Effective Service Operations Management: Aligning Priorities in Healthcare Operations with Customer Preferences

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1 Introduction

One of the fundamental issues service operations management aims to solve is to develop strategies to allocate limited resources. To accomplish this, the priorities of tasks need to be identified. Similar to what are recognized as "competitive priorities" in operations strategy (namely cost, quality, delivery, and flexibility) (Boyer & Verma, 2009), the healthcare system has goals that compete for resources, including but not limited to maximization of population health, reduction of inequities in health, and financial protection against the costs of ill health. Quality is in the eye of the beholder, and this is especially true when it refers to the quality of healthcare services. This chapter presents a study in which healthcare customers' perspectives are used as an anchor to explore the healthcare system's priority. The priorities of tasks in the

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healthcare system also reveal the priorities in healthcare operations management (HOM) research. More attention from academic scholars shall be focused on the healthcare tasks and topics with high priorities.

This chapter will focus on answering the following three relevant questions: (1) What are the most concerning issues in the healthcare system from its customers' perspective? (2) What factors account for these perceptions? (3) Is there alignment between healthcare task priorities and healthcare operations research?

A multi-year study shows that, in general, customers are most concerned about (1) cost of care, (2) access to care and coverage, and (3) quality and efficiency. Those customer concerns are found to be associated with health policies, sociodemographic characteristics, and living conditions. We then compare customers' pressing concerns and themes of published healthcare research within operations management discipline, and respectfully make suggestions for potential future healthcare operations research directions.

2 Background

The recent outbreak of the COVID-19 pandemic has drawn considerable attention to how each nation's healthcare system operates with limited resources. Since resource allocation is one of the fundamental issues operations management aims to solve, an operations strategy perspective can be useful in assessing healthcare priorities, which then contribute to resource allocation. This chapter discusses a study using data from the U.S. to explore healthcare priorities from its customers' perspectives. More importantly, we discuss the implications generated for healthcare stakeholders and healthcare operations researchers.

Healthcare is one of the biggest industries in the U.S. in terms of its economic value. With the recent rapid growth rate, the healthcare industry's share of GDP is projected to be 19.7% by 2026.[1] In contrast, the GDP percentage for developed counties that are known for their sound healthcare systems is around 10% (Germany, 11.3%; Canada, 10.4%; and Japan, 10.7%). Despite its size, the U.S. healthcare system faces many issues, such as higher health costs but no better care quality, and high uninsured number (27.6 million in 2016[2]). As is the case of healthcare systems in many countries, policies and plans on how to allocate limited resources have to be established to achieve the optimal solutions, and priorities on healthcare have to be set properly at multiple levels, from overall strategy to specific budgeting for individual patients.

[1] CMS National Health Expenditure Projections 2017–2026.

[2] https://www.kff.org/uninsured/fact-sheet/key-facts-about-the-uninsured-population/

An operations strategy perspective can used to assess potential priority mismatches. Just as in all operations systems, healthcare system has goals that compete for limited resources, such as maximizing population health, reducing inequities in health, and protecting against the costs of ill health. To set health priorities to achieve an optimal set of solutions, policy makers have to make strategic decisions such as setting budgets for healthcare expenditures (in contrast to other spending areas such as education), emphasizing primary care versus tertiary care, deciding which diseases to alleviate, allocating resources among different population groups, and setting budget limits for individual patients. Multiple stakeholders are involved in this process. Normally, these stakeholders include government officials, healthcare professionals, public and lay representatives, and government commissions. Usually, macro-level decisions, such as national healthcare budgets, are usually made by politicians, whereas care providers and other healthcare professionals are responsible for micro-level decisions, such as the level of intervention in individual patient care.

However, policy decisions may not be based on rational processes, causing the limited resources are not used to the optimal extent. The major reason is due to the nature and complexity of the decision process, the decisions are mostly ad hoc and based on historical or political patterns rather than on current realities. For example, although research shows that strong primary care is associated with improved population health (Kringos et al., 2013) and that investing in primary care is more effective than paying for tertiary care (MOH Republic of Ghana Ministry of Health, 1998), the U.S. continues to invest in specialty care and new technologies, leading to a shortage of primary care providers and rising costs of care. Unable to apply a holistic view and neglecting many factors that influence the process, policy makers are not doing particularly well and need assistance in making those decisions (Baltussen & Niessen, 2006; McDaniels et al., 1999; Bazerman & Moore, 2013).

To make better choices, politicians, healthcare professionals, and healthcare researchers need to better understand the major issues of the healthcare system and concerns from various perspectives. Of crucial importance among these perspectives is that of the public, for the following reasons: due to the public funds applied to the healthcare system, citizens are important stakeholders of the system, involving the public in policy making promotes the principles of democracy; encouraging public insights in making decisions that affect individuals' lives can, in turn, improve public confidence in the healthcare system (Traulsen & Almarsdóttir, 2005); and the public provides a perspective about the values and priorities of the community that could improve the quality of priority decisions (Ham, 1993).

