Healthcare 7 (2019) 100353

Contents lists available at ScienceDirect

Healthcare

journal homepage: www.elsevier.com/locate/healthcare

Investigating consumer hospital choice: Demand and supply-side levers could address health care costs

Susan Koch-Weser[a], Kenneth Chui[a], Sarah Hijaz[a,*], Amy Lischko[a], David Auerbach[b]

[a] Tufts University School of Medicine, United States
[b] Massachusetts Health Policy Commission, United States

ARTICLE INFO

Keywords:
Discrete choice experiment
Consumer preferences
Hospital choice

ABSTRACT

Objective: Policies that aim to steer patients from higher to lower cost providers of comparable quality have potential to impact health care cost growth – but their effectiveness depends, in part, on consumer perceptions of value and willingness to make tradeoffs. We sought to understand what was required to shift substantial numbers of consumers to higher-value care settings for several "shoppable" conditions.
Methods: A discrete choice experiment (DCE) was conducted to elicit patient preferences for hospital type. We used an Internet panel of 1005 Massachusetts residents to conduct this experiment in 2016. The DCE data were analyzed using alternative-specific conditional logit regression.
Results: Consumers reported large influences of out of pocket costs, physician referrals and quality ratings on their choice of hospital. For example, up to a third of consumers would shift from Academic Medical Centers to community hospitals if the latter had higher quality ratings, lower copays or a physician referral. Choice of site for maternity care was most influenced by physician referral; cancer treatment and orthopedic procedures by quality ratings; and MRI by cost, suggesting that patients prioritize quality over cost as perceived risk increases.
Conclusions and implications: Our findings provide guidance for identifying promising policy levers that most influence consumer choice of provider. However, the extent to which potential levers can influence choice is likely to be dependent upon the kind of care being sought.

1. Introduction

Steering patients toward inpatient and outpatient services provided by lower cost hospitals and other settings has the potential to meaningfully impact health care costs. In a recent study of health care transactions involving more than a quarter of the nation's privately insured, the authors find substantial variation in hospital inpatient prices within regions – such that if all patients paying above-median prices instead went to median-priced hospitals in their regions, inpatient spending for the privately-insured would drop by more than 25%.[1] Such price variation has been shown to be associated with market leverage but generally not with quality of care. Thus higher premiums and out of pocket costs borne by patients reflect higher prices but return little measureable value.[2]

Payers employ a mix of supply and demand-side strategies to attempt to constrain health care costs. Payment reform strategies including Medicare's ACO models and in Massachusetts, Blue Cross Blue Shield's Alternative Quality Contract (AQC), are supply-side strategies that use financial incentives determined by total costs of care and quality to influence provider behavior. Studies of the AQC found that much of the savings to date have stemmed from shifting provider referrals, for example, to imaging and diagnostic testing centers with lower costs.[3] Demand-side strategies seek to influence patient choices directly, by rewarding them for choosing high-quality, low-cost providers of care. These include cost sharing in benefit design such as high-deductible plans and tiered provider co-payments, and more recently, cash-back incentives for certain types of care.[4]

Although recent work has found that these approaches can influence where care is sought,[5,6] there is limited understanding of which factors are most likely to influence patient hospital choices and whether there are particular services or conditions that are more amenable to these approaches than others. In Massachusetts, the state hospital market is characterized by well-known, high-priced Academic Medical Centers in the Boston area that contrast with a number of community-based hospitals that have been shown to have lower prices and comparable quality of care.[7,8] Understanding patient preferences for certain

* Correspondence to: Department of Public Health and Community Medicine, Tufts University School of Medicine, 136 Harrison Ave, Boston, MA 02111, United States.
E-mail address: sarah.hijaz@tufts.edu (S. Hijaz).

https://doi.org/10.1016/j.hjdsi.2019.01.001
Received 2 February 2018; Received in revised form 29 December 2018; Accepted 1 January 2019
Available online 11 January 2019
2213-0764/

providers in light of available quality information and more aggressive cost sharing, for example, would help payers and purchasers of care better design and target strategies toward reducing health care spending growth.

