kind of popular democracy into many social domains. “Because of their competition,” Simmel writes, “teachers, party leaders, artists, or journalists... must obey the instincts or moods of the mass once the mass can choose among them” (62-63).

Competition for patient satisfaction acts like an institutional spotlight, turning the system's attention to what patients will write on their satisfaction surveys, and how to improve those scores (Espeland and Sauder 2007; Sauder and Espeland 2009; Sharkey and Bromley 2015). When there is asymmetric visibility between different aspects of hospital care, does competition lead hospitals to pursue the “innermost wishes” of their patients: better health and longevity? Or do they mostly end up competing for the halo effects that come from hospitality and hotel amenities?

Anecdotally, the patient satisfaction movement seems to have given hospitals greater license to focus on hospitality, and to give vague medical justifications for non-medical features. For example, at a newly-renovated Los Angeles hospital, executives comment that “[the hospital] looks like you're in a country club... I think it gives people hope” (quoted in Bromley 2012:1062). Many hospitals – especially those in the most competitive health care markets –

seem to be investing heavily in the model of a luxury hotel and resort, with private rooms, gourmet meals, and immaculately manicured grounds. These are comforting consumer-oriented features to which none would personally object. However, they are very different than the priorities emphasized by the patient safety movement: reducing observable errors in diagnosis and treatment.

In a competitive, consumerist model of medicine, hospitals face an incentive to provide forms of care that are most 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 classical theory and consumer-driven health care arguments, competition for customer loyalty is the central mechanism that drives quality improvement (Herzlinger 1997; 2004). In an era of management by satisfaction survey, how does hospital competition shape the kind of medical services offered to patients?

The central empirical questions of this study are as follows:

*Question 1:* What are the relative effects of medical quality and hospitality on patient satisfaction? Is satisfaction driven mostly by hospitality, or by medical quality?

*Question 2:* Does hospital competition lead to improvement in either medical quality or patient satisfaction? Under competitive pressure, are customer satisfaction and patient safety complimentary, orthogonal, or rivalrous goods?

## **Existing Evidence**

Existing evidence is conflicted 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 regardless of the technical quality of treatment; moreover, satisfaction was not associated with long-term survival or the probability of recurrent heart attack (Lee et al. 2008; see also Fenton et al. 2012). In a now-classic experiment on health insurance, RAND found that higher co-pays and out-of-pocket expenses led patients to cut back on their treatment and medications. While these patients did reduce treatments that are generally not effective (such as seeking medical treatment for the flu), they equally cut back on 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). In short, patients generally evaluate nurses by the standards of a

friendly and caring personal assistant, and give little conscious attention to their technical medical role.<sup>5</sup> These studies suggest that patients indeed have trouble distinguishing between technical medical quality and hospitality.

In contrast, other research using Medicare hospital data has found that technical quality and patient satisfaction have a positive relationship and “care was consistently better in the hospitals that received high [patient] ratings” (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). This work concludes that patient satisfaction is a strong proxy for medical excellence.

This range of findings, on the face of it, seems hard to reconcile. However, 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. Existing research provides little sense of which factor is more important overall.

Our 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

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<sup>5</sup> Nurse technical skills include clinical assessment, case management, telemetry, cardiac life support, starting and managing IVs, central lines and other ports, managing chest tube, ventilator and other airway conditions.

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.

## **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) are included, for the three-year-period July 2007 to June 2010. The data were obtained from the Centers for Medicaid and Medicare Services (CMS). 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 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 (by CMS before release) at the hospital level, showing 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 majority of patients clearly liked their hospital (which may be part of the reason why these surveys have become so popular). Patient satisfaction scores have been shown to be highly correlated with hospital Yelp reviews (Ranard et al 2016).

*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 Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) 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?), 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. 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.

*Controls.* We also include a set of controls that may be linked to both satisfaction and medical quality. This involves hospital characteristics such as the prices they charge the Medicare system, ownership structure (government, non-profit, for-profit), the presence of an Emergency ward, a measure of information given to patients about their recovery at home, and the hospital-level survey response rate. As well, we consider state-level controls of education, per capita income, and population density – which may affect both patient expectations and service levels at different hospitals.