During the recent decade, we have seen a gradual increase in the quantity of healthcare operations management research. Additionally, the trend has also shifted from the analysis of single healthcare delivery organizations to a broader perspective of a healthcare ecosystem which includes multiple entities. One reason for this trend is that healthcare system stakeholders include more than just care providers and patients. Entities such as government, policy makers, and pharmaceutical companies also play important roles. As a result, the trend encourages operations management researchers to think about the interactions among entities while setting future research priorities (Dai & Tayur, 2019).

From an operations management perspective, we conduct this study to identify consumers' perceptions of healthcare priorities with a goal of contributing to healthcare resource allocation. Comparing our findings with a thorough healthcare operations management literature review from several top operations management journals over the past decade, we explore the alignments between issues in healthcare consumers' perception and the topics addressed by our fellow researchers. Based on our results, we respectfully suggest future research opportunities in healthcare operations management.

3 A Systematic Literature Review in HOM

Although many problems in healthcare operations management are not analytically different from those in other industries, healthcare and health services have distinctive characteristics. For example, one essential attribute of healthcare is people's quality of life. However, quality of life is difficult to measure, and it is awkward to quantify this with a dollar value. Also, the healthcare system involves shared decision processes among a variety of decision makers, including physicians, nurses, patients, and administrators, and it entails complex reimbursement and payment mechanisms (Pierskalla & Brailer, 1994). Thus, we use the taxonomy framework Dai et al. (2018), Dai and Tayur (2019) proposed in their handbook and HOM review paper, rather than the traditional operations management topics to categorize the sampled HOM articles. In this framework, the sampled HOM articles are grouped into three levels by the scope of issues they are dealing with: macro, meso, and micro. With this framework, seven operations management journals such as *Production and Operations Management*, *Management Science*, *Manufacturing & Service Operations Management*, *Decision Analysis*, *Journal of Operations Management*, *Decision Sciences*, and *Operations Research* are reviewed. And 205 articles published from 2007 to 2017 are included in this review.

We categorize all sampled articles into 21 thrusts, as shown in Fig. 1. Among all thrusts, the most studied are organization design (21.5%), design of delivery (17.6%), ambulatory care (15.1%), and resource allocation (10.7%). Barely 10% of all the articles we sampled (9.8%) touched upon macro-level topics, which deal with the broad strategic directions or overarching policies, the general role of different entities, and the design and structure

