THE VALUE OF TELEMEDICINE DURING THE COVID-19 PANDEMIC RESPONSE

Insights From Patient Care Utilization in Colorado

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OeHI
Office of eHealth Innovation

COLORADO HEALTH INSTITUTE

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The Value of Telemedicine During the COVID-19 Pandemic Response

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This research was conducted in collaboration with the Colorado Office of eHealth Innovation (OeHI) and the Colorado eHealth Commission, in support of the Colorado Health Information Technology (IT) Roadmap. OeHI is responsible for defining, maintaining, and evolving Colorado's Health IT strategy concerning care coordination, data access, health care integration, payment reform, and care delivery. To ensure that OeHI and the eHealth Commission create a strategy that reflects the wants and needs of Coloradans, they have created the Health IT Roadmap, which defines strategic initiatives to close the gaps in health care for patients and providers. This research was conducted in support of several Roadmap initiatives, including Initiative #16 to expand access to broadband and virtual care.

OeHI led the Governor's Innovation Response Team's telemedicine efforts during the initial COVID-19 pandemic response and continues to lead state telemedicine efforts in partnership with state agencies and community leaders.

Introduction

The COVID-19 pandemic caused an unprecedented drop in traditional in-person care and a rapid expansion of care delivered remotely via telemedicine. This brief uses a unique, Colorado-specific source of clinical data to analyze the shift toward telemedicine, which Coloradans were able to access care through telemedicine, for what types of care, and the implications of these findings for the future of telemedicine in Colorado.

Providers, patients, and policymakers moved quickly in response to the pandemic in early 2020. Gov. Jared Polis signed executive orders that temporarily barred many health care providers from performing voluntary or elective procedures from March 23 through most of April.[1,2]

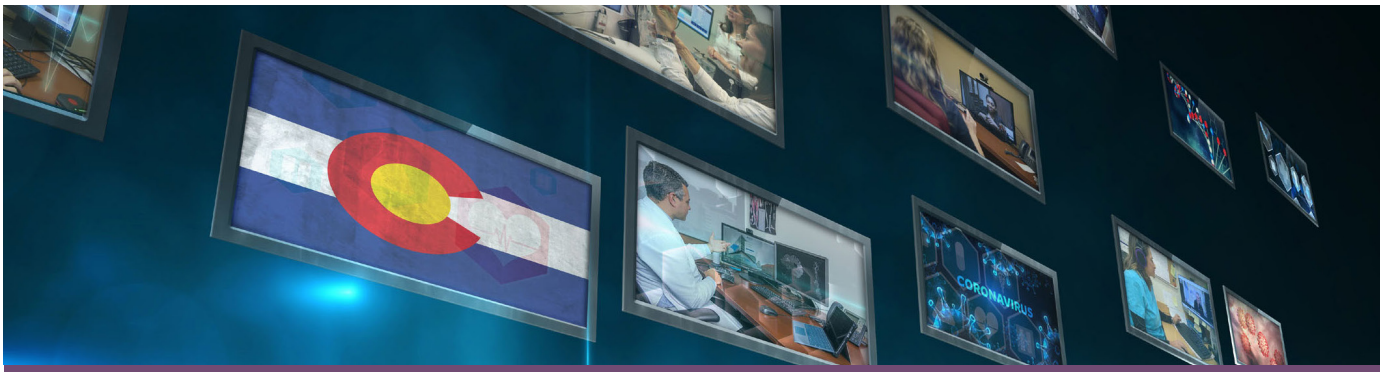
A statewide stay-at-home order effective March 27, combined with calls for Coloradans to severely limit in-person interactions to preserve health system capacity, may have further discouraged people from seeking care.[3] Fewer patients meant less revenue for most providers, who faced significant budget shortfalls.[4]

An April 1 executive order suspended some state laws to clear the way for more use of telemedicine, giving providers more flexibility in how they treated their patients.[5] Further relief came from federal emergency waivers and temporary exemptions made by private insurers. Providers responded by quickly investing in the technology and training needed to see patients remotely.

Before this, telemedicine accounted for a tiny fraction of care delivered in Colorado. Analysis of encounter volume data provided by a set of Colorado Front Range providers tells a story of telemedicine's rapid growth, from a baseline of fewer than 100 weekly encounters before the

Three Key Findings

- The amount of care delivered by telemedicine during the COVID-19 pandemic increased more than 600-fold, with the most significant use by community mental health centers and patients seeking behavioral health care for conditions such as anxiety and depression.
- Even as telemedicine encounters increased dramatically, overall care use (in-person and telemedicine) dropped by 43% among some Colorado providers, indicating a large number of Coloradans postponing or forgoing care while the state's stay-at-home and Safer at Home orders were in effect.
- A large decrease in care for certain chronic conditions and cancers suggests many patients were forgoing care, potentially worsening health issues down the road, highlights the limitations of telemedicine for treating certain conditions.



The Value of Telemedicine During the COVID-19 Pandemic Response

This is one of three briefs from the Colorado Health Institute (CHI) examining the immediate and long-term impacts of telemedicine adoption due to the COVID-19 pandemic on Colorado's patients, providers, payers, and policymakers.

- ***Insights From Patients in Colorado*** highlights how patients feel about using telemedicine during the pandemic, examines the barriers to use some patients experienced, and analyzes the potential of telemedicine in Colorado from perspectives of the patients who use it.
- ***Insights From Patient Care Utilization in Colorado*** studies the utilization of telemedicine during the early months of the pandemic using electronic health record data from a unique collaboration of Colorado providers.
- ***The Financial Impact On Providers and Payers in Colorado*** explores the financial effect of the pandemic and related policy decisions on Colorado's providers and payers and assesses the business case for expanded telemedicine in the future.

As part of this research, CHI interviewed patients and providers about their experiences using telemedicine during the COVID-19 pandemic and their thoughts about continuing to use it in a post-pandemic environment. This research also draws insights from a unique source of clinical data, the Colorado Health Observation Regional Data Service (CHORDS). CHORDS is a collaborative effort by health care, behavioral health, and public health partners on the Front Range to share aggregate medical record data for public health monitoring, evaluation, and research.

CHI interviewed 10 health care workers, providers, and administrators across three health care organizations about their experiences reacting to the pandemic, how their care processes adapted to an environment where remote care became a necessity, and how they see the future of telemedicine at their organizations.

CHI interviewed 23 patients, most of whom were first-time users of telemedicine since the start of the COVID-19 pandemic. Patients shared their perspectives through individual conversations on what worked, what didn't, access barriers they ran up against, their perception of the quality of care they received, their own engagement and confidence in managing their care, and situations in which they would consider continuing to use telemedicine in the future.

pandemic to a peak of more than 30,000. Adoption occurred first primarily via audio-only phone calls, which were eventually surpassed in weekly volume by video visits as providers stood up and onboarded patients onto new platforms for delivering video visits.

This rapid growth, however, was not nearly enough to offset a large decrease in ambulatory (in-person) encounters, which dropped 61% compared to average volumes for the same 16 weeks from the year before. Overall care volumes dropped 43% over the same period, indicating a large amount of postponed or forgone care during the state's stay-at-home and Safer at Home orders, and potentially foreshadowing long-term consequences for the health of many Coloradans.

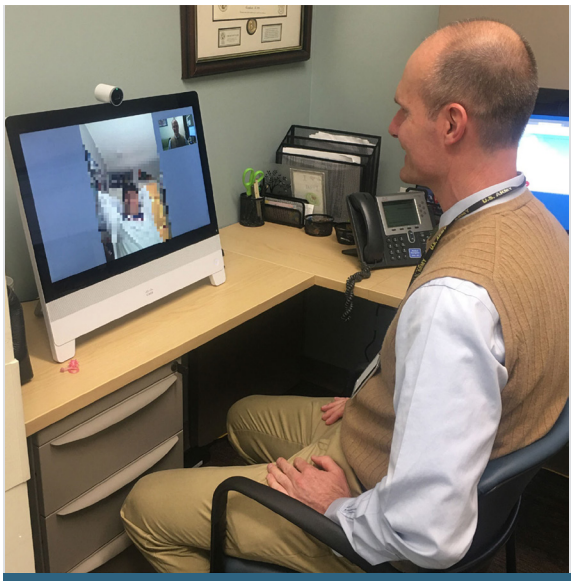
Telemedicine adoption was generally lower among older Coloradans, and forgone care tended to increase with age. Telemedicine adoption and changes in care volume also varied by race and ethnicity, with the greatest adoption among American Indian or Alaska Native Coloradans and lowest among Asian Coloradans. Asian Coloradans also experienced the largest decrease in care volume: 52%, compared to a 43% decrease among all Coloradans.

Certain providers, such as community mental health centers, had more success than others in pivoting to telemedicine. And certain types of services, such as behavioral health services related to anxiety, depression, and substance use disorder, were delivered via telemedicine more often. Very little care was delivered via telemedicine for chronic conditions such as diabetes, hypertension, and hyperlipidemia, and encounter volume for each of those conditions was down by at least two-thirds during the stay-at-home and Safer at Home orders.

Telemedicine Adoption and Use in Colorado

Ambulatory care dropped precipitously in the early days of the pandemic. In week 0, the last week before the closures of bars, restaurants, gyms, and ski areas and restrictions on large gatherings, ambulatory volume was almost 128,000 visits, similar to the weekly average during the baseline period of just under 133,000 (see Figure 1). A week later, ambulatory visits had dropped to less than 54,000. They continued dropping until week 4, when 29,300 visits were recorded. Despite a gradual rebound in ambulatory visits starting in week 6, ambulatory care encounter volume was down 61% in the analysis period compared to the baseline period. By week 15 of the analysis period, ambulatory encounters were still down 44% compared to the baseline.

As ambulatory volume dropped, telemedicine encounters rose quickly, but they did not offset the loss of ambulatory encounters.



In this research, ***telemedicine*** refers to the delivery of care services between different locations via an electronic exchange of medical information. It includes a broad scope of remote health care including diagnosis, treatment, patient education, care management, and remote patient monitoring.

In some cases, providers interviewed used the term ***telehealth***, which in this context can be assumed to be interchangeable with the term telemedicine.

Methods: What You Need to Know

This research primarily draws on insights from a unique source of clinical data, the Colorado Health Observation Regional Data Service (CHORDS).

CHORDS aggregates medical and behavioral health electronic medical record (EMR) data from 14 contributing providers along the Front Range. These providers include three health systems (Children's Hospital Colorado and the Barbara Davis Center, Denver Health and Hospital Authority, and Kaiser Permanente Colorado), three community mental health centers (Jefferson Center for Mental Health, Mental Health Center of Denver, and Mental Health Partners), and seven Federally Qualified Health Centers (Clinica Family Health, Clinica Tepeyac, Colorado Coalition for the Homeless, High Plains Community Health Center, North Colorado Health Alliance, STRIDE Community Health Center, and Salud Family Health Centers).

Data from CHORDS are more current than most other sources since the data are sourced directly from EMR systems at each provider site. Unlike CHORDS analyses, claims data analyses require either a multi-month lag period (given that claims are not finalized for about three months after they are submitted), or an "incurred but not reported" (IBNR) adjustment. The IBNR methodology allows researchers to examine claims from more recent periods. However, the adjustment is less accurate the more recent the analysis period.

