TELEHEALTH RESEARCH INCUBATOR

Research Snapshots

CONTENTS

INTRODUCTION

The Telehealth Research Incubator's Research Snapshots compilation provides policymakers, journalists, healthcare administrators, and others with research insights on the population-level impact of telehealth on healthcare access, costs, quality, and experience. In this databook, we present published and unpublished research conducted by members of the Institute for Healthcare Policy and Innovation (IHPI).

The Telehealth Research Incubator is a signature program of the University of Michigan's (U-M) Institute for Healthcare Policy and Innovation. IHPI is the nation's largest university-based group of health services researchers working across diverse disciplines to solve complex and timely health challenges. IHPI unites 650 faculty across 15 U-M schools and colleges on the Ann Arbor campus, and several units on the Flint and Dearborn campuses, aligning broad expertise to respond to vital questions within healthcare policy and practice.

Since its founding in 2018, the Telehealth Research Incubator has connected more than 30 collaborators from the U-M School of Medicine, School of Public Health, School of Information, and the Ross Business School to publish manuscripts, submit grants, and disseminate research findings through scientific conferences, national podcast interviews, social media, and meetings with governmental organizations. Similar to a corporate startup accelerator, the Incubator supports early-stage telehealth researchers by providing intense content expertise and education in telehealth policy, research methods, and dissemination with the aim of producing relevant research on the population-level impact of telehealth on healthcare access, costs, quality and experience. The research produced by the Telehealth Research Incubator is more important than ever as policymakers grapple with developing post-COVID-19 telehealth payment policy and regulations.

The July 2021 edition of Research Snapshots represents the debut of the Telehealth Research Incubator. We look forward to producing updated databooks in the future.

For more information about the Telehealth Research Incubator or any specific study featured in this databook, please contact us.

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TELEHEALTH TRENDS

SUMMARY OF RESEARCH FINDINGS IN THIS SECTION

During the COVID-19 pandemic, need for social distancing and major regulatory reforms caused telehealth use to surge to unprecedented levels. Prior to the pandemic, less than 1% of healthcare clinicians and patients had used billable telehealth services. In March and April 2020, as most states experienced shut-down orders, telehealth use surged. Even as in-person care ramped back up, our research shows that telehealth use has persisted and currently represents about 20% of total outpatient care.

KEY HIGHLIGHTS

- Telehealth use grew during the COVID-19 pandemic, but total care remains at the same level as prior to the pandemic, suggesting that telehealth has largely been used as a substitute for in-person care. (Snapshot 1.1)

- While nearly all specialties use telehealth, there is wide variation in use. (Snapshot 1.2)

- Smaller and rural practices have lower rates of telehealth use. (Snapshot 1.3)

- Compared to non-users, patients using direct-to-consumer telehealth are more likely to be female, be a nonelderly adult, live in an urban area, and have fewer comorbidities. (Snapshot 1.4)

1.1 HOW HAS TELEHEALTH USE CHANGED DURING THE COVID-19 PANDEMIC?
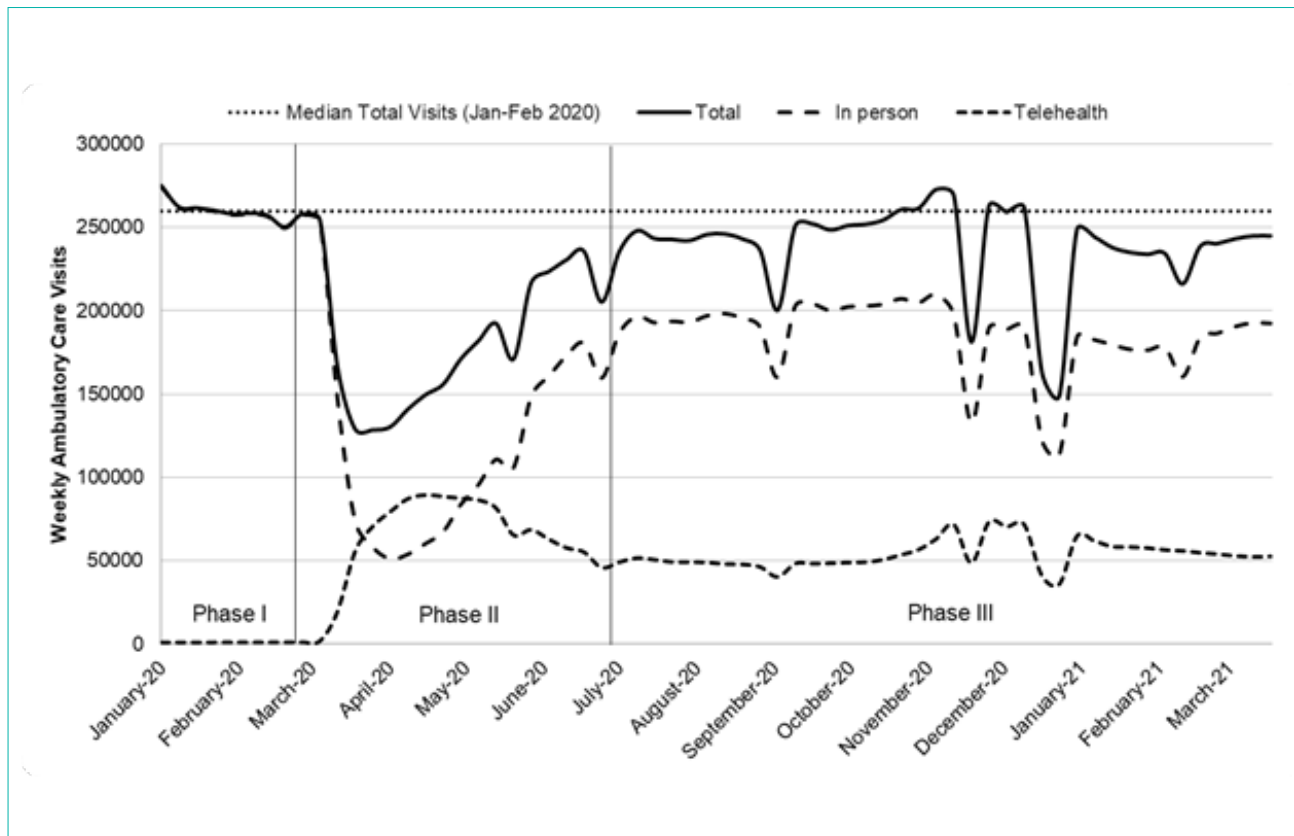
- We studied trends in telehealth during COVID-19 using Blue Cross Blue Shield of Michigan insurance claims from January 2020 through March 2021.
- Telehealth use grew rapidly during the early months of the pandemic (March through May 2020), comprising 61% of total outpatient visits during the week of April 5th, 2020.
- After May 2020, telehealth use declined but is currently used for approximately 21% of all outpatient visits.
- Total care remains at the same level as prior to the pandemic, suggesting that telehealth has largely been used as a substitute for in-person care.

Citation: Unpublished data analysis by Ellimoottil C.

1.2 HOW DOES TELEHEALTH USE VARY BY SPECIALITIES?

Percentage of outpatient visits conducted virtually

Specialty	Percentage
Anesthesiology	31%
Cardiac Surgery	26%
Dermatology	11%
Family Medicine	27%
Internal Medicine	22%
Neurology	50%
Neurosurgery	34%
Obgyn	14%
Opthalmology	1%
Orthopaedic Surgery	15%
Otolaryngology	7%
Pediatrics	19%
Physical Medicine	21%
Psychiatry	67%
Radiation Oncology	23%
Radiology	41%
Surgery	20%
Urology	15%

- In this analysis of University of Michigan outpatient visits from July 1, 2020 through March 1, 2021, psychiatry showed highest sustained use of video visits, followed by neurology, family medicine, and internal medicine. Surgical specialities reported fewer video visits after the early part of the pandemic.

Citation: Unpublished data analysis by Ellimoottil C.

1.3 HOW HAS TELEHEALTH ADOPTION VARIED BY PRIMARY CARE PRACTICE SIZE AND RURALITY?
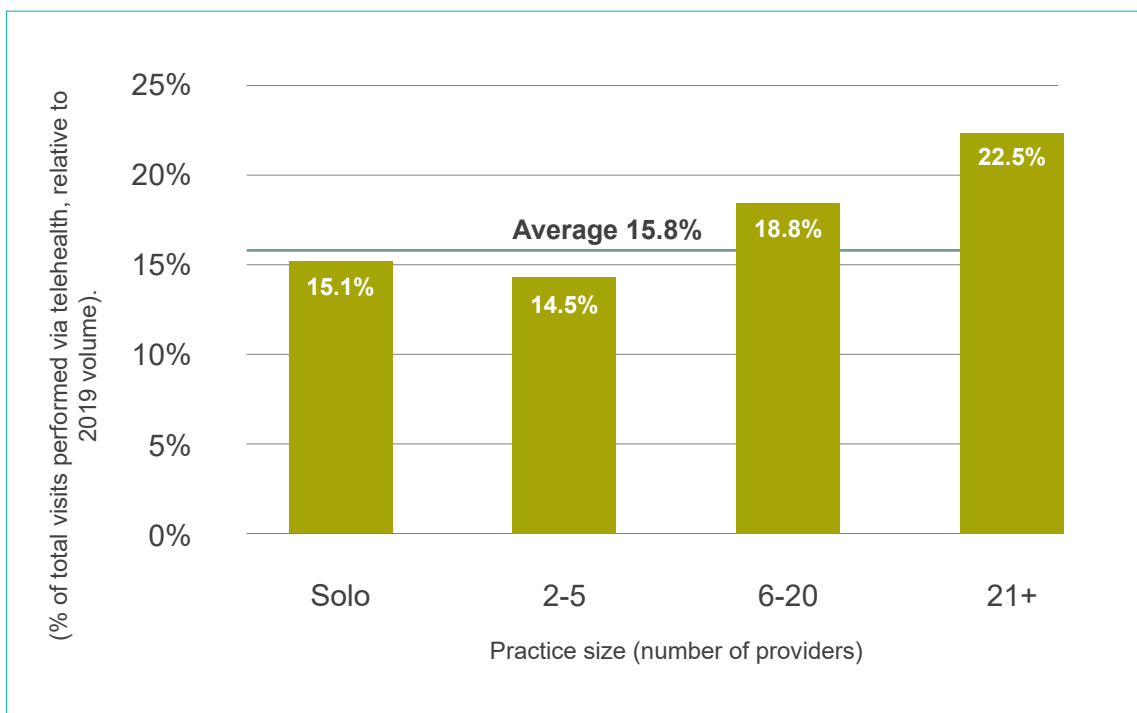
- We determined differences in telehealth adoption across primary care practices in Michigan by using Blue Cross Blue Shield of Michigan insurance claims from March through September 2020.
- Most primary care practices (71%) used some degree of telehealth during the pandemic, but this varied by practice size and rurality. Sixty-three percent (63%) of solo practices used telehealth compared to 91% of larger practices. Sixty-one percent (61%) of practices in rural areas used telehealth compared to 73% of practices in urban areas.
- Larger practices performed more telehealth visits.

Citation: Unpublished data analysis by Li K, Ng S, and Ellimoottil C.

1.4 WHAT TYPE OF PATIENTS USE DIRECT-TO-CONSUMER TELEHEALTH?

Patient Characteristics	Non-telemedicine group (n = 3,402,889)	Direct-to-consumer telemedicine group (n = 28,716)
Sex		
Female	56.6%	61.3%
Male	43.4%	38.7%
Age, years		
0-9	26.7	7.6
10-19	16.4	8.3
20-29	10.3	12.5
30-39	10.1	27.2
40-49	11.4	24.2
50-59	12.9	16.1
60-69	8.0	4.1
70-79	2.5	0.1
80+	1.8	0.0
Rurality		
Urban	94.2	95.6
Rural	5.8	4.4
Comorbidities		
Cancer	2.3	1.4
Diabetes	5.8	4.1
Congestive heart failure	1.5	0.4
Chronic obstructive pulmonary disease	2.7	0.7
Chronic kidney disease or renal failure	0.7	0.2

- Direct-to-consumer telehealth refers to a live, video-based encounter that is initiated, on demand, by the patient. These visits are most commonly performed by clinicians working for national for-profit companies with which the patient has no existing relationship and which lack access to prior medical records—although many health systems, and some practices, also now offer on-demand visits for patients under their care.

- We used Blue Cross Blue Shield of Michigan insurance claims from 2016 through 2019 to identify patients who had a direct-to-consumer telehealth visit for symptoms of an acute respiratory infection, and compared them to patients who had an in-person visit for the same condition. Individuals using direct-to-consumer telehealth were more likely to be female, be a nonelderly adult, live in an urban area, and have fewer comorbidities.

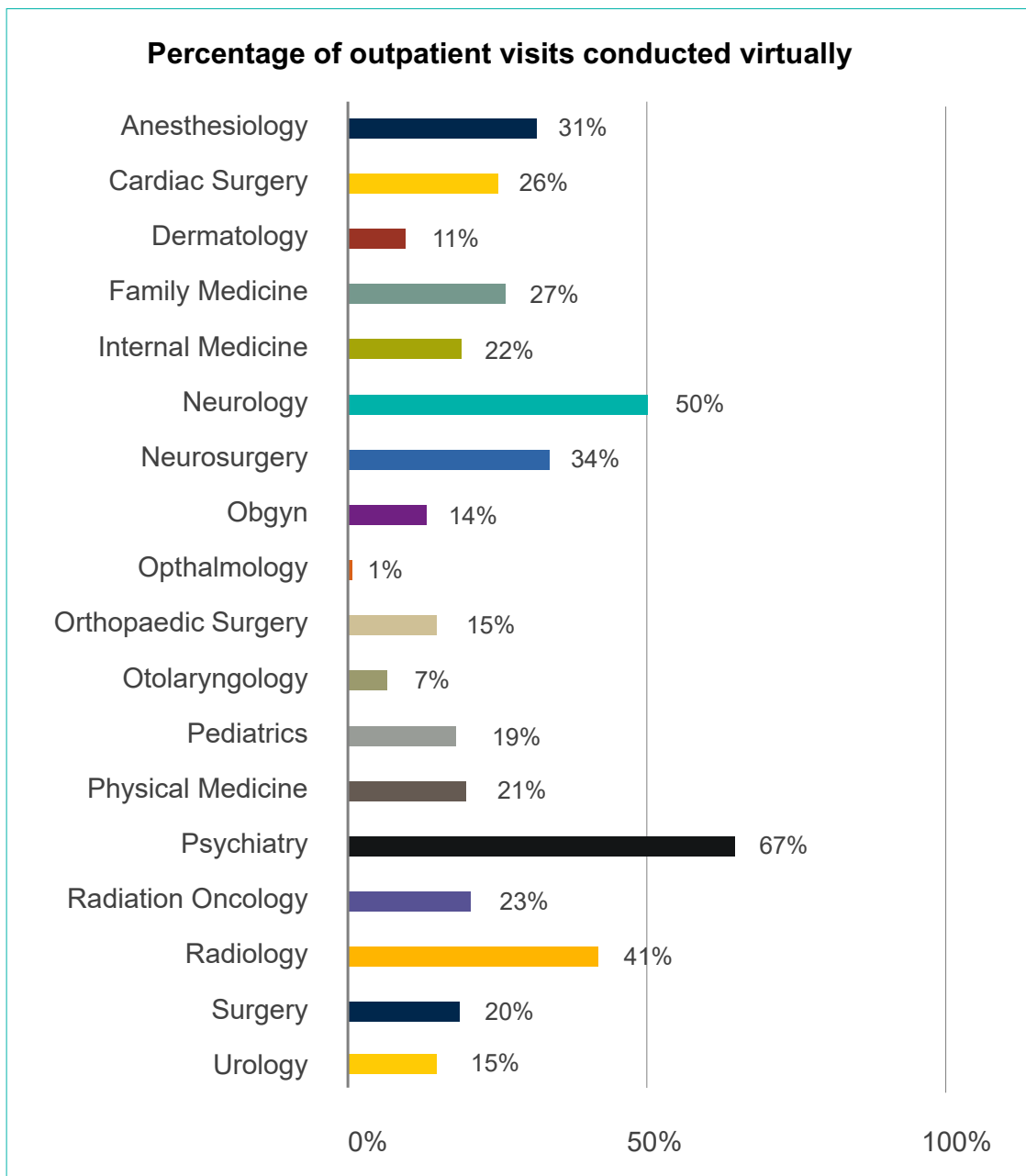Citation: Li KY, Zhu Z, Ng S, Ellimoottil C. Direct-To-Consumer Telemedicine Visits For Acute Respiratory Infections Linked To More Downstream Visits. Health Aff (Millwood). 2021 Apr;40(4):596-602.

TELEHEALTH AND ACCESS

SUMMARY OF RESEARCH FINDINGS IN THIS SECTION

The relationship between telehealth and healthcare access is not straightforward. On one hand, the use of video visits, eVisits, and other forms of telehealth has the potential to increase patients' ability to access their healthcare provider. On the other hand, patients must feel comfortable using these technologies and must have telehealth-compatible devices.