We hypothesized that Massachusetts consumers choice of community-based hospitals over prestigious AMCs could be influenced by factors amenable to change. To test this hypothesis we conducted a discrete choice experiment (DCE), to determine the relative influence of: 1) out of pocket costs, 2) hospital quality, and 3) referral from a primary care physician on hospital choice under a defined set of 'shoppable' conditions.

2. Data and methods

2.1. Discrete choice experiment

The discrete choice experiment (DCE) was designed to elicit patient preferences for hospital type in scenarios based on the need for "shoppable," i.e. non-emergency care that could be planned in advance. Discrete choice experiments provide information about stated preferences, and allow for the examination of hypothetical choices where the attributes of those choices can be specifically designed and manipulated by the researcher.[9] We surveyed participants in an Internet panel from *Marketing Systems Group*. Our 1005 respondents were Massachusetts residents aged 18–64 with household incomes greater than $25,000 (to more closely approximate a commercially-insured population where price variation is relevant). A quota for Boston residents, for whom an AMC might in fact be their local hospital, was set at 10% of the sample.

2.2. Choice dimensions

We identified attributes that could influence consumer choices of hospitals that were present in the literature, and amenable to intervention. We also conducted focus groups with commercially insured Massachusetts residents to confirm these attributes. The focus groups confirmed the near uniform reputation for quality and cutting-edge medicine of Massachusetts AMCs and revealed high variability in the reputations of local community hospitals. This was a strong factor in how focus group participants choose hospitals, but it is not amenable to change. The final attributes tested included: out of pocket costs, hospital quality rating, and referral from a primary care physician. In the case of MRI scans, the choices were between hospital-based and free-standing imaging centers[10] and the attributes included out of pocket costs, referral from a primary care physician, and convenience (hours of operation) as quality is perceived to be more homogeneous. For the DCE we assigned levels to each attribute as shown in Table 1.

The AMC and community level cost differential was developed for each scenario based on assessments of out of pocket costs in the MA market for maternity and knee replacements; a review of various national-level out of pocket estimates for colon cancer care; observations of cost-sharing amounts in tiered-network products in the local marketplace, and a review of cash incentives for MRI imaging. For hospital quality ratings, we used a global star rating format similar to Medicare's Hospital Compare ratings–3 or 4 out of 5 stars was used in our scenarios. This presentation was also supported by our focus group observations where participants often discussed the ubiquitous "stars" found on the Internet as a way to denote the quality of services.

2.3. Choice scenarios

Our choice scenarios were based on four "shoppable conditions," that is a non-emergency service for which there is time to consider options. We posed the care location choice as a community hospital near the patient's home or an Academic Medical Center. The scenario included a complete list of Massachusetts AMCs. The experimental design allowed us to test whether the relative importance of the choice attributes varied depending on the nature of the services sought as the care scenarios represented varying degrees of perceived severity and risk. The following 4 care scenarios were tested in the DCE: knee replacement surgery, normal vaginal delivery, colorectal cancer surgery and subsequent chemotherapy, and diagnostic MRI. In the case of MRI, the care locations were changed to hospital-based MRI vs. MRI center.

2.4. Questionnaire design

Participants were presented with four hypothetical scenarios whereby they were asked to consider varying levels of attributes and to then make a selection between the two care locations. Respondents were given one paired-choice experiment for each of the 4 scenarios and the attributes were randomized within a set of 24 pairings designed to allow for analysis of the marginal impact of each attribute in isolation with maximum efficiency.[11] Respondents were also surveyed about demographics, features of their health insurance plan, health care utilization in the last twelve months, and how much they trust quality information from various sources.

2.5. Analysis

The DCE data were analyzed using alternative-specific conditional logit regression, which can accommodate adjusting for covariates that are constant within each choice and non-choice pair. All models were adjusted for demographics including age, sex, race and ethnicity, education, household income, residing in Boston metropolitan area, length of time with current primary care provider, having searched for hospital ratings online in the last 12 months, and degree of trust in one's physician. We conducted the analyses both unweighted and weighted with available data to match the demographics of Massachusetts residents under the age of 65. The results were not meaningfully different and we therefore present the weighted results here. The estimated WTP was derived from the alternative-specific conditional logit regression using the ratio "regression coefficient of the attribute" divided by the "–1 × regression coefficient of the cost variable". The corresponding 95% CIs were estimated using the nonlinear component estimation in Stata software.

