


# Patient Preferences for Preventive Healthcare During the COVID-19 Pandemic in a Large Integrated Health System

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Cheryl D Stults, PhD<sup>1</sup> , Xiaowei Yan, PhD<sup>2</sup>, Sien Deng, PhD<sup>1</sup>,  
Ellis C Dillon, PhD<sup>1</sup>, Su-Ying Liang, PhD<sup>1</sup>, JB Jones, PhD, MBA<sup>2</sup>,  
Minal Bhanushali, MD<sup>1</sup>, and Dominick L Frosch, PhD<sup>1</sup>

## Abstract

The COVID-19 pandemic caused healthcare systems and patients to cancel or postpone healthcare services, particularly preventive care. Many patients still have not received these services raising concerns about the potential for preventable morbidity and mortality. At Sutter Health, a large integrated healthcare system in Northern California, we conducted a population-based email survey in August 2020 to evaluate perceptions and preferences about where, when, and how healthcare is delivered during the COVID-19 pandemic. In total, 3351 patients completed surveys, and 42.6% reported that they would “wait until they felt safe” before receiving a colonoscopy as compared to 22.4% for a mammogram. The doctor’s office was the most common preferred location for receiving vaccines/shots (79.9%), though many also reported preferring an outdoor setting or in a car (63.7%). With over 40% of patients reporting that they would “wait until they feel safe” for a colonoscopy, healthcare systems could focus on promoting other evidence-based options such a fecal-occult blood test to ensure timely colon cancer screening.

## Keywords

COVID-19, preventive care, survey

## Introduction

During the first few months of the COVID-19 pandemic, when much was still unknown about the SARS-CoV-2 virus, many health systems limited in-person care to only immediate, acute needs, and many patients chose to cancel or delay their medical care. With increasing knowledge about how to prevent and treat COVID-19, health systems safely expanded access to all forms of care. Yet, many individuals, over half according to one survey, reported delaying or avoiding medical care due to fear of exposure or “catching” COVID-19 (1,2). Hospitals reported substantial decreases in visits to emergency departments for severe issues like heart attacks and stroke (3,4) and a decline in cardiac catheterizations (5). Healthcare organizations also saw a dramatic decline in preventive measures during the first few months of the pandemic for mammograms, (6) colonoscopies, (6) and vaccines (7).

The extent to which patient preferences drove this decrease for when, how, and where to receive care

remains unclear. Delaying care, including preventative care, such as postponing vaccines or cancer screening, can potentially result in increased morbidity and mortality (8,9). Additionally, it is also important to understand which preventive services patients are more likely to forgo so that healthcare systems and providers can plan accordingly. Patients may be more open to receiving care in an alternative location than a doctor’s office, like in an outdoor or a drive-up car setting (10). There have been several COVID variants (eg, Delta, Omicron) causing surges and there may be other periodic surges in the future (11). Therefore, it is critically important to

<sup>1</sup> Sutter Health, Palo Alto, CA, USA

<sup>2</sup> Sutter Health, Walnut Creek, CA, USA

## Corresponding Author:

Cheryl D Stults, Sutter Health, 795 El Camino Real, Palo Alto CA 94301, USA.

Email: stultsc@sutterhealth.org



understand patient preferences for receiving care in various healthcare settings during the previous waves of the COVID pandemic. It is also critical to understand the possible reasons why many individuals are skipping or delaying care, in order to guide healthcare systems approaches to alternative healthcare delivery settings and develop targeted solutions for groups with different preferences. We sought to understand what preventive services patients are more likely to forgo, how soon they are comfortable resuming care, and how care delivery might change to be more accommodating during the COVID-19 pandemic. Specifically, this study tried to answer two main research questions as below:

RQ1: How soon are patients willing to be seen for preventative care services?

RQ2: Where do patients want to be seen for preventative care services?

We looked at specific preventive care services of annual exam, vaccines, mammograms, and colonoscopy. We will also examine how preferences vary across subgroups (eg, age, gender, race/ethnicity, comorbidities, income, and health-care utilization).

## Methods

Sutter Health is an integrated healthcare system in Northern California serving a racially and socioeconomically diverse population of over three million patients annually. To better understand how patients felt about receiving preventive care and the mode of care delivery during the pandemic, we conducted a population-based email-survey to active patients who completed at least one visit in 2019 at any ambulatory clinic at Sutter Health and had an email address documented in the electronic health record (EHR). The research team developed a short, confidential survey in consultation with a patient advisor and operational leaders, and informed by the emerging literature (See Appendix A for survey instrument). The project was reviewed by the Sutter Health Institutional Review Board and approved as a quality improvement study. The survey was conducted between August 12 through September 4, 2020.