Aligned with the National Quality Forum's Framework to Support Measure Development for Telehealth, we consider five domains of access when measuring the impact of telehealth on access to care:

- **Affordability** – Do both patients and clinicians have the financial means to afford telehealth devices and other equipment to perform telehealth?
- **Availability** – Does telehealth ensure that a clinician is available at the time of the patient's need?
- **Accessibility** – Is the telehealth technology accessible by all patients, including those with low levels of technological literacy?
- **Accommodation** – Does the telehealth modality accommodate the needs of patients?
- **Acceptability** – Do patients and clinicians accept the use of telehealth as a means of care delivery?

Our studies evaluate the impact of telehealth on healthcare access in the context of these domains.

KEY HIGHLIGHTS

- Patients who are older, are African-American, need an interpreter, have Medicaid as a primary insurance, and live in a zip code with low broadband access were less likely to use video visits. (Snapshot 2.1, 2.2)
- While patients who live in rural zip codes had a lower probability of using video visits, low broadband access—not just rurality—appears to more strongly predict the probability of using video visits. (Snapshot 2.1, 2.3)
- While individual patient demographic, socioeconomic, and geographic factors will influence the probability of using video visits, many patients will face multi-factorial barriers to care. By predicting each patient's probability of using video visits, one can determine the overall probability that the population of patients for a particular health system, county, or state will use video visits. (Snapshot 2.4)

2.1 WHAT FACTORS PREDICT THE PROBABILITY OF A PATIENT USING VIDEO VISITS VERSUS AUDIO-ONLY TELEHEALTH?

Age
Per 10 years increase

Gender
Female
Male

Race
White or Caucasian
Black or African-American
Asian
American Indian and Alaska Native
Native Hawaiian and Pacific Islander
Other

Ethinicity
Non-Hispanic
Hispanic

Needed Interpreter
No
Yes

Primary Insurer
Non-Medicaid
Medicaid

Rural residence, by zip code
Non-rural
Rural

Households below poverty, by zip code
(lowest poverty) 1st quartile
2nd quartile
3rd quartile
4th quartile

Households with broadband access, by zip code
(greatest access) 1st quartile
2nd quartile
3rd quartile
4th quartile

-20   -10   0   +10   +20

Probabilities are calculated using average marginal effects. Negative percentages represent a lower
probability of using video visits relative to audio-only visits

Notes: Negative percentages represent a lower probability of using video visits relative to audio-only visits

- Most insurance organizations reimbursed both video and audio-only (phone call) visits during the COVID-19 pandemic, but may discontinue audio-only coverage after the pandemic.

- Our analysis of all patients who had an outpatient evaluation and management visit at Michigan Medicine from April through June 2020 found that patients who were older, were African-American, needed an interpreter, had Medicaid as a primary insurance, and lived in a zip code with low broadband access were less likely to use video visits than audio-only visits. For example, the probability of using video visits (relative to audio-only visits) was 10.2% lower and 12.1% lower for patients who were African-American or used Medicaid as a primary insurance, respectively.

Citation: Chen J, Li K, Andino J, Hill C, Ng S, Steppe E, Ellimoottil C. Predictors of audio-only versus video telehealth visits during the COVID-19 pandemic (In Press).

2.2 HOW DOES AGE IMPACT VIDEO VERSUS AUDIO-ONLY TELEHEALTH USE?
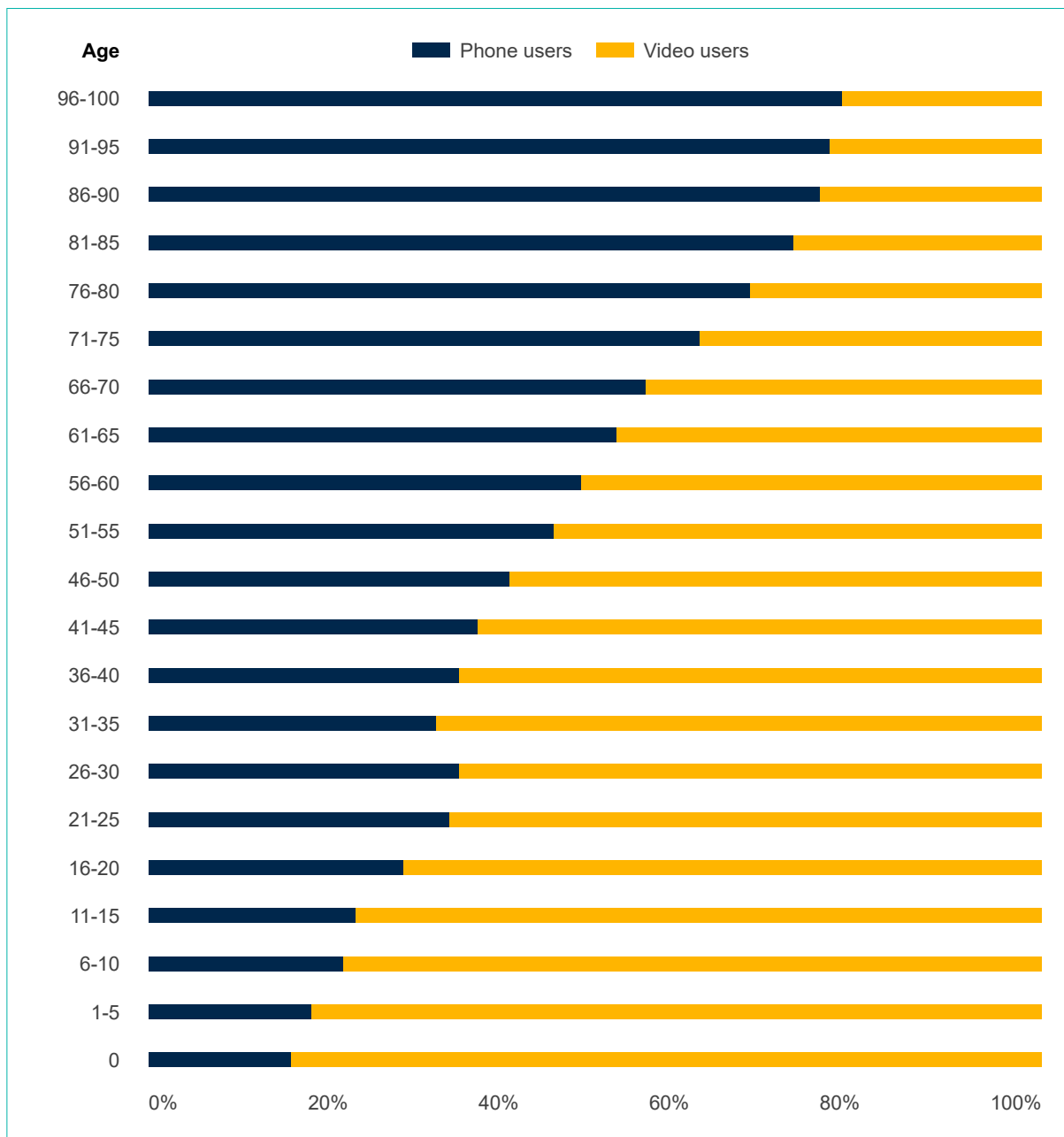
- To assess the association between age and probability of video-visit use, we analyzed all patients who had an outpatient evaluation and management visit at Michigan Medicine from April through June 2020. Of all those with virtual visits, older patients tended to use less video-based telehealth.
- Controlling for multiple demographic, socioeconomic, and geographic factors, we found that for every 10 years of age, the probability of using video in a virtual visit declined by approximately 7%.

Citation: Chen J, Li K, Andino J, Hill C, Ng S, Steppe E, Ellimoottil C. Predictors of audio-only versus video telehealth visits during the COVID-19 pandemic (In Press).

2.3 HOW DO RURALITY AND BROADBAND ACCESS IMPACT THE USE OF VIDEO VISITS?

Live in rural area

Percent household with broadband (quartiles)
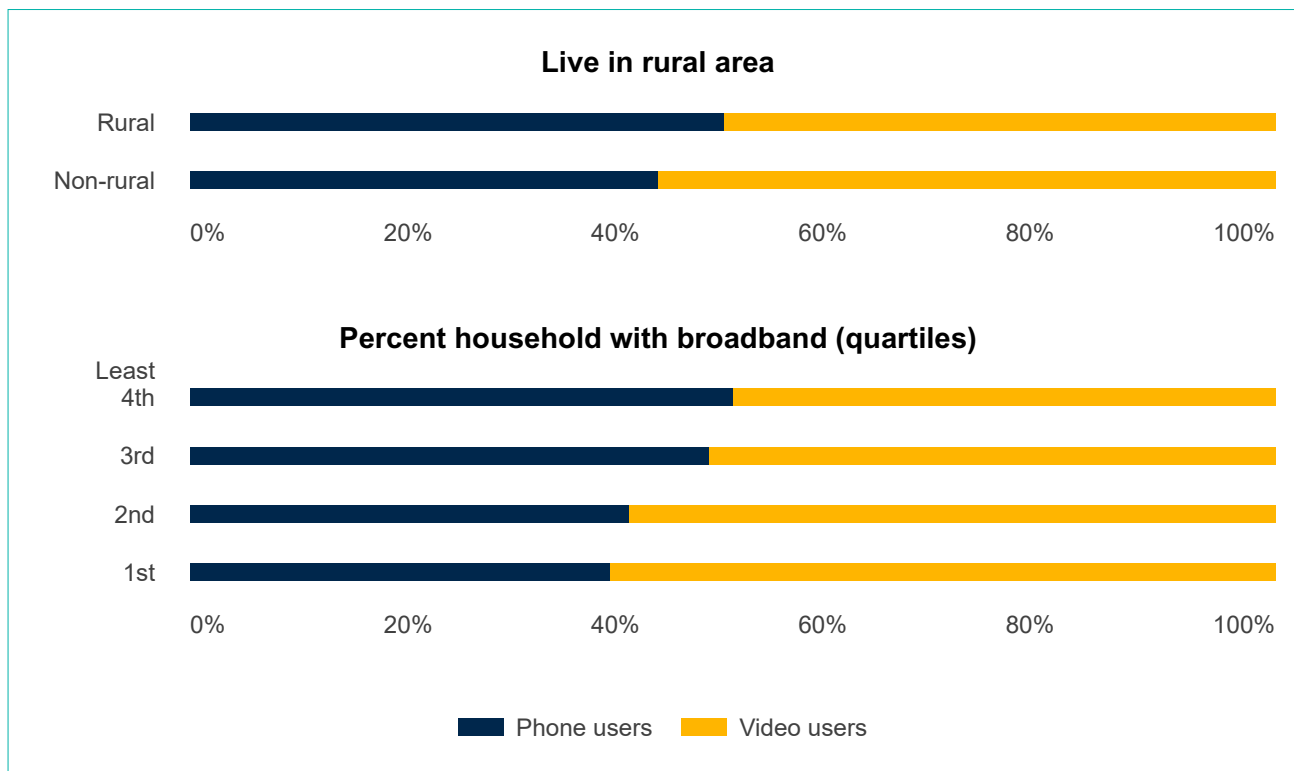
- Our analysis of all rural and non-rural patients who had an outpatient evaluation and management visit at Michigan Medicine from April through June 2020 found lower likelihood of using video visits, compared to audio-only visits, for patients who lived in zip codes considered rural as well as for those who had lower access to broadband services.

- Controlling for multiple demographic, socioeconomic, and geographic factors, patients with rural zip codes were 2% less likely to use video visits, while patients living in a zip code with the lowest broadband access were 7% less likely to use video visits.

Citation: Chen J, Li K, Andino J, Hill C, Ng S, Steppe E, Ellimoottil C. Predictors of audio-only versus video telehealth visits during the COVID-19 pandemic (In Press).

2.4 WHAT IS THE CUMULATIVE EFFECT OF PATIENT FACTORS ON THE PROBABILITY OF USING VIDEO VISITS?

Figure A: Probability of using video versus audio-only telehealth, selected patient cases

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	90%	50%	37%	19%
	Age 0-8 Non-medicaid No interpreter needed (reference)	Age > 65	Age > 65 Medicaid	Age > 65 Medicaid Needed interpreter
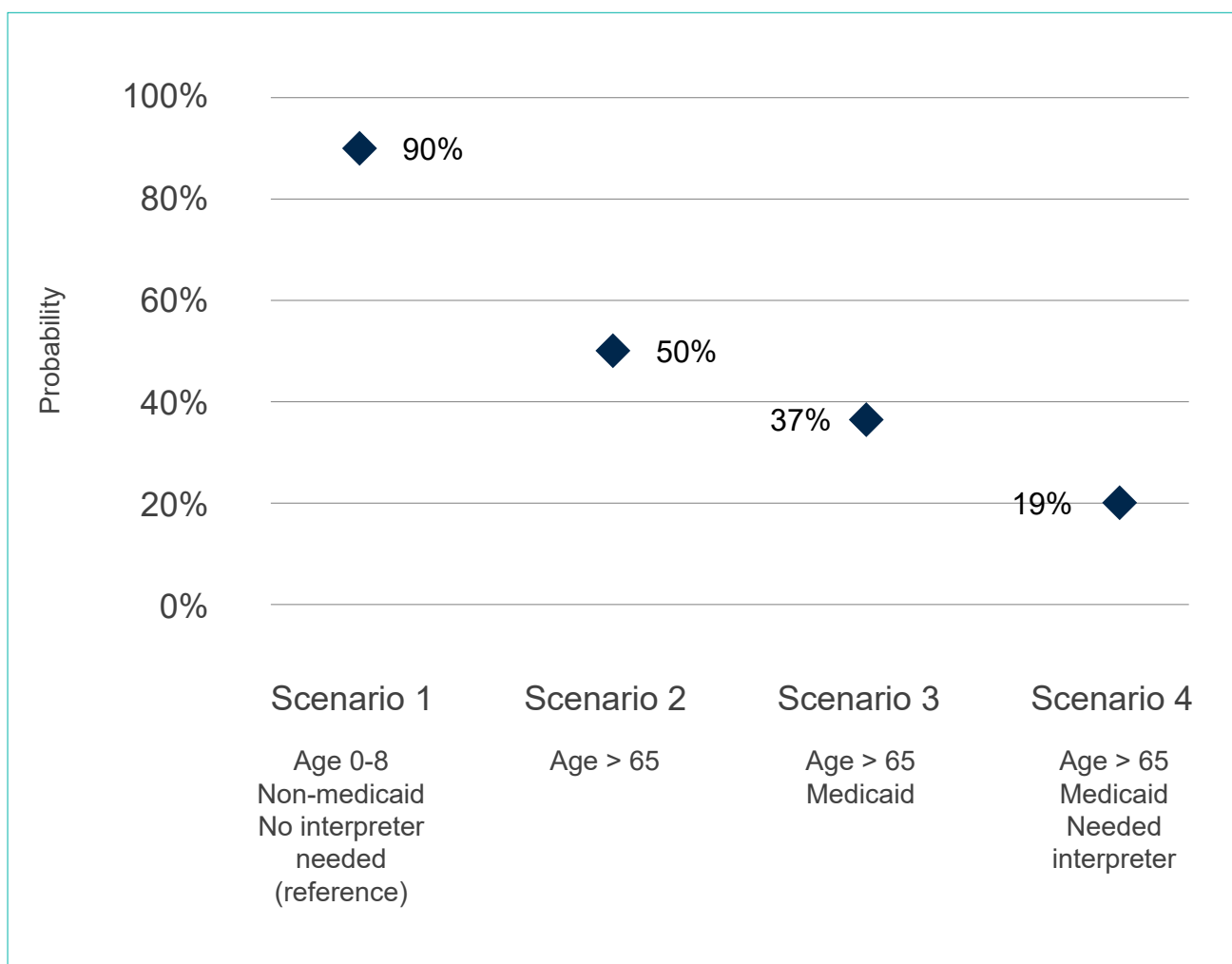
Figure B: Probability of using video versus audio-only telehealth, all patients

- While individual patient demographic, socioeconomic, and geographic factors will influence the probability of using video visits, most patients will be impacted by more than one factor.

- Using data from all patients who had an outpatient evaluation and management visit at Michigan Medicine from April through June 2020, we predicted each patient's probability of using video visits based on their particular mix of characteristics. The cumulative effect is profound: for example, a young patient who is not on Medicaid and does not require an interpreter will

approximately have a 90% probability of using video visits. On the other hand, a 65-year-old who is on Medicaid and requires an interpreter has 19% probability of using video visits. (Figure A)

- By predicting each patient's probability of using video visits, one can determine the overall probability that the population of patients for a particular health system, county, or state will use video visits. For Michigan Medicine, the individual patients with their associated probabilities are plotted in Figure B.

Citation: Chen J, Li K, Andino J, Hill C, Ng S, Steppe E, Ellimoottil C. Predictors of audio-only versus video telehealth visits during the COVID-19 pandemic (In Press).