Table 1
Attributes of discrete choice experiment.

Care scenario	Referral	Cost	Quality	Hours
Knee replacement surgery	yes/no	AMC: $1500/$4000 community: $0/$750	3 or 4 "stars"	–
Normal childbirth	yes/no	AMC: $1500/$4000 community: $0/$750	3 or 4 "stars"	–
Colon Cancer	yes/no	AMC: $6000/$10,000 community: $0/$3000	3 or 4 "stars"	–
MRI	yes/no	$200 bonus/$100 bonus/$0/$100/$200	–	9–5/always open

3. Results

The analysis of the DCE focused on the key attributes modeled within the DCE as described below. Full results, including associations of preferences with other factors such as age and gender are available in the Appendix.

3.1. Main results

Our interpretation of the DCE results makes use of a hypothetical starting point in which 1) patients are indifferent between an AMC and a community hospital – meaning half choose each - and 2) the three key attributes of the DCE (out of pocket costs, whether they have a referral from a primary care physician for that hospital, and the objective measure of quality or convenience (in the case of MRI)) are equivalent for the AMC or community hospital.[12] We then use the consumer responses to the DCE to estimate how modifying either the cost, quality/convenience or referral conditions would result in an expression of preferences over the neutral baseline of assumed indifference.

Results from the DCE indicate that attributes of out-of-pocket cost, quality, and physician referrals were significant predictors of preferences in most cases (Fig. 1).

For example, as shown in Fig. 1, if patients face a $1000 copayment for delivering a baby at an AMC versus no cost sharing at a community hospital (with equivalent quality and primary care physician referral to either choice), 27% of patients who might have initially chosen the AMC would choose to deliver at the community hospital. An out of pocket difference of just $100 could shift half of those who might have initially chosen a hospital-based MRI to a freestanding center. The effects of an additional $1000 copayment for knee surgery and for cancer care are smaller, but significant, shifting 20% and 13% of patients, respectively, toward expressing a preference for a community hospital.

Referral from a PCP to the lower-cost setting would shift the choice of one-third of patients in the MRI and knee scenarios and 45% of those choosing a hospital for maternity care (the effect on choice of hospital for cancer care was smaller and insignificant).

If a community hospital was rated 4 stars compared to a 3-star rating at an AMC, 39% of patients would shift to a community hospital for knee surgery and 35% would shift for cancer care while 29% would shift to a freestanding center for an MRI (maternity results were smaller and not significant).

The conditions or procedures in the figure are arrayed from left-to-right in order of increasing perceived risk or invasiveness. The results suggest a pattern of relatively greater importance of cost for low-risk procedures and relatively greater importance of quality for higher-risk procedures.

Table 2
Willingness to pay according to various scenario attributes.
Source: Author's analysis of survey data self-collected from a Massachusetts panel (n = 1005) in 2016. Notes: The estimated WTPs were derived from the alternative-specific conditional logit regression using the ratio "regression coefficient of the attribute" divided by the "–1 × regression coefficient of the cost variable". The corresponding 95% CIs were estimated using the nonlinear component estimation in Stata software.

	Willingness to pay (WTP), US	
MRI	**Estimate**	**95%CI**
Referral vs. no referral	$56	$21, $91
24/7 vs. business hours	$55	$22, $88
Maternity	**Estimate**	**95% CI**
Referral vs. no referral	$1722	$788, $2656
4-star vs. 3-star	$621	-$223, $1465
Knee	**Estimate**	**95% CI**
Referral vs. no referral	$1638	$639, $2638
4-star vs. 3-star	$1983	$912, $3054
Cancer	**Estimate**	**95% CI**
Referral vs. no referral	$1043	-$130, $2216
4-star vs. 3-star	$2735	$1311, $4159

3.2. Willingness to pay

We also assessed the results in terms of the dollar value-equivalent of a referral or a quality star under each condition (Table 2). In other words, if a consumer was referred to an AMC by his or her physician, the 'willingness to pay' results estimate how much *more* would the AMC choice have to cost the consumer to negate the effect of the referral and make him or her again indifferent between the AMC and the community hospital. For instance, the $56 for referral under MRI indicates that on average, AMC with referral is perceived to be worth $56 dollars more than community hospital with no referral.