## 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:

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

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

In each model the subscript  $i$  denotes the hospital.  $Quality_i$  represents the technical quality of medical care at hospital  $i$ .  $\mathbf{Z}$  is a vector of variables capturing the ‘room and board’ quality of hospitals.  $\mathbf{X}$  is a vector of hospital- and state-level control variables. The terms  $v_i$  and  $\eta_i$  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.<sup>6</sup> 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 ( $v_i$  and  $\eta_i$ ) are likely to be correlated within hospitals, we use pooled OLS clustered on hospitals. Writing the above two equations as one jointly-estimated model,

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

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. Coefficients from this model capture the effect of an explanatory variable on both outcomes (satisfaction and recommendation) pooled together. The sample size for equation 3 is  $N \times 2 = 6,038$ . We report standardized coefficients to directly compare the effects of explanatory variables (hospitality and medical quality) that are measured in different units.

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

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<sup>6</sup> 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).

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.<sup>7</sup> This is a byproduct of hospital-level, rather than individual-level measurement in the available data set. 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.

## **Findings**

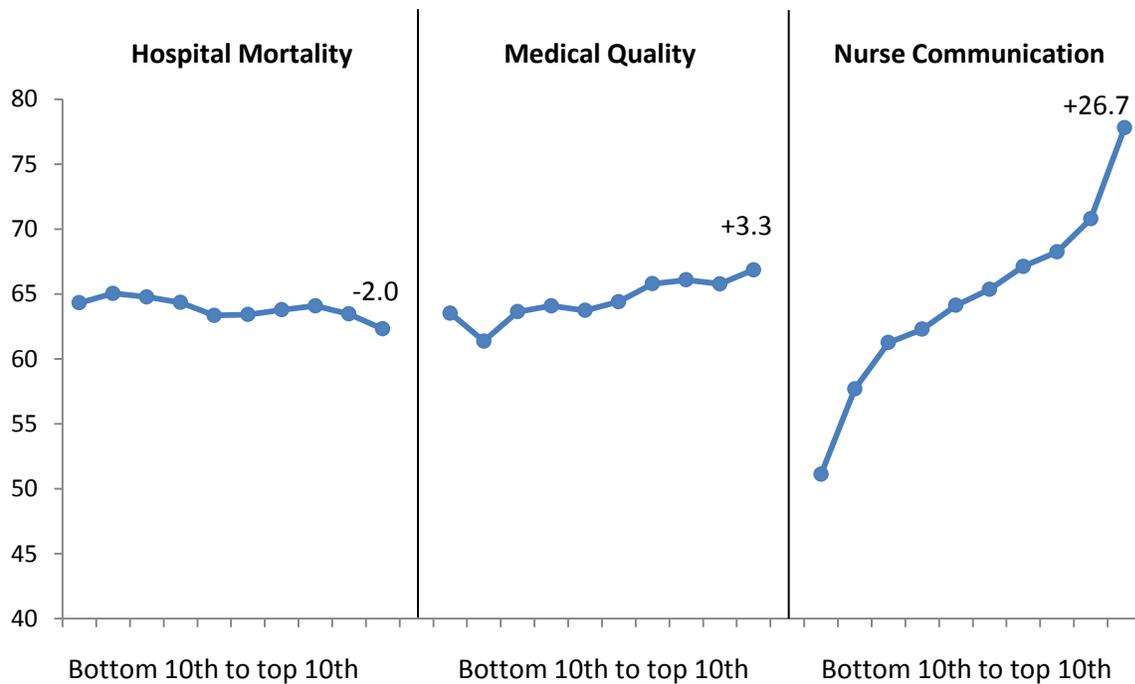
For an initial look at the data, Figure 1 provides a non-parametric examination of patient satisfaction by deciles of patient mortality, medical quality and nurse communication. This shows that patient satisfaction is higher in the deciles with the lowest patient death rate, but the difference is small. Hospitals with the very highest death rates have only 2.0 percentage points less patient satisfaction than those with very low death rates. The evidence indicates that 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.

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<sup>7</sup> Studying variation in moderate satisfaction is redundant, as the values for moderate satisfaction are fully determined by the values of the other two variables.

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.<sup>8</sup> 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**

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

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*

<sup>8</sup> Note that the standard deviation of medical quality is roughly the same as that of nurse communication, as shown in Table 1. Also note that in these non-parametric graphs, the slopes are approximately linear.

*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 effectively 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. 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-in-magnitude 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.<sup>9</sup> 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

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<sup>9</sup> In other specifications, we include hospital mortality and medical quality in the same model, and find substantively equivalent results.