TELEHEALTH AND COSTS

SUMMARY OF RESEARCH FINDINGS IN THIS SECTION

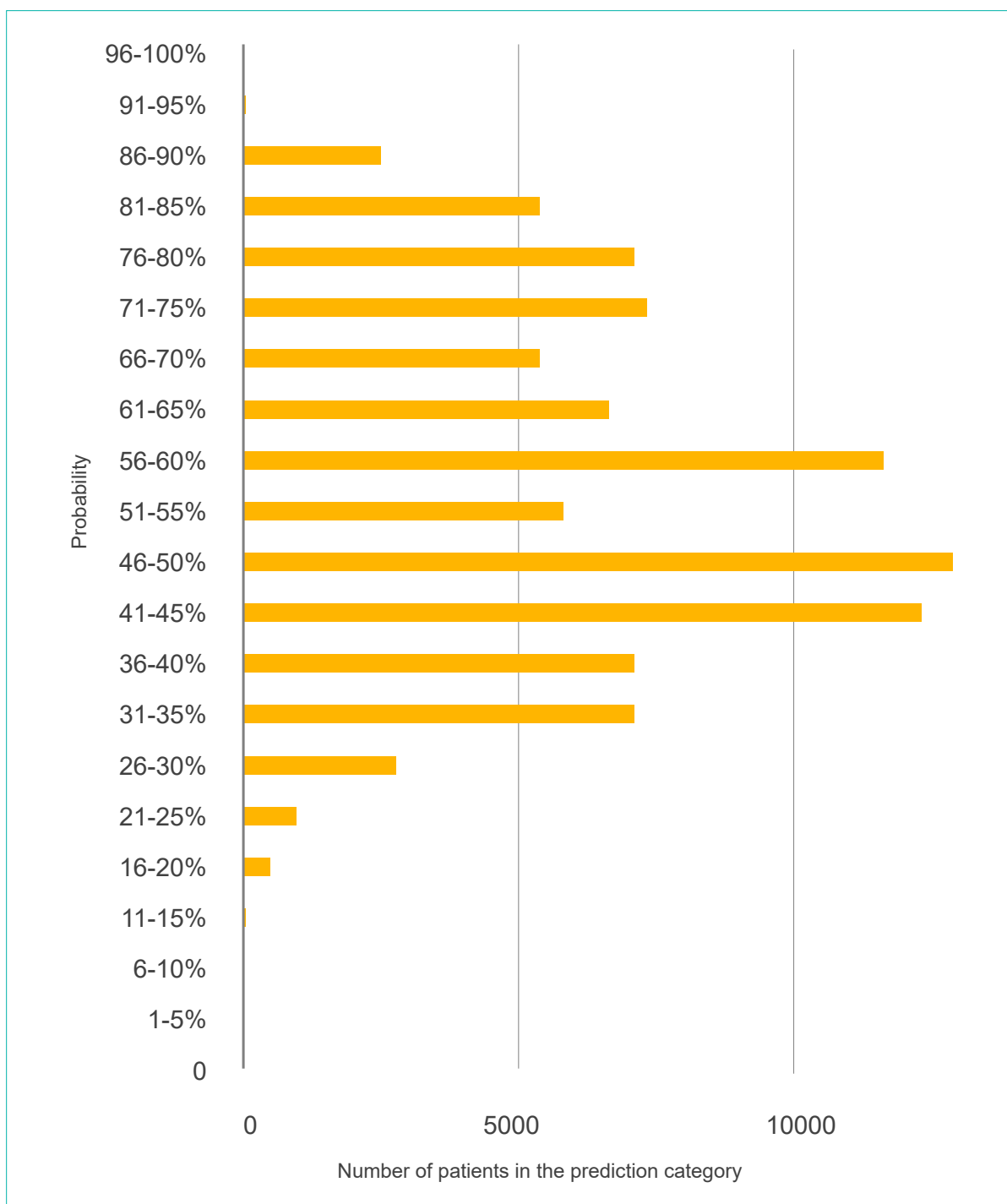The impact of telehealth on healthcare costs is of paramount importance. Policymakers worry that telehealth may lead to runway healthcare spending, fraud, and abuse, or similarly that telehealth may increase healthcare spending for individual patients. Ultimately, the impact of telehealth on healthcare spending for patients and the country at-large will depend on whether telehealth is used as a substitute for in-person care or as an additive service.

Health services researchers often consider three perspectives when assessing the costs of a particular healthcare service: patient, provider, and payer. For each, there are compelling arguments for why costs may increase or decrease with the proliferation of telehealth.

Perspective	Cost Increase If	Cost Decrease If
Patient	More appointments (with co-pays)	No trasnportation costs, parking fees
Provider	Upfront investment, subscription fees, incremental staff	Reduce practice expenses, increase patient volume
Payer	More appointments, New billable services	Less adverse events, low value care

TO ASSESS HEALTHCARE SPENDING, THE TELEHEALTH RESEARCH INCUBATOR HAS USED THE FOLLOWING MEASURES:

- Telehealth as a substitute for care: For these studies, we examine whether telehealth modalities, such as eVisits and interprofessional consultations, lead to lower rates of in-person care.
- Telehealth's relationship to increased downstream care, compared to in-person visits: For these studies, we examine whether an episode of care initiated via telehealth results in related, unplanned office visits, urgent care visits, etc. within a short interval of time. The length of an episode of care will vary by the condition.
- Return visit interval: It is possible that easy access to telehealth may lead to more frequent follow-up care initiated by clinicians or by patients. If that is the case, the interval between visits may be shorter.
- Time-driven activity-based costing (TDABC): To assess practice expenses, we use costing methodology, called "time-driven activity based costing," which helps calculate the costs of healthcare resources consumed as a patient moves along a care process.

KEY HIGHLIGHTS

- While video visits may be more efficient for patients due to reduced travel and waiting time, surgeons spent more face-to-face time in the video visits than in-person visits, which challenges claims that clinicians can use telehealth to increase daily patient volume and reduce the marginal cost of telehealth visits. (Snapshot 3.1)

- In comparing the labor costs involved in a video visit and in-person visit, video visits and in-person visits cost approximately the same. Because physician-assistants have lower labor input costs, their visits were less costly. (Snapshot 3.2)

- While clinicians are generally happy with video visits, these encounters did not necessarily increase their productivity. (Snapshot 3.3)

- There was no difference in the completion, cancellation, and no-show rates between video visits and in-person visits. (Snapshot 3.4)

- Patients spent considerably less time between check-in and check-out during video visits compared to in-person visits. (Snapshot 3.5)

- Across many conditions, telehealth visits were associated with a higher frequency of related downstream visits within 30 days. This increased healthcare utilization could represent excessive care or could reflect expanded access to care. (Snapshot 3.6)

- The vast majority of eVisits did not require follow-up care with a primary care provider or emergency department within 14 days. Interestingly, patients who did not receive an antimicrobial prescription during their eVisit were more likely to pursue a follow-up visit. (Snapshot 3.7)

3.1 DO CLINICIANS SPEND MORE OR LESS TIME ON VIDEO VISITS COMPARED TO IN-PERSON VISITS?

Statistic	In-person clinic visit	Physician-led video visit	Physician assistant-led video visit
N	73	14	15
Mean	10.2 min	13.8 min	9.7 min
St. Dev.	5.3	5.3	3.0
Min	2.0	6.0	5.0
Max	33.0	24.0	13.3

- While video visits may be more efficient for patients due to reduced travel and waiting time, it is unclear whether face-to-face time between patients and clinicians differs when visits are conducted through video versus in-person.

- Our analysis of timed video and in-person encounters conducted in general surgery and urology clinics at Michigan Medicine from April 2018 through June 2018 found that physicians, on average, spent more time with patients when the visit was conducted by video (13.8 minutes) versus in-person (10.2 minutes). Physicians assistants spent slightly less time during video visits compared to in-person clinic visits. There was, of course, wide variation in the time spent based on clinician and patient factors.

Citation: Portney DS, Ved R, Nikolian V, Wei A, Buchmueller T, Killaly B, Alam HB, Ellimoottil C. Understanding the cost savings of video visits in outpatient surgical clinics. Mhealth. 2020 Oct 5;6:32.

3.2 DO VIDEO VISITS COST CLINICAL PRACTICES LESS THAN IN-PERSON VISITS?
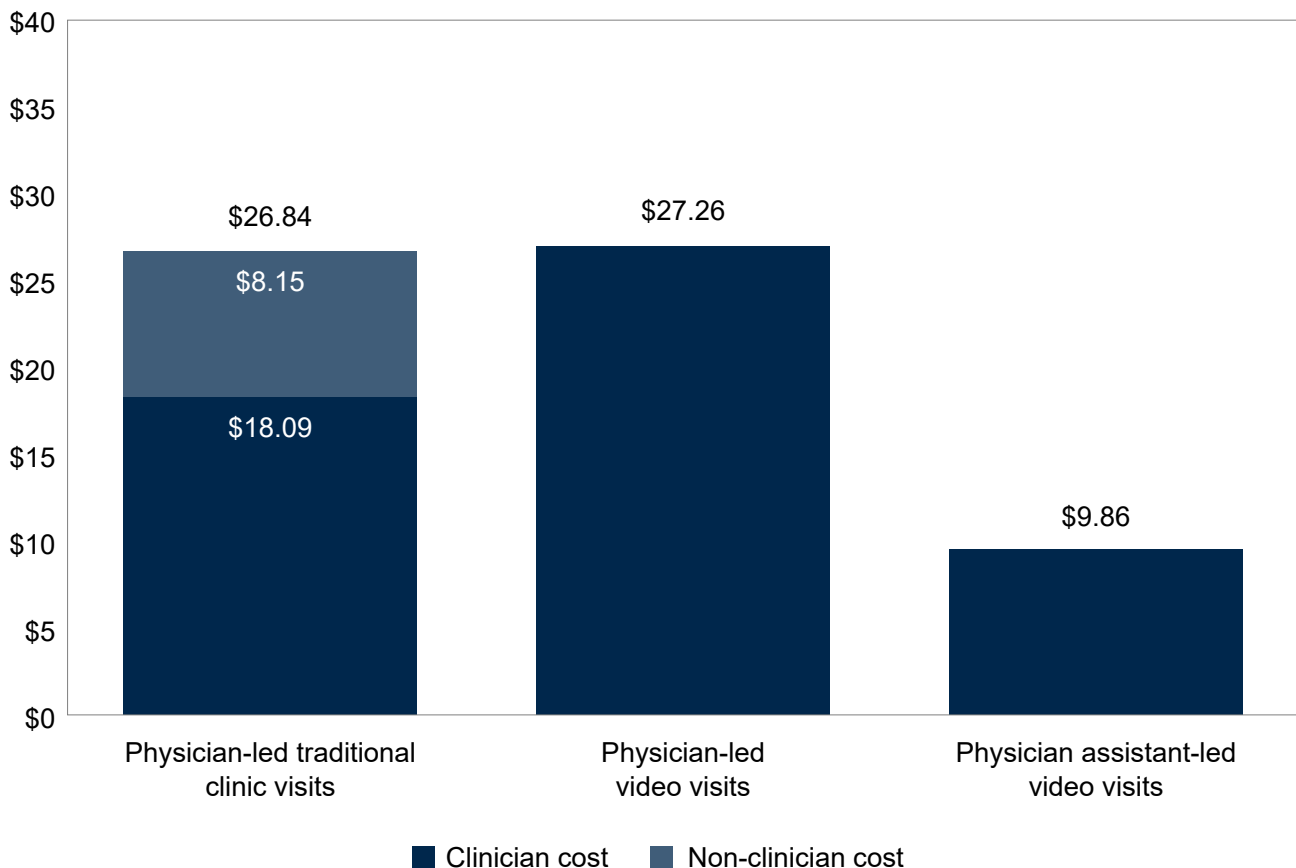
- Because video visits require less staff involvement (e.g., check-in staff, medical assistants), it is assumed that video visits have lower labor-resource costs than in-person visits.

- We used a technique called "time-driven activity-based costing" to assess the labor costs associated with video-visit and in-person encounters conducted in general surgery and urology clinics at Michigan Medicine from April 2018 through June 2018. We found that video visits and in-person visits cost approximately the same. Because physician-assistants have lower labor input costs, their visits were less costly.

Citation: Portney DS, Ved R, Nikolian V, Wei A, Buchmueller T, Killaly B, Alam HB, Ellimoottil C. Understanding the cost savings of video visits in outpatient surgical clinics. Mhealth. 2020 Oct 5;6:32.

3.3 ARE HEALTHCARE CLINICIANS MORE PRODUCTIVE WHEN USING TELEHEALTH COMPARED TO IN-PERSON CARE?

After the COVID-19 public health emergency, I plan to offer _____ video visits than I do now

		Percent	Count
1	Substantially Fewer	7.08%	68
2	Fewer	27.58%	265
3	The same volume of	49.64%	477
4	More	11.24%	108
5	Substantially More	4.47%	43
			961

I feel my productivity is _____ when I conduct video visits as compared to in-person visits.

		Percent	Count
1	Substantially Lower	4.51%	43
2	Lower	19.92%	190
3	The same	40.99%	391
4	Higher	27.46%	262
5	Substantially Higher	7.13%	68
			954

- During the COVID-19 pandemic, a large number of clinicians who have never used telehealth began to use telehealth.

- We conducted a survey of clinicians at Michigan Medicine. Of the 1,040 clinicians who responded to the survey, 73% felt that their patients were able to login and start the video visit without additional support from them. However, 40% felt that technical issues during the visit impacted their ability to complete the video visit. While 83.4% were satisfied with video visits, 65% of clinicians felt that their productivity was the same or lower when using video visits compared to in-person care. Thirty-five percent (35%) of clinicians felt as though they will do fewer video visits once the COVID-19 pandemic is over.

Citation: Unpublished data analysis by Patel M, Berlin H, Peahl A, and Ellimoottil C.

3.4 HOW DO NO-SHOW AND CANCELLATION RATES DIFFER BETWEEN TELEHEALTH AND IN-PERSON VISITS?

Cancellation and No-show Rates for Video Visits and Clinic Visits
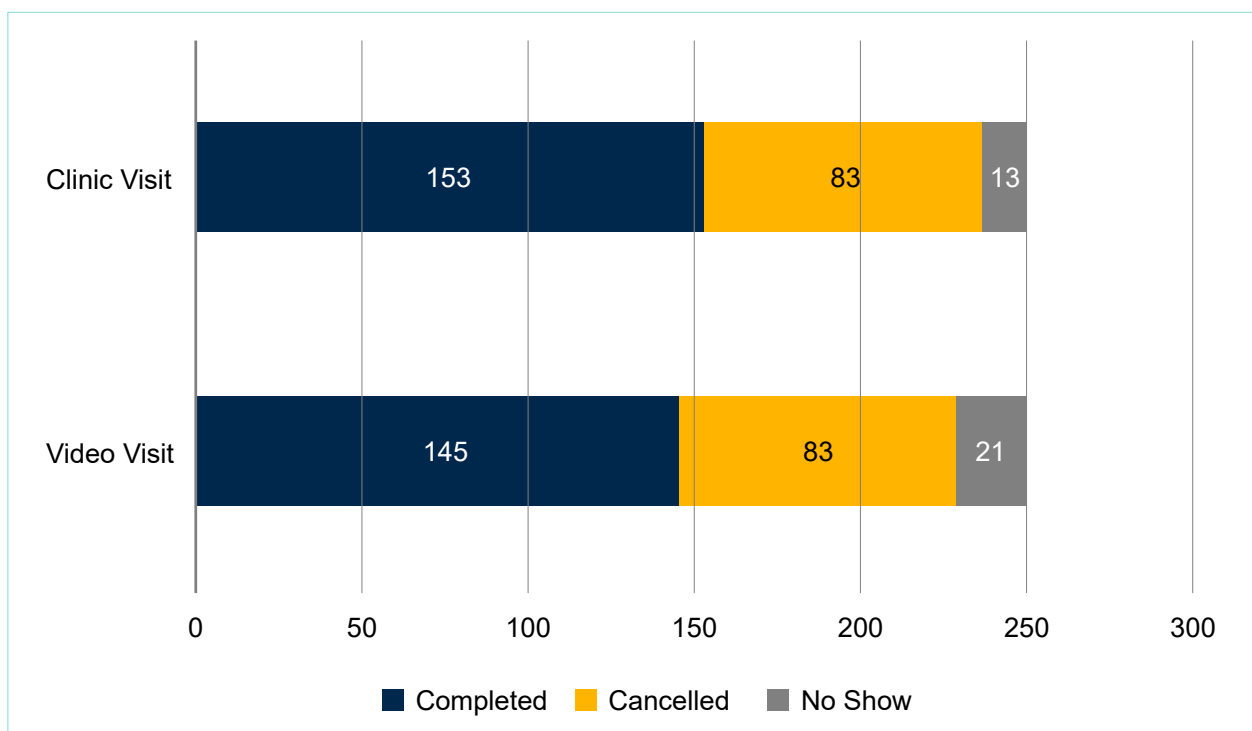
- To assess no-show and cancellation rates, we compared 250 video visits of established patients at Michigan Medicine Department of Urology and 250 in-person clinic visits with the same clinicians completed between July 2016 and July 2017. Our outcome of interest was the percentage of appointments completed as scheduled. We identified and calculated the number of visits that were canceled or labeled as no-show. For a visit to be classified as a cancellation, the patient had to notify the clinic that they were unable to make that appointment. For video visits, cancellation included converting to a telephone encounter. No-show visits were visits for which patients were unable to make their appointment and did not notify clinic staff in advance.