As in Fig. 1, the data shown in Table 2 reveal a pattern of increasing emphasis on quality as the severity of the condition/procedure increases, moving downward in the figure. Willingness to pay for an additional quality star ranges from $621 for maternity care, to $1983 for knee replacement to $2735 for cancer care. The willingness to pay for a referral is greatest in the maternity and knee scenarios – consistent with the largest impact of referrals for these scenarios shown in Fig. 1.

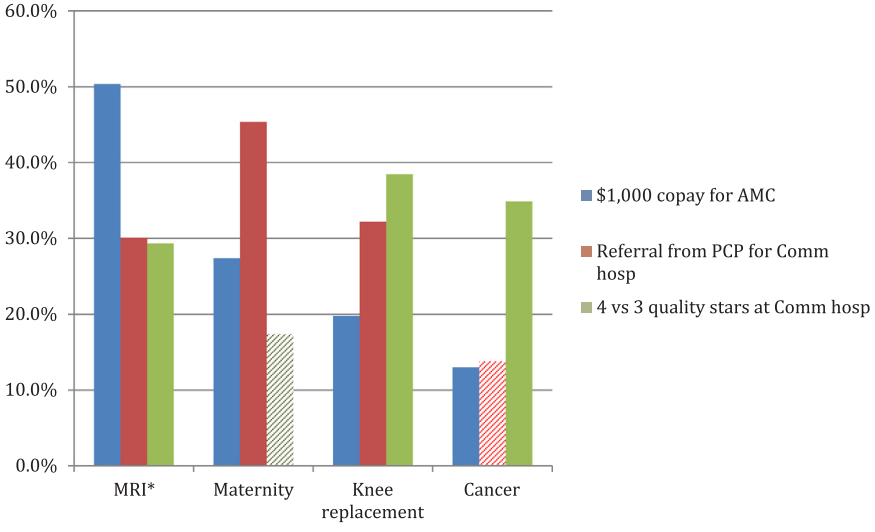

Fig. 1. Percentage of patients who would shift from indifference toward preferring the community hospital based on changes in copayments, referral from a PCP and quality rating as shown. Notes: The estimated changes were derived from the odds ratio (OR) produced by the alternative-specific conditional logit regression under the assumption of an initial prevalence of 50%. Bars in lighter shade indicate that the association is statistically non-significant. *In the case of MRI we tested a $100 reward instead of $1000 copay and convenience, as measured by hours of operation instead of quality stars.
Source: Author's analysis of survey data self-collected from a Massachusetts panel (n = 1005) in 2016.

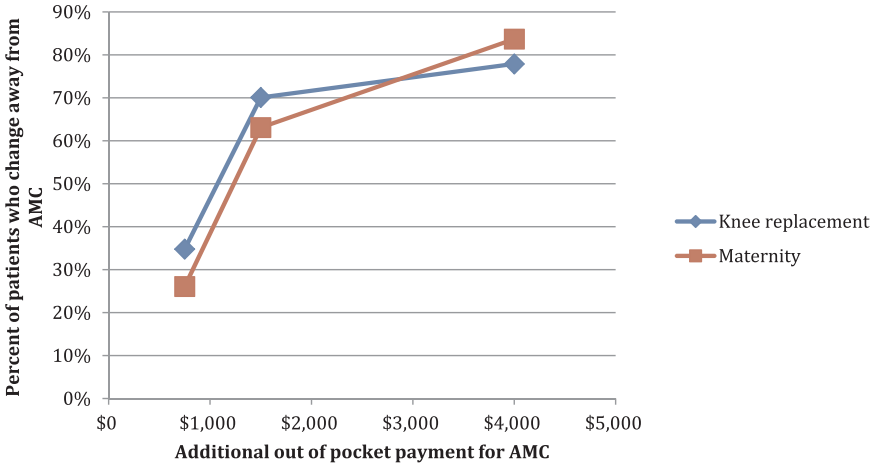

Fig. 2. Percentage of patients initially choosing care at an AMC who would now prefer care at a community hospital for each level of copayment at the AMC.
Source: Author's analysis of survey data self-collected from a Massachusetts panel (n = 1005) in 2016.Notes: The estimated changes were derived from the odds ratio (OR) produced by the alternative-specific conditional logit regression under the assumption of an initial prevalence of 50%. Bars in light blue shade indicate that the association is statistically non-significant.