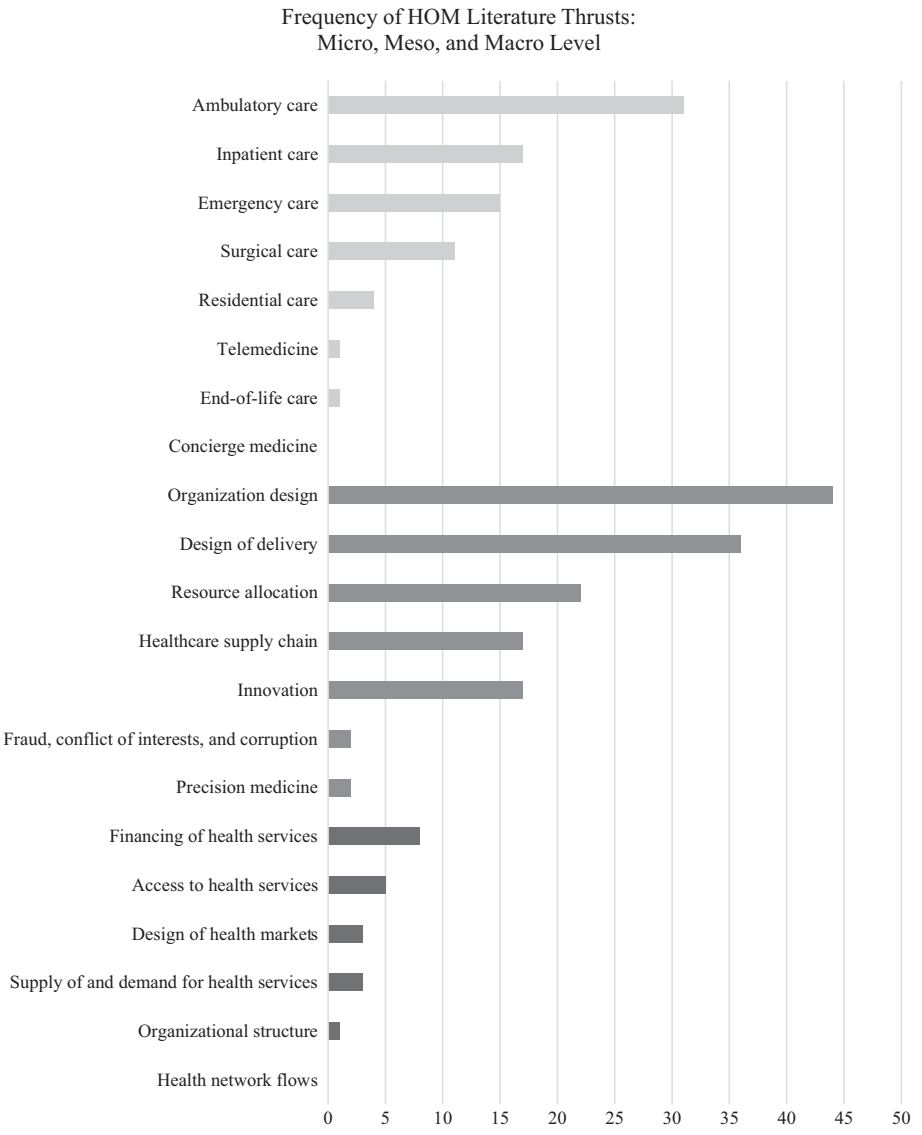

Fig. 1 Frequency of healthcare operations management literature thrusts

of the national healthcare system. Among those articles, more than half are focused on the financing of health service (3.9%) and access to health services (2.4%). None talk about health network flow topics, such as the consolidation of hospitals and payers.

The majority (68.3%) of sampled articles explore meso-level thrusts in HOM. These deal with the problems that extend beyond specific operations problems within an organization, but are not as broad as the design of general health markets. Among those papers, many studied organization design (21.5%)—for instance, hospital design and service flow design—and many explored designs of delivery (10.7%), such as referral strategies, infection prevention, and treatment management. A fair number of papers studied resource allocation (10.7%), the healthcare supply chain (8.3%), and health innovations (8.3%), such as studies on electronic medical records systems.

Thirty-nine percent of sampled articles studied micro-level thrusts, that is, specific problems in a single organization, such as ambulatory care (15.1%), inpatient care (8.3%), emergency care (7.3%), and surgical care (5.4%). Only a couple of papers focused on residential care, telemedicine, and end-of-life care (in total 3%), and none studied concierge medicine. Many papers falling into the micro scope studied scheduling, staffing, and capacity planning. Among all specific operations issues, scheduling is the more thoroughly studied. Some 52 papers out of 205 focus on the scheduling issue of patients or care providers.

4 Public Involvement in Healthcare Priority Setting

Needless to say, the public is an important stakeholder in the healthcare system. As decision makers are increasingly pressured to engage the public in the priority setting processes, many researchers have explored the involvement of the public in healthcare priority setting: the methods, the scope of public engagement, and the results.

In their review, Mitton et al. (2009) sampled 175 empirical articles and found that the majority (58%) of studies used the "middle level interactive" methods to collect public opinions. Those methods include poll and survey, referendum, consultation document, interactive websites, focus group, and study circle. About a quarter (24%) of researchers used "low level interactive" methods to gather information from the public. Those methods include traditional publicity, public hearing, and hotline. Finally, a small portion of

studies involved the public with "high level interactive" methods, which include but are not limited to consensus conference, deliberative poll, and town voting meetings (Rowe & Frewer, 2005).

In practice, the public tends to focus on the location of health service provision along with non-medical aspects. The majority of studies on public involvement in health priorities engage the public in the macro-level issues, which deal with the broad system design and functions. Only a small number of studies engage the public in meso- and micro-level issues, which deal with problems related to more specific services, programs, and populations.

Despite the increasing number of studies in this area, the results are not as satisfactory. In general, research points out that at this stage, public involvement in healthcare priority setting is relatively informal and operates on an ad hoc basis, rather than a formal approach. Little research has provided evidence having produced practical guidance for policy making.

5 External Factors Affecting Consumers' Perceptions on Healthcare

Many external factors, such as government healthcare policies and general economic status, may affect people's perception of healthcare systems. This chapter focuses on government policies when examining the external impact, due to the necessity of government supervision and legislation in healthcare. Researchers have studied the consistency between public opinion and government policy and the potential rationale for such policy (Monroe, 1998; Burstein, 1998), and have argued that sociologists should review the importance of public policy when analyzing public perception.

As indicated above, government policies have great impact on the entire healthcare system, including care providers, healthcare organizations, insurance companies, and pharmaceutical companies, not to mention the ultimate consumers of healthcare—patients. Research predicts that policy interventions, if appropriate, could significantly improve population health (Mehta et al., 2017). Even non-health-related social policies, such as receiving government housing assistance and unemployment benefits, can unexpectedly affect consumers' health status.

Particularly in the U.S., the Patient Protection and Affordable Care Act (ACA), enacted on March 2010, introduced major changes in overarching government health policies that affect the healthcare system and population welfare. The ACA's main goals of making affordable health insurance available

to more people, expanding the Medicaid program to cover more people, and improving quality of care while lowering the costs were believed to be the U.S. healthcare system's most significant regulatory overhaul since the passage of Medicare and Medicaid in 1965.