To assess readiness and settings to seek care among Sutter patients we asked the question (Q16 in Appendix A), "Starting from today, how soon do you think you will be willing to receive care for..." where six types of care visits were listed: (1) virtual visit for a health concern; (2) in-person visit for a health concern; (3) annual exam/check-up; a surgery (4) in doctor's office, (5) in an outpatient surgical center, or (6) in a hospital. This question has 7 options (ie, within 1 week, within 1 month, within 3 months, within 6 months, when COVID cases decrease in my area, only with a COVID vaccine, or not applicable). For this analysis, we focus on just the annual exam and two extreme response options: "within 1 week" and combined into one category "when

COVID cases decrease in my area/only with a COVID vaccine" ("COVID decrease/vaccine" in Table 2) as outcomes. Based on declines seen by the medical director for quality, we also specifically looked at three other preventive services, vaccine/shots, mammogram and colonoscopy, using questions "If you needed to receive [XX] care today, what would be your preferred setting?" (see Q8, 11, 12 in Appendix A). We analyzed the response "Wait until I feel safe" as the measure of readiness to receive preventive care, and other responses to evaluate location preferences to receive preventive care.

We extracted retrospective EHR data from January 1, 2019-August 12, 2020 and identified ambulatory healthcare utilization before and after the California shelter-in-place date (March 16, 2020) for all eligible patients: patient demographic characteristics, including age, sex, race/ethnicity, insurance information, census median household income, clinical encounter diagnosis history, Charlson comorbidity index scores, (12) and primary care clinic geographic locations (ie, Bay Area, Central Valley, or no primary care at Sutter). We stratified patients by whether they had cancelled appointments (either self-cancelled or cancelled by the system) after March 16, 2020, age group (18-49, 50+), race/ethnicity (Non-Hispanic (NH) white, NH-Asian, NH-African American (NH-Black), Hispanic, Other), and at least one of four chronic diseases (diabetes mellitus, congestive heart failure (CHF), cancer, chronic obstructive pulmonary disease (COPD)). We projected the overall response rate to be around 15%. Hence, we oversampled patients with cancelled appointments, who were 50 years or older, African American, Hispanic, and who had one of the four chronic conditions to ensure sufficient responses to have statistically meaningful results in these subgroups. These subgroups are relatively small in our system but usually have more medical needs. All analyses were conducted using sampling weights to reflect the Sutter Health population and account for response bias. In total 1.19 million patients were identified as eligible based on the above criteria. 19,530 adult patients were selected and invited to complete the survey. We received 3,351 completed surveys.

We used both survey responses and EHR data to assess patient preferences, focusing on patients 18 years or older. To generalize statistical inferences to the eligible Sutter Health population, descriptive statistics were adjusted for both response bias and sampling fraction using the inverse propensity weight method (13,14). We first summarized the weight-adjusted descriptive statistics for overall samples. Then we further examined preference differences by care types/clinical settings, patient demographics, and healthcare utilization using the weighted chi-square tests with  $P \leq .05$  as the level of significance. All sampling and analyses were conducted using SAS Enterprise Guide 7.1.

## Results

We received 3351 completed surveys with a response rate of 17.2%. The stratified random sample of survey respondents

differed from non-respondents on all demographic variables (Table 1). Compared to non-respondents, respondents were more likely to be 65 or older (57.3% vs. 37.7%), female (53.7% vs. 49.5%), NH-White (42.4% vs. 31.3%), with one or more comorbidities (18.3% vs. 14.9% with 1-2 comorbidities). Respondents were more likely to be insured with Medicare fee for service (FFS) (41.2% vs. 26.9%) and had higher census median household income (29.9% vs. 24.1%).

Correction for response weight successfully reduced differences in estimates for all demographic variables between respondents and the overall sample of 19,530, with the exceptions of race/ethnicity and census median household income (Table 1). After correction for both response

weights and sampling weights (ie, overall weight), patient respondents were age 18-49 (56.0%), female (59.7%), NH-White (47.1%), had a CCI of 0 (88.1%), married (43.7%), had PPO/FFS insurance (44.6%), and were in the 25%-75% of census median household income (51.6%). Results reported are all weight-adjusted statistics.