3.3. Impact of different levels of out of pocket cost

Finally, we find that out of pocket cost had a nonlinear effect on choice of hospital. While the results presented in Fig. 1 summarized the impact on hospital choice per $1000 additional out of pocket spending, the DCE used three different cost points to test responses at different levels of cost sharing. These results are shown in Fig. 2 (the coefficients on cancer care were not all significantly different from zero).

These results suggest diminishing returns of additional financial incentives once out of pocket amounts are above a few thousand dollars, and a significantly greater impact of $1500 compared to $750 for both conditions.

4. Discussion and implications for policy

The DCE results suggest that consumers are strongly influenced by out of pocket cost, quality, and referrals in choosing where to receive care and that among some consumers these factors can overcome the reputational pull of AMCs in Massachusetts. The magnitude of the effect is similar to that found in a study of physician choice[13] and others studies assessing tiered network plans.[14,15] The latter studies found that using copays of this magnitude for hospitals more broadly shifted roughly 7% of total hospital admissions to preferred hospitals and a follow-up study of the same plans found total cost savings on the order of 5% relative to non-tiered plans.[14,15]

In Massachusetts, copayment differentials of $1000 would shift on the order of a quarter to a third of patients away from AMCs for several shoppable conditions. Given the price differentials between AMCs and community hospitals, these shifts could have a significant effect on premiums and save employers and consumers considerable amounts of money. For example, the Massachusetts Health Policy Commission found a $7000 difference in total payments for knee replacement surgery for low-risk patients between AMCs and community hospitals ($36,100 versus $29,000) with no measureable quality differences. If a $1000 differential copayment shifted 20% of those occurring at AMCs (roughly 3000) to community hospitals in accordance with Fig. 1, savings to state residents would exceed $40 million.[16,17]

Because of the weight consumers place on quality information as revealed by the DCE, it seems that much could be gained by presenting quality information on hospitals to consumers. In addition, finding ways to incentivize physicians to refer patients to lower-cost hospitals and settings for care could be an important lever for insurers to consider.

Finally, the DCE findings also indicate that the extent to which out of pocket costs, quality ratings, and referrals influence choice varies depending on the perceived invasiveness or risk of procedures. This pattern resonates with findings from an experiment by Anna Sinaiko,[18] whereby the importance that consumers placed on selected quality indicators varied depending on seriousness of health risk. This finding that the underlying health issue influences how choices are made has implications for consumer engagement and value-based insurance design. However, prior research suggests that what consumers perceive as constituting a risky or invasive procedure may not necessarily match health professionals' perceptions.[19] Therefore, further investigation related to communicating health care risk information also may be warranted.

This study had several limitations. The scenarios are hypothetical, eliciting preferences. Although predictive of behavior they are not measuring behavior. It will be important to validate the results by comparing them to revealed preference data, ideally from policy experiments. However, the evidence from this study suggests several promising strategies to address healthcare costs. The models also make the assumption that all important factors that influence the choice have been included. While we included the main factors discussed in the literature and supported by our formative work, it is possible that there are other untested factors that might be more predictive of patient preferences. Moreover, the experiment tested a limited number of conditions and other scenarios may reveal different results. We also acknowledge that there are likely non-linearities in quality stars and physician referrals which were not tested. Finally, this study was conducted in Massachusetts and takes advantage of the healthcare environment, where insurers have broad networks of providers. Our results may not be applicable to all health care markets.

Precis

A discrete choice experiment shows a strong influence of out of pocket costs, quality and referrals on hospital choices for 'shoppable' conditions.

Take-away points

Various levers appear promising when it comes to influencing consumer choice of hospital or setting of care. However, the extent to which potential levers can influence choice is likely to be dependent upon the kind of care being sought.

- Consumers reported large influences of out of pocket costs, physician referrals and quality ratings on their choice of hospital.
- Findings suggest that consumers prioritize quality over cost as perceived risk increases.

Funding source

Robert Wood Johnson Foundation, "Optimizing Value in Health Care: Consumer-focused Trends from the Field," Grant ID: 73050.

