THINC-19: Telemedicine and Health Inequalities during the COVID-19 Pandemic

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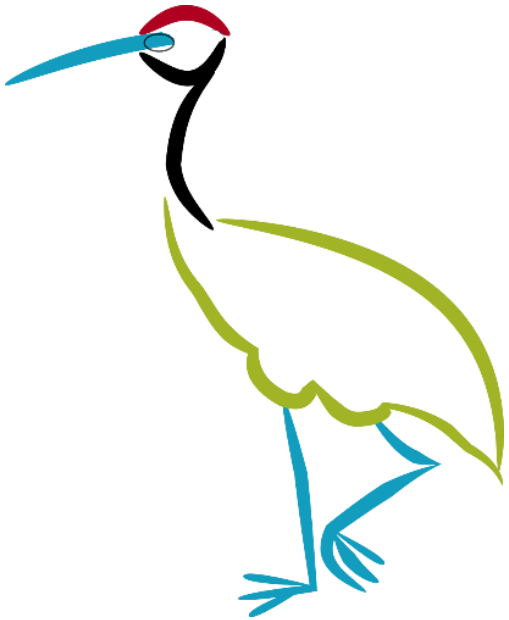
Research Team

Acknowledgements



UNMC's Clinical Research Analytics Environment (CRANE)

Discussion Points

- Status of telehealth use during COVID-19
- Geographic patterns of in-person and telehealth visits during the COVID-19 pandemic
- Telehealth's potential to address and exacerbate disparities in access to care
- Associations of provider access with demographic and socioeconomic factors overall and in patients with diabetes

Background

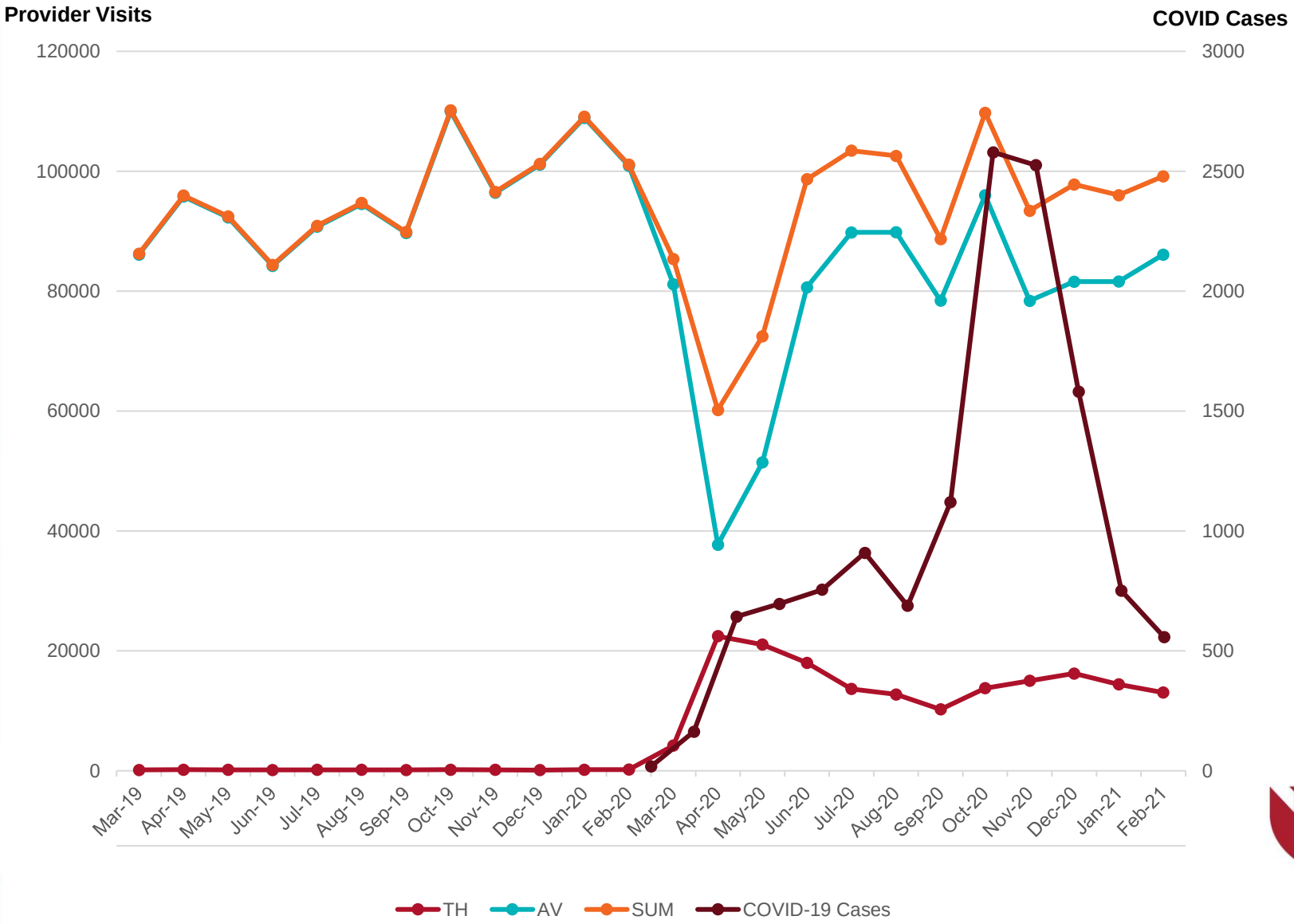
HHS Telehealth Definition: use of electronic information and telecommunication technologies to provide care when the patient and provider are not in the same place at the same time