### Preferences on When to Seek Preventive Care

Overall, 26.6% of patients responded that they would have an annual exam within 1 week of receiving the survey, similar to 27.3% who indicated that they would wait until COVID cases decreased or a vaccine became available. However,

**Table 1.** Characteristics of Survey Sample, Respondents, Non-Respondents, and Weighted Sample.

Patient Characteristics	Overall sample (N = 19,530)	Respondents (N = 3351)	Non-Respondents (N = 16,179)	Respondents after adjusting response weight	Respondents after adjusting overall weight (both response and sampling weights)
Age Group (a), (b)					
18-49	40.4%	24.3%	43.8%	40.1%	56.0%
50-64	18.5%	18.4%	18.5%	18.6%	10.1%
65-79	26.7%	40.5%	23.8%	27.2%	20.9%
80+	14.4%	16.8%	13.9%	14.2%	13.0%
Female (a), (b)	50.2%	53.7%	49.5%	50.9%	59.7%
Race/Ethnicity (a), (b) <sup>c</sup>					
NH White	33.2%	42.4%	31.3%	33.2%	47.1%
Hispanic	20.2%	16.1%	21.0%	20.1%	2.5%
NH Asian	19.9%	19.4%	2.0%	21.3%	12.7%
NH Black	8.6%	6.0%	9.1%	7.9%	22.1%
Other	18.1%	16.0%	18.6%	17.5%	15.7%
Charlson Comorbidity Index (CCI) (a), (b)					
0	76.3%	73.7%	76.9%	76.3%	88.1%
1-2	15.5%	18.3%	14.9%	15.5%	8.3%
3+	8.2%	8.2%	8.0%	8.2%	3.6%
Insurance (a), (b)					
HMO	15.8%	13.6%	16.3%	15.6%	16.8%
Medicaid/MediCal	2.3%	0.9%	2.5%	2.5%	3.5%
Medicare FFS	29.4%	41.2%	26.9%	29.5%	25.2%
Medicare HMO	8.1%	11.1%	7.6%	7.9%	5.6%
PPO/FFS	40.6%	31.5%	42.5%	41.0%	44.6%
Other	3.7%	1.8%	4.1%	3.6%	4.3%
Census Block Median Household Income (a), (b) <sup>c</sup>					
(c)					
<\$88,872 (25th percentile)	25.3%	19.6%	26.5%	24.7%	19.4%
\$88,872-\$153,036 (50th percentile)	49.6%	50.4%	49.4%	49.6%	51.6%
>\$153,036 (75th percentile)	25.1%	29.9%	24.1%	25.7%	29.0%
Marital Status (a), (b)					
Married/Significant Other	54.5%	64.4%	52.2%	55.2%	47.3%
Single	30.8%	20.2%	33.0%	30.5%	39.0%
Divorced/Separated	4.4%	4.8%	4.4%	4.4%	3.0%
Widowed	4.6%	6.0%	4.4%	4.4%	3.7%
Unknown/Other	5.7%	4.5%	6.0%	5.4%	7.1%
Interpreter needed (a), (b)	1.6%	0.5%	1.8%	1.5%	0.2%

<sup>a</sup>Variables statistically different between response and non-response.

<sup>b</sup>Variables statistically different between response and all sample.

<sup>c</sup>Variables statistically different between all sample and adjusted response weight.

Table 2. Readiness to Seek Preventive Care.