References

1. Cooper Z, Craig S, Gaynor M, Van Reenen J The price ain't right? Hospital prices and health spending on the privately insured. NBER Working Paper no. 21815. 2018; Available from: 〈http://www.nber.org/papers/w21815〉.
2. Hussey Peter S, Wertheimer Samuel, Mehrotra Ateev. The association between health care quality and cost: a systematic review. *Ann Intern Med.* 2013;158(1):27–34.
3. Song Z, Rose S, Safran DG, Landon BE, Day MP, Chernew ME. Changes in health care spending and quality 4 years into global payment. *New Engl J Med.* 2014;371(18):1704–1714.
4. Commonwealth of Massachusetts. (January). 2015 Cost Trends Report; 2016. Available from: 〈http://www.mass.gov/anf/budget-taxes-and-procurement/oversight-agencies/health-policy-commission/publications/2015-cost-trends-report.pdf〉.
5. Gruber J, McKnight R. Controlling health care costs through limited network insurance plans: evidence from Massachusetts State Employees. *Am Econ J Econ Policy.* 2016;8(2):219–250.
6. Frank MB, Hsu J, Landrum MB, Chernew ME. The impact of a tiered network on hospital choice. *Health Serv Res.* 2015;50(5):1628–1648.
7. Massachusetts Health Policy Commission. (January). Cost trends report 2015 provider price variation. 2016. Available from: 〈http://www.mass.gov/anf/budget-taxes-and-procurement/oversight-agencies/health-policy-commission/publications/2015-ctr-ppv.pdf〉.
8. Commonwealth of Massachusetts Health Policy Commission. Community hospitals at a crossroads; March 2016. Available from: 〈http://www.mass.gov/anf/budget-taxes-and-procurement/oversight-agencies/health-policy-commission/publications/community-hospitals-at-a-crossroads.pdf〉.s.
9. de Bekker-Grob, Esther W, Ryan Mandy, Gerard Karen. Discrete choice experiments in health economics: a review of the literature. *Health Econ.* 2012;21(2):145–172.
10. Wu S, Sylwestrzak G, Shah C. Price transparency for MRIs increased use of less costly providers and triggered provider competition. *Health Aff.* 2014;33(8):1391–1398.
11. Kuhfeld Warren F. *Market Research Methods in SAS*. Cary, NC, USA: SAS Institute Inc; 2010. [Available from]. 〈https://support.sas.com/techsup/technote/mr2010.pdf〉.
12.. The results are not extremely dependent on this assumption – it is merely an aid in interpreting the results. However, it is probably not far from the truth. Roughly one-third of community-appropriate care is treated at AMCs and half of commercial discharges take place at either AMCs or teaching hospitals. In addition, many individuals (such as those in tiered products) already face higher of out of pocket costs for AMCs in the status quo, so if out of pocket costs are equalized in this hypothetical scenario, the share served by AMCs would be higher.
13. Sinaiko Anna D. How do quality information and cost affect patient choice of provider in a tiered network setting? Results from a survey. *Health Serv Res.* 2011;46(2):437–456.
14. Frank MB, Hsu J, Landrum MB, Chernew MB. The impact of a tiered network on hospital choice. *Health Serv Res.* 2015;50(5):1628–1648.
15. Sinaiko AD, Landrum MB, Chernew ME. Enrollment in a health plan with a tiered provider network decreased medical spending by 5 percent. *Health Aff.* 2017;36(5):870–875.
16. Massachusetts Health Policy Commission. (January. Cost trends report 2014; 2015. Available from: 〈https://www.mass.gov/files/documents/2016/07/wn/2014-cost-trends-report.pdf〉.
17. Massachusetts Center for Health Information and Analysis. (January). Massachusetts hospital profiles industry overview: data through fiscal year 2016. 2018. Available from: 〈http://www.chiamass.gov/assets/docs/r/hospital-profiles/2016/FY16-Massachusetts-Hospital-Industry-Overview.pdf〉.
18. Sinaiko Anna D. How do quality information and cost affect patient choice of provider in a tiered network setting? Results from a survey. *Health Serv Res.* 2011;46(2):437–456.
19. Lischko A, Koch-Weser S, Auerbach D. Understanding consumer preferences for sites of care in massachusetts. Report for the massachusetts health policy commission; September 2015.