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 ]**

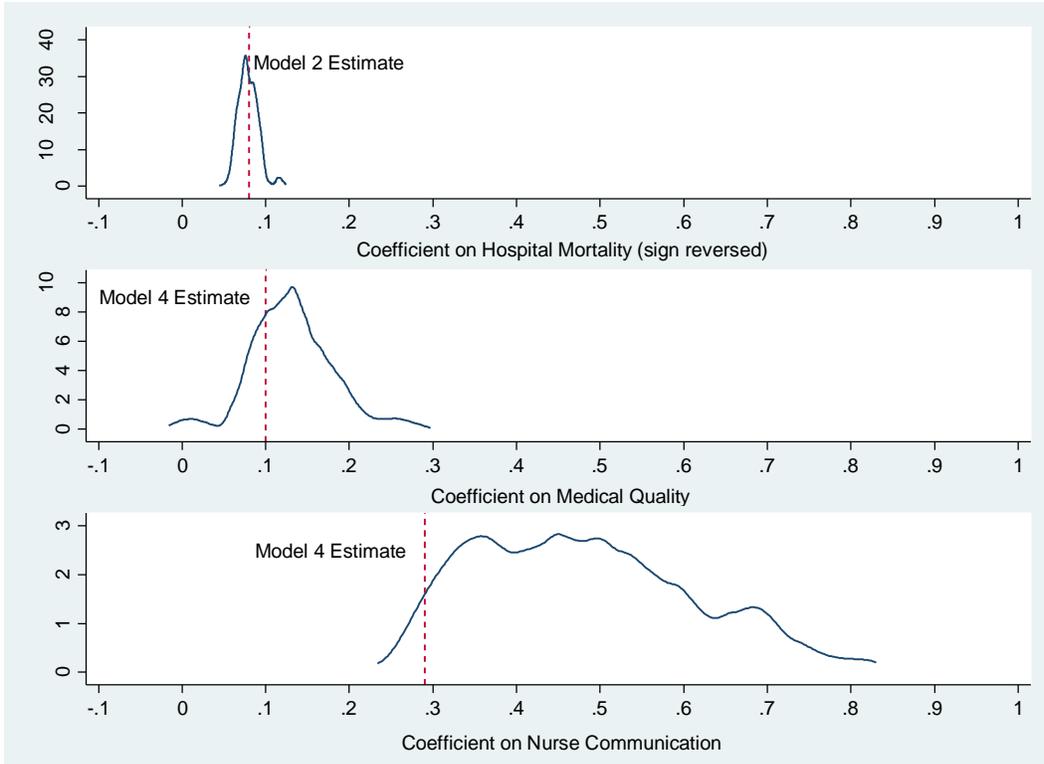
The right half of Table 2 (models 5 to 8) reports on the negative response models: the chance of hospitals receiving negative evaluations from patients. Recall that the coefficients in the negative response models are expected to have the opposite signs as in the positive response models. In models 5 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. 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 and Holsteen 2017; Muñoz and Young 2018). 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)**

*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.

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.

## **Hospital Competition**

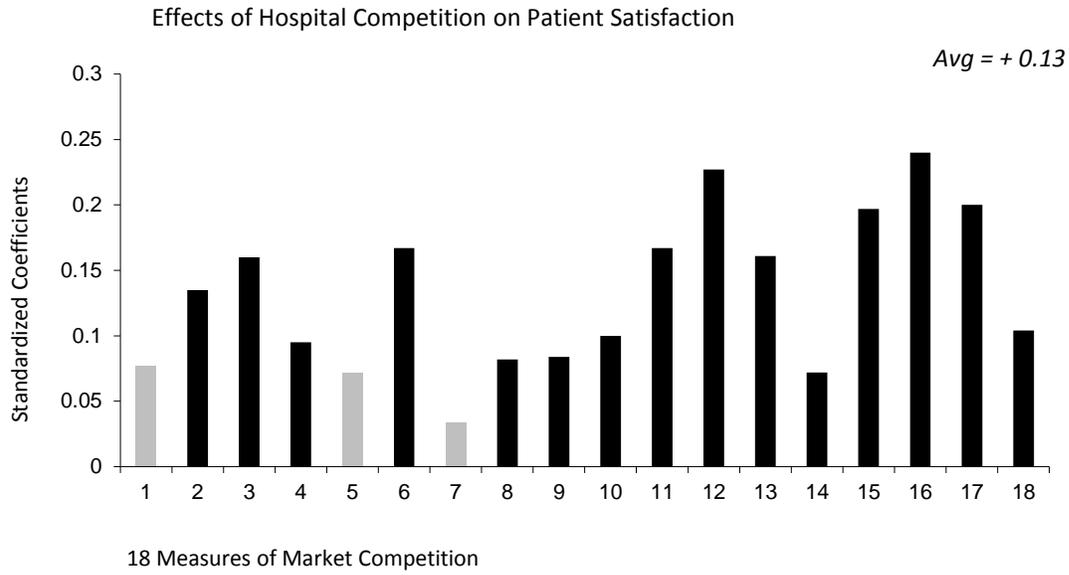
Next, we consider the competitive environment of hospitals. Highly competitive hospital markets may help reveal what hospitals prioritize when under pressure to attract patients. Empirically, we examine how the intensity of competition influences both patient satisfaction and patient safety. To obtain data on the competitive environment facing hospitals, we merged in data from the Health Care Cost and Utilization Project using the hospital market structure files from 2006. 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 degree of market competition among hospitals is measured in a number of different ways, with the measures anchored around “the spatial density of hospitals” (Scott et al. 2000:127). One can think of hospitals as having a geographic catchment area: the degree of