6 Effects of Sociodemographic and Other Internal Factors on Consumer Perceptions

In addition to external factors, personal characteristics and experiences can also influence people's perceptions on healthcare. Firstly, personal characteristics contribute to people's health status. In their 2018 National Vital Statistic Reports, the Center for Disease Control and Prevention (CDC) listed ten leading causes of death in the U.S. This list, which is led by heart disease, cancer, and accidents, gives only the primary pathophysiological conditions identified at the time of death rather than their root causes (McGinnis & Foege, 1993). Each of the conditions results from a combination of internal causes, such as genetic predispositions, and external factors, such as behavioral. For example, heart disease is well known to be related to tobacco use, elevated serum cholesterol levels, hypertension, obesity, and inadequate physical activity. Some argue that healthcare (or the lack thereof) only contributes to 10% of premature deaths, while behavioral patterns contribute to about 40%, followed by genetic predisposition (30%), social circumstances (15%), and environmental exposure (5%) (Schroeder, 2007). The World Health Organization defined social determinants of health as the "conditions in which people are born, grow, live, work, and age." Per the request of the WHO Regional Office for Europe, a group of scholars at University College London summarized the pure evidence on the social determinants of health. They listed the social gradient, stress, early life, social exclusion, work, unemployment, social support, addiction, food, and transport as ten social determinants of health (Wilkinson & Marmot, 2003).

The link between socioeconomic and health status is also well established: people with higher socioeconomic status, which is "a composite construct of income, total wealth education, emplacement, and residential neighborhood (Schroeder, 2007)," are healthier than those with lower socioeconomic status, in terms of age of death and number of disability, and this is true through all social classes (Minkler et al., 2006; Isaacs & Schroeder, 2004; and Marmot, 2001). One study found that the difference in life expectancy between the richest 1% and poorest 1% of U.S. individuals (age 40–76) is 14.6 years

(Chetty et al., 2016). A possible explanation for this dichotomy is that people with lower socioeconomic states might be more likely to engage in unhealthy behaviors.

Chetty et al. (2016) also found that the location of one's home affects a person's health status, especially for the poor, and this variation is significantly correlated with health behaviors such as smoking. In their report, Heiman and Artiga (2015) summarized health-related neighborhood and physical environmental factors such as housing, transportation, safety, parks, playgrounds, walkability, and geographic factors.

7 A Multi-year Study on Public Perceptions of Healthcare

A multi-year study with the time span of 2016 through 2018 was conducted to answer the three questions we identified in the introduction section. An annual survey targeting New York State adult residents who are age 18 and over was collected. Eight-hundred valid interviews were conducted each year. Table 1 shows some of the questions designed for and used in this study.

As stated above, health customers' social-demographic characteristics and living environment have the potential to affect their healthcare perceptions and concerns. Thus, we also include secondary data achieved from variety of public sources. As shown in Table 2, all archival data are at the county level, describing the counties' characteristics, including physical living environment, socioeconomic facets, and healthcare facts.

The survey question that was used as dependent variable in our later analysis was in the form of open-ended question: "In your opinion, what is the MOST important problem in U.S. healthcare that needs to be urgently addressed?" Thus, qualitative analysis is necessary: similar concepts need to be clustered into categories. We read through all answers, identify frequent topics, determine categories, assign categories to each response, and conduct frequency analysis on the topics.

Using three separated binary logistic Generalized estimating equation regression models, we explore the external and internal factors that are associated with the probability healthcare customers believe certain specific healthcare issues should be given the highest priority in U.S. healthcare system.

Table 3 shows all major categories extracted from the open-ended question and a brief description of each category, along with some example responses assigned to each category.

Table 1 List of interview questions and response choices used in our study

Construct	Interview question	Response choices
Most urgent healthcare issue	In your opinion, what is the MOST important problem in U.S. healthcare that needs to be urgently addressed?	Open-ended
Rating of last visit experience	How would you rate the overall level of customer service experience during your most recent visit to the healthcare facility?	– Very poor – Somewhat poor – Average – Somewhat positive – Very positive
Employment status	Last week, did you do any work for either pay or profit? Include any job from which you were on vacation, temporarily absent, or on layoff	– Yes – No – Retired – Disabled – Unable to work
Social ideology	When it comes to social issues, do you usually think of yourself as	– Extremely liberal – Liberal – Slightly liberal – Moderate or middle of the road – Slightly Conservative – Conservative – Extremely Conservative
Political party	Generally speaking, when it comes to political parties in the U.S., how would you best describe yourself?	– Strong Democrat – Not very strong Democrat – Independent, close to Democrat – Independent, close to neither – Independent, close to Republican – Not very strong Republican – Strong Republican
Marital status	Are you married, divorced, separated, widowed, or single?	– Married – Divorced – Separated – Widowed – Single
Age	What year were you born?	– Age was calculated from the year of birth
Gender	Recorded by the interviewer	– Male – Female