- There was no difference in the completion rates between video visits and in-person visits. Fifty-eight percent (58%) (n=146) of patients completed their video visit as scheduled, compared to 61% (n=154) of patients seen in-clinic (p=0.24). The cancellation rate of 33% was the same (n=83) for video and clinic visits, and only 1.2% (n=3) of video visits converted to telephone encounters. The no-show rate for video visits was 8% (n=21), which was higher than the 5% no-show rate for clinic visits (n=13); however, this difference was not statistically significant (p=0.14)

Citation: Andino JJ, Castaneda PR, Shah PK, Ellimoottil C. The impact of video visits on measures of clinical efficiency and reimbursement. Urol Pract. 2021;8(1):53-57.

3.5 HOW DOES CHECK-IN TO CHECK-OUT TIME DIFFER BETWEEN VIDEO VISITS AND IN-PERSON VISITS?

Average Cycle Time (minutes) for Video Visits and Clinic Visits
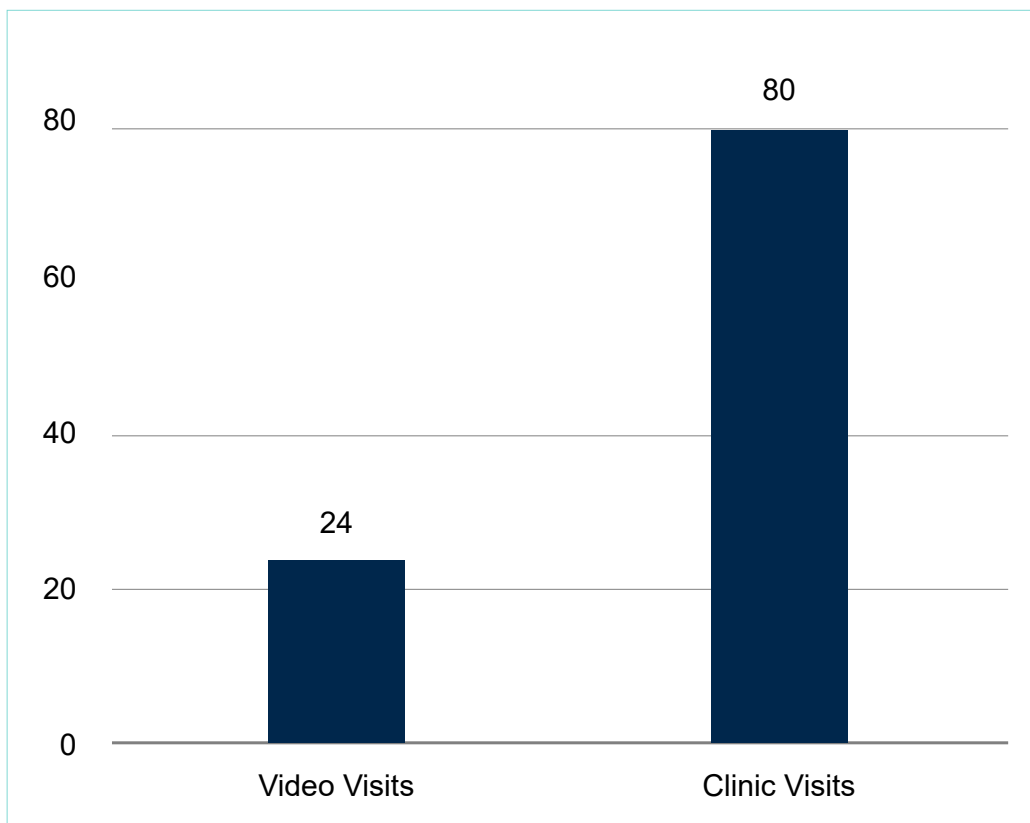
- To compare check-in to check-out time (i.e., cycle time) between video visits and in-person visits, we compared 250 video visits of established patients at Michigan Medicine Department of Urology and 250 in-person clinic visits with the same clinicians completed between July 2016 and July 2017. We used clinic metrics to calculate cycle time, a measure of clinical efficiency, which is defined as the amount of time, in minutes, that a patient spends at an office visit. We obtained check-in and check-out time for in-person visits, which included waiting time, rooming time, time spent with their clinician, and time spent checking out. For video visits, the cycle time was a measure of when patients logged in and logged out of their video appointment.

- We calculated cycle time for 40% (n=99) of video visits and 60% (n=150) of clinic visits based on completed appointments and availability of check-in/check-out data. For these visits, we found that the average cycle time for video visits was 24 minutes—significantly lower than the 80-minute average cycle time of clinic visits (p<0.01).

Citation: Andino JJ, Castaneda PR, Shah PK, Ellimoottil C. The impact of video visits on measures of clinical efficiency and reimbursement. Urol Pract. 2021;8(1):53-57.

3.6 DOES THE USE OF TELEHEALTH LEAD TO ADDITIONAL DOWNSTREAM VISITS?

Mean difference in number of related visits that occur within 30- days when episodes of care are initiated by telemedicine versus in-person
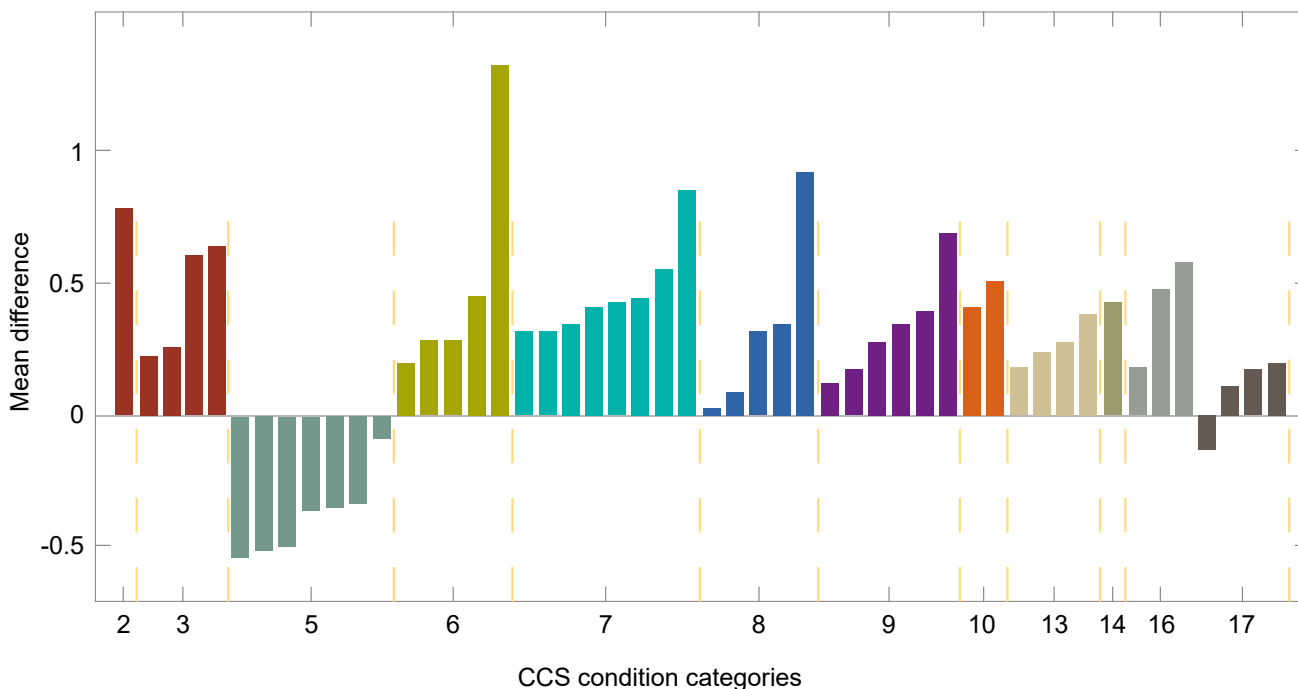
- Using Blue Cross Blue Shield of Michigan insurance claims from 2011 through 2017, we assessed the frequency of follow-up visits following encounters initiated via telehealth versus in-person. We identified the primary diagnostic category for 30-day episodes of care using clinical classifications software (CCS). Our intervention group consisted of episodes initiated via telehealth; our control group consisted of episodes initiated in-person. Our primary outcome was the percentage of 30-day episodes with a related visit (encounters occurring within the same period and CCS categories).

- We identified 4,982,456 patients and 68,148,070 claims, of which 53,853 were telehealth-related. Many episodes did not have related visits (the mean related visit rate was 16%). Telehealth visits had a higher frequency of related visits across most CCS categories, except multi-level CCS category 5 (mental health). This increased most utilization could represent excessive care or could reflect expanded access to care.

Citation: Liu X, Goldenthal S, Li M, Nassiri S, Steppe E, Ellimoottil C. Comparison of Telemedicine Versus In-Person Visits on Impact of Downstream Utilization of Care. Telemed J E Health. 2021 Jan 29.

3.7 DO EVISITS AVOID THE NEED FOR DOWNSTREAM IN-PERSON CARE?

	Frequency of follow-up, in-person care, by visit type			
	PCP (%)	**ED (%)**	**PCP + ED (%)**	**Overall (%)**
eVisit accepted	12.1	0.3	0.2	12.6
eVisit rejected	44.5	0.3	0.4	45.2
Total	22.6	0.3	0.2	23.1

Note: PCP + ED includes patients who had a follow-up encounter with both PCP and ED within 14 days after eVisit. PCP (Primary Care Provider), ED (Emergency Department).
Source: Analysis of Michigan Medicine eVisit program data, 2017-2020

- An eVisit is a form of asynchronous telehealth whereby the patient submits an online request for medical advice and receives a written response from a healthcare clinician. The intention of eVisits is to reduce the need for in-person care.

- We performed a retrospective review of 8,627 eVisits that occurred through Michigan Medicine's eVisit program from July 2017 to March 2020. The most common conditions treated through the eVisit program included cough/cold/flu-like symptoms (39%), sinus problems (23%), and painful urination (15%). Of this total, clinicians accepted 5,837 eVisits (67.7%) and rejected 2,790 (32.3%) eVisits.

- Clinicians will reject eVisits if they are not clinically appropriate. There was a 23.1% total rate of follow-up medical care within 14 days. Patients who did not receive an antimicrobial prescription during their accepted eVisit were significantly more likely to pursue a follow-up visit with a primary care physician or emergency room than patients who did receive antibiotics during their accepted eVisit (14.4% vs. 10.8%, $p < 0.05$).

Citation: Patel M, Haddad H, Miller R, Devito J, Chen J, Tacconelli N, Buchi A, Heinrich L, Steppe E, Punch M, Ellimoottil C. An Evaluation of eVisits at an Academic Medical Center. J Ambul Care Manage. 2021 Apr-Jun 01;44(2):166-169.

TELEHEALTH AND QUALITY

SUMMARY OF RESEARCH FINDINGS IN THIS SECTION

While telehealth has the potential to improve quality of care, the technology, on its own, will not improve quality. Instead, the clinician using the technology has the ability to improve care quality—and thus improve clinical outcomes—through a number of potential mechanisms, illustrated below:
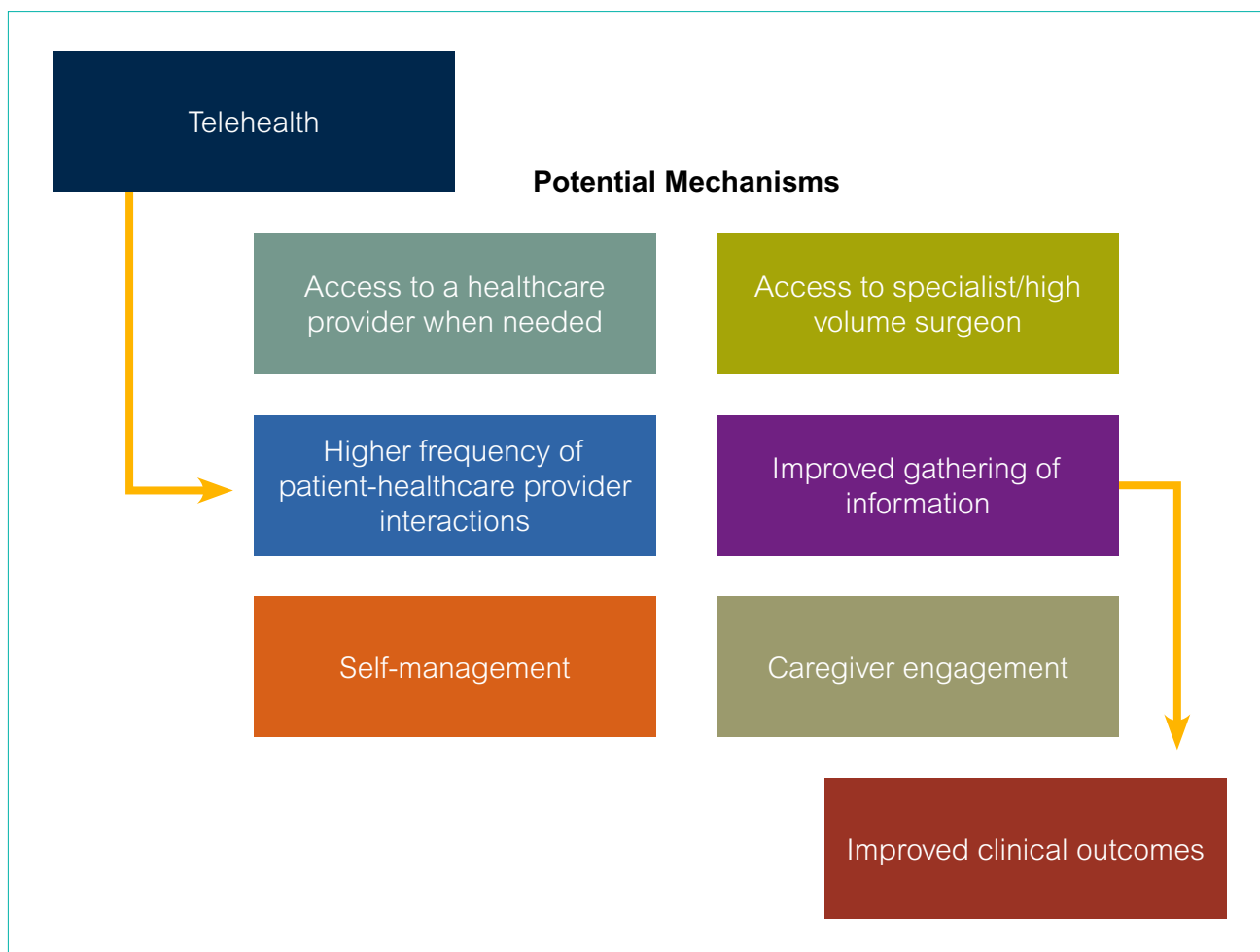
Our research focuses on the effect of telehealth on clinical outcomes for which there is a well-established link between outpatient access and improved outcomes. For this purpose, we have focused on Ambulatory Care Sensitive Conditions (ACSCs). ACSCs are health conditions for which timely and effective outpatient care can prevent hospitalizations. The Centers for Medicare & Medicaid Services recognizes several Acute and Chronic ACSCs.

ACUTE ACSCS INCLUDE:

- dehydration
- bacterial pneumonia
- urinary tract infection

CHRONIC ACSCS INCLUDE:

- diabetes
- chronic obstructive pulmonary disease
- asthma
- heart failure

We are also studying whether telehealth visits lead to higher rates of downstream care compared to in-person visits for the same condition. We believe that downstream care is an important quality indicator, in addition to having implications for the cost of care.