CHORDS also offers more granular insights into clinical practices and provider types within systems than many data sources. It also includes clinical measurements with results of care delivery and allows data to be analyzed by specific demographic factors. It can also support surveillance of incidence and prevalence of conditions (through the use of diagnosis codes, for example), and provide insights on the management of conditions at a population level (through screening and lab results such as body mass index or hemoglobin a1c control).

These analyses include aggregate data from approximately 1.5 million Coloradans (approximately 27% of the state's total 2018 population). The majority of these 1.5 million people live in the following 10 Colorado counties: Adams, Arapahoe, Boulder, Broomfield, El Paso, Denver, Douglas, Jefferson, Larimer, and Weld. The CHORDS data used in these analyses represent approximately 32% of the total population living in these 10 counties in 2018. Some analyses use data from a subset of partners due to limitations in data availability.

CHORDS data are not intended to be representative of the entire state but provide insights into telemedicine use among a portion of Coloradans living along the Front Range and seeking care with the medical and behavioral health providers who contribute data.

CHI analyzed de-identified weekly clinical encounter volume for telemedicine and in-person encounters before and during the pandemic to understand how a set of providers adapted to a new set of restrictions and dynamics.

The pre-pandemic period, termed the **baseline period**, includes data from 16 weeks before the pandemic that roughly corresponds to the **analysis period**: the 16 weeks from March 17, 2019, through July 6, 2019.

The analysis period includes the 16 weeks from March 15 through July 4, 2020. This time period is labeled on charts and otherwise referred to as weeks 1 through 16.

Week 0 is defined as the second week in March (March 8 through March 14), representing the last week before major pandemic-related restrictions were imposed in Colorado (for example, closures of bars, restaurants, gyms, and ski areas and restrictions on large gatherings).[6]

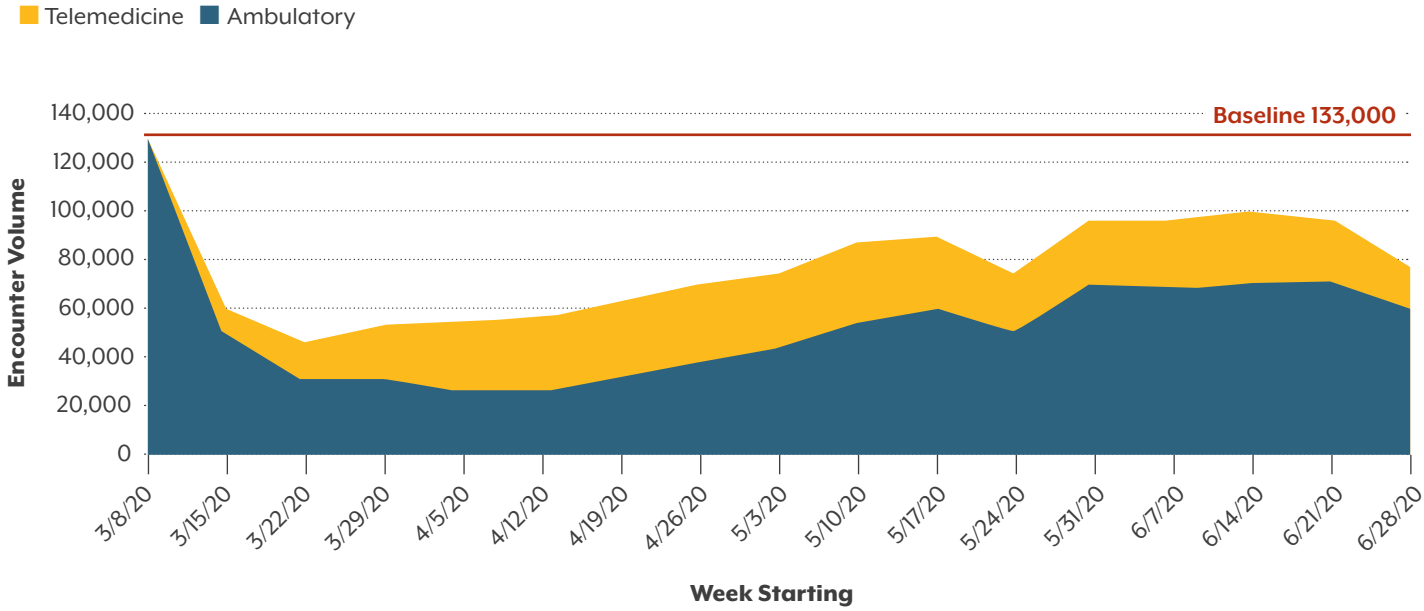
This primary unit of analysis for this publication includes in-person ambulatory encounters (labeled as ambulatory in this report) and encounters providing telemedicine services (labeled telemedicine) that were billed to insurance carriers and/or patients. Telemedicine encounters included both synchronous video visits and synchronous audio (telephone) visits. With this unit of analysis population-level trends in care can be seen, but individual care utilization patterns are not visible.

The following types of encounters were not included in this analysis: emergency department, acute inpatient, radiology, laboratory and all non-billable telecommunications. These encounter types may be the focus of future research.

This report also draws on CHI's interviews with providers and patients about their experiences with telemedicine. Quotes and findings from these interviews appear throughout the analysis. See The Value of Telemedicine During the COVID-19 Pandemic Response on Page 4 for more information on CHORDS and CHI's research approach.

For more detail on the methods used in this analysis, see the Methods Appendix on Page 23.

Figure 1. Ambulatory and Telemedicine Encounter Volume Over Time, March 8 Through July 4, 2020



Note: Dips in overall encounter volumes in week 11 and week 16 are likely due to holiday-related office closures (Memorial Day on May 25 and Independence Day on July 4, respectively).

Telemedicine encounters grew from an average of 39 per week during the baseline period to a peak of just over 30,000 weekly encounters in weeks 6 through 8. Over the 16 weeks of the analysis period, telemedicine encounters averaged 24,600 per week. In week 5 of the pandemic, almost half of all encounters (49%) were delivered via telemedicine. As ambulatory care volumes rebounded, telemedicine's share of total encounters dropped, representing under a quarter of all encounters (22%) in week 16.

Despite the explosive growth of telemedicine, total weekly encounter volume, including ambulatory and telemedicine visits, was down 43% during the analysis period compared to the baseline. This indicates that a large amount of care was put off, particularly during the early stages of the pandemic in March and April, as providers drastically limited whatever in-person care was allowed. Some providers and care types more easily transitioned to telemedicine, a topic explored in detail later in this brief.

Which Coloradans Are Using Telemedicine?

Some Coloradans were more likely to seek and obtain care via telemedicine than others, depending on their demographic characteristics and the kind of care they were seeking.

Telemedicine adoption was higher among younger Coloradans. For those under age 18, 38% of total encounters during the analysis period were via telemedicine. American Indian and Alaska Native Coloradans had the highest rate of telemedicine adoption, followed by biracial and multiracial Coloradans, while Asian Coloradans had the lowest rates of adoption. Adoption was similar for Hispanic and non-Hispanic Coloradans and for males and females.

Demographics: Telemedicine Adoption by Age

Analysis of the CHORDS data found that telemedicine adoption during the pandemic,

measured as the percentage of total encounters delivered via telemedicine, decreased with age (see Figure 2).

The highest adoption of telemedicine was by the youngest age group analyzed, those age 0 through 17. About 38% of this group's encounters took place via telemedicine, almost triple the rate of the oldest age group, those age 80 and above. Telemedicine adoption dropped slightly from the under 18-year-olds to those ages 18 to 29 (from 38% to 35%) and remained relatively steady at 35% for those in their 30s and for those ages 40 to 54. There was an additional slight decrease in adoption for the next age group: Those ages 55 to 64 received less than a third (30%) of their care via telemedicine.

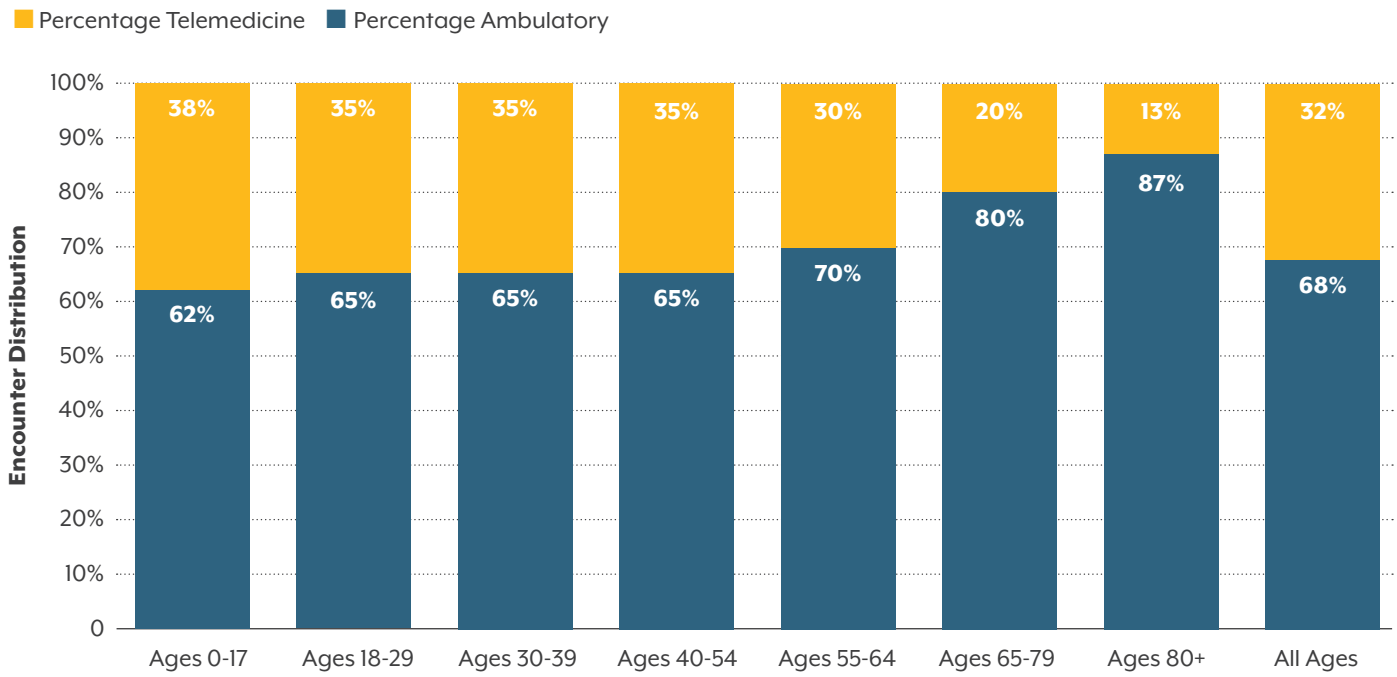
Further analysis of telemedicine use among those ages 0 through 17 show greatest adoption among those ages 8 through 16. Adoption varies slightly without a clear trend within that group, ranging from 44% to 48%.

This roughly school-age population may be well-suited for telemedicine: They are likely old enough to be relatively attentive in a remote visit and to communicate with their provider, and have in many cases grown up with exposure to video technology such as FaceTime to communicate with their friends and family members. By contrast, providers tended to prioritize in-person visits for children under 3 to make sure they got all their immunizations and well-child visits on time.

The lowest rate of telemedicine use was among those ages 65 and older. Those between ages 65 and 79 only had a fifth of encounters via telemedicine, while those ages 80 and older used even less telemedicine: It accounted for 13% of their total encounters.