(*continued*)

Table 1 (continued)

Construct	Interview question	Response choices
Education level	What is the last grade or class that you completed in school?	– None, or grades 1–8 – High school incomplete (grades 9–11) – High school graduate (grade 12 or GED certificate) – Technical, trade, or vocational school after high school – Some college, no four-year degree (including Associate degree) – College graduate (BS, BA, or other four-year degree) – Post-graduate training or professional schooling after college
Household income before taxes	Two questions covered income. The first question asked interviewees what was their total household income in 2015 from all sources, before taxes. Follow-up questions asked interviewees instead of a specific number, indicate if their total household income was under or over $50,000, and then use a scale to indicate their income level. Best responses obtained from these questions were used to code income	

Frequency percentage of major categories was calculated and summarized in Fig. 2.

The conclusions from the qualitative analysis are as follows. First of all, the high cost of care is the issue of greatest concern for healthcare customers during the three years of the study. These costs include the expense of care in general, of medication and of insurance. Other issues of high concern are access to care, quality of service, and low efficiency. Among all respondents, only a small portion (2.8%) believes that there is no problem in U.S. healthcare that needs urgent attention.

At a closer look, among all respondents referring access as their highest priority healthcare concern, 65.7% believe the essence of the problem is the lack

Table 2 Archival data: variables, sources, and descriptive analysis

Variables	Description and source	Unit	Min	Max	Mean	SD
Population density/1000	Population density per square mile of land area by county, data of 2010. Source: http://www.census.gov	Count	0.02	69.47	15.78	23.22
Percent poverty	Poverty estimates by county, data of 2015. Source: http://www.census.gov	Percentage	6.00	30.30	15.71	5.50
Percent uninsured	Percent without health insurance coverage by county, data of 2015. Source: http://www.census.gov	Percentage	4.90	20.20	8.88	2.83
Weighted average TPS quality score	TPS (Total Performance Score) weighted by total number of staffed beds by each county. Archived 03/03/2018. Source: https://www.ahd.com	Score, range 0–100	21.04	64.00	33.71	6.57
Sum of total beds	Number of total staffed beds by county. Archived 03/03/2018. Source: https://www.ahd.com	Count	67.00	6150	2858.55	2199.15
Length of life	Calculated score by county, data of 2017. The lower the better health ranking. Source: http://www.countyhealthrankings.org/	Score	−1.07	1.21	−0.27	0.54
Health behaviors	Calculated score by county, data of 2017. The lower the better health ranking. Source: http://www.countyhealthrankings.org/	Score	−0.52	0.40	−0.10	0.22
Clinical care	Calculated score by county, data of 2017. The lower the better health ranking. Source: http://www.countyhealthrankings.org/	Score	−0.24	0.29	−0.02	0.14
Physical environment	Calculated score by county, data of 2017. The lower the better health ranking. Source: http://www.countyhealthrankings.org/	Score	−0.07	0.08	0.01	0.04
Monthly premium	Monthly premiums for second lowest cost silver plans (SLCSP), by county—individual. Data of 2016, 2017, and 2018. Source: https://nystateofhealth.ny.gov/	USD	353.19	618.25	460.29	66.51
Price-adjusted Medicare reimbursement per enrollee	The amount of price-adjusted Medicare reimbursements per enrollee by county. Data of 2016, 2017, and 2018. Source: http://www.countyhealthrankings.org	USD	6796.00	11980.00	9435.29	1109.39
Average cost of drugs	The average of three prices from the most common pharmacy of the particular region. Six of top ten prescribed drugs in the U.S. were used for price comparison. Data of 2010. Source: https://apps.health.ny.gov/pdpw/SearchDrugs/Home.action; https://www.medicinenet.com/top_drugs_prescribed_in_the_us/views.htm	USD	80.00	340.00	125.76	33.32

Table 3 List of topics (categories) of perceived customer healthcare issues

Category	Category description	Example responses
High costs of care	Includes concerns with costs of healthcare, such as costs in general, costs of medication, and costs of insurance	"Cost. We shouldn't have to spend this much money to keep ourselves healthy"
Lack of access to care	Comments concern coverage and access to healthcare of entire population and certain sub-population groups	"Affordable healthcare for all"; "Insurance for the poor"; "We need to provide more universal healthcare"
Low quality and inefficiency	Concerns regarding wait time, scheduling, resource waste, communication, clinical competency, hospital quality, and healing environment	"You should not have to wait for your appointment"; "I think the quality of the healthcare needs to be improved"
Unmet health issues	Comments regarding treatment for specific diseases, special care for certain population groups, drug issues, and preventive care	"The health of the elderly"; "Maybe preventative care through healthier living"; "Heroin epidemic"
Insurance policy and coverage	Comments related to health insurance policies such as coverage of certain items, coverage of visiting certain physicians and hospitals	"Deductibles, high premiums, and the level of coverage"; "The price or the fact that only certain insurances are only accepted in certain places"
Negative comments of Affordable Care Act	Comments that express negative opinions about Affordable Care Act and mandatory insurance	"Obamacare needs to be removed"; "The conflict between taking care of people who can't buy healthcare because of their situation and the people who are forced to buy healthcare because of regulations when it's not right for their situation"
Positive comments of Affordable Care Act	Comments that express negative opinions about Affordable Care Act or worry about repealing Affordable Care Act without a functional plan	"Obamacare, needs to be reformed a little bit. Good for communities though"; "Preventing the appeal of the Affordable Care Act"; "We need the Affordable Care Act to remain. We need people to be covered"