KEY HIGHLIGHTS

- We found that primary care practices in Michigan that used more telehealth during the early months of the COVID-19 pandemic had marginally higher rates of emergency department visits and hospitalizations for ACSCs, compared to practices that used little or no telehealth. However, our study period coincided with a period of unprecedented fluctuations in care utilization during the COVID-19 pandemic, which may have impacted the results. (Snapshot 4.1)

- Compared to patients who had an in-person visit for upper respiratory infection symptoms, patients who used direct-to-consumer telehealth for the same symptoms had a higher rate of secondary office, telehealth, and urgent care visits within seven days. (Snapshot 4.2)

4.1 DOES ACCESS TO A PRIMARY CARE PRACTICE THAT PERFORMS TELEHEALTH REDUCE HOSPITALIZATIONS AND EMERGENCY ROOM VISITS?

Emergency room visits and hospitalizations for patients with ACSCs per year per 1,000 patients, by tertile of PCP practice telehealth adoption

Average telehealth visit rates March-July 2020 relative to 2019 visit volumes

- ■ Low telehealth adoption (5%)
- ■ Medium telehealth adoption (16%)
- ■ High telehealth adoption (35%)
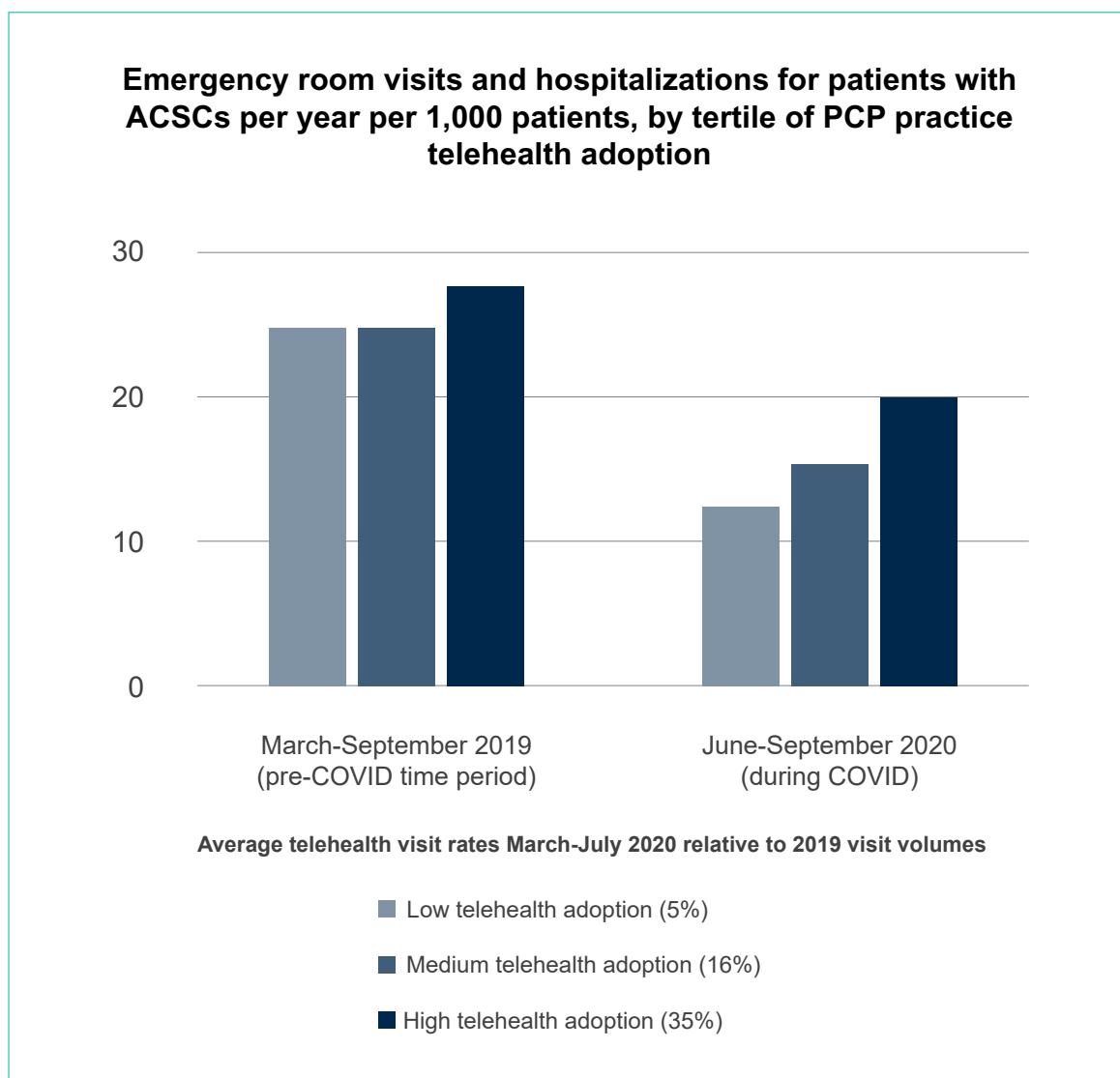
- Telehealth has the potential to reduce emergency department (ED) visits and hospitalizations for ambulatory care sensitive conditions (ACSCs). ACSCs are conditions for which effective outpatient care can prevent the need for hospitalization.

- We used Blue Cross Blue Shield of Michigan insurance claims data to study the relationship between primary care practice telehealth adoption and emergency room visits or hospitalizations for ACSCs. The study period was March 2020 through September 2020.

- Overall, the rate of ED visits and hospitalizations for ACSCs declined sharply in March – April 2020. The rate of visits then increased and plateaued in subsequent months, still remaining below pre-pandemic levels. The difference in ED visit or hospitalization rates between the highest and

lowest telehealth adopters was marginal. Primary care practices in Michigan with the greatest proportion of visits converted to telehealth had slightly higher rates of visits for ACSCs (an increase of 1 to 2 visits per year per 1,000 people for acute and chronic ACSCs, respectively). There was no difference in ED visit or hospitalization rates between practices that performed a moderate amount, very little, or no telehealth visits.

Citation: https://ihpi.umich.edu/telehealthACSCs

4.2 DOES DIRECT-TO-CONSUMER TELEHEALTH LEAD TO MORE DOWNSTREAM VISITS?

Site	Index visit was through direct -to-consumer telemedicine (*n*=28,716)	Index visit was through office or urgent care (*n*=57,427)
Any site	10.3%	5.9%
Office	6.0	4.5
Emergency department	0.5	0.6
Urgent care	1.7	1.0
Telemedicine	2.5	0.0

- Direct-to-consumer telehealth refers to a live, video-based encounter that is initiated, on demand, by the patient. While telehealth advocates claim that these visits can reduce urgent care and emergency room visits, it is unclear whether inadequate assessments by telehealth may lead to downstream visits.

- We used Blue Cross Blue Shield of Michigan insurance claims data to identify patients who had a direct-to-consumer telehealth visit for an acute respiratory infection between 2016 – 2019.

- Compared to patients who had an in-person visit, patients who had a visit initiated via direct-to-consumer telehealth were more likely to have a downstream related visit (10.3% vs. 5.9%).

Citation: Li KY, Zhu Z, Ng S, Ellimoottil C. Direct-To-Consumer Telemedicine Visits For Acute Respiratory Infections Linked To More Downstream Visits. Health Aff (Millwood). 2021 Apr;40(4):596-602.

TELEHEALTH AND THE USER EXPERIENCE

SUMMARY OF RESEARCH FINDINGS IN THIS SECTION

The user experience with telehealth, from the perspective of both patient and clinician, is an important area of research for the Telehealth Research Incubator. While many studies focus on measures such as "satisfaction," we believe that "experience" is far more telling . For example, even if a patient or clinician feels largely satisfied with their telehealth visit, they may still feel that particular aspects of the visit may have been compromised by the virtual environment, such as rapport or quality of care. In order to gain this robust understanding of experience, many of our studies utilize surveys and qualitative interviews with patients and/or clinicians.

KEY HIGHLIGHTS

- In a large health system survey, we found that a majority of clinicians feel that they are able to not only provide equal quality of care in a video visit and an in-person visit, but also to establish rapport to the same extent via either type of visit. (Snapshot 5.1)

- In another health system survey, we found that the top three challenges to video-visit expansion identified by clinicians were the lack of education surrounding insurance coverage, lack of marketing for video visits, and the lack of resource support from their respective departments. Clinicians were less concerned about the clinical inefficiency or security of video visits. (Snapshot 5.2)

- In a patient survey, we found that the vast majority of respondents agreed that their video-visit experience was similar to that of in-person visits and that, overall, they would recommend video visits. However, many patients still experienced technical issues with their visit, including video issues, audio issues, slow/dropped connection, initial set-up issues, or long wait times.

- In another patient survey, individuals who received both a treatment plan and prescription were more likely to be satisfied with eVisits than those who only received a treatment plan (and no prescription). (Snapshot 5.4)

- In a nationwide survey of older adults, the most common concerns about telehealth visits were the inability of the healthcare provider to conduct a physical exam, decreased quality of care compared to an in-person visit, and a lack of feeling personally connected to the healthcare provider. (Snapshot 5.5)

5.1 DO HEALTHCARE CLINICIANS FEEL AS THOUGH THEY PROVIDE THE SAME QUALITY OF CARE THROUGH A VIDEO VISIT AS THEY DO IN AN IN-PERSON VISIT?

	Strongly agree	Moderately agree	Somewhat agree	Somewhat disagree	Moderately disagree	Strongly disagree
I can provide the same quality of care through video visits (n=974)	15.4%	32.3%	24.7%	12.8%	8.1%	6.5%
I believe I can build the same level of rapport with patients over video as I can in-person (n=973)	22.8%	30.9%	21.2%	14.0%	6.0%	4.8%
In general, my patients are able to log on and start the video visit without additional support from me (n=968)	16.4%	31.4%	25.3%	13.9%	9.81%	3.1%
Technical issues OFTEN impact my ability to complete video visits after the patient and I connect (n=965)	3.7%	11.5%	24.0%	20.7%	27.8%	12.1%
Overall, I am satisfied with doing video visits (n=962)	31.6%	29.6%	22.2%	8.1%	4.4%	3.9%

- During the COVID-19 pandemic, a large number of clinicians who had never previously used telehealth began to use telehealth services, most notably the video visits. We were interested in understanding their impressions of the quality of care they are able to provide through a video visit.

- In this survey of 1,040 clinicians at Michigan Medicine, we found that 72% agreed that they can replicate the quality of care of an in-person visit through a video visit. Similarly, 75% agreed that they can build the same level of rapport with patients over video as they can in-person.

Citation: Unpublished data analysis by Patel M, Berlin H, Peahl A, Ellimoottil C.

5.2 WHAT ARE THE BIGGEST CHALLENGES FACED BY CLINICIANS WHEN USING VIDEO VISITS?

Percent Disagree / **Percent Agree**

#	Percent Disagree	Middle	Percent Agree
1	18%	16%	66%
2	22%	15%	62%
3	19%	25%	56%
4	11%	34%	55%
5	17%	34%	49%
6	26%	46%	28%
7	55%	23%	22%
8	43%	45%	11%
9	79%	12%	9%

Legend: Strongly disagree | Somewhat disagree | Neither agree or disagree | Somewhat agree | Strongly agree

1. My department/division provides the necessary resources to support video visits.

2. I have the appropriate training to perform video visits.

3. Lack of education about insurannce coverage is a barrier to video visit use.

4. Video visits allow me to provide better care for my patients

5. There is sufficient technical support for video visits.

6. My departmen/division has an adequate plan to market video visits to patients.

7. I am concerned about medical liability in regards to video visits.

8. Video visits make my clinic inefficient.

9. I am worried that patient health information is not secure during video visits.

- Even prior to the COVID-19 pandemic, we recognized that there were important barriers to video visit implementation. In order to better understand these barriers, we administered a survey to clinicians at Michigan Medicine. We received responses from 268 clinicians.
- The greatest number of survey respondents came from the following four specialties: primary care, general surgery, otolaryngology, and neurology.

- As identified by clinicians, the top three challenges to video-visit adoption and further expansion were the lack of education surrounding insurance coverage, lack of marketing for video visits, and the lack of resource support from their respective departments. Clinicians were less concerned about the clinical inefficiency or security of video visits.

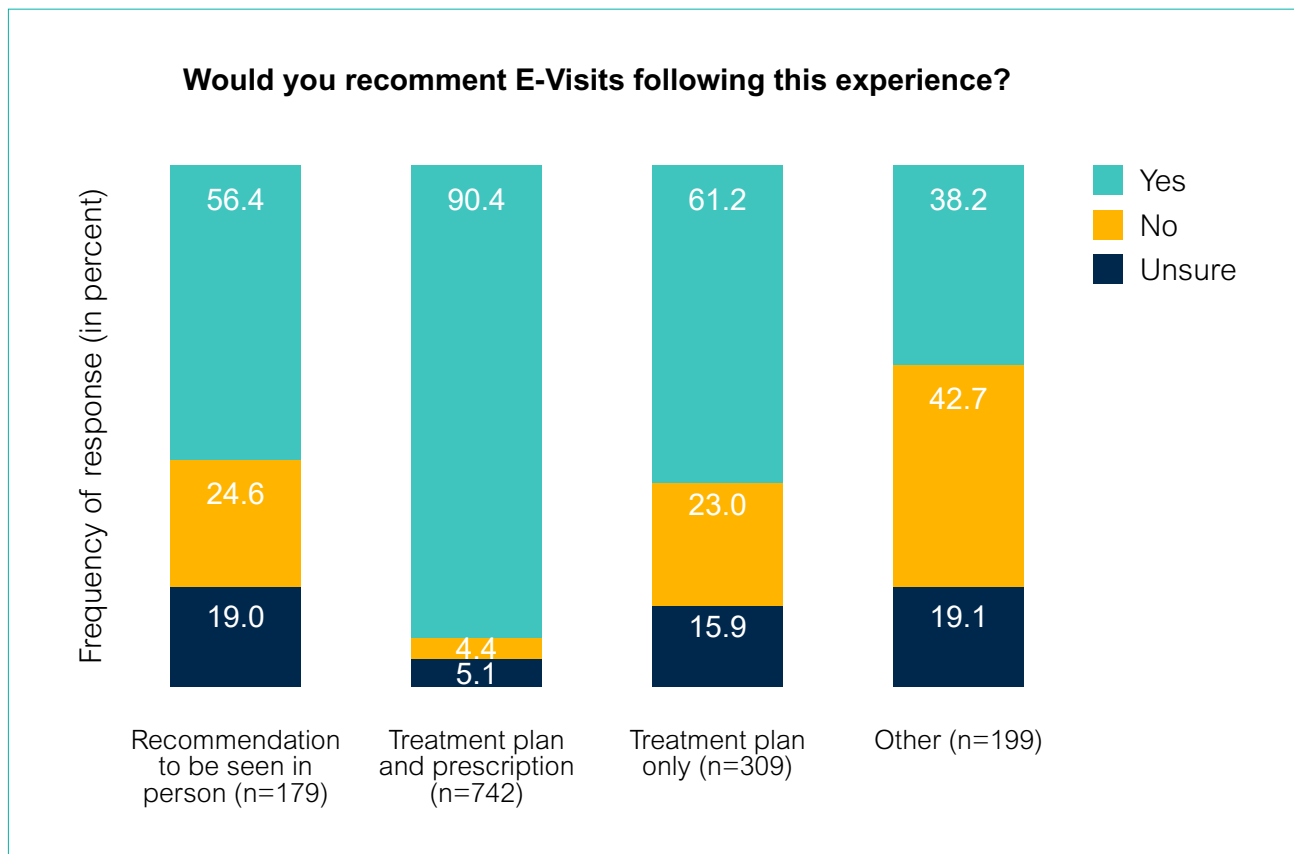Citation: Unpublished data analysis by Rajkumar A, Ellimoottil C.

5.3 WHAT IS THE PATIENT EXPERIENCE OF VIDEO VISITS?

Questions	No. of patients (%)
1. Did you experience any technical issues with your video visit today?	
Video issues	11 (6.1)
Audio issues	5 (2.8)
Video and audio issues	2 (1.1)
Slow dropped connection	7 (3.9)
Initial set-up issues	4 (2.2)
Long wait time	3 (1.7)
Other	4 (2.2)
Total	36 (20.0)
Was your video visit experience similiar to care you expect to receive at Michigan Medicine?	
Yes	162 (90.0)
No	6 (3.3)
Unsure	6 (3.3)
Would you recommend video visits following this experience?	
Yes	168 (93.3)
No	6 (3.3)
Unsure	6 (3.3)
Why did you choose to have a video visit versus an in-person visit?	
No travel	113 (62.8)
Saves time	97 (53.9)
Easer to fit in my schedule	92 (51.1)
Followed provider's recommendation	89 (49.4)
Shorter wait for an appointment	38 (21.1)
I prefer virtual care/I did not want to come in-person	17 (9.4)
Someone else would need to take me to an in-person visit	17 (9.4)
Other	23 (12.8)

- We conducted a survey of patients who received care from the Michigan Medicine video-visit program from January 31, 2019 to July 31, 2019. We received responses from 180 patients regarding their experiences.

- Overall, the patient experience was positive. Ninety percent (90%) of respondents agreed that their virtual care was similar to that of in-person care, and 93% of respondents suggested that they would recommend video visits. Nevertheless, one in every five respondents cited technical issues during their video visit; video issues (n=11), audio issues (n=5), video and audio issues (n=2), slow/dropped connection (n=7), initial set-up issues (n=4), long wait time (n=3), and other (n=4).
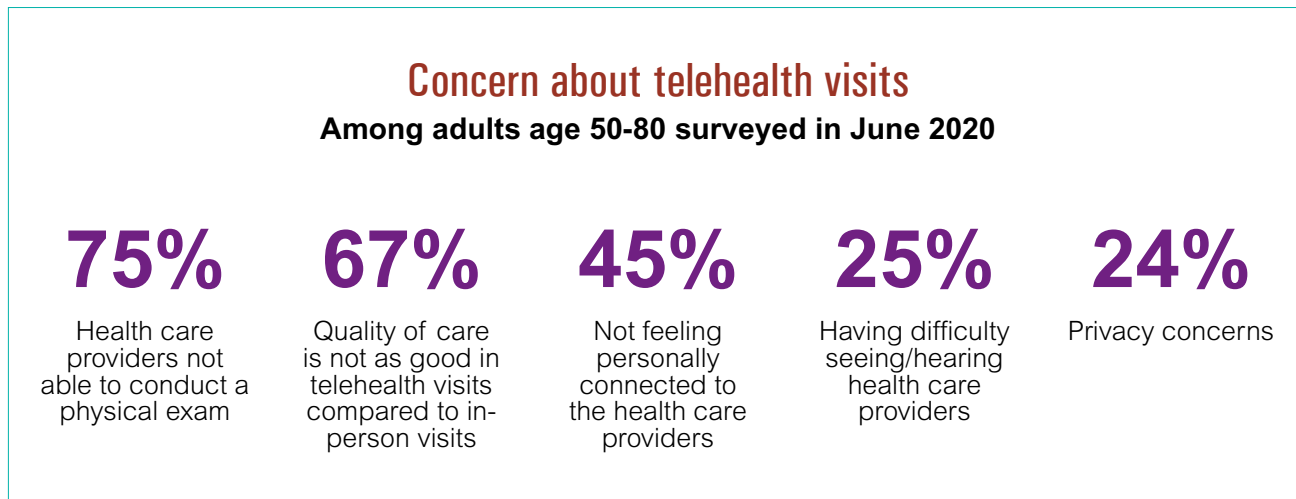
Citation: Patel M, Miller R, Haddad H, An L, Devito J, Neff A, Rajkumar A, Ellimootti C. Assessing patient usability of video visits. mHealth 2020.