	Annual exam/Check-up (N = 3145)		"Starting from today, how soon do you think you will be willing to receive care for ..."		Vaccine/Shots (N = 3145) If you needed to receive care today for vaccines/shots, what would be your preferred setting?		Mammogram (N = 1809) If you needed to have a mammogram today, what would be your preferred setting?		Colonoscopy (N = 2697) If you needed to have a colonoscopy today, what would be your preferred setting?	
	Within 1 week % (P-value)	COVID decreases/Vaccine % (P-value)	Wait until safe % (P-value)	Wait until safe % (P-value)	Wait until safe % (P-value)	Wait until safe % (P-value)	Wait until safe % (P-value)	Wait until safe % (P-value)	Wait until safe % (P-value)	Wait until safe % (P-value)
Overall	26.6% (0.096)	27.3% (0.001)**	12.5% (0.412)	22.4% (0.125)	42.6% (0.229)					
Age										
18-49	24.3%	30.9%	12.8%	21.7%	43.1%					
50-64	30.2%	23.5%	11.8%	25.6%	46.1%					
65-79	28.0%	26.0%	13.8%	26.6%	43.1%					
80+	31.2%	16.8%	9.5%	16.1%	35.9%					
Gender										
Female	26.3%	28.1%	13.9%	24.2%	46.0%					
Male	27.0%	26.1%	10.4%	12.0%	37.7%					
Race										
NH White	29.8% (0.043)*	25.8% (0.001)**	11.4% (0.003)**	21.2% (0.001)**	38.9% (0.001)**					
Hispanic	27.6%	17.0%	6.4%	14.1%	30.8%					
NH Asian	19.1%	35.1%	18.8%	34.0%	57.8%					
NH Black	34.5%	10.4%	9.5%	7.3%	32.1%					
Other	25.0%	32.1%	12.6%	19.0%	45.6%					
Charlson Comorbidity Index (CCI)										
0	26.2%	28.5%	12.4%	22.8%	43.6%					
1+	29.2% (0.64)	18.6% (0.008)	13.5% (0.054)	18.7% (0.005)*	35.8% (0.001)**					
Census Median Household Income										
<\$88,872 (25th percentile)	28.1%	19.2%	8.3%	12.9%	29.4%					
\$88,872-\$153,036 (50th percentile)	27.1%	28.2%	14.4%	23.1%	44.6%					
>\$153,036 (75th percentile)	24.7%	31.2%	12.1%	28.1%	46.8%					
In-person Doctor's Office Visit during COVID										
No	19.7%	33.3%	14.3%	27.1%	47.8%					
Yes	39.2% (0.001)**	16.5% (0.001)**	9.2% (0.005)**	14.1% (0.001)**	33.5% (0.001)**					
Image/Lab/Procedure Visit during COVID										
No	20.9%	31.1%	14.0%	26.3%	46.9%					
Yes	38.5%	19.1%	9.2%	14.4%	33.8%					

(continued)

**Table 2. (continued)**

	Annual exam/Check-up (N = 3145)		Vaccine/Shots (N = 3145) If you needed to receive care today for vaccines/shots, what would be your preferred setting?	Mammogram (N = 1809) If you needed to have a mammogram today, what would be your preferred setting?	Colonoscopy (N = 2697) If you needed to have a colonoscopy today, what would be your preferred setting?
	Within 1 week % (P-value)	COVID decreases/Vaccine % (P-value)	Wait until safe % (P-value)	Wait until safe % (P-value)	Wait until safe % (P-value)
Portal Utilization during COVID	(0.001)**	(0.229)	(0.006)**	(0.077)	(0.031)
No	25.1%	27.9%	13.3%	23.4%	43.8%
Yes	34.3%	24.1%	8.3%	17.0%	36.1%
Telephone Communication during COVID	(0.001)**	(0.001)**	(0.926)	(0.006)**	(0.252)
No	24.9%	29.0%	12.5%	23.7%	43.2%
Yes	36.0%	18.2%	12.3%	15.0%	39.4%

Notes: \*= $P < 0.05$ ; \*\*= $P < 0.01$

results showed that patient preferences for when to have an annual exam varied across groups. Specifically, middle age adults (age 18-49), NH-Asians, healthy adults (ie, those who had no comorbidities), and those with higher census median household income, single adults, and those who did not utilize health services during COVID pandemic (ie, no in-person doctor's office visits; no image/lab/procedure; no telephone communication) were the subgroups reporting that they prefer to delay an annual exam until COVID cases decrease/only with a COVID vaccine (Table 2). Those who received health services during COVID pandemic were more likely to desire an annual exam within a week compared to those who did not use health services during the pandemic.

For other preventative health services, 42.6% reported that they would "wait until they felt safe" to get a colonoscopy in comparison to 12.5% for vaccines/shots and 22.4% for mammogram. NH-Asians and those who had no in-person doctor's office visits nor image/lab/procedure visit during COVID were more likely to indicate their preference to wait until COVID cases decrease/only with a COVID vaccine to receive all types of preventive care, including colonoscopy, mammogram, and vaccine/shots (Table 2).