(*continued*)

Table 3 (continued)

Category	Category description	Example responses
System deficiency	Comments concern healthcare system abuse, the role and power of insurance and pharmaceutical companies, immigrants occupying resources	"Insurance companies, and their whole behavior towards healthcare"; "I think the most urgent problem is that people are using the emergency room as their regular doctor"
Barriers to physical access	Physical access to healthcare, such as transportation, need reference, and introduction to a specialist, or not enough time with physician	"Transportation and accessibility"; "Inability to access the best doctors hard to change different doctors when you have been seen one. Cannot switch very easily"
Negative comments of government role	Comments about government policies, regulations, laws, and being too involved in the healthcare system	"Getting the government out of it is the biggest issue"; "Being able to sell insurance nation-wide instead of being limited to states"
Positive comments of government role	Comments that demand more government involvement, more laws, regulations, and so on	"The health insurance as a whole it needs regulation"
No problem	Respondents that do not have any issues with the current healthcare system	"No problems with healthcare"; "I am being taken care of very well"
Others	Other issues than stated above with frequency lower than 5	"Racism"; "The middle class"; "There should be more employment"

of availability of coverage of the population. Another 28.5% state that the problem is a lack of a single payer system or universal healthcare. When the respondents list quality and efficiency as their top concerns, 46.4% are worried about efficiency of the system and communication among stakeholders, 31.8% believe the quality of care and service needs urgent improvement, 14.2% question the competency of healthcare providers, and others believe the hospital and healing environment needs to be improved. Among all respondents who list unmet health issues as the most urgent healthcare concern, 43.9% want to prioritize developing a cure and treatment for specialized diseases such as cancer, 20.0% believe preventive care should be given a high priority, 15.8% appeal for better senior care, and 20.3% believe drug issues, such as over-prescription and legalization of marijuana, should be top priorities.