Older patients interviewed by CHI suggested they were willing to use telemedicine when there was no other option, and some reported being pleasantly surprised with the experience. But most were less willing to choose it when given an option. Patients of all ages also consistently reported preferring to use in-person care to manage or treat serious conditions, which may be more present in older populations.

Figure 2. Ambulatory and Telemedicine Encounter Distribution by Age Group, Analysis Period (March 15 Through July 4, 2020)



Consistent with the finding that total encounter volume decreased 43% in the analysis period compared to the baseline period, each age group saw a large decrease in total encounter volume despite adoption of telemedicine services (see Figure 3).

The decrease was greatest for those ages 65 and older, whose encounter volume was more than cut in half during the pandemic. For those over age 80, total encounter volume decreased by 57%. For those between ages 65 to 79, total encounter volume decreased by 52%.

Those ages 18 through 29 and ages 30 through 39 experienced the smallest drops in overall encounters (35% and 34%, respectively), indicating fewer total visits being missed during the pandemic. The percentage decrease in total encounters generally increased among older groups.

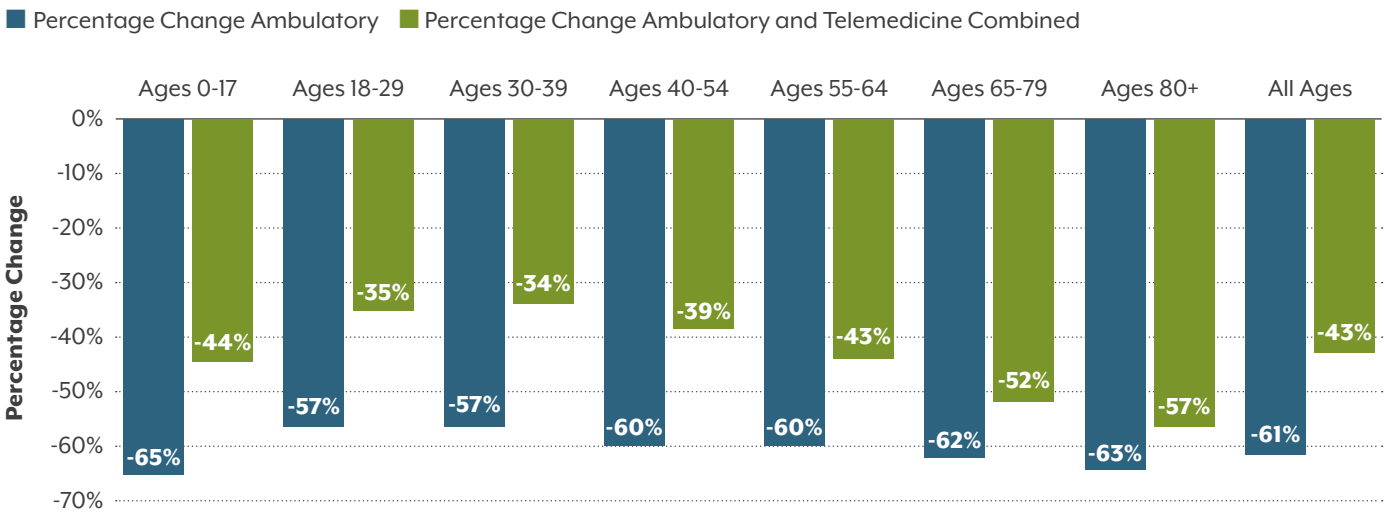
Decreases in ambulatory visits during the pandemic by age category appear to have been partially offset by adoption of telemedicine. Drops in total encounters for patients ages 0 through 54 were at least 20 percentage points lower than their respective drops in ambulatory-only encounters. This age range also experienced the highest adoption rates of telemedicine during the pandemic, at 35% or greater (see Figure 2).

In contrast, patients age 55 and older experienced only a 17 percentage point decrease or less in total encounters compared to the respective drops in ambulatory-only encounters. This age range also showed the lowest adoption rates of telemedicine during the pandemic at 30% or lower (see Figure 2).

This may be because a larger proportion of encounters by young adults could be done through telemedicine, and because younger populations more readily accessed telemedicine. It may also be because younger populations were less likely to curtail their normal behaviors, including care seeking, for fear of the virus. Or it could be some combination of those factors and others.

In an exception to the general trend, total encounters for those under 18 were down by 44% even though they had the highest rate of adoption of telemedicine (38% of all encounters). This may be due to a large proportion of early childhood encounters being postponed by parents, such as well-child visits and immunizations. Medicaid in Colorado did not allow providers to reimburse for well-child visits conducted over telemedicine, and immunizations cannot be done via telemedicine.[7]

Figure 3. Change in Ambulatory Encounters Only and Combined Ambulatory/Telemedicine Encounters by Age Group, Baseline Period (March 17 Through July 6, 2019) to Analysis Period (March 15 Through July 4, 2020)



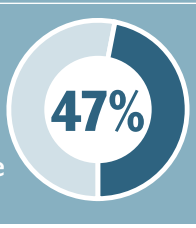
Demographics: Telemedicine Adoption by Race, Ethnicity, and Gender

Telemedicine adoption was greatest among Coloradans identifying as American Indian or Alaska Native, with almost half of all encounters among this group (47%) during the analysis period delivered through telemedicine (see Figure 4). The American Indian or Alaska Native population may have had the greatest telemedicine adoption rates across all races because community mental health centers, which were rapid adopters of telemedicine (see the section titled How Has Telemedicine Affected the Volume of Care Delivered by Different Providers During the Pandemic), served high proportions of these residents. Telemedicine adoption was much lower among Asian and Black populations (27% and 29% respectively). Across all races and ethnicities, telemedicine adoption was around a third, or 32% of total encounters. White and Hawaiian/Pacific Islander populations adopted telemedicine at rates right around the average adoption across races and ethnicities. Those identifying as biracial or multiracial had a slightly higher adoption rate, 37%.

Telemedicine adoption by Hispanic Coloradans was similar to adoption among non-Hispanic Coloradans (33% and 32%, respectively). This may indicate relatively robust Spanish language services offered by the providers included in the CHORDS data set, though providers interviewed by CHI for this research noted that offering translation services via telemedicine is a challenge.

Telemedicine Adoption By Race, Ethnicity

HIGHEST:
- American Indian/ Alaska Native



LOWEST:
- Black: **29%**
- Asian: **27%**

Figure 4. Ambulatory and Telemedicine Encounters by Race, Analysis Period (March 15 Through July 4, 2020)

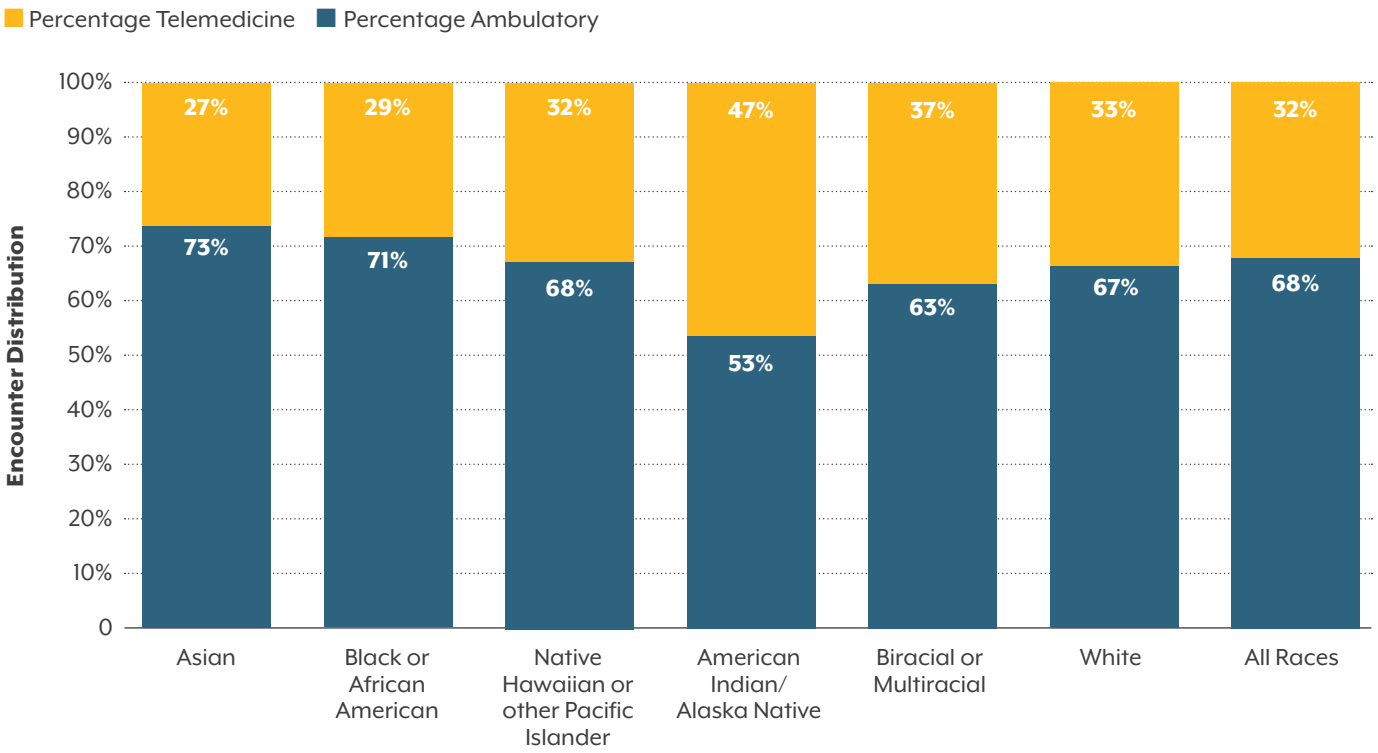
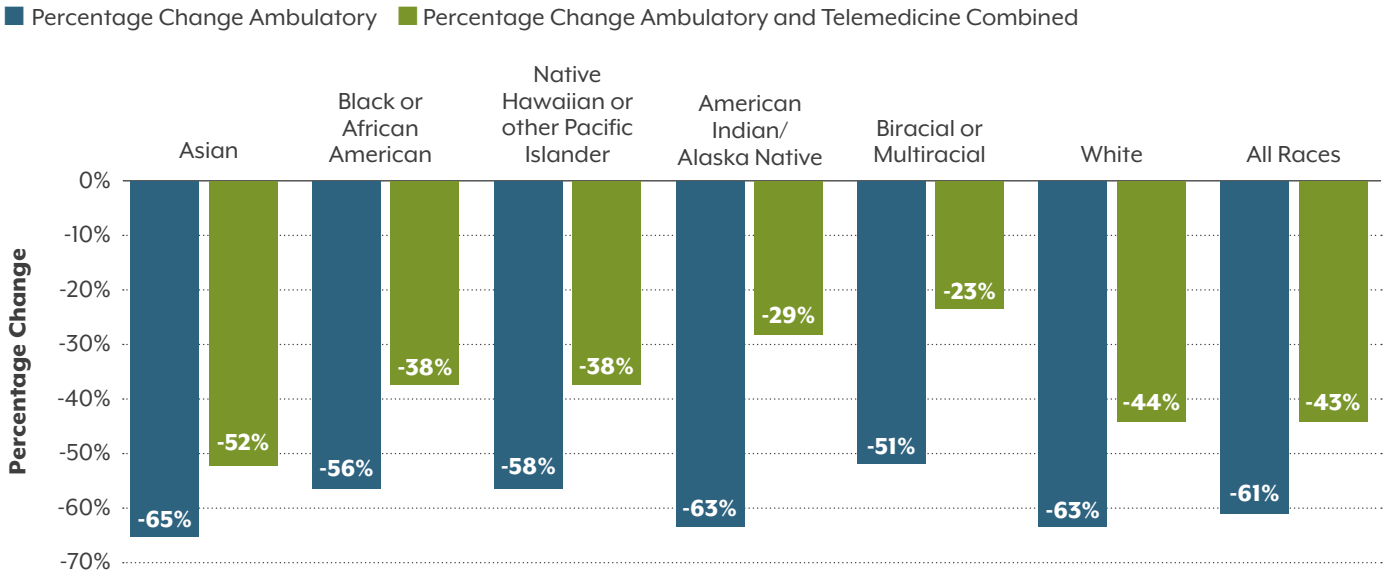


Figure 5. Change in Ambulatory Encounters Only and Combined Ambulatory/Telemedicine Encounters by Race, Baseline Period (March 17 Through July 6, 2019) to Analysis Period (March 15 Through July 4, 2020)



Asian and white Coloradans had the greatest drops in overall encounters during the pandemic: 52% and 44%, respectively. One possible reason for the lower rates among some Asian Coloradans could be challenges with implementing translation services within telemedicine. The American Indian/Alaska Native population and those identifying as multiracial had the lowest decrease in overall encounters: 29% and 23%, respectively.