competition is defined by how many other hospitals share the same catchment area. Uncertainty in this measure comes from the many different possible ways of defining local markets / catchment areas (such as using political boundaries, fixed geographic radius, variable radius, or patient flows across hospitals). As well, there are two different measures of the intensity of competition within a local area: the number of hospitals in the area, and the Herfindahl index measuring relative market shares (Wong, Zhan, and Mutter, 2005). Overall, the data include 18 unique measures of local hospital competition. 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.

With 18 measures of competition and three outcome variables (positive response, negative response, and medical quality), we have 54 regression models. Appendix III shows the key coefficients of interest from all these models. Figure 3 graphs the standardized coefficients showing the effect of competition on patient satisfaction (positive responses).

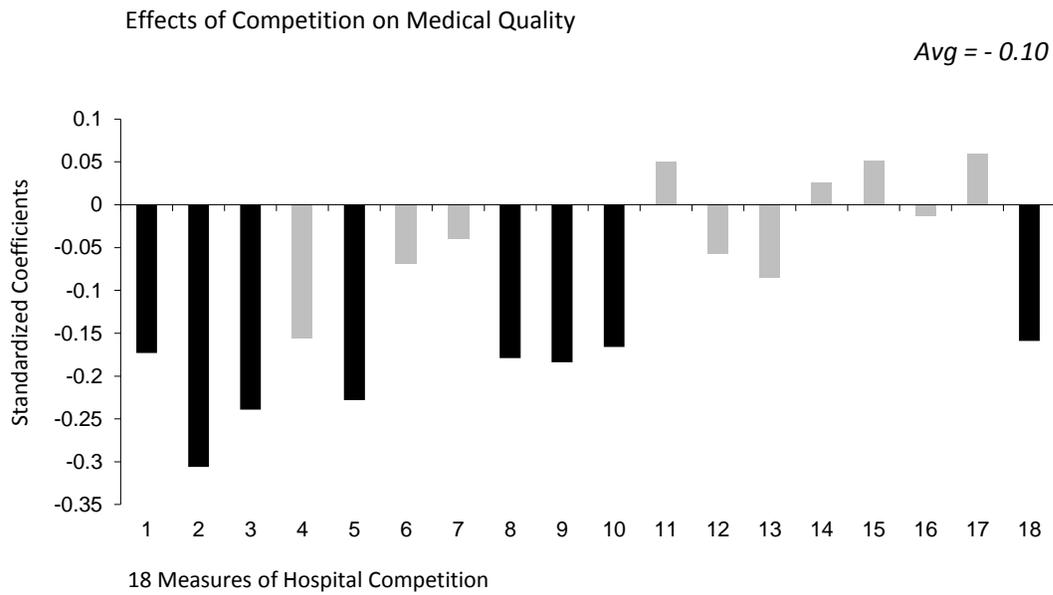
For positive satisfaction responses, the signs on competition are positive in all 18 measures, and are statistically significant for 15 (significant effects are shown in dark; non-significant effects are shown in grey). Overall, hospital competition raises patient satisfaction. Looking at negative responses, 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 (see Appendix III). In sum, the weight of the evidence clearly supports the idea that competition improves patient satisfaction scores.



**Figure 3. Estimates of the Effect of Competition on Patient Satisfaction, 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.