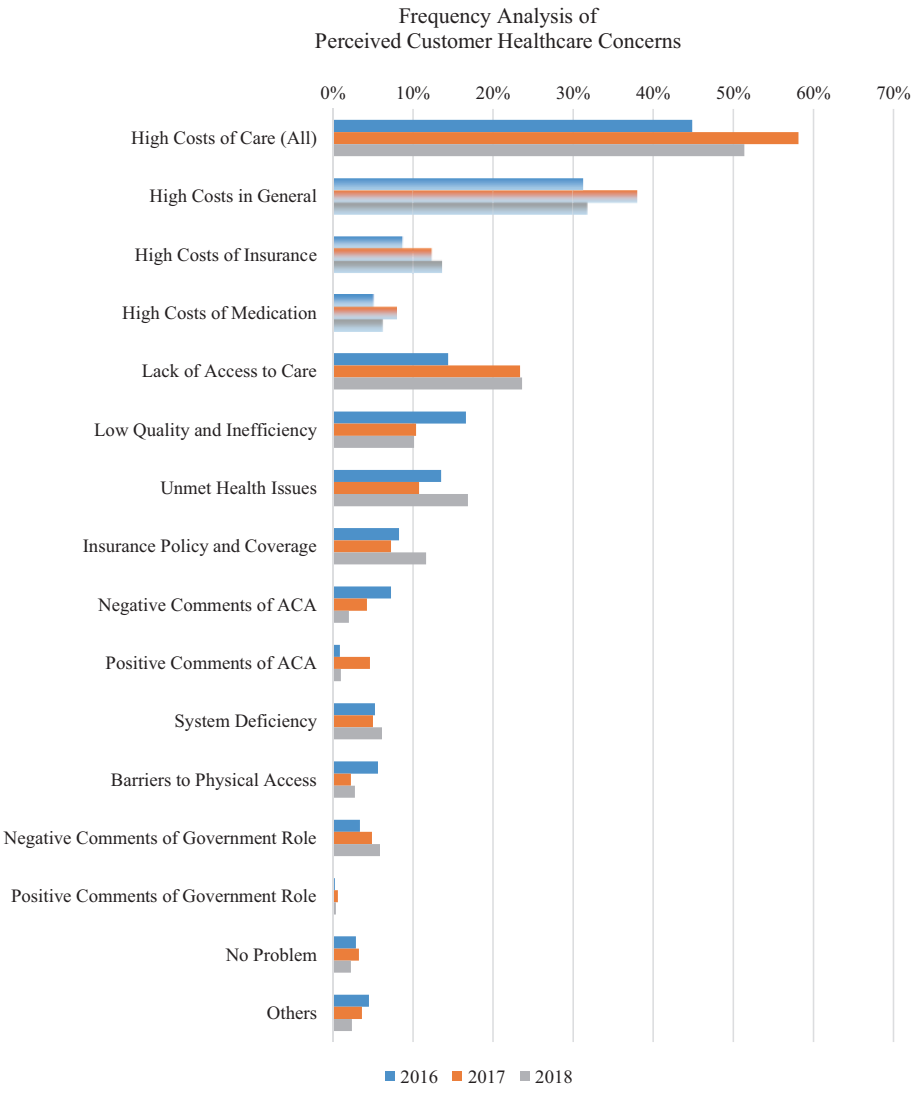

Fig. 2 Frequency analysis of perceived customer healthcare concerns. *High Costs of Care (All) includes: High Costs in General, High Costs of Insurance, and High Costs of Medication

Change in frequency by year is also directly observable. In 2016, the top three healthcare priorities among the respondents were costs of care, quality and efficiency, and access to care. In 2017, more respondents worried about costs of care and access, and fewer about quality and efficiency and unmet health issues. The year 2018 saw an increase in the number of respondents who worried that costs of insurance continue to increase. However, that year's

respondents focused less attention on general costs of care and costs of medication. More tension rises on the availability and costs of insurance policies and coverage, and on unmet health issues, especially treatments for specialized diseases. Negative comments regarding government involvement increased over the three years, and negative comments on the ACA decreased.

We further explore what external and internal factors may affect the most concerned healthcare issues.

Cost of Care

Our result shows that year, gender, employment status, self-reported personal future financial status, household income, social ideology, and education level are statistically significant in explaining cost of care as the most important healthcare issue. Respondents in 2017 are 17.2% more likely to be concerned with costs than in 2016; male respondents are 17.9% more likely than females to be concerned with costs; the unemployed are most likely to worry about costs of care, while the people who are not able to work are least likely to worry; respondents who feel unconfident about their future financial status are 38.5% more likely to be concerned with cost of care than those who feel confident; liberals are 38.5% more likely than Conservatives to worry about costs of care; and the relationship line between education level and probability of worrying about costs goes down and up, with people who are college graduated least likely to be concerned with costs. Counterintuitively, as income level increases, the probability of worrying about costs increases as well.

On the county level, population density, uninsured percentage, length of life, and average costs of drugs are negatively associated with the probability of worrying about costs, whereas clinical care quality is positively associated.

Access of Care

Result shows that year, number of children in household, household income, political party, social ideology, and education level are statistically significant in explaining the probability of healthcare customers perceiving lack of access as the most important healthcare issue.

In years 2017 and 2018, respondents are 58.3% more likely to worry about access to care and coverage than in 2016; Democrats and liberals are more likely to be concerned with access to care than conservative Republicans; and college graduates are most likely to worry about access to care than those with

less education. Number of children in household is negatively associated with the probability of believing access should be given the highest priority among all healthcare issues, whereas household income is positively associated.

On the county level, average monthly insurance premium is positively associated with the probability of perceiving lack of access as the most important healthcare issue.

Quality and Efficiency of Care

Controlling for the repeated measures and all other sociodemographic characteristics, result shows that year, gender, most recent hospital visit experience, social ideology, the part of the state in which one lives, and education level are statistically significant in explaining whether healthcare customers believe that the quality of care and lack of efficiency are the most important issues in healthcare. Respondents were 66.7% more likely to be concerned with quality and efficiency in 2016 than in 2017 and 2018; female respondents are more concerned with this issue; people who are more conservative are more likely to be concerned with quality and efficiency; people who live in downstate New York are more likely to worry about quality and efficiency than those who live in upstate; and people who had a better experience during their most recent hospital visit are less likely to worry about the quality and efficiency.

On the county level, poverty level is positively related to the probability of being concerned with quality of care and low efficiency, and clinical care quality is negatively related.

8 Conclusions and Discussions

The above-stated results provide empirical evidence for the "Iron Triangle of Health Care." This concept was first introduced in 1994 by William Kissick (1994), the father of Medicare, describing three issues which are the primary concerns of all healthcare systems: cost, access, and quality. Those three issues compete for resources, and it was believed that when one of the three changes, the other two will be affected. Over the years, government policy makers have attempted to solve this complicated problem set, for example, by improving quality of care without increasing cost. The "Iron Triangle of Health Care" issues happen to be what worries customers the most. This finding provides confirmatory information for healthcare industry stakeholders who have been devoted to addressing those issues.