Decreases in ambulatory visits during the pandemic by race appear to have been partially offset by adoption of telemedicine. The changes in total visits for American Indian/Alaska Native and multiracial patients were at least 28 percentage points smaller than the changes in ambulatory-only visits among these patients. These groups also experienced the highest adoption rates of telemedicine during the pandemic at 37% or greater (see Figure 4).

In contrast, Asian patients experienced a decrease in total visits only 13 percentage points lower than their drop in ambulatory-only visits. These patients also showed the lowest adoption rates of telemedicine during the pandemic at 27% (see Figure 4). Hispanic Coloradans show similar drops in overall encounters during the pandemic compared to non-Hispanic Coloradans (42% and 46%, respectively).

Telemedicine adoption did not differ substantially between men and women. During the analysis period, 33% of encounters for female patients were via telemedicine, compared to 31% for male patients.

How Has Telemedicine Affected the Volume of Care Delivered by Different Providers During the Pandemic?

CHORDS data allow a deeper look at certain provider types, to understand how trends in telemedicine and overall utilization varied during the analysis period.

Telemedicine care by Federally Qualified Health Centers (FQHCs) increased from a pre-pandemic average of two encounters to 7,300 encounters per week during the analysis period. This increase was almost enough to offset the large decrease

in ambulatory care during the analysis period. Telemedicine use increased dramatically at community mental health centers (CMHCs) as well, from 19 to 8,400 encounters per week; CMHCs' total care volume actually increased during the analysis period compared to the baseline. Telemedicine encounters among all other providers (including large ambulatory and acute care health systems) increased similarly, from fewer than 10 to almost 9,000 per week, but telemedicine represented a smaller share of total care delivered.

Federally Qualified Health Centers

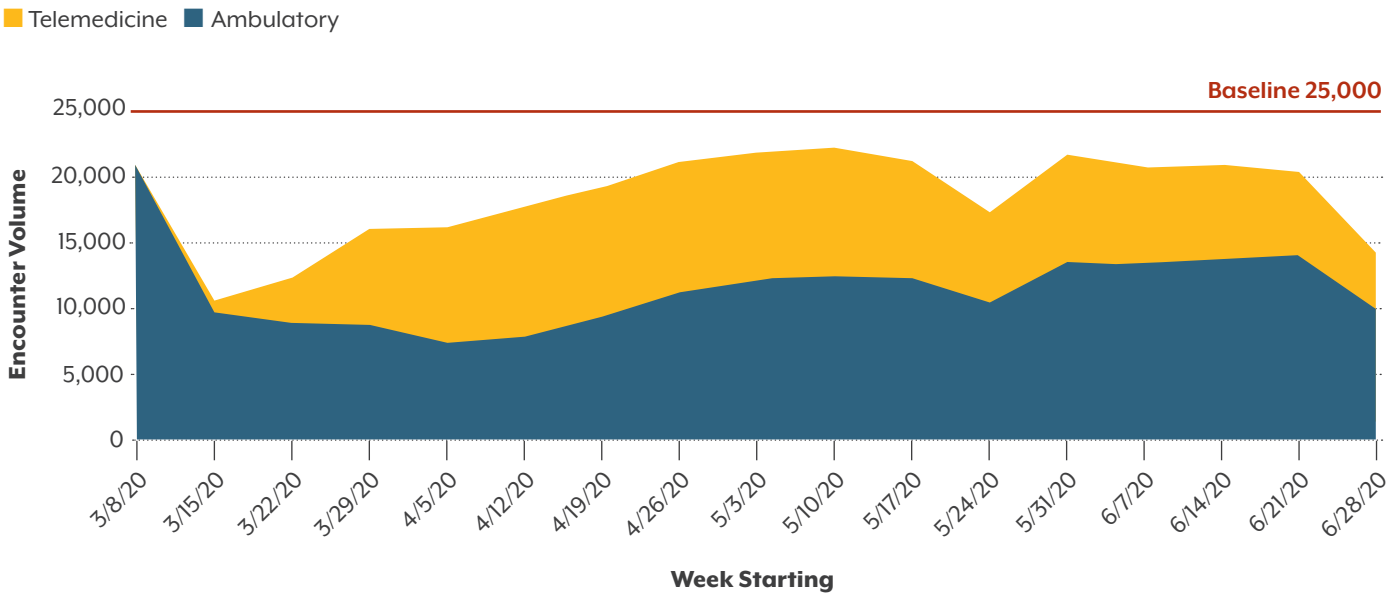
FQHCs provide primary care, including preventive physical, dental, and behavioral health services. They are located in medically underserved areas and among medically underserved populations.

FQHCs receive federal grant funding as well as cost-based reimbursement from Medicaid and Medicare. Data from six FQHCs show a rapid, dramatic decrease in ambulatory care quickly followed by a sharp rise in telemedicine (see Figure 6). FQHCs were not permitted to bill for telemedicine services by either Medicaid or Medicare prior to the relaxation of restrictions due to the pandemic, but they were able to pivot to telemedicine relatively quickly in the early weeks of the pandemic.

Due to swift telemedicine adoption and a gradual rebound in ambulatory visits starting in week 7 (week starting April 26, 2020) of the analysis period, FQHCs posted total encounter volume of more than 83% of baseline volume (excluding weeks 11 and 16, when lower volume was likely due to a holiday-related closure).

FQHCs continued to provide ambulatory care throughout the analysis period, but at much reduced volumes. In week 4 of the analysis period (week starting April 5, 2020), FQHCs delivered ambulatory care at under a third (31%) of the weekly average of the baseline. However, due to the combination of telemedicine adoption and continued ambulatory care, FQHCs were able to avoid large, protracted volume decreases. In Week 15 of the analysis period, total encounter volume was down just slightly (down 4%) compared to week 0 of the pandemic.

Figure 6. Federally Qualified Health Center Encounter Volume Over Time, Telemedicine and Ambulatory, March 8 Through July 4, 2020



Note: Dips in overall encounter volumes in week 11 and week 16 are likely due to holiday-related office closures (Memorial Day on May 25 and Independence Day on July 4, respectively).

Community Mental Health Centers

CMHCs provide outpatient, emergency, day treatment, and partial hospitalization mental health and substance use disorder services for residents of designated geographic service areas with low incomes.

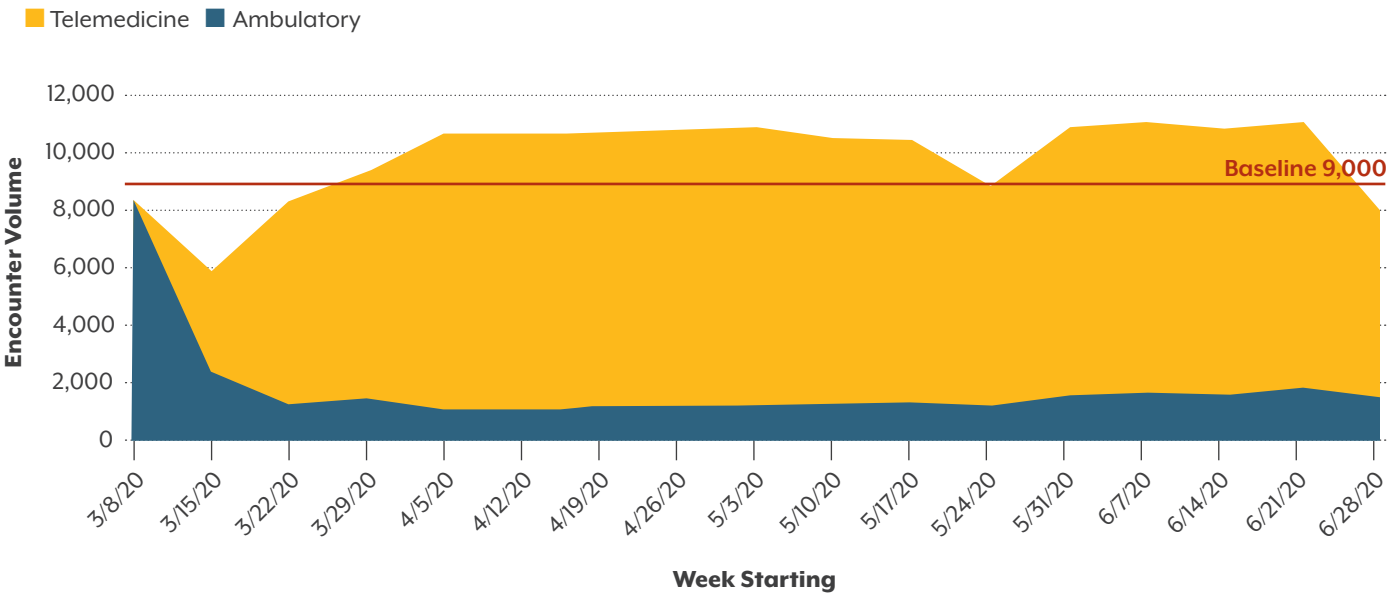
CMHCs experienced an even greater shift toward telemedicine than FQHCs. In the baseline period over 99% of CMHC encounters were in-person ambulatory services, which dropped to only 16% during the analysis period. A majority (84%) of encounters during the analysis period were delivered via telemedicine (see Figure 7).

CMHCs delivered a much higher proportion of services via telemedicine than either FQHCs or the aggregate of all providers in the CHORDS data set, potentially reflecting the strength of fit between telemedicine and many behavioral health services, including talk therapy. Unlike most other providers, CMHCs did not see a strong rebound in ambulatory services after the early weeks of the pandemic — in the second to last week of June (week 15) only 18% of encounters were for in-person care.