Figure 4 shows standardized coefficients for the effect of competition on medical quality. The effect of competition on medical quality is negative in 14 out of 18 coefficients, and significantly negative for 8 of those. Though there are some null estimates, the balance of evidence indicates that medical quality is *lower* in areas with more competition among hospitals. This sharply contrasts with how competition affects satisfaction. Local competition among hospitals leads to higher patient satisfaction, but lower medical quality. This provides further evidence of decoupling between medical excellence and patient satisfaction.



**Figure 4. Estimates of the Effect of Competition on Medical 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.

## **Discussion and Conclusion**

Consumer-driven health care is a growing force in modern medicine, with patient / customer satisfaction becoming a central standard of care. How is treating patients as consumers likely to re-focus the attention and priorities of a health care system? 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 positive but small effect on patient satisfaction. In contrast, the quality of interaction with nurses has an 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.

Hospital medical care involves both front-stage and back-stage elements (Goffman 1959). Front-stage aspects are highly visible to patients, and 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. The things patients can see, hear, and feel are not necessarily those that matter for their long-term well-being. This asymmetry in visibility 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. The result is a halo effect of hospitality, in which patients seem to treat the non-medical aspects of their care as an overall signal of quality on all dimensions. Halo effects adhere to the appearance of caring, rather than to the delivery of expert medical care.

Competitive hospital markets appear to amplify and reinforce a focus on hospitality. When hospitals face greater competition from other hospitals, medical quality is lower but

patient satisfaction is higher. This further illustrates the decoupling of quality and status in hospital care. Our findings suggest that, as a business strategy, investing in hospitality and hotel amenities offers a much higher return than medical quality. If hospitality and medical care had the same per-unit costs, hospitality investments would generate two to three times 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.

It is worth noting, as a scope condition, that this is a study of general, acute care hospitals. In areas such as chronic disease management (diabetes, hemophilia, HIV, epilepsy) patients often develop expert knowledge in their illness and their repeated treatment. In such fields, we would likely see (1) greater ability of patients to detect the quality of medical care, (2) a smaller halo effect of hospitality, and (3) more beneficial effects of competition (see Cleary [2003] for an insightful case study of hemophilia treatment). A study that directly compares a sample of chronically-ill persons with acute care patients would be valuable future research.

Nevertheless, this research speaks to broad concerns about the unintended consequences of marketization (Polanyi [1944] 2001; Fourcade and Healy 2007; Davis 2009). Hospitals have traditionally been conceived as an essential service to a community, but are becoming more like products in a consumer marketplace (Reich 2014). Those working in hospitals are increasingly expected to focus on the pursuit of customer satisfaction. The day-to-day institutional question is shifting from “will this improve patient health?” to “will this raise satisfaction scores?” More and more, hospitals are under pressure to invest in what their consumers can immediately observe, and economize on what they cannot. In hospitals today, we see developments such as 24-hour room service, gourmet meals, HBO channels, designer hospital gowns, hospital executives recruited from the service industry, and immense capital investments in private rooms and

country-club facilities. Consumer-driven health care trends towards turning hospitals into hotels (Bromley 2012; Goldman and Romley 2008). Making hospitals a better consumer product is not a promising pathway to better medicine.<sup>10</sup>

The marketization of medicine is part of a broader pattern making professions more like business (Matthews 1991). This is a process of moving from professional commitments to business incentives. In doing so, marketization may put at risk a commitment to serve the *ultimate interests* of patients. The philosophy of business is, ‘if customers think something is worth paying for, we will sell it to them.’ If better quality medicine and patient safety do not add to the patient experience, hospitals-as-hotels have no obligation to provide them. Business is a world of *caveat emptor* in which consumers are responsible for their preferences. If hospitals are doing what raises satisfaction scores, patients would seem to be getting what they want from their health care providers. Yet, customer satisfaction is problematic when it shows, not what patients ultimately want, but simply what patients can see. When patients enter an acute care hospital, often their deepest fear is that they might die there; yet the hospital-level risk of dying matters little for patient satisfaction scores. Consumerist metrics and market competition do not seem to be focusing hospitals on their patients’ “innermost wishes” (Simmel 1955:62).