Prior to COVID-19 pandemic: video visits were reimbursable by CMS when they occurred in a designated rural site at an originating site such as a hospital or clinic.

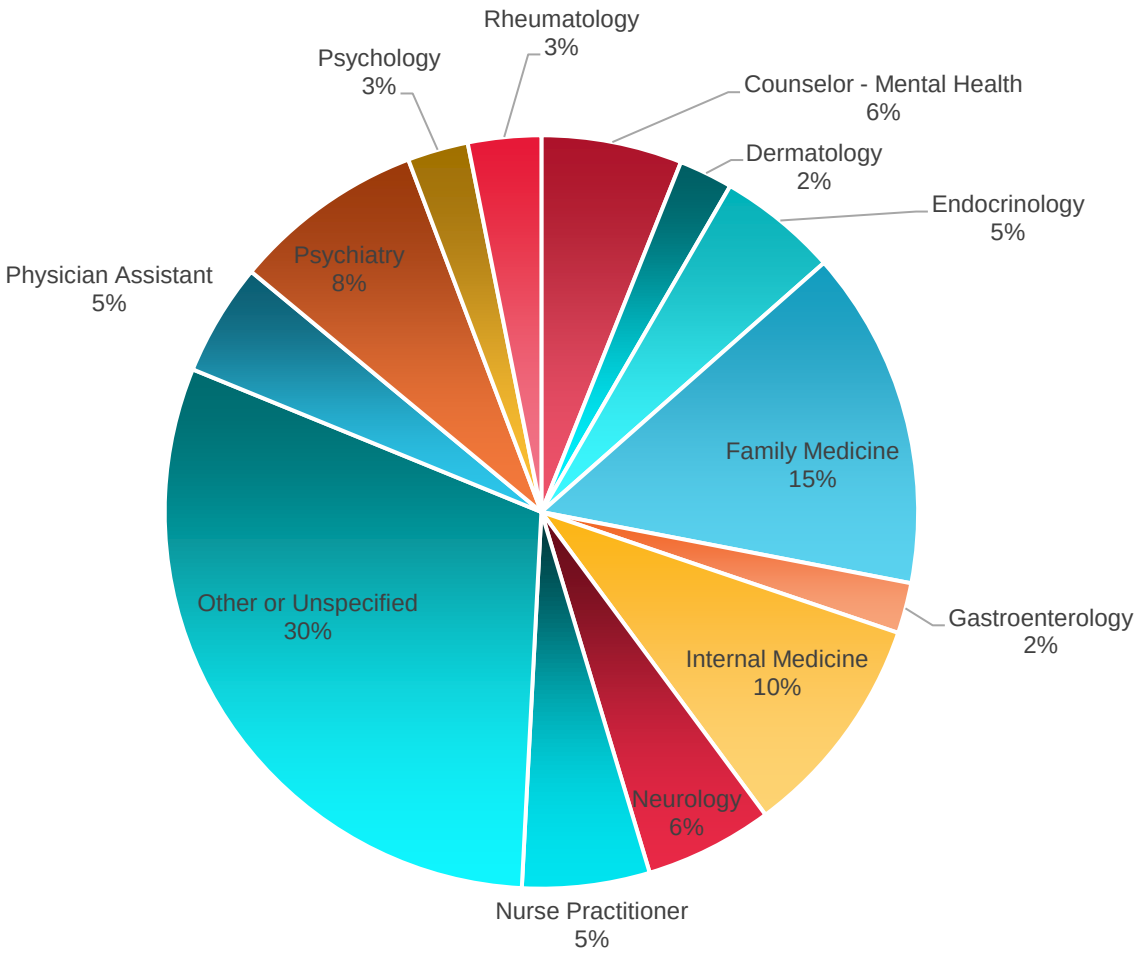
After PHE in spring 2020, home was recognized as place of service and rural stipulation was removed