For almost all of the weeks during the analysis period, CMHC total encounter volume actually surpassed baseline volume. Qualitative data gathered for this project indicate this was likely due to an increased visit rate for existing patients and a decrease in no-show visits rather than due to an increase in new patients. Patients may be seeking behavioral health care at a higher rate due to pandemic-related factors, or they may have a higher attendance rate for certain services delivered via telemedicine. For more information on the patient experience using behavioral health services through telemedicine, see *Insights From Patients in Colorado.*

This dramatic shift was in many ways a success story: Patients at these CMHCs were able to continue to receive behavioral health services during the pandemic. In some cases, the added convenience of telemedicine may have meant they were able to receive more care than before. These changes may also have major implications for how CMHCs operate in the future. The combination of high telemedicine visit rates and the fact that ambulatory care did not rebound

Figure 7. Community Mental Health Center Encounter Volume Over Time, Telemedicine and Ambulatory, March 8 Through July 4, 2020



Note: Dips in overall encounter volumes in week 11 and week 16 are likely due to holiday-related office closures (Memorial Day on May 25 and Independence Day on July 4, respectively).

materially in the later weeks of the analysis period indicates that telemedicine may be here to stay in a big way for these providers. Future decisions by payers and policymakers on how to continue to reimburse for telemedicine, as well as the continued evolution of patient preference, may or may not cause a larger return to ambulatory care. But CMHCs, as well as other providers delivering behavioral health services, can expect and should prepare for a substantial amount of their services to be delivered remotely for the foreseeable future.

Other Provider Types

Other provider types (including large ambulatory and acute care health systems) also experienced steep decreases in total visit volumes and dramatic growth in telemedicine encounters during the pandemic. However, telemedicine adoption rates were significantly lower for these providers than for FQHCs and CMHCs.

Telemedicine encounters represented just 19% of all encounters at these other provider types during the pandemic. By contrast, 40% of FQHC encounters and 84% of CMHC encounters during the pandemic were via telemedicine. Possible causes for lower telemedicine adoption among these providers include competing priorities during the pandemic response such as addressing acute and emergency care needs, as well as the greater difficulty large systems face in quickly pivoting to new care processes, especially without existing technological infrastructure.

Telemedicine Care Delivery by Health Condition and Procedure

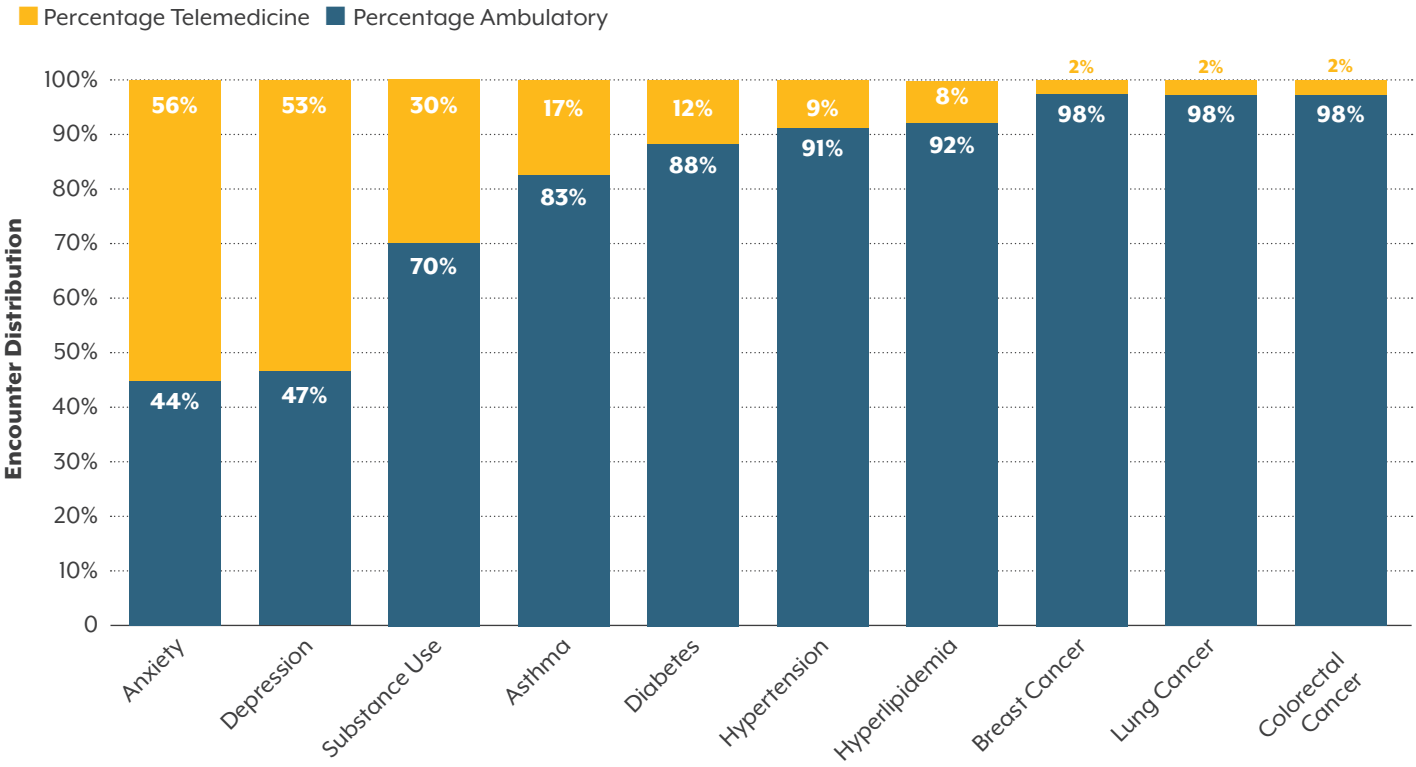
Examining the CHORDS data by health condition, as well as volumes for specific diagnostic and screening procedures, provided insight into which types of care more successfully translated to telemedicine. Services involving conversational therapies had higher adoption of telemedicine than services requiring hands-on treatment. Of the screenings and diagnostics analyzed, the largest decrease during the analysis period was for wellness exams (which typically include a review of medical history, routine measurements such as height, weight, and blood pressure, and personalized health advice), down 74%. Volume for services related to chronic disease management saw a smaller but still substantial decrease, suggesting potential serious implications for the management of those diseases should providers be limited to virtual care in the future.

Telemedicine adoption for encounters with diagnoses of behavioral health conditions (anxiety, depression, and substance use disorder) was much higher than for other chronic conditions such as asthma, diabetes, hypertension, and hyperlipidemia (see Figure 8). In fact, telemedicine encounters accounted for over half of all visits for patients diagnosed with anxiety and depression during the pandemic (56% and 53% respectively). Telemedicine adoption for various types of cancer (breast, colorectal, and lung cancers) was minimal (2% or below), reflecting the limitations of telemedicine for treating conditions that require in-person care.

Comparing CHORDS total encounter volumes (for both telemedicine and ambulatory services) during the analysis period shows a sobering picture of dramatically reduced care for many serious conditions as a result of the pandemic (see Figure 9). For each condition analyzed, total encounters dropped by more than a third for all but colorectal cancer, which still dropped by 28%. Clearly the chaos caused by the pandemic had a serious impact on the treatment of many Coloradans with serious health conditions and comorbidities, many of which cannot be treated comprehensively through telemedicine alone.

Decreases in encounters were particularly notable for chronic conditions requiring regular management such as hyperlipidemia, hypertension, asthma, and diabetes. Each of those four conditions saw at least a 66% decrease in encounter volume during the analysis period, indicating many patients with those chronic conditions may have fallen behind in their care management and may have complications in the future as a result. As part of this research, CHI interviewed patients about their experiences with telemedicine during the pandemic. When asked if their care or services had changed since the start

Figure 8. Encounters by Diagnosis, Telemedicine and Ambulatory, Analysis Period (March 15 Through July 4, 2020)



Note: Encounters for patients with multiple diagnoses are included in all applicable categories.

Figure 9. Change in Ambulatory Encounters Only and Combined Ambulatory/Telemedicine Encounters by Condition, Baseline Period (March 17 Through July 6, 2019) to Analysis Period (March 15 Through July 4, 2020)

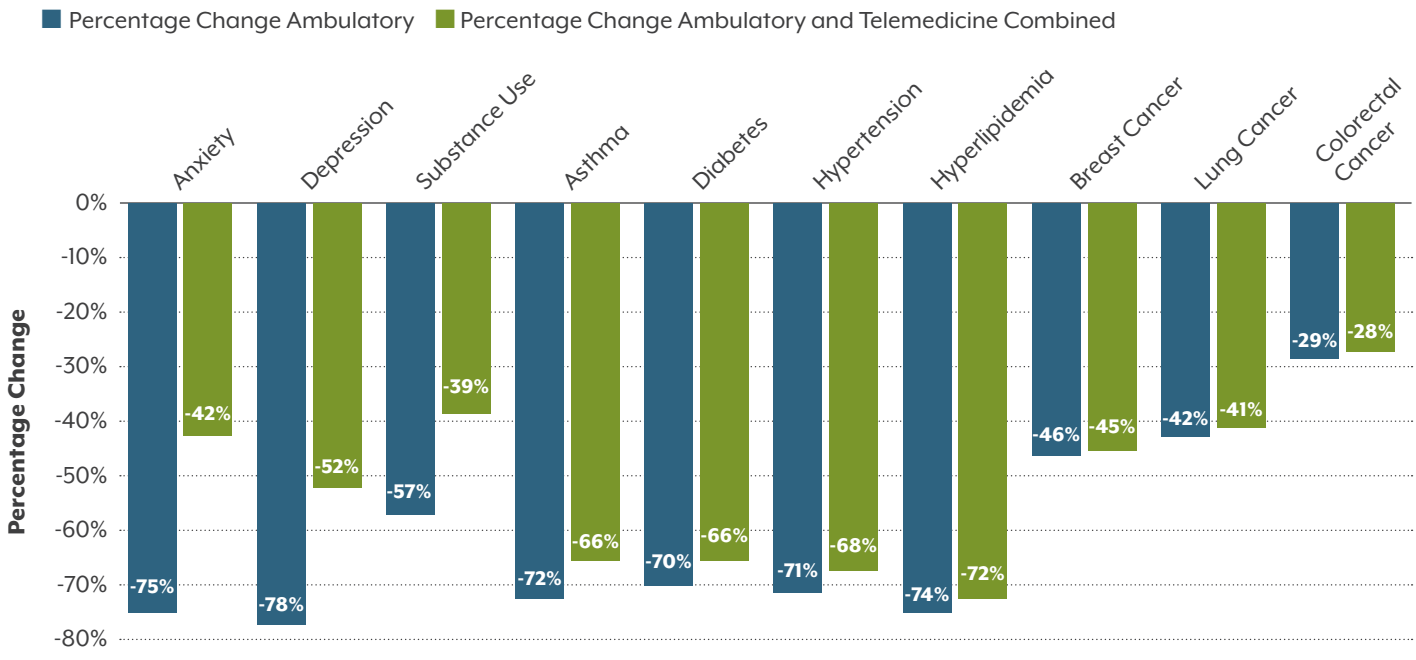
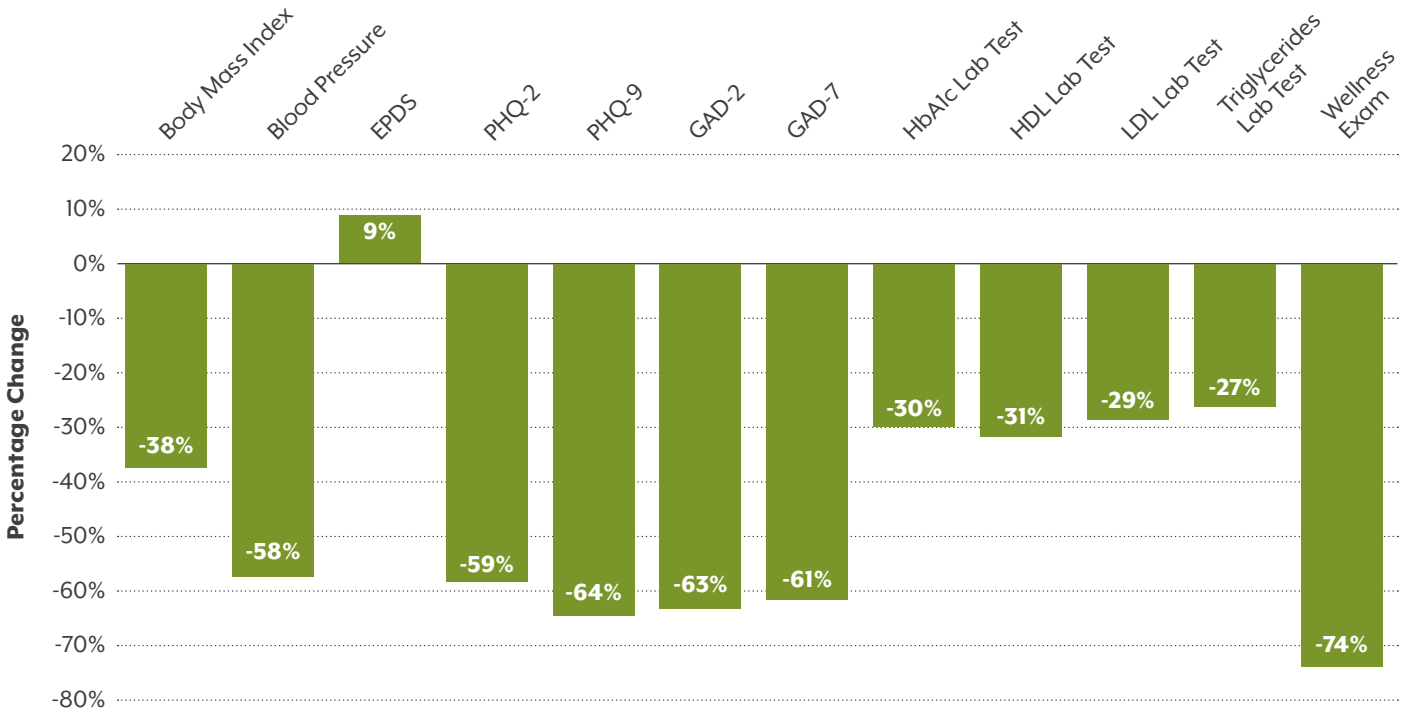