Cost of care, access to care and coverage for all, and quality of care and system efficiency are perceived by healthcare customers as the healthcare issues that need to be most urgently addressed. This information, above all, tells us what customers want in healthcare: they want it to be affordable, they want access to insurance coverage, and they want reliable care. As a consequence, resources should be allocated accordingly. Along with rising costs, the concept "value of care" has become increasingly popular. In the healthcare context where the information asymmetry level is high, the issues of who should be the one to decide how much to spend on a case and where should the point be to stop treatment from the value point of view are ethically difficult to determine. Yet operations management theories on the decision-making process, for both providers and patients, may shed some light. The uninsured rate has always been lower in the U.S. than in some other developed countries such as Germany and Japan. While it is the government's responsibility to decide whether a single payer system should be adopted, the operations management field could expand the insurance coverage rate under the current system by methods such as modeling the insurance companies' product price system and patients' decision process of choosing an insurance product. Regarding quality of care, the recent "patient-centered care" concept emphasizes the role of patients and their participation in co-creating high quality care. Under this concept, the quality of non-clinical aspects of care, such as emotional wellbeing, is considered as important as the clinical aspect of care, including physical wellbeing. In this regard, the operations management field could build upon service operation theories and infuse service excellence into healthcare settings.

In facing resource allocation issues, those that are not important to customers are as crucial as those that are. Few respondents in our survey commented on the physical access to health service, such as lack of transportation or being too far away from any healthcare facility. Also, only several people mentioned any concern over the quality of the hospitals, in terms of safety and cleanness. As a developed country, basic infrastructures such as healthcare facilities and transportation networks are well developed. Thus, further investments in those areas may not achieve marginal utility as high as would be true in other areas.

We discover that the alignments and mismatches between current HOM research streams and customers' perceived issues are mixed. That is, fair alignments exist in some areas, as many papers are studying what customers are frequently worried about. Meanwhile, mismatches also exist when concerns that worry customers are not being addressed by research or when research focuses on issues that are not frequently brought up by customers.

Looking more deeply into alignment issues, we note that customers' most frequently mentioned concern is cost of care, but not many healthcare operations management (HOM) research articles directly address the cost issue. That said, many research studies questions that help contain or even reduce the cost of care. For example, at the micro level we find HOM papers that examined issues on ambulatory care (Cayirli et al., 2008; Liu & Ziya, 2014; and Liu, 2016), inpatient care (Lemay et al., 2017), and emergency care (Batt & Terwiesch, 2015) focused on scheduling and queuing of both patients and care providers, with a goal of reducing idle time and improving efficiency, thus decreasing costs in the long run. Quality remains an operations problem, and many customers brought up their concerns with quality of care and service. Likewise, many research papers are indeed trying to solve this matter, with studies that include quality of clinical care (Kong et al., 2020; Anderson et al., 2014), quality of service in healthcare settings (Zheng et al., 2018; Theokary & Ren, 2011), and the combination and tradeoff between the two (Senot et al., 2015).

The most noticeable mismatch in the HOM literature is access to care and coverage. This was the second most frequently mentioned healthcare issue of customers, but it was not explored often in HOM literature. To be clear, access does not mean the physical access to healthcare services, such as "need a referral" or "need transportation to facility," or "waitlist is too long." Instead, this issue involves peoples' access to insurance coverage at a macro level, such as "universal healthcare" or "everyone should be covered for healthcare." This requires macro-level decision making, and some may argue that it is more political than operational. However, when viewed as allocating healthcare resources to different population and locations on a national level, access is one of the original issues that operations management has tried to address ever since World War II. Many research opportunities emerge from here, such as exploring how insurance companies could provide affordable coverage to broader population groups while still making a reasonable profit, or modeling the decision process of how customers choose whether to purchase insurance, and, if so, what kind of insurance to have. Another issue that appears more frequently in this study than in previous research is unmet health issues. Here, operations management could at least contribute to the expansion of preventive care and improve the quality of senior care. Research directions such as identifying the optimal locations of preventive care clinics to improve coverage of the local communities, the decision process to use for offering preventive care services, the insurance policies to cover preventive care, and the application of healthcare operations methods to senior care facilities could be beneficial.

9 Implications

The study presented in this chapter has several implications for healthcare stakeholders, including healthcare insurers, providers, and policy makers, in terms of where to allocate more resources and where not to. For example, when non-healthcare companies move into healthcare area, such as Amazon.com, Berkshire Hathaway, and JPMorgan, they may want to contain the costs for customers and broaden the access to coverage before rushing to new incentives. Healthcare policy makers could draw upon our findings and encourage more value-based healthcare programs and policies to contain customer costs and increase value. Also, the findings regarding personal characteristics could help companies design and market their products to better align with customer segments.

This study also provides implications for service operations management, especially healthcare operations management researchers. For example, more research is needed in solving insurance coverage issues, such as developing affordable insurance products and customer decision process in shopping for insurance products. Also, operations management researchers can contribute to the exploration of unmet health issues, such as efficiently expand of preventive care, and improve the quality of senior care.

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