Similar kinds of problems appear in the world of higher education, where universities are expected to provide four years of rigorous education, while also providing room and board hospitality while students receive that education. These two aspects of the university experience are not equally visible to students, and it is likewise problematic to treat students as consumers

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<sup>10</sup> A counter argument is that greater comfort and hospitality may encourage future engagement and utilization of hospital services. However, greater utilization is not an objective in its own right – especially among those with insurance. Surveys show that most physicians think their patients are receiving too much, rather than too little, medical treatment (Sirovich et al 2011; Lyu et al 2017). Moreover, if the medical system is becoming focused on metrics that are not well aligned with the best interests of patients, then there is less reason for patients to engage with that system.

who are buying an educational experience. At the classroom level, teaching evaluations have a minimal or even negative correlation with student learning, but a strong connection with the easiness of courses (Uttl et al 2017; Braga et al 2014; Wallish and Cachia 2018). At the college level schools compete to admit the smallest percentage of their aspiring students (Sauder and Espeland 2009). Cultivating a large pool of applicants that can be rejected is a troubling incentive for universities. At many institutions, these metrics nudge colleges towards a public face of college-as-summer-camp, giving greater leeway to a party culture and popular sports while downplaying the academic rigor of their programs (Armstrong and Hamilton 2015; O’Neil 2016; Stevens 2007). Consumerist competition in higher education seems in tension with the professional mandate of colleges: providing a high quality, affordable education that can change students’ lives (Eaton et al 2018).

In journalism, professional standards are fading in an online “market for clicks” (Christin 2018). For consumers of the news media, it is often unclear what stories merit our limited attention space. An ideal news story is both attention-grabbing (engaging) and newsworthy (truthful). The term “click-bait” indicates there is often a decoupling between these two aspects of merit, and that newsworthiness – the harder part to observe – is usually the first to be sacrificed. Readers can much more readily tell if a story will be engaging than whether it will be true or genuinely newsworthy. Indeed, false news stories are often the most surprising, evocative, and engaging, while accurate information about current events is often less interesting (Heath and Heath 2007; Vosoughi et al. 2018). Even the most principled journalists today are under growing pressure to write sensationalist click-bait that can vie for attention with YouTube algorithms and media outlets that reject traditional journalistic standards. In many ways,

professional journalism is being outrun by profit-seeking entertainment companies aiming only to draw attention, clicks, and alarm from readers – rather than to usefully inform them.

Medicine is part of a boarder world of professional services where two aspects of quality – the front stage and back stage, the visible and the opaque – compete for priority in delivery to consumers. In these marketizations, the competitive pressure is on to provide satisfying consumer experiences that make clients happy but not necessarily better. These fields face little market pressure to uphold their core professional commitments: nurturing healthy, informed, knowledgeable citizens in the long run. Current consumer metrics – satisfaction scores, college applications, clicks – do not seem to elicit the deepest aspirations and goals of their clients, but rather capture short-term aspects of consumer experiences. We call for a research agenda that seeks to better understand and improve feedback on what people ultimately want and need from these professional services, and how to avoid the unintended consequences of expanding market logics.

**Table 1. Descriptive Statistics**

<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>s.d.</b>	<b>Minimum</b>	<b>Maximum</b>
<i>Dependent Variables</i>					
Overall ratings (9 or 10, high, %)	3180	64.5	8.9	25.3	96.0
Overall ratings (6 or lower, low, %)	3180	10.2	4.6	0.00	43.7
Recommendation (yes, definitely, %)	3180	67.8	10.0	25.3	97.0
Recommendation (no, not, %)	3180	6.0	3.5	0.0	36.7
<i>Quality of Medical Care</i>					
Technical medical quality (%)	3180	90.7	7.0	29.5	99.5
Mortality rate	3019	12.8	1.3	7.9	17.7
<i>Hospitality</i>					
Nurse communication	3180	73.9	6.1	35.0	98.3
Quiet room	3180	55.8	10.2	30.3	93.7
Clean room	3180	68.6	7.2	41.3	94.3
Pain management	3180	68.1	5.3	36.0	95.0
<i>Hospital Characteristics</i>					
Price(\$)/1000	3180	12.3	3.8	2.5	32.2
Ownership					
Government	3180	0.2	0.4	0.0	1.0
Nonprofit	3180	0.6	0.5	0.0	1.0
Profit	3180	0.2	0.4	0.0	1.0
Emergency service (yes=1)	3180	0.9	0.2	0.0	1.0
Information about recovery at home	3180	80.6	4.8	45.3	96.3
Response rate (%)	3180	32.9	9.3	6.3	91.0
<i>State Characteristics</i>					
Education (% of population with bachelor's or higher degree)	3180	27.0	4.5	17.3	49.2
GDP Per Capita (logged)	3180	10.6	0.1	10.3	11.1
Population density (logged)	3180	5.0	1.0	0.2	9.2