Figure 10. Change in Combined Telemedicine and Ambulatory Encounters for Selected Diagnostic Vitals, Screenings, and Lab Tests, Baseline Period (March 17 Through July 6, 2019) to Analysis Period (March 15 Through July 4, 2020)



of the pandemic in a way that made it difficult to manage their health, one patient said, "There are multiple conditions I have put off treatment for, including physical therapy, thyroid medication, and monitoring my liver levels."

Equally as concerning are the substantial decreases in encounter volume for breast cancer, lung cancer, and colorectal cancer during this time.

Decreases in ambulatory encounters during the pandemic by condition appear to have been partially offset by the adoption of telemedicine, particularly for encounters related to behavioral health conditions. Patients with these conditions had the greatest adoption of telemedicine during the pandemic, with telemedicine representing at least 30% of encounters. For example, ambulatory encounter volume for the conditions of anxiety and hyperlipidemia decreased by a similar amount (75% and 74% respectively, see Figure 9). However, during the analysis period, 56% of encounters related to anxiety were delivered via telemedicine, compared to only 8% for hyperlipidemia (see Figure 8). As a result, total encounter volume for anxiety decreased by only 42%, compared to a 72% decrease in the encounter volume for hyperlipidemia (see Figure 9).

Measurement of vitals, diagnostic screenings, lab tests, and preventive visits were down significantly across the spectrum of those included in this analysis, with the exception of the Edinburgh Postnatal Depression Scale (EPDS), a screening for pregnant or new mothers (up 9%) (see Figure 10). Wellness exams jump out as the largest decrease, with volume at only about a quarter of the baseline, suggesting that people who were relatively healthy may have postponed preventive care.

Tests and screenings related to chronic conditions such as diabetes and hyperlipidemia were down

as well, but not down as significantly, indicating management of those diseases may have been a higher priority for patients and providers than screenings for otherwise healthy individuals such as the wellness exam. Or providers may have prioritized these services for whatever in-person care they were able to provide. Many patients interviewed said they were least likely to use telemedicine for tests and screenings related to chronic care management. For more information on the patient experience managing their health telemedicine, see *Insights From Patients in Colorado*. These substantial decreases are still cause for concern, however, as they may have potential negative effects on the management of these patients' health.

Down more significantly were screenings for anxiety and depression, specifically the GAD-2, GAD-7, PHQ-2, and PHQ-9. Volumes for these screenings decreased by around 60%, indicating many potential new cases of these behavioral health conditions were being missed. These screenings can be done via telemedicine, but one provider said that their telemedicine workflow was not built to accommodate them. Typically, a medical assistant or other support provider would conduct the screenings before the doctor physically walks into the room. The telemedicine workflow was not built to accommodate this handoff.

Interestingly, the volume of EPDS screenings, also a depression screening, was up slightly from the baseline. This may be because these screenings could be conducted as part of a bundle of procedures during a standard postnatal visit or because pregnancy-related visits were prioritized for in-person care during the pandemic.

Telemedicine Adoption by Insurance Type

Payer data was available for five safety net providers that offer care to people who have low incomes, are uninsured or underinsured, or are enrolled in publicly funded health insurance programs, regardless of their ability to pay. Trends in encounters covered by Medicaid, the Child Health Plan *Plus* (CHIP/CHP+) and uninsured/self-pay were analyzed (private insurance data were suppressed due to inadequate sample size).

This subset of payers and providers experienced a similar decrease in encounters during the analysis period, down 42% compared to 43% for all payers and providers in the overall data set.

Of patients receiving care at those providers, Medicaid patients had the highest adoption of telemedicine at 21% of total encounters, followed by CHIP/CHP+ at 14% adoption (see Figure 11).

Decreases in ambulatory encounters during the pandemic appear to have been partially offset by adoption of telemedicine. The drop in total encounters for Medicaid patients was 13 percentage points smaller than the respective drop in ambulatory-only encounters for these patients (see Figure 12). Medicaid also experienced the highest adoption rates of telemedicine during the pandemic: 21% of all encounters were via telemedicine (see Figure 11).

Figure 11. Telemedicine and Ambulatory Encounter Distribution by Payer, Analysis Period (March 15 Through July 4, 2020)

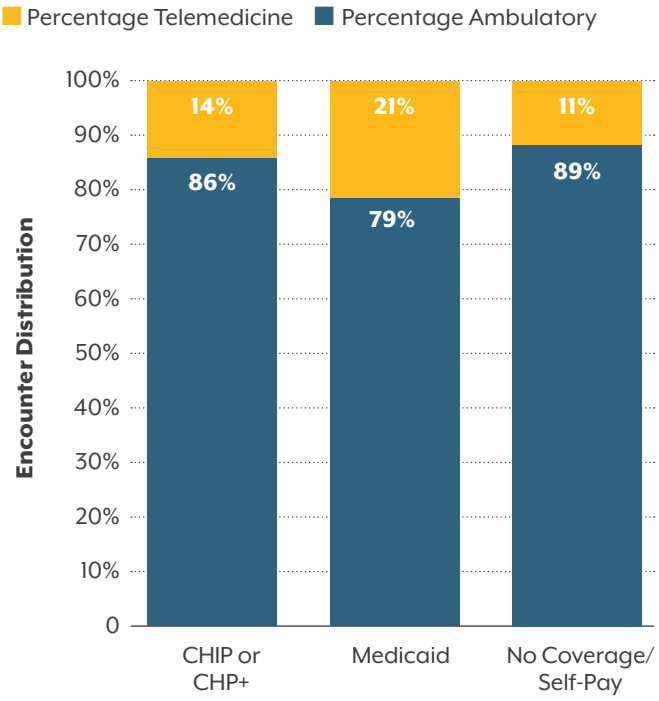
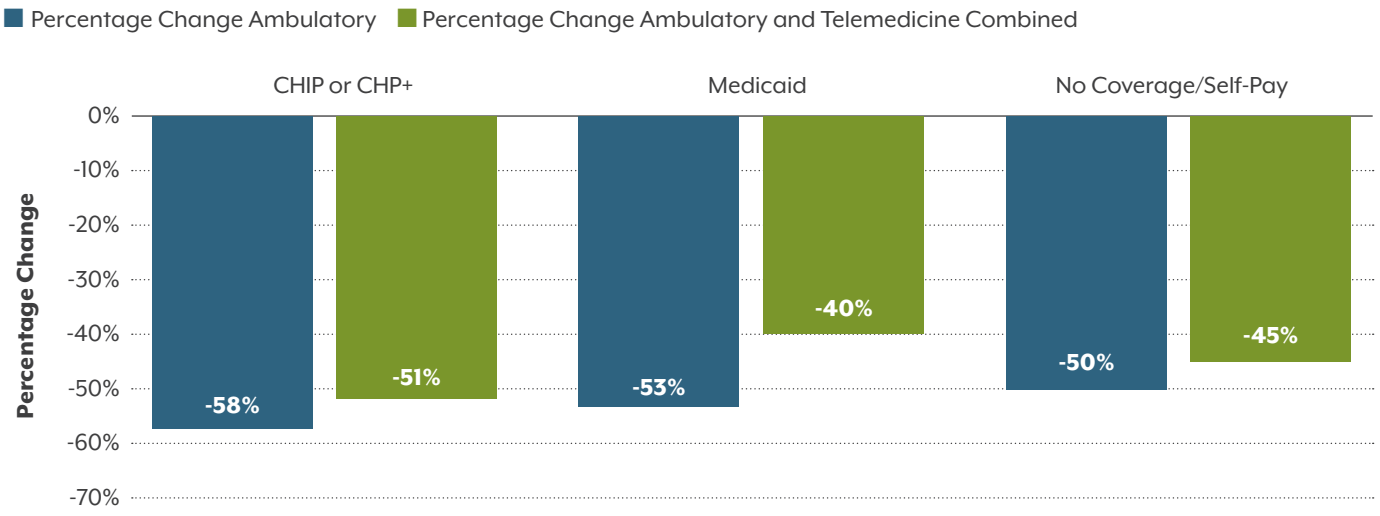


Figure 12. Change in Ambulatory-Only Encounters and Combined Ambulatory/Telemedicine Encounters by Primary Payer, Baseline Period (March 17 Through July 6, 2019) to Analysis Period (March 15 Through July 4, 2020)



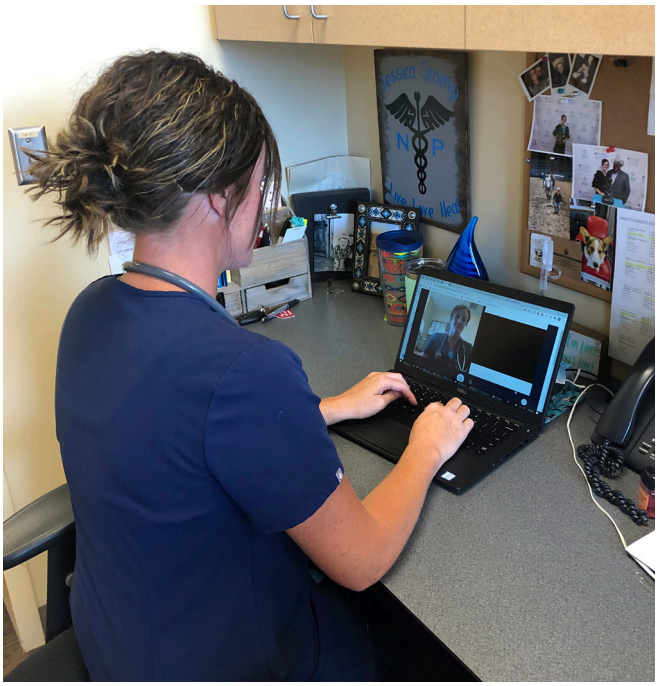
By contrast, patients who were self-pay or uninsured experienced a decrease in total encounters that was just 5 percentage points lower than their drop in ambulatory-only encounters. Access to telemedicine may have been particularly difficult for uninsured or self-pay patients. Just 11% of this group's encounters took place via telemedicine. This may indicate access problems exacerbated significantly during the pandemic for the population that already had the hardest time accessing care.