### Preferred Location for Receiving Preventive Care

Overall, doctor's office/separate area in clinic were the most popular location preferences for receiving vaccine/shots (79.9%) and mammogram (69.6%). However, we identified variation across subgroups. For vaccine/shots, women were more likely to prefer outdoor/in car compared to men (68% vs. 57.4%,  $P < .01$ ) and less likely to prefer doctor's office/separate area (77.7% vs. 83.2%,  $P < .05$ ). NH-Asian and NH-White were more likely to select "outdoor/in car" ( $P < 0.001$ ) but not "Dr. office/separate area" ( $P < 0.5$ ) than other race/ethnic groups. The same pattern was also found among those with higher census median household income and did not utilize in-person doctor's office visits, nor image/lab/procedure visits nor portal utilization, nor telephone communication during COVID (Table 3).

For colonoscopy, 59.3% respondents indicated outpatient surgical center in comparison to 16.6% at the hospital. NH-Whites (64.8%), NH-Blacks (63.8%), had 3 or more in-person doctor's office visits before COVID (3-5 visits 61.5%; 6-11 visits 63.8%; 12+ visits 65.2%), and utilized in-person doctor's office visit (68.4%), image/lab/procedure visit (66.5%), portal utilization (66.1%) or telephone communication (65.1%) during the pandemic were more likely to report that they wanted a colonoscopy at an outpatient surgical center ( $P < 0.05$ ).

### Discussion

Nearly 40% of patients reported that they would "wait until they feel safe" before receiving a colonoscopy, which might explain the lower rates of screening during the

COVID pandemic period that have been projected to result in excess deaths from colorectal cancer (15). This delayed routine screening might also result in later stage cancer diagnoses. Given that patients are so worried about coming in for colonoscopies, healthcare systems could instead promote other evidence-based screening tests such as fecal-occult blood tests (FOBT) or the fecal immunochemical test (FIT) which are both recommended by the United States Preventive Service Task Force (USPSTF) (16). An advanced simulation model published in *JAMA Network Open* found that "increasing fecal immunochemical test-based colorectal cancer screening participation during the COVID-19 pandemic could mitigate the consequences of reduced screening rates during the pandemic for colorectal cancer outcomes." (17).

Interestingly, our survey found that mammograms had less than a quarter of patients indicating that they would "wait until they feel safe." Other studies have shown that there was a dramatic decrease in mammograms in the few months after the beginning of the COVID-19 pandemic. Thereafter, rates began to rebound when healthcare systems began to reopen in the summer months. Even with this rebound, there have been estimates of deficits in routine screening mammograms and some subsequent breast cancer diagnoses (9). Further monitoring is necessary to ultimately determine the impact of missed screenings and diagnostic care due to the pandemic and periodic surges in COVID-19 cases. This may be an opportunity for additional public health education about the risk/benefit assessment of coming in during the COVID pandemic for these preventative screenings.

Unsurprisingly, those who were higher utilizers of healthcare both before and during COVID-19 pandemic reported that they would be likely to have an annual exam within a week and also indicated that their preferred location to receive preventive services (ie, vaccines/shots and mammogram) was at a doctor's office and in an outpatient surgical center for a colonoscopy.

The COVID-19 pandemic has disrupted the standard practices for preventive care, but some initial signs (18) show some return to prior habits of care seeking. Health systems were able to rapidly implement reopening protocols within several months and safely perform mammograms and colonoscopies at rates similar to pre-pandemic for privately insured patients (18). Yet, given the dramatic decreases seen from the first few months of the pandemic, screening rates will need to surpass previous levels in order to account for the backlog. Thus, "subsequent statements indicating that individuals could return to non-urgent care where safe procedures can be followed may not have had the same penetration as the initial stay home message." (9) This is similar to our survey findings with many patients reporting that they would "wait until safe" or "COVID decreases/only with a COVID vaccine" to have preventive services, particularly for colonoscopy. What is unknown is how long until patients perceive that it is sufficiently safe