5.4 IS PATIENT SATISFACTION WITH EVISITS ASSOCIATED WITH WHETHER PATIENTS RECEIVE A PRESCRIPTION?

Would you recomment E-Visits following this experience?

Frequency of response (in percent)

	Yes	No	Unsure

- Recommendation to be seen in person (n=179): 56.4 / 24.6 / 19.0
- Treatment plan and prescription (n=742): 90.4 / 4.4 / 5.1
- Treatment plan only (n=309): 61.2 / 23.0 / 15.9
- Other (n=199): 38.2 / 42.7 / 19.1

- An eVisit is a form of asynchronous telehealth whereby the patient submits an online request for medical advice and receives a written response from a healthcare clinician.

- We assessed the patient experience with our eVisit program by asking patients to answer a short questionnaire following the clinician's acceptance or rejection of their request. Specifically, from November 2019 to March 2020, the questionnaire asked patients to select the type of care they received through their eVisit and whether they would recommend eVisits following this experience.

- 1,429 patients answered the questionnaire. Among patients who received a "treatment plan and prescription," 90.4% reported that they would recommend eVisits compared to only 61.2% of patients who only received a treatment plan (and no prescription).

Citation: Patel M, Haddad H, Miller R, Devito J, Chen J, Tacconelli N, Buchi A, Heinrich L, Steppe E, Punch M, Ellimoottil C. An Evaluation of eVisits at an Academic Medical Center. J Ambul Care Manage. 2021 Apr-Jun 01;44(2):166-169.

5.5 WHAT CONCERNS DO OLDER ADULTS HAVE ABOUT TELEHEALTH?

Concern about telehealth visits
Among adults age 50-80 surveyed in June 2020

75%
Health care providers not able to conduct a physical exam

67%
Quality of care is not as good in telehealth visits compared to in-person visits

45%
Not feeling personally connected to the health care providers

25%
Having difficulty seeing/hearing health care providers

24%
Privacy concerns

- In June 2020, the University of Michigan National Poll on Healthy Aging (NPHA) surveyed a national sample of U.S. adults aged 50-80 about their experiences related to telehealth visits.

- When comparing office visits to telehealth visits, the majority of respondents perceived office visits as providing better communication with healthcare providers (54%) and higher overall quality of care (56%). However, telehealth visits were thought to be more convenient than office visits (56%). Forty-two percent (42%) of respondents felt that the time spent with the healthcare provider was about the same during both telehealth and office visits.

- Survey respondents were most concerned that a healthcare provider cannot conduct a physical exam during a telehealth visit (75%) and that the quality of the care of a telehealth visit is not as good as in-person (67%). Other concerns with the telehealth experience include not feeling personally connected to the health care provider (45%), difficulty hearing or seeing the healthcare provider (25%), and privacy (24%).

Citation: Telehealth Use Among Older Adults before and During COVID-19. National Poll on Healthy Aging. https://www.healthyagingpoll.org

SPECIALITY SPECIFIC STUDIES

SUMMARY OF RESEARCH FINDINGS IN THIS SECTION

Because telehealth adoption, sustained use, and outcomes will vary by speciality, Institute for Healthcare Policy and Innovation (IHPI) members have been conducting numerous speciality-specific studies.

KEY HIGHLIGHTS

Surgery (Snapshots 6.1-6.3)

- Prior to March 2020, less than 1% of new patient surgical visits were conducted through telehealth. Telehealth use peaked in April 2020 and facilitated 34.6% of all new patient visits during that month. In later months, telehealth use for new surgical patients dropped, representing only 2.5% of 2019 new patient visit volumes.

- Approximately 60% of surgeons used telehealth in some capacity.

- Surgical specialities with the highest rate of telehealth use were neurosurgery and urology.

- Of note, these data are limited because they do not include postoperative telehealth visits, which are not reliably billed.

Urology (Snapshots 6.4-6.5)

- Urological patients seen through video visits and in-person visits have similar rates of unplanned visits within 30 days.

- In a study of interprofessional electronic consult (eConsult) use in urology, we found that eConsults can be used to avoid in-person referrals for low complexity issues.

Sickle cell anemia (SCA) (Snapshot 6.6)

- While the overall number of outpatient visits declined during the initial months of the pandemic compared to 2019, telehealth use rapidly increased (but then dropped) among children and adolescents with SCA. Research is needed to understand patient and clinician preferences for telehealth in this population.

Prenatal care (Snapshot 6.7)

- Most patients and almost all clinicians reported that virtual prenatal visits improved access to care, and that they believed that virtual visits were safe. Respondents had concerns that unequal access to virtual visits could deepen existing maternal care inequities.

Ophthalmology (Snapshots 6.8-6.11)

- There was a rapid increase and subsequent decrease in the use of telehealth by ophthalmologists during the initial phases of the COVID-19 pandemic, but low levels of teleophthalmology use, overall.

- Patient attitudes toward telemedicine for diabetic retinopathy were influenced by their health

status and perceptions, but not by their demographics. Receptive patients focus on convenience, whereas unreceptive patients strongly value their patient-physician relationships.

- External photographs that are interpreted remotely by ophthalmologists are not suitable for telemedicine applications.

- The majority of eye clinicians were at least somewhat confident about using telemedicine. Confidence was associated with telemedicine visit volume and intention to continue using telemedicine.

Behavioral health (Snapshots 6.12-6.13)

- Nearly all respondents in a provider survey felt that, from their perspective, clients were satisfied with telebehavioral health services; that they meet their clients' diverse needs; and that telehealth (including audio-only telehealth) mitigated frequently-cited barriers to accessing behavioral health care (e.g., lack of transportation, missed work, arranging childcare). About half of respondents felt that remote care quality was the same or better than in-person care quality; audio-only telehealth services were as effective as audio-visual services; and certain behavioral health services were not well suited for telehealth, such as group services and physical health care services (e.g., injections).

- Use of telemedicine to deliver buprenorphine treatment for opioid use disorder in the Veterans Health Administration increased 3.5-fold between 2012 and 2019, though overall use remained low prior to COVID-19.
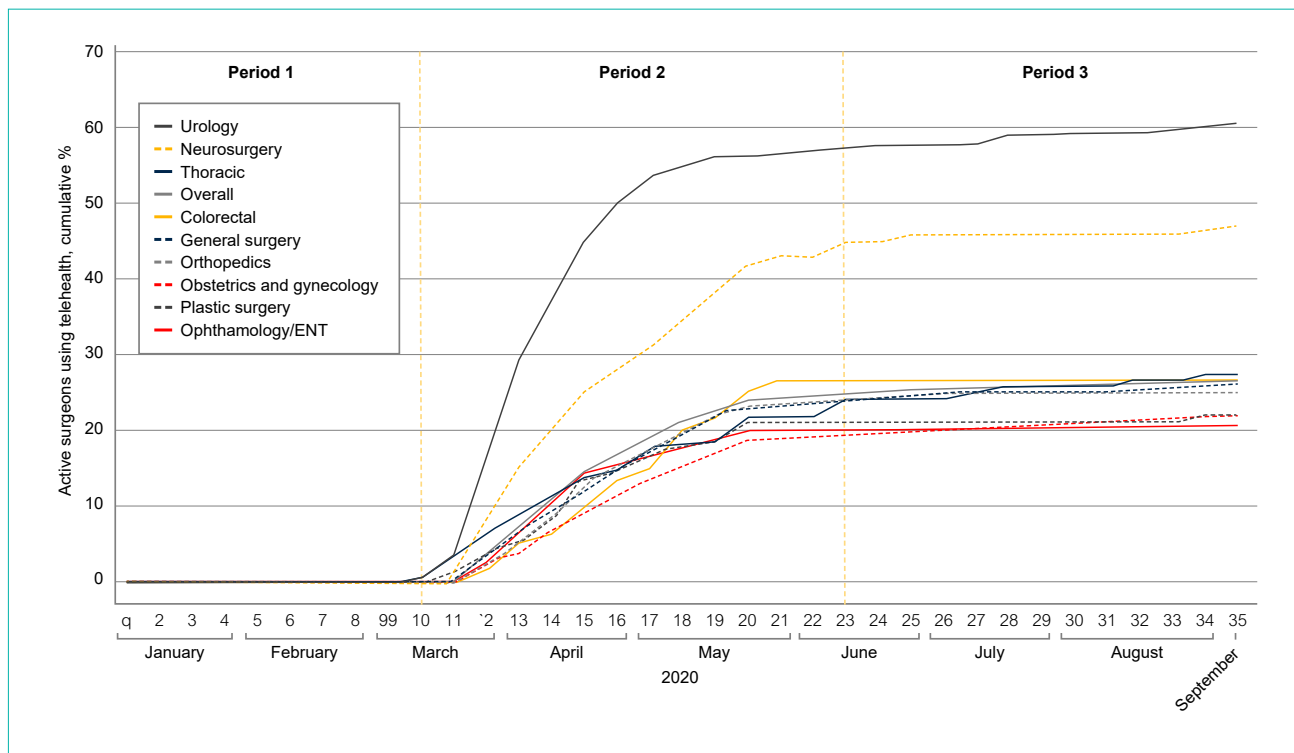
6.1 HOW HAS NEW PATIENT TELEHEALTH BEEN USED IN SURGICAL SPECIALITIES?
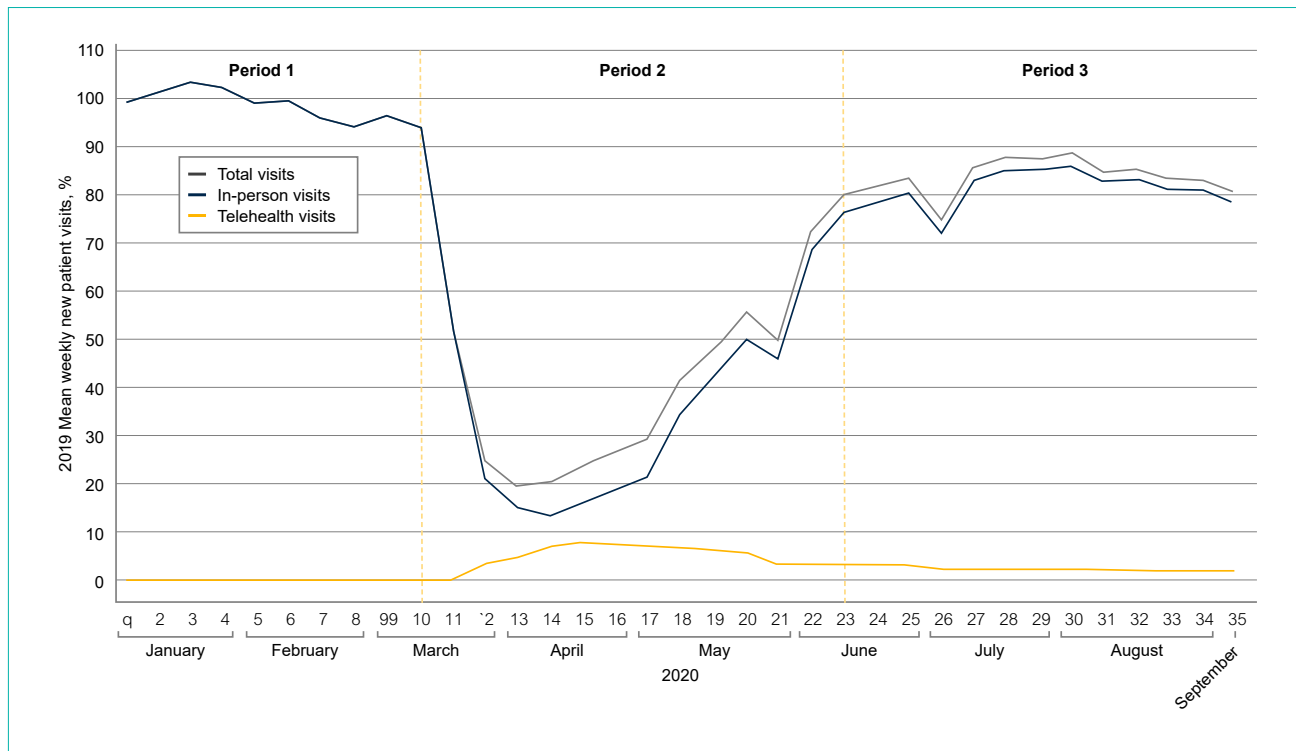
- We analyzed Blue Cross Blue Shield of Michigan insurance claims for new patient visits with a surgeon from one of nine surgical specialties (colorectal surgery; general surgery; neurosurgery; obstetrics and gynecology; ophthalmology/ear, nose, and throat; orthopedics; plastic surgery; thoracic surgery; and urology) during one of the following periods: prior to the COVID-19 pandemic (Period 1: January 5 to March 7, 2020), early pandemic (Period 2: March 8 to June 6, 2020), and late pandemic (Period 3: June 7 to September 5, 2020). We studied the conversion rate, defined as the rate of weekly new patient telehealth visits divided by the mean weekly number of total new patient visits in 2019. This outcome adjusts for the substantial decrease in outpatient care during the pandemic.

- Prior to March 2020, less than 1% (eight of 173,939) of new patient visits were conducted through telehealth. The telehealth conversion rate peaked in April 2020 (week 15) and was equal to 8.2% of the 2019 mean weekly new patient visit volume. During Period 2, a mean of 16.6% of all new patient surgical visits were conducted via telehealth (conversion rate of 5.1%). During Period 3, 3% (2,168 of 71,819) of all new patient surgical visits were conducted via telehealth (conversion rate of 2.5%).

Citation: Chao GF, Li KY, Zhu Z, McCullough J, Thompson M, Claflin J, Fliegner M, Steppe E, Ryan A, Ellimoottil C. Use of Telehealth by Surgical Specialties During the COVID-19 Pandemic. JAMA Surg. 2021 Mar 26.

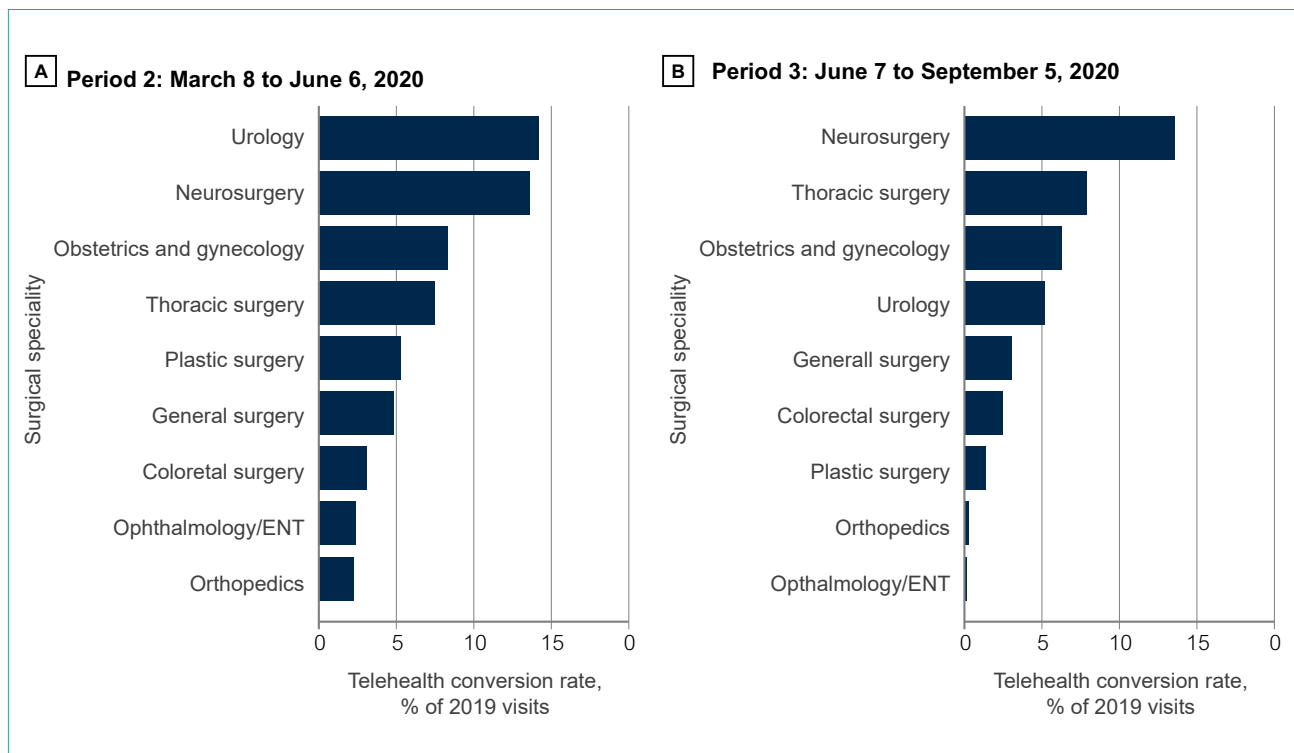# 6.2 HOW HAVE SURGEONS ADOPTED TELEHEALTH DURING THE COVID-19 PANDEMIC?