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	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	BETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA
	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)
<b>Technical Quality</b>								
Mortality rate	-0.08*** (0.02)	-0.07*** (0.01)			0.02 (0.02)	0.02** (0.01)		
Quality of medical care			0.15*** (0.02)	0.10*** (0.01)			-0.13*** (0.02)	-0.08*** (0.01)
<b>Hospitality</b>								
Nurse communication		0.33*** (0.03)		0.29*** (0.03)		-0.49*** (0.03)		-0.46*** (0.03)
Quiet room		0.13*** (0.02)		0.14*** (0.01)		0.06*** (0.01)		0.09*** (0.01)
Clean room		0.12*** (0.01)		0.14*** (0.01)		-0.08*** (0.01)		-0.09*** (0.01)
Pain management		0.14*** (0.03)		0.17*** (0.03)		-0.09*** (0.03)		-0.13*** (0.03)
<b>Other Hospital Characteristics</b>								
<i>Ownership</i>								
Government-Owned (reference category)		...		...		...		...
Private, non-profit		0.12*** (0.02)		0.09*** (0.03)		-0.03 (0.02)		-0.00 (0.02)
Private, for-profit		0.08** (0.03)		0.03 (0.03)		0.09*** (0.03)		0.16*** (0.03)
Price (\$) / 1000		0.29*** (0.01)		0.25*** (0.01)		-0.14*** (0.01)		-0.11*** (0.01)
Emergency service		0.01 (0.05)		-0.11* (0.05)		-0.02 (0.04)		-0.03 (0.04)
Information about recovery at home		0.14*** (0.01)		0.11*** (0.02)		-0.18*** (0.01)		-0.15*** (0.01)
Survey response rate		0.21*** (0.02)		0.20*** (0.01)		-0.15*** (0.01)		-0.10*** (0.01)
State-Level Controls Included?	N	Y	N	Y	N	Y	N	Y
R <sup>2</sup>	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). Standardized coefficients reported, with cluster-robust standard errors in parentheses.

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

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**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

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

	Positive Response MODEL				Negative Response MODEL			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	BETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA
	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)
<b>Technical Quality</b>								
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)
<b>Hospitality</b>								
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)
Pain management		-0.01		0.04		0.01		-0.15
		(0.09)		(0.08)		(0.08)		(0.12)
<b>Other Hospital Characteristics</b>								
<i>Ownership</i>								
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)
Information about recovery at home		0.08		0.08		-0.13***		-0.15***
		(0.04)		(0.05)		(0.04)		(0.04)
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 <sup>2</sup>	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). Standardized coefficients reported, with 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	Negative response	Overall quality	Difference between coefs
	<i>BETA</i> ( <i>se</i> )	<i>BETA</i> ( <i>se</i> )	<i>BETA</i> ( <i>se</i> )	<i>Posi vs. quality</i> <i>t</i>
Core-Based Statistical Area	0.077 (0.041)	-0.050 (0.031)	-0.173* (0.068)	0.250** 3.148
County	0.135*** (0.038)	-0.054 (0.031)	-0.306*** (0.081)	0.441*** 4.929
Health Service Area	0.160*** (0.036)	-0.058 (0.030)	-0.239** (0.078)	0.339*** 4.645
Metropolitan Statistical Area	0.095* (0.045)	-0.079* (0.034)	-0.156 (0.083)	0.251** 2.659
Fixed Radius	0.072 (0.042)	-0.009 (0.028)	-0.228*** (0.069)	0.300*** 3.714
Variable Radius 75%	0.167*** (0.039)	-0.070** (0.025)	-0.069 (0.065)	0.236** 3.113
Variable Radius 90%	0.034 (0.025)	0.003 (0.013)	-0.040 (0.055)	0.074 1.225
Patient Flow 75%	0.082* (0.036)	-0.019 (0.029)	-0.179* (0.082)	0.261** 2.914
Patient Flow 90%	0.084* (0.038)	-0.017 (0.027)	-0.184** (0.071)	0.268*** 3.328
Patient Flow 95%	0.100** (0.038)	-0.045 (0.026)	-0.166* (0.073)	0.266** 3.232
<b>Herfindahl Index</b>				
Core-Based Statistical Area	0.167*** (0.033)	-0.051* (0.025)	0.050 (0.075)	0.117 1.428
County	0.227*** (0.034)	-0.055* (0.027)	-0.058 (0.070)	0.285*** 3.662
Health Service Area	0.161*** (0.031)	-0.034 (0.022)	-0.085 (0.068)	0.246*** 3.292
Metropolitan Statistical Area	0.072* (0.032)	-0.045 (0.027)	0.026 (0.052)	0.046 0.753
Fixed Radius	0.197*** (0.033)	-0.038 (0.029)	0.052 (0.094)	0.145 1.455
Variable Radius 75%	0.240*** (0.029)	-0.095*** (0.023)	-0.013 (0.071)	0.253*** 3.299
Variable Radius 90%	0.200*** (0.030)	-0.072** (0.025)	0.060 (0.095)	0.140 1.405
Patient Flow	0.104*** (0.032)	-0.003 (0.022)	-0.159* (0.070)	0.263*** 3.417

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.