**Table 3.** Preferred Location to Receive Preventive Care.

	Vaccine/Shots (N = 3145)		Mammogram (N = 1809)		Colonoscopy (N = 2697)	
	If you needed to receive care today for vaccines/shots, what would be your preferred setting?		If you needed to have a mammogram today, what would be your preferred setting?		If you needed to have a colonoscopy today, what would be your preferred setting?	
	Doctor office/Indoor separate area % (P-value)	Outdoor/ In Car % (P-value)	Doctor office/Indoor separate area % (P-value)	Outpatient surgical center % (P-value)	Hospital % (P-value)	
Overall	79.9% (0.113)	63.7% (0.02)*	69.6% (0.001)**	59.3% (0.227)	16.6% (0.035)*	
Age						
18-49	80.5%	64.7%	77.0%	57.8%	18.3%	
50-64	77.2%	70.0%	61.0%	55.8%	13.3%	
65-79	77.0%	62.9%	51.3%	60.8%	12.6%	
80+	84.6%	55.6%	67.3%	65.2%	21.0%	
Gender	(0.025)*	(0.001)**	(0.069)	(0.668)	(0.007)**	
Female	77.7%	68.0%	68.3%	58.6%	13.5%	
Male	83.2%	57.4%	76.8%	60.1%	20.9%	
Race	(0.036)*	(0.001)**	(0.075)	(0.003)**	(0.167)	
NH White	77.5%	65.6%	65.6%	64.8%	17.1%	
Hispanic	88.2%	47.8%	78.8%	59.3%	23.6%	
NH Asian	79.8%	68.6%	73.4%	46.9%	13.5%	
NH Black	89.3%	40.7%	74.6%	63.8%	20.5%	
Other	79.6%	67.3%	66.6%	57.2%	12.3%	
Charlson Comorbidity Index (CCI)	(0.398)	(0.045)*	(0.597)	(0.116)	(0.733)	
0	79.7%	64.5%	69.8%	58.6%	16.7%	
1+	81.9%	58.0%	67.8%	63.9%	15.9%	
Census Median Household Income	(0.031)*	(0.012)*	(0.602)	(0.669)	(0.001)**	
<\$8,872 (25th percentile)	86.2%	54.2%	70.1%	62.4%	28.3%	
\$8,872-\$153,036 (50th percentile)	77.9%	66.0%	68.1%	59.0%	14.5%	
>\$153,036 (75th percentile)	79.2%	66.0%	72.2%	57.8%	13.3%	
In-person Doctor's Office Visit pre-COVID	(0.004)**	(0.637)	(0.868)	(0.003)**	(0.015)	
0-2	75.1%	62.7%	69.2%	50.6%	21.6%	
3-5	84.8%	66.6%	71.5%	61.5%	14.1%	
6-11	78.2%	62.5%	68.0%	63.8%	11.6%	
12+	83.3%	62.6%	69.2%	65.2%	17.3%	

(continued)

**Table 3.** (continued)

	Vaccine/Shots (N = 3145)		Mammogram (N = 1809)		Colonoscopy (N = 2697)	
	If you needed to receive care today for vaccines/shots, what would be your preferred setting?		If you needed to have a mammogram today, what would be your preferred setting?		If you needed to have a colonoscopy today, what would be your preferred setting?	
	Doctor office/Indoor separate area % (P-value)	Outdoor/ In Car % (P-value)	Doctor office/Indoor separate area % (P-value)	Outpatient surgical center % (P-value)	Hospital % (P-value)	
Image/Lab/Procedure Visit pre-COVID	(0.004)**	(0.513)	(0.124)	(0.097)	(0.175)	
0	72.5%	60.1%	75.1%	51.6%	22.5%	
1-3	84.1%	65.8%	71.3%	58.6%	16.0%	
4-7	77.6%	63.3%	68.5%	63.8%	13.7%	
8+	81.6%	63.3%	61.5%	62.8%	15.6%	
In-person Visit during COVID	(0.001)**	(0.118)	(0.001)**	(0.001)**	(0.796)	
No	76.4%	66.2%	67.8%	54.0%	16.3%	
Yes	86.2%	59.3%	72.8%	68.4%	17.0%	
Image/Lab/Procedure Visit during COVID	(0.001)**	(0.547)	(0.269)	(0.001)**	(0.899)	
No	77.2%	64.2%	68.5%	55.6%	16.7%	
Yes	85.8%	62.6%	71.9%	66.5%	16.4%	
Portal Utilization during COVID	(0.215)	(0.506)	(0.234)	(0.02)*	(0.861)	
No	79.4%	64.0%	69.0%	57.9%	16.7%	
Yes	82.5%	62.0%	73.0%	66.1%	16.2%	
Telephone Communication during COVID	(0.066)	(0.01)**	(0.843)	(0.033)*	(0.297)	
No	79.3%	65.0%	69.7%	58.1%	17.0%	
Yes	83.6%	56.8%	69.0%	65.1%	14.3%	



for them to return to the clinic or what additional safety measures are necessary. Given that the COVID-19 Delta variant can still impact even those who have been vaccinated by being asymptomatic carriers, (19) further study is needed to see what other safety measures are necessary to prevent future declines in preventive services during these surges.