- We analyzed Blue Cross Blue Shield of Michigan insurance claims for new patient visits with a surgeon from one of nine surgical specialties (colorectal surgery; general surgery; neurosurgery; obstetrics and gynecology; ophthalmology/ear, nose, and throat; orthopedics; plastic surgery; thoracic surgery; and urology) during one of the following periods: prior to the COVID-19 pandemic (Period 1: January 5 to March 7, 2020), early pandemic (Period 2: March 8 to June 6, 2020), and late pandemic (Period 3: June 7 to September 5, 2020).
- Among 4,405 surgeons in the cohort, 2,588 (58.8%) performed telehealth in any patient care context. Specifically for new patient visits, 1,182 surgeons (26.8%) used telehealth.

Citation: Chao GF, Li KY, Zhu Z, McCullough J, Thompson M, Claflin J, Fliegner M, Steppe E, Ryan A, Ellimoottil C. Use of Telehealth by Surgical Specialties During the COVID-19 Pandemic. JAMA Surg. 2021 Mar 26.

# 6.3 HOW WAS TELEHEALTH USED ACROSS SURGICAL SPECIALITIES DURING COVID-19?

- We analyzed Blue Cross Blue Shield of Michigan insurance claims for new patient visits with a surgeon from one of nine surgical specialties and analyzed the conversion rate, defined as the rate of weekly new patient telehealth visits divided by the mean weekly number of total new patient visits in 2019. This outcome adjusts for a substantial decrease in outpatient care during the pandemic.

- The telehealth conversion rate for most surgical subspecialties was less than 10%. Neurosurgery and urology were the specialties with the highest rates of telehealth conversion. The mean telehealth conversion rate for urology in Period 2 was 14.3% of new patient visits in the prior year. The mean telehealth conversion rate for neurosurgery in Period 3 was 13.8% of new patient visits in the prior year. The specialty with the lowest telehealth conversion rate during Period 2 was orthopedics, with a mean telehealth conversion of 2.3%. The specialty with the lowest telehealth conversion during Period 3 was ophthalmology/ENT, with a mean telehealth conversion rate of 0.3%.

Citation: Chao GF, Li KY, Zhu Z, McCullough J, Thompson M, Claflin J, Fliegner M, Steppe E, Ryan A, Ellimoottil C. Use of Telehealth by Surgical Specialties During the COVID-19 Pandemic. JAMA Surg. 2021 Mar 26.

6.4 DOES THE USE OF TELEHEALTH IN UROLOGY VISITS LEAD TO ADDITIONAL UNPLANNED VISITS ?

30-day Planned (Blue) and Unplanned (Yellow) Visit Rate for Urological Video Vs. In-Person Visits
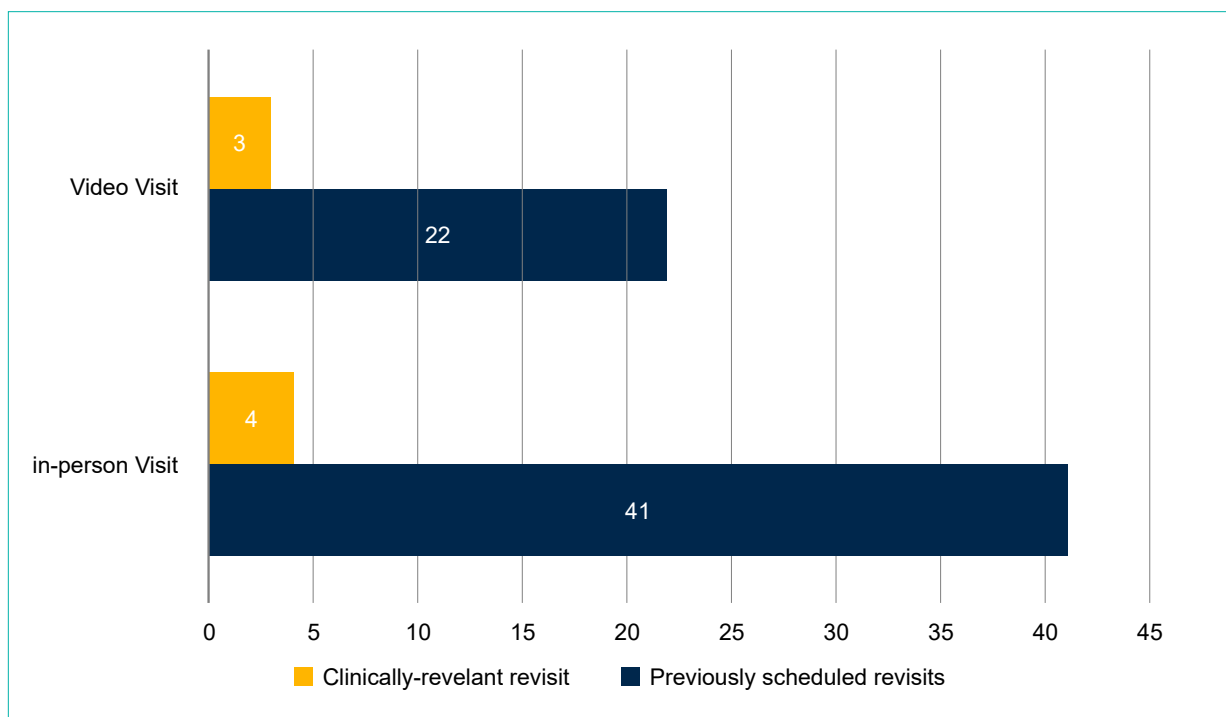
- Inadequate care during telehealth visits may lead to unplanned visits for related issues. To understand this concern, we evaluated 600 video visits from July 11, 2016 through February 2020 and compared these visits to a control group composed of an equal number of randomly selected established patients who had completed a clinic visit. We assessed overall revisit rate, defined as an in-person evaluation by any urologist or urology advanced-practice clinician within 30 days of the patient's initial visit, as well as related revisit rate, which included visits for the same diagnosis. We included clinic, emergency department (ED), and in-patient hospitalization encounters in our evaluation.

- The revisit rate was lower for video visits compared to clinic visits over our study period. Clinicians saw 26 patients within 30 days of their initial video visit (4.3%) compared to 45 patients following an initial in-person encounter (7.5%, P =.01). There were no ED visits or hospitalizations within 30 days of either video or in-person visits. However, the clinically relevant revisit rate was similar across both groups (0.5% of video visits and 0.67% of in-person visits, P = .60).

Citation: Andino JJ, Lingaya MA, Daignault-Newton S, Shah PK, Ellimoottil C. Video Visits as a Substitute for Urological Clinic Visits. Urology. 2020;144:46-51.

6.5 HOW HAVE UROLOGISTS USED INTERPROFESSIONAL CONSULTS?
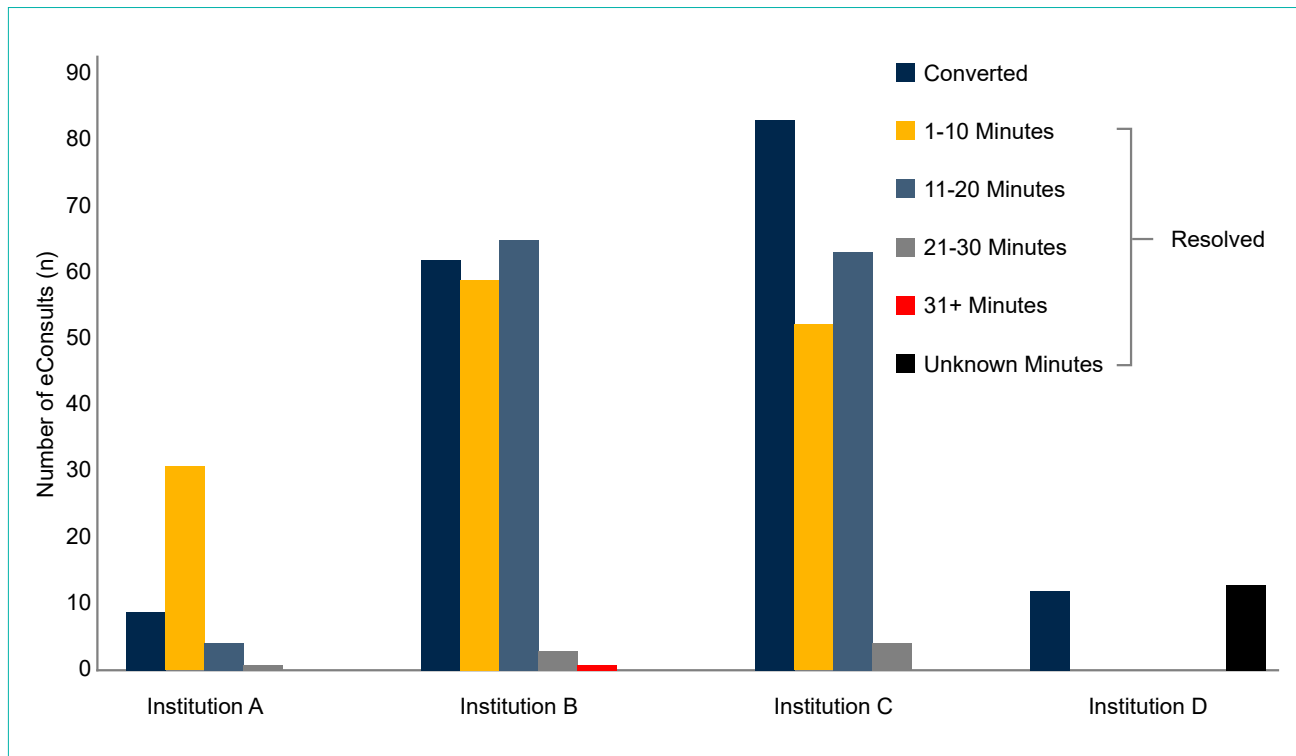
- An interprofessional electronic consultation (eConsult) is an asynchronous form of telehealth whereby a primary care provider requests virtual consultation with a specialist in place of an in-person consultation.

- We analyzed every urological eConsult performed at the University of Michigan, University of California San Francisco, the University of Washington, and Montefiore Medical Center from the launch of their respective eConsult programs through August 2019.

- Clinicians requested a total of 462 urological eConsults. Of these, 36% converted to a traditional in-person visit. Among resolved eConsults, with data on clinician response time available (n=119), 53.8% of eConsults were addressed in less than one day; 28.6% in one day; 8.4% in two days; 3.4% in three days; 3.4% in four days; 1.7% in five days; and 0.8% in 6 days. Among resolved eConsults, with data on clinician completion time available (n=283), 50.2% were completed in 1-10 minutes; 46.7% in 11-20 minutes; 2.8% in 21-30 minutes; and less than 1% in 31 minutes.

Citation: Milan Patel, Gadzinski AJ, Bell AM, Watts K, Steppe E, Odisho A, Yang C, Ellimoottil C. Interprofessional Consultations (eConsults) in Urology. Urology Practice. 2021 May.

6.7 WHAT IS THE PATIENT EXPERIENCE WITH VIRTUAL CARE FOR PRENATAL VISITS?

Question	Patients (n=253)	Providers (n=77)
Telemedicine experience		
Access		
Virtual visits improve access to health services.	174 (68.8)	74 (96.1)
It is easy to do virtual visits.	235 (92.9)	68 (88.3)
I had techhnical issues with virtual visits.	20 (7.9)	30 (39.0)
Quality and safety		
I was able to express myself effectively during virtual visits	213 (84.2)	73 (94.8)
The quality of virtual visits is the same as in-person care	94 (37.1)	35 (45.5)
I think the virtual visits are as safe as in-peson visits.	164 (64.8)	50 (65.0)
Patient satisfaction		
I felt well-prepared to do virtual visits.	231 (91.3)	70 (88.6)
I think virtual visits are a poositive change for patients.	154 (60.9)	54 (70.1)
I am satisfied with doing virtual visits.	196 (77.5)	64 (83.1)
After COVID-19, I would like to continue vrtual visits.	102 (40.3)	71 (92.2)
Home device use experience		
I think having a blood pressure cuff is important for virtual prenatal care	213 (92.2)	63 (95.5)
I think having a fetal Doppler is important for virtual prenatal care.	196 (84.8)	47 (71.2)

- Michigan Medicine created a prenatal care delivery model incorporating video visits into prenatal care during the COVID-19 pandemic. The study team then conducted an online survey of all patients and clinicians who participated to understand their experience in the domains of: (1) access, (2) quality and safety, and (3) satisfaction.

- Most patients and nearly all clinicians reported that virtual visits improved access to care. More than half of respondents believed that virtual visits were safe. Nearly all believed that home blood pressure cuffs were important for virtual visits. Most reported satisfaction with the coronavirus disease 2019 model. In free-text responses, drivers of positive care experiences included perceived improved access to care through decreased barriers, perceived high quality of virtual visits for low-risk patients and increased safety during the pandemic, and improved satisfaction through better patient counseling. Perceived drivers of negative care experience were concerns that unequal access to virtual visits could deepen existing maternity care inequities.

Citation: Peahl AF, Powell A, Berlin H, Smith RD, Krans E, Waljee J, Dalton VK, Heisler M, Moniz MH. Patient and provider perspectives of a new prenatal care model introduced in response to the coronavirus disease 2019 pandemic. Am J Obstet Gynecol. 2021 Apr;224(4):384.

6.8 WHAT ARE THE TRENDS IN TELEHEALTH USE IN OPHTHALMOLOGY?
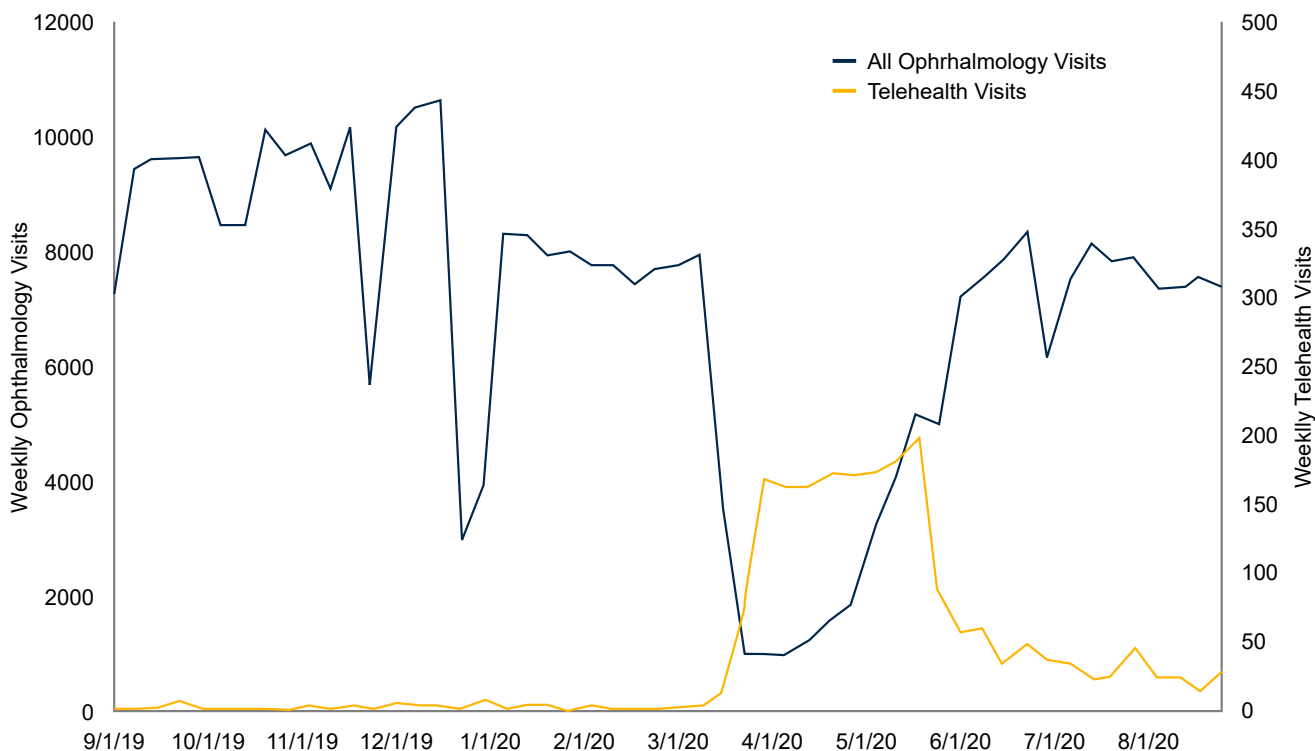
- We used Blue Cross Blue Shield of Michigan insurance claims to identify ophthalmology encounters from September 1, 2019 through September 1, 2020. A synchronous telehealth encounter was defined by the presence of specific procedure modifier codes (25 or GT). Store-and-forward retinal imaging claims (Current Procedural Terminology codes 92227 and 92228) were added to the analysis separately. Postoperative visits within the global postoperative period were not included because they are not billed regularly.