Telemedicine Adoption by Modality (Telephone and Video)

CHORDS data, as well as conversations with patients and providers, suggest that Colorado's providers and patients rapidly adopted audio-only telemedicine, with slightly slower growth in video visits as providers stood up their systems and connected patients to their technology (see Figure 13). But video visits eventually outpaced audio-only visits as the most preferred modality. For more information on the provider and payer response to the COVID-19 pandemic, see *The Financial Impact on Providers and Payers in Colorado.* This analysis is based on a subset of CHORDS partners based on data availability.

Audio telemedicine ramped up sharply from week 0 to peak in week 4 and decreased slightly each week after that. Video encounters grew steadily during the early weeks of the analysis period, but at a slower rate than audio visits. This was likely because providers needed more time to obtain or upgrade a system capable of conducting video visits. Interviews with providers and patients also suggest some patients needed to be trained or nudged to install or log into video visit systems. These barriers largely do not exist for audio-only visits, which are typically conducted as a phone call.

By week 6 (April 19, 2020), video encounters had surpassed audio encounters. Audio encounters began decreasing the previous week as patients shifted onto video platforms. It may also be the case that some audio-only patients began returning to in-person care. Figure 1 shows that week 6 was when ambulatory volumes began to slowly rebound after sharply dropping off in the early weeks of the pandemic. Qualitative data from patient interviews found three-fourths of patients interviewed (76%) prefer video platforms,

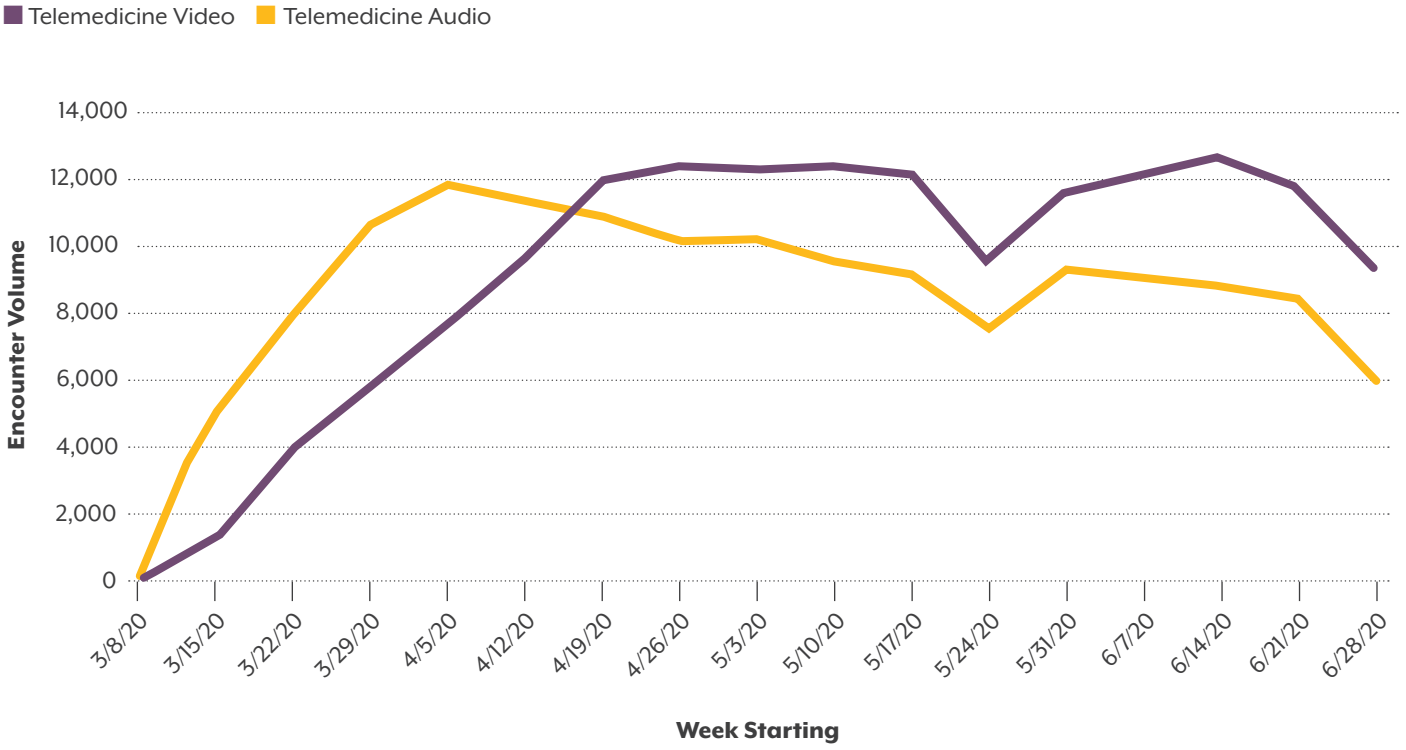


Patients and providers at the Family Practice of Holyoke have embraced telemedicine services during the COVID-19 pandemic.

fewer than one in four (18%) preferred the telephone, and one patient (6%) preferred e-chat.

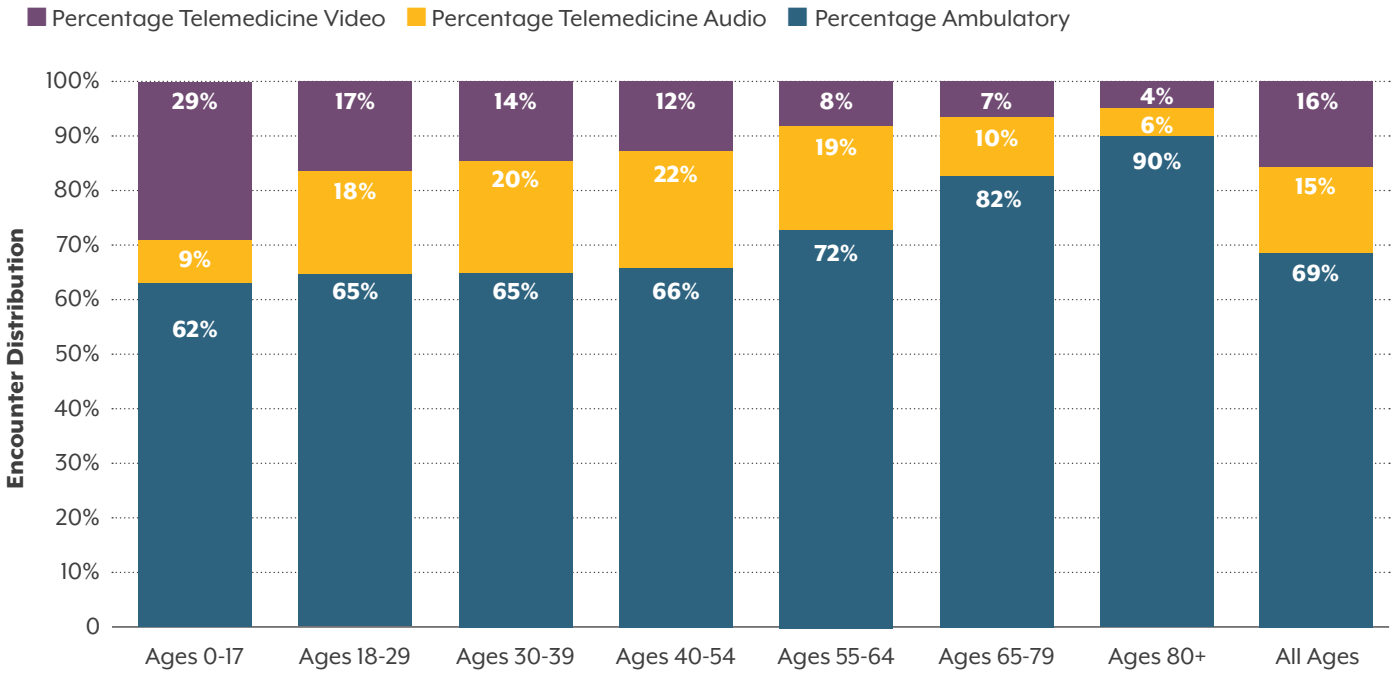
Higher age was correlated with lower adoption of video telemedicine, as well as lower adoption of telemedicine overall (see Figure 14). The 0 to 17 group was the only age group to use more telemedicine by video than audio. One behavioral health provider interviewed by CHI for this research said video was essential for engaging with younger children (such as those ages 6 to 9), with the relative effectiveness of telephone care improving with age. The next age group, those between ages 18 to 29, was about equally likely to use either audio or video. Video telemedicine adoption continued to drop off with each increasing age group. This may indicate a decreasing preference for video, or decreasing access, or both. Given that video was more difficult to access, particularly in the early weeks of the pandemic, these data might slightly understate the preference for video among all age groups.

Figure 13. Telemedicine Encounter Volume by Modality, March 8 Through July 4, 2020



Note: Dips in overall encounter volumes in week 11 and week 16 are likely due to holiday-related office closures (Memorial Day on May 25 and Independence Day on July 4, respectively).

Figure 14. Telemedicine Adoption by Modality and Age, Analysis Period (March 15 Through July 4, 2020)



Stephanie Allred, Senior Clinical Director with Axis Health System in southwest Colorado, displays some of her organization's telemedicine capabilities. PHOTO BY JERRY MCBRIDE/DURANGO HERALD

Opportunities to Increase the Value of Telemedicine

Telemedicine has been vital in partially offsetting dramatic decreases in ambulatory care during the pandemic. Without a rapid shift to telemedicine, a much greater amount of care would have been forgone, or many more Coloradans would have potentially exposed themselves to COVID-19. There is also significant value for telemedicine beyond the pandemic, but that value proposition is less defined: providers, payers, and policymakers must come together to determine when telemedicine should be used, how it is paid for, and what investments should be made to increase access and quality.

This unprecedented shift to telemedicine from ambulatory care presents an opportunity to rethink how care is delivered in Colorado even after the pandemic has passed. But there are considerable barriers to be addressed before reaching that stage.

Finding: Telemedicine provides essential access to physical and behavioral health services for patients during a pandemic. A precipitous drop in in-person visits was significantly mitigated by the rapid adoption and use of telemedicine services.