Overall, the doctor's office was indicated as the preferred location to receive vaccines/shots and mammogram fairly early in the pandemic (August 2020) and 12.5% of respondents said they would not seek vaccines "until they feel safe." However, outdoor settings or in the car was also frequently mentioned as a place where patients were willing to receive care for vaccines/shots. Health systems should provide a range of options to accommodate those whose preferences for receiving care have changed. COVID-19 testing and COVID-19 vaccine administration are currently being performed in outdoor settings, such as stadiums (12,20) or in-car/drive-thru (21) so these settings could potentially also be utilized for healthcare in a broader context than just COVID-19. It could also be an option for those groups, like women and NH-Asians in our survey, who indicated that they would "wait until feel safe" to receive healthcare services but indicated that they were willing to receive these services in an outdoor setting or in the car. Providing multiple options for care may increase the likelihood that they can have an option that works for them. This has direct implications for the future vaccination of children as women typically report having primary responsibility for seeking healthcare for their children (22). Health systems should consider how to improve perceptions of safety for women as it not only impacts their own preventive healthcare, but also for their children. With the approval of the COVID-19 vaccine for children age 5-17 and possible future approval for younger children, healthcare systems may want to turn to some of these alternative locations for vaccine administration such as outdoor clinics or in the car, or to offer it during a routine office visit given that the doctor's office is generally perceived as safe.

Our results reveal that older/sicker people are more likely to be less worried about continuing to seek care in regular settings, or perceive the risks of not seeking care as outweighing potential benefits. This may be because the cost of not seeking care appears to be higher for them as they may have urgent needs. However, for younger/healthier people, it may be that to them, the costs of postponing preventive services like colonoscopy, mammogram, routine vaccines, and/or annual exams for a few years outweighs the possible risk of being exposed to COVID-19 at healthcare centers. A population health management strategy is needed to segment patient population according to their medical need and to develop targeted communications.

### Limitations

This study has several limitations. We only surveyed patients of one large health system in Northern California and so our

results may have limited generalizability. We oversampled for particular characteristics. However, we applied both sampling and response weights to reduce any potential survey bias.

The survey was only conducted online, and so it omits those patients without online access. About 35% of ambulatory care patients do not have an email address documented in EHR, and the survey population may under-represent older patients or low-income patients who have no email access. It has been noted that those in the digital divide "whose access was impeded were the most vulnerable to poor health outcomes related to COVID-19." (23) Future surveys should be multi-modal with both email and postal mail recruitment to capture those who do not have regular access to the internet.

Additional research could include a repeated survey among patients to see if their perspectives have changed given the introduction and wider utilization of the COVID vaccines.

### Conclusion

Healthcare systems have quickly implemented new means to deliver healthcare to react to and address urgent issues, such as safety. After several surges with wide-spread availability and uptake of COVID vaccines, COVID-19 is likely to become "endemic like the common cold." (24) The COVID-19 pandemic provides a great learning opportunity for healthcare systems to think about strategy for providing continuous high-quality care delivery by prioritizing care services and customizing care delivery models that consider location of care delivery. The doctor's office is still viewed as the primary location to receive preventive care, but there are indications that this may continue to change beyond just the COVID-19 pandemic as telemedicine and drive-up care are becoming more integrated and widely accepted. With increasing need and demand for care delivery at alternative locations, health systems and health policy makers will need to develop reimbursement and quality metrics, and outcome measures to capture these new forms of care delivery.

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### Ethical Approval

This project was reviewed by the Sutter Health Institutional Review Board and approved as a quality improvement study.

**ORCID iD**

Cheryl D Stults  <https://orcid.org/0000-0001-7958-1511>

**Statement of Human and Animal Rights**

All procedures in this project were conducted with in accordance with Sutter Health Institutional Review Board approved protocols.

**Statement of Informed Consent**

Informed consent for patient information to be published in this article was not obtained because the work was determined to be quality improvement by the Sutter Health Institutional Review board.

**Supplemental material**

Supplemental material for this article is available online.

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