- We identified a total of 362,355 ophthalmology visits during the study period. Telehealth visits accounted for 91 of the 235,327 ophthalmic visits (0.04%) from September 1, 2019 through March 14, 2020, and 2,031 of the 127,028 ophthalmic visits (1.6%) from March 15, 2020 through September 1, 2020 (P < 0.001). The proportion of telehealth visits peaked at 17% of ophthalmic visits. A maximum of 84 (30%) ophthalmologists used telehealth (March 29, 2020 - April 4, 2020). By September 2020, 228 of 610 ophthalmologists (37.4%) had used telehealth.

Citation: Portney DS, Zhu Z, Chen EM, et al. COVID-19 and Use of Teleophthalmology (CUT Group): Trends and Diagnoses. Ophthalmology. 2021;S0161-6420(21)00118-4.

6.9 WHAT ARE PATIENT PERCEPTIONS OF TELEMEDICINE FOR DIABETIC RETINOPATHY?
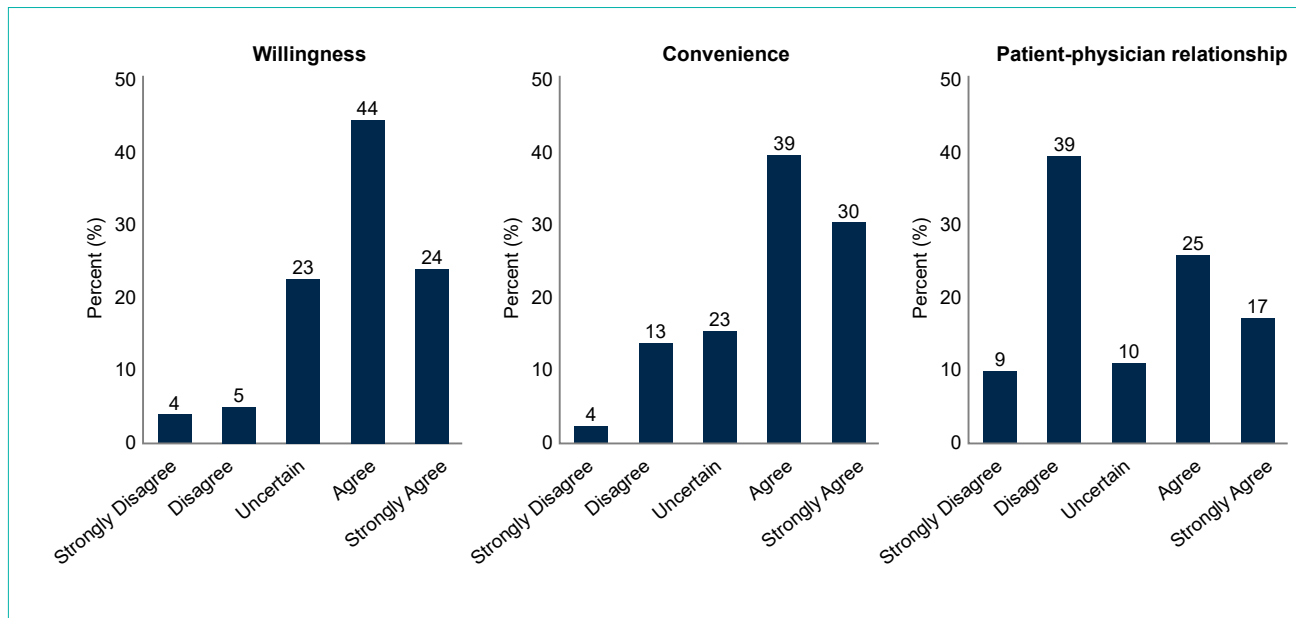
- 97 participants with diabetes mellitus (DM) were recruited to complete an interview regarding: (1) willingness to participate in telemedicine, (2) perception of the convenience of telemedicine, and (3) the perceived impact of telemedicine on the patient-physician relationship Responses were recorded on a five-point Likert scale and then converted to binary outcomes by combining "strongly agree" with "agree," and combining "uncertain," "disagree," and "strongly disagree."

- Demographic factors were not associated with the outcomes. Patients were less likely to participate in telemedicine if they valued the patient-physician relationship (adjusted odds ratio [OR] = 0.08) or had a longer duration of diabetes (adjusted OR = 0.93). Patients had increased odds of willingness if they perceived increased convenience (adjusted OR = 8.10) or had more systemic comorbidities (adjusted OR = 1.85).

Citation: Valikodath NG, Leveque TK, Wang SY, Lee PP, Newman-Casey PA, Hansen SO, Woodward MA. Patient Attitudes Toward Telemedicine for Diabetic Retinopathy. Telemed J E Health. 2017 Mar;23(3):205-212.

6.10 WHAT IS THE DIAGNOSTIC ACCURACY OF CORNEAL DISEASE DETECTION USING EXTERNAL PHOTOGRAPHS?

Inter-rater reliability for the diagnosis of corneal pathology from iTouch and Nidek cameras

	Normal	Pathology	Kappa (CI)
iTouch			
Grader 1 vs Grader 2			
Normal	94	7	0.54 (0.43,0.65)
Pathology	38	59	
Grader 1 vs Grader 3			
Normal	90	11	0.63 (0.53,0.74)
Pathology	25	72	
Grader 2 vs Grader 3			
Normal	110	22	0.71 (0.61,0.81)
Pathology	5	61	
Nidek			
Grader 1 vs Grader 2			
Normal	104	8	0.75 (0.66,0.84)
Pathology	16	70	
Grader 1 vs Grader 3			
Normal	96	16	0.76 (0.66,0.85)
Pathology	8	78	
Grader 2 vs Grader 3			
Normal	100	20	0.76 (0.66,0.85)
Pathology	4	74	

- Corneal and other eye diseases cause most of the urgent visits to eye care professionals and may be suitable for telemedicine. Researchers evaluated the diagnostic accuracy telehealth to detect corneal abrasions, ulcers, scars, and pterygia. A cornea specialist provided the gold-standard diagnosis by slit-lamp examination. Images of both eyes were obtained using two cameras and interpreted by three cornea specialists for the presence of pathology.

- A total of 198 eyes were photographed. Sensitivity to detect pathology ranged from 54% to 75% depending on the camera and grader, and specificity ranged from 82% to 98%. The intergrader reliability was moderate to strong (kappa ranges: 0.54-0.76 depending on the camera).

- External photographs that are interpreted remotely by ophthalmologists are not suitable for telemedicine applications.

Citation: Woodward MA, Musch DC, Hood CT, Greene JB, Niziol LM, Jeganathan VS, Lee PP. Tele-ophthalmic approach for detection of corneal diseases: accuracy and reliability. Cornea. 2017; 36:1159-65.

6.11 WHAT ARE EYE CLINICIAN ATTITUDES TOWARD USING TELEMEDICINE?

Survey Questions	Total No. (%)
Before the coronavirus epidemic did you provide any of the following telemedicine services?	*N=88*
None	61 (69.3)
Interprofessional e-consultations	3 (3.4)
Phone visits	14 (15.9)
Phone visits, interprofessional e-consultations	6 (6.8)
Phone visits, video visits	3 (3.4)
Phone visits, video visits, interprofessional e-consultations	1 (1.1)
Since the coronavirus epidemic began, how many times have you conducted video visits with patients?	*N=87*
Never	57 (65.5)
1-2 times	17 (19.5)
3-10 times	13 (14.9)
Since the coronavirus epidemic began, how many times have you conducted phone visits with patients?	*N=87*
Never	18 (20.7)
1-2 times	12 (13.8)
3-10 times	29 (33.3)
>10 times	28 (32.2)
Since the coronavirus epidemic began, how many times have you conducted consults with other health care providers that included photographs, or videos provided in person, through e-mail, or online?	*N=88*
Never	55 (62.5)
1-2 times	18 (20.5)
3-10 times	14 (15.9)
>10 times	1 (1.1)
Based on your ecperience with telemedicine since the coronavirus epidemic began, how would you describe your confidence in using remote screening for eye care?	*N=84*
Extremely confident	5 (6.0)
Confident	19 (22.6)
Somewhat confident	32 (38.1)
Not at all confident	28 (33.3)
Since the coronavirus epidemic began, how do you feel about telemedicine utilization in ophthalmology?	*N=87*
Highly underutilized	15 (17.2)
Somewhat underutilized	39 (44.8)
Utilized appropriately	22 (25.3)
Somewhat overutilized	10 (11.5)
Highly overutilized	1 (1.1)

How likely are you to continue to provide eye telemedicine services (video visits, phone visits, e-consultations) for the next 1 year?	N=87
Likely	31 (35.6)
Somewhat likely	21 (24.1)
Unsure	11 (12.6)
Somewhat unlikely	11 (12.6)
Unlikely	13 (14.9)

- The purpose of this study was to determine clinician confidence in telemedicine-based eye care services during COVID-19. Researchers administered an electronic survey at the University of Michigan Kellogg Eye Center (April 17 - May 6, 2020) and assessed clinician confidence in using telemedicine-based eye care during COVID-19.

- Of the 88 respondents (90.7% response rate), 83% (n = 73) were ophthalmologists and 17% (n = 15) were optometrists. Clinicians' confidence in their ability to use telemedicine varied, with 28.6% (24/84) feeling confident/extremely confident, 38.1% (32/84) somewhat confident, and 33.3% (28/84) not-at-all confident. Most felt that telemedicine was underutilized (62.1%; 54 of 87) and planned continued telehealth use over the next year (59.8%; 52 of 87).

Citation: De Lott LB, Newman-Casey PA, Lee PP, Ballouz D, Azzouz L, Cho J, Valicevic AN, Woodward MA. Change in ophthalmic clinicians' attitudes toward telemedicine during the coronavirus 2019 pandemic. Telemed J E Health. 2020.

6.12 WHAT HAS BEEN BEHAVIORAL HEALTH PROVIDERS' EXPERIENCE WITH TELEHEALTH?

1   **Quality of care and provider/client satisfaction**

Out of 31 respondents

31   Telebehavioral health reimbursement alleviated and prevented financial shortfalls for providers during the COVID-19 pandemic.

30   From the providers' perspective, clients were satisfied with telebehavioral health services.

18   Remote care quality was the same or better than in-person care quality.

31   Audio-only telehealth services were as effective as audio-visual services and were sometimes preferable for clients with anxiety or trauma, who were uncomfortable with video.

2   **Access to care for isolated and/or vulnerable clients**

Out of 31 respondents

31   Providers felt better-equipped to meet their clients' universe needs after receving flexibilitty to offer telehealth services when appropriate

28   Telehealth mitigate frequently-cited barriers to accessing behavioral health care (e.g., lack of transportation, missed work, arranging childcare).

22   Providers reported decreased no-show and cancelation rates.

13   Audio-only telehealth services allowed for expanded access care for clients who are geographically isolated,lack transportaion, lack adequate internet access or internet-connected devices, or certain populations such as older adults.

## (3) Challenges and limitations of telehealth

Out of 31 respondents

15 Many clients, especially in rural areas, had inadequate access to the internet or internet-connected devices and persistent barriers to in-person care.

11 Certain behavioral health services were not well suited for telehealth, such as group services and physical health care services (e.g., injections)

5 Obtaining written consent for treatment proved difficult when clients lacked the technology to email or fax physicaly sign forms. The temporary allowance for verbal consent during the pandemic alleviated these barriers.

The interviewees included: a psychiatrist, psychologists, registered nurses, clilnical social workers, mental health counselors, substance use disorder counselors, applied behavior analysts, and peer suppoort providers, among others.

- Between late July and mid-August 2020, a team at the University of Michigan Behavioral Health Workforce Research Center conducted in-depth interviews with 31 Michigan behavioral health providers* providing telebehavioral health services across the state during the COVID-19 pandemic.

- All or nearly all respondents felt, from the provider's perspective, that clients were satisfied with telebehavioral health services, that the services met their clients' diverse needs, and that telehealth (including audio-only telehealth) mitigated frequently-cited barriers to accessing behavioral health care (e.g., lack of transportation, missed work, arranging childcare). Providers reported decreased no-show and cancellation rates.

- About half of respondents felt that remote care quality was the same or better than in-person care quality; audio-only telehealth services were as effective as audio-visual services; and that certain behavioral health services were not well suited for telehealth, such as group services and physical health care services (e.g., injections).

- A few respondents felt that obtaining written consent for treatment proved difficult when clients lacked the technology to email or fax physically signed forms.

Citation: Unpublished analysis by Beck A. Policy brief here: https://ihpi.umich.edu/MItelehealth

6.13 WHAT ARE THE TRENDS IN THE USE OF TELEMEDICINE-BASED BUPRENORPHINE TREATMENT IN US VETERANS WITH OPIOID USE DISORDER?
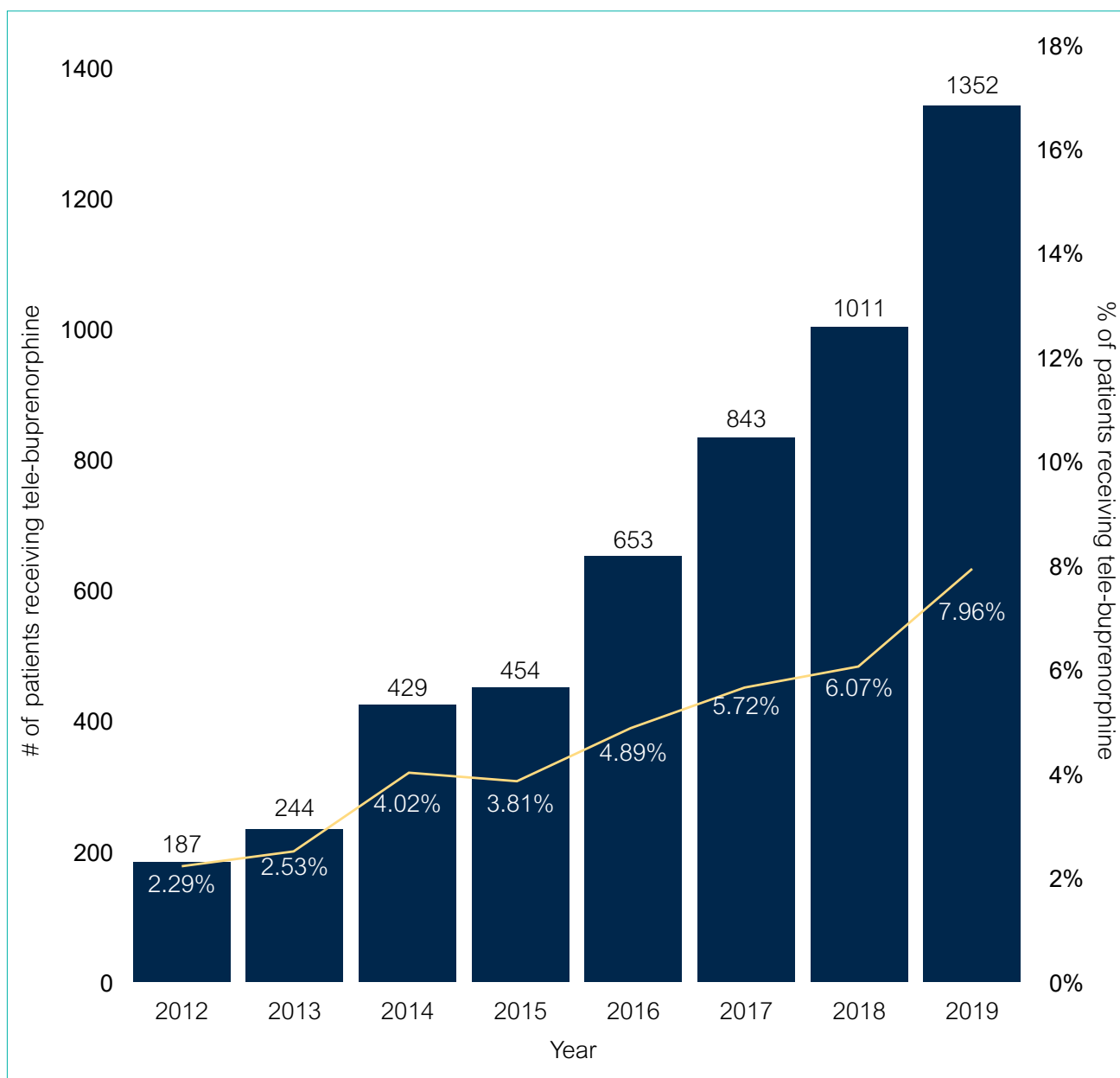
- Telemedicine-delivered buprenorphine (tele-buprenorphine) can potentially increase access to buprenorphine for patients with opioid use disorder (OUD)
- This study was a retrospective national cohort study of Veterans diagnosed with opioid use disorder (OUD) receiving buprenorphine treatment from the Veterans Health Administration from 2012 through 2019.

- Utilization of tele-buprenorphine increased from 2.29% of buprenorphine patients in 2012 (n=187) to 7.96% (n=1352) in 2019 in VHA Veterans nationally. Compared to patients receiving only in-person care, tele-buprenorphine patients were less likely to be male (AOR=0.85, 95% CI: 0.73-0.98) or Black (AOR=0.54, 95% CI:0.45-0.65), but more likely to live in rural areas (AOR=2.13, 95% CI:1.92-2.35).

Citation: Lewei A, Fortney J, Bohnert A, Coughlin L, Zhang L, Piette J. Comparing telemedicine to in-person buprenorphine treatment in US Veterans with opioid use disorder (In Press)

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