Opportunity: Continued investments in telemedicine infrastructure by providers, policymakers, and other relevant stakeholders will further prepare Colorado for the continued effects of the COVID-19 pandemic, as well as future crises causing disruptions of in-person care. Public investment in rural broadband, as well as policy incentives for providers to invest in the hardware and software necessary to more effectively deliver their services remotely, would further bolster access in underserved areas of the state.

Finding: The use of telemedicine decreases with age. The over-80-year-old population used telemedicine for only 13% of their visits to providers, even though this group is at highest risk during the pandemic.

Opportunity: Efforts to promote digital literacy, to connect older populations with the necessary technology, and to make telemedicine more user-friendly could improve access to care for this population. This may include collaboration on educational activities with organizations and agencies that serve older adults, working with technology vendors to simplify their products and include features that are accessible and familiar to older adults, and identifying strategies to align with technology efforts that promote and enable "aging in place" among older adults.

Finding: Telemedicine was adopted at somewhat lower rates among Asian and Black patients compared to American Indian/Alaska Native, white, and Hispanic patients.

Opportunity: Multiple barriers likely contribute to this inequity, including access to technology and access to providers offering accessible telemedicine services at convenient times and with adequate translation services. Outreach to these populations and investment in technology for patients and providers is essential to connecting them to the services they need to manage their health during the pandemic and beyond. Further research into barriers to care for these populations may uncover additional areas to target.

Finding: Telemedicine adoption by patients diagnosed with specific medical conditions varied greatly during the pandemic. Patients diagnosed with behavioral health conditions (e.g. anxiety and depression) used telemedicine for most of their visits during the pandemic, while patients with other chronic conditions (e.g. diabetes and hypertension) did not use telemedicine as frequently to meet with their providers.

Opportunity: Understanding the barriers to telemedicine use for patients with certain chronic conditions, as well as what can be treated remotely and what requires in-person care, can increase the appropriate use of telemedicine for these patients and improve the treatment of their diseases.

Finding: During the pandemic there were dramatic decreases in the recording of vitals, diagnostic screenings, lab tests, and preventive visits. Drops in these procedures have significant long-term impacts upon the diagnosis and treatment of medical conditions.

Opportunity: A systematic review published by the Agency for Healthcare Research and Quality found evidence that telemedicine is effective for remote patient monitoring for patients with chronic conditions.[8] Care could improve through investment in connected devices for remote patient monitoring to provide diagnostic information such as blood glucose, weight, and/or blood pressure to providers, particularly for patients who are home-bound or cannot visit medical offices in person, including those at greater risk for COVID-19 infection. At the same time, technical assistance and education may be needed for both providers and patients to implement and use these tools as well as incorporate them into their workflows.

What We Don't Know Yet: Next Steps for Research

These data provide a first glimpse into the rapid change in health care delivery at providers in Colorado, including the adoption of telemedicine, during the COVID-19 pandemic. Many of these initial findings pose additional questions worthy of further research.

Future analyses may further examine the demographic characteristics of those who use telemedicine compared to those who do not, including but beyond variables such as age, race, and ethnicity. Uninsured patients showed particularly low telemedicine use and a large decrease in overall encounters. More research is necessary to understand the experience of those who have historically experienced greater barriers to care such as those who are uninsured, those who lack access to stable housing, those with disabilities, and other marginalized populations.

Telemedicine access required access to technology and telecommunications infrastructure, which can be related to income and geography, two areas for future exploration. As well as further delving into some of the areas uncovered by this brief, such as the low adoption of telemedicine and large decrease in care use among Asian Coloradans, the large decrease in care use for the group ages 0 to 17 is also worth exploring. What services were postponed or missed? What are the potential short-, medium-, and long-term health consequences for that population?

CMHCs had success in pivoting to a telemedicine model, but other providers did not have the same level of success. Given the obvious success in behavioral health utilization of telemedicine, it is worth additional exploration into the quality of services when delivered via telemedicine, and how that might affect when and why telemedicine should be used in the future when pandemic concerns may not be as salient.

Interviews with providers and patients suggest video visits offer a closer facsimile of an ambulatory visit when compared to an audio-only encounter.

Older populations, who often need more care and experience more difficulty with transportation, may benefit from telemedicine in certain situations. Exploring their relatively low use of video visits might help isolate which barriers can be removed to help this population access care.

An exploration of emergency department use was not included in this initial research, but this research is critically important to understanding the care-seeking landscape and the role of telemedicine in potentially reducing emergency department use or as a follow-up service.

Future research may benefit from additional data sources such as claims data, which could provide more detail on services billed and help to answer questions of cost. Claims data also could cover a larger geographic area.

Continued refinement of the CHORDS data set will allow additional granularity in future analyses, including potentially tracking cohorts of patients before and after a particular intervention. Additional data will be available to analyze as the pandemic, and telemedicine care delivery, continues. Additional analyses may look at the evolution of care trends during various phases of the pandemic as well as looking at health outcomes or proxies for health outcomes.

Conclusion

The sudden onset of the COVID-19 pandemic in Colorado caused a rapid and unprecedented expansion of telemedicine. Unfortunately, the pandemic also forced many Coloradans to go without needed care. Certain types of providers, such as CMHCs, and certain services, such as those related to anxiety and depression, more successfully translated to telemedicine than other providers and service types. Older patients, as well as Black and Asian Coloradans, experienced more barriers to accessing telemedicine. Additional investment in telemedicine infrastructure, including broadband and technology access, remote patient monitoring, and development of new care processes, will help to alleviate some of those inequities. Future analyses will continue to assess the role of telemedicine in Colorado.

Methods Appendix

The Colorado Health Observation Regional Data Service (CHORDS)

This research primarily draws on insights from a unique source of clinical data, the Colorado Health Observation Regional Data Service (CHORDS).

CHORDS aggregates medical and behavioral health electronic medical record (EMR) data from 14 contributing providers along the Front Range. These providers include three health systems (Children's Hospital Colorado and the Barbara Davis Center, Denver Health and Hospital Authority, and Kaiser Permanente Colorado), three community mental health centers (Jefferson Center for Mental Health, Mental Health Center of Denver, and Mental Health Partners), and seven Federally Qualified Health Centers (Clinica Family Health, Clinica Tepeyac, Colorado Coalition for the Homeless, High Plains Community Health Center, North Colorado Health Alliance, STRIDE Community Health Center, and Salud Family Health Centers).

Data from CHORDS are more current than most other sources since the data are sourced directly from EMR systems at each provider site. Unlike CHORDS analyses, claims data analyses require either a multi-month lag period (given that claims are not finalized for about three months after they are submitted), or an "incurred but not reported" (IBNR) adjustment. The IBNR methodology allows researchers to examine claims from more recent periods. However, the adjustment is less accurate the more recent the analysis period.

CHORDS also offers more granular insights into clinical practices and provider types within systems than many data sources. It also includes clinical measurements with results of care delivery and allows data to be analyzed by specific demographic factors. It can also support surveillance of incidence and prevalence of conditions (through the use of diagnosis codes, for example), and provide insights on the management of conditions at a population level (through screening and lab results such as body mass index or hemoglobin a1c control).

CHORDS data are not intended to be representative of the entire state but provide insights into telemedicine use among a portion of Coloradans living along the Front Range and seeking care with the medical and behavioral health providers who contribute data.

For more information about the CHORDS network and how data coverage overall and by county compare with the U.S. Census Bureau's 2017 American Community Survey, visit www.CHORDSnetwork.org.

Analysis Details

These analyses include aggregate data from approximately 1.5 million Coloradans (approximately 27% of the state's total 2018 population). The majority of these 1.5 million people live in the following 10 Colorado counties: Adams, Arapahoe, Boulder, Broomfield, El Paso, Denver, Douglas, Jefferson, Larimer, and Weld. The CHORDS data used in these analyses represent approximately 32% of the total population living in these 10 counties in 2018. Some analyses use data from a subset of partners due to limitations in data availability.

For this analysis, telemedicine was defined primarily as encounters that were billed as telemedicine using Place of Service (POS) and/or Current Procedural Terminology (CPT) modifiers. However, not all telemedicine visits had billing indicators. For example, early in the pandemic providers had more variability in how they coded their telemedicine encounters. As a result, there are additional visits that are included depending on the particular provider. Those specifics were worked out in collaboration with individual providers.

The majority of telemedicine encounters are synchronous audio/video (video visits) and synchronous audio-only (phone calls). Other methods of electronic synchronous and asynchronous communication such as email, patient portal messaging, texting, and electronic

chat were excluded from the analysis because providers almost never billed for these forms of communication.

Only ambulatory and telemedicine encounters were included in this analysis. Emergency department, inpatient, and long-term care encounters were not included. Some CHORDS participants coded their encounters as either video or audio-only telemedicine, while others indicated encounters as telemedicine without specifying modality. Analyses looking at differences in modality (video compared to audio-only) only use the subset of participants who did code their modality. Analyses using all CHORDS participants simply combine the two modalities under the umbrella of a telemedicine encounter, and compare telemedicine and ambulatory encounters.

Baseline and Analysis Periods

CHI analyzed de-identified weekly clinical encounter volume for telemedicine and in-person encounters before and during the pandemic to understand how a set of providers adapted to a new set of restrictions and dynamics.

The pre-pandemic period, termed the baseline period, includes data from 16 weeks before the pandemic that roughly corresponds to the analysis period: the 16 weeks from March 17, 2019, through July 6, 2019.

The analysis period includes the 16 weeks from March 15 through July 4, 2020. This time period is labeled on charts and otherwise referred to as weeks 1 through 16.

Week 0 is defined as the second week in March (March 8 through March 14), representing the last week before major pandemic-related restrictions were imposed in Colorado (for example, closures of bars, restaurants, gyms, and ski areas and restrictions on large gatherings).[9]

Endnotes

[1] Governor of Colorado. (2020). Executive Order No. D 2020 009. https://www.colorado.gov/governor/sites/default/files/inline-files/D%202020%20009%20Ordering%20Cessation%20of%20All%20Elective%20Surgeries_0.pdf

[2] Governor of Colorado. (2020). Executive Order No. D 2020 027. https://www.colorado.gov/governor/sites/default/files/inline-files/D%202020%20027%20Elective%20Surgeries_0.pdf

[3] Colorado Health Institute. (2020). "COVID-19 in Colorado: Resources and policy analyses for addressing the coronavirus pandemic." https://www.coloradohealthinstitute.org/research/covid19

[4] Werley, J. (2020). "Colorado hospitals face a $1.2B loss due to coronavirus – and that's just the beginning." Denver Business Journal. May 2020. https://www.bizjournals.com/denver/news/2020/04/15/colorado-hospitals-losses-coronavirus.html

[5] Executive Order No. D 2020 020. (2020). https://www.colorado.gov/governor/sites/default/files/inline-files/D%202020%20020%20Telehealth_0.pdf

[6] Colorado Health Institute. (2020).

[7] Colorado Department of Health Care Policy & Financing. *Telemedicine – Provider Information*. Retrieved September 21, 2020 from https://www.colorado.gov/pacific/hcpf/provider-telemedicine

[8] Agency for Healthcare Research and Quality. (2016). Telehealth: Mapping the Evidence for Patient Outcomes From Systematic Reviews. https://effectivehealthcare.ahrq.gov/sites/default/files/pdf/telehealth_technical-brief.pdf

[9] Colorado Health Institute. (2020).

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Notes

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