## Appendix IV: Supplementary Tables for Reviewers

**Table 2a: Regressions for Patient Satisfaction (Positive Response Model)**

	R&R Model 1 BETA (se)	<b>R&amp;R Model 2 BETA (se)</b>	R&R Model 3 BETA (se)	R&R Model 4 BETA (se)	<b>R&amp;R Model 5 BETA (se)</b>	R&R Model 6 BETA (se)
<b>Technical Quality</b>						
Mortality rate	-0.08*** (0.02)	<b>-0.09*** (0.01)</b>	-0.07*** (0.01)			
Quality of medical care				0.15*** (0.02)	<b>0.14*** (0.01)</b>	0.10*** (0.01)
<b>Hospitality</b>						
Nurse communication		<b>0.31*** (0.03)</b>	0.33*** (0.03)		<b>0.29*** (0.03)</b>	0.29*** (0.03)
Quiet room		<b>0.02 (0.02)</b>	0.13*** (0.02)		<b>0.08*** (0.01)</b>	0.14*** (0.01)
Clean room		<b>0.05** (0.02)</b>	0.12*** (0.01)		<b>0.11*** (0.02)</b>	0.14*** (0.01)
Pain management		<b>0.22*** (0.03)</b>	0.14*** (0.03)		<b>0.22*** (0.03)</b>	0.17*** (0.03)
<b>Other Hospital Characteristics Included?</b>	N	N	Y	N	N	Y
State-Level Controls Included?	N	N	Y	N	N	Y
R <sup>2</sup>	0.007	<b>0.561</b>	0.654	0.023	<b>0.620</b>	0.691
Observations	6,038	<b>6,038</b>	6,038	6,360	<b>6,360</b>	6,360

Notes: \*p<.05, \*\*p<.01, \*\*\*p<.001 (two-tailed tests). Standardized coefficients reported, with cluster-robust standard errors in parentheses.

**Table 2b: Regressions for Patient Satisfaction (Negative Response Model)**

	R&R Model 7	<b>R&amp;R Model 8</b>	R&R Model 9	R&R Model 10	<b>R&amp;R Model 11</b>	R&R Model 12
	BETA (se)	<b>BETA (se)</b>	BETA (se)	BETA (se)	<b>BETA (se)</b>	BETA (se)
<b>Technical Quality</b>						
Mortality rate	0.02 (0.02)	<b>0.03*** (0.01)</b>	0.02** (0.01)			
Quality of medical care				-0.13*** (0.02)	<b>-0.08*** (0.01)</b>	-0.08*** (0.01)
<b>Hospitality</b>						
Nurse communication		<b>-0.49*** (0.03)</b>	-0.49*** (0.03)		<b>-0.47*** (0.03)</b>	-0.46*** (0.03)
Quiet room		<b>0.13*** (0.01)</b>	0.06*** (0.01)		<b>0.13*** (0.01)</b>	0.09*** (0.01)
Clean room		<b>-0.06*** (0.01)</b>	-0.08*** (0.01)		<b>-0.09*** (0.01)</b>	-0.09*** (0.01)
Pain management		<b>-0.13*** (0.03)</b>	-0.09*** (0.03)		<b>-0.14*** (0.03)</b>	-0.13*** (0.03)
<b>Other Hospital Characteristics Included?</b>	<b>N</b>	<b>N</b>	<b>Y</b>	<b>N</b>	<b>N</b>	<b>Y</b>
State-Level Controls Included?	N	N	Y	N	N	Y
R <sup>2</sup>	0.000	<b>0.546</b>	0.578	0.018	<b>0.566</b>	0.589
Observations	6,038	<b>6,038</b>	6,038	6,360	<b>6,360</b>	6,360

Notes: \*p≤.05, \*\*p≤.01, \*\*\*p≤.001 (two-tailed tests). Standardized coefficients reported, with cluster-robust standard errors in parentheses.