https://telehealth.hhs.gov/patients/understanding-telehealth/

Ambulatory visits at UNMC

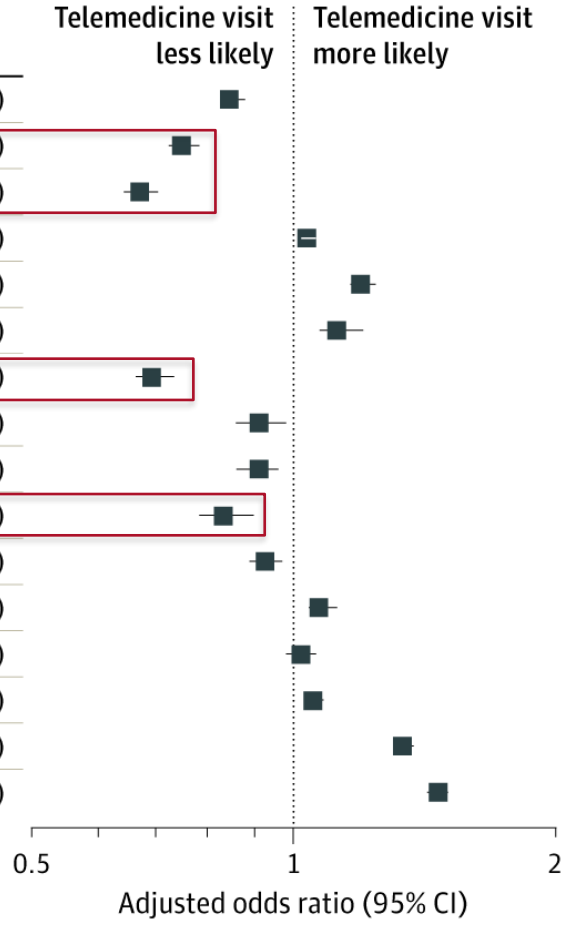


Telehealth visit by Provider specialty



Studies from early phase of the pandemic identified disparities in Telemedicine

Characteristic	Adjusted odds ratio (95% CI)
Aged 55-64 y vs <55 y	0.85 (0.83-0.88)
Aged 65-74 y vs <55 y	0.75 (0.72-0.78)
Aged >75 y vs <55 y	0.67 (0.64-0.70)
Female	1.04 (1.02-1.06)
Black vs White	1.20 (1.16-1.24)
Latinx vs White	1.13 (1.07-1.20)
Asian vs White	0.69 (0.66-0.73)
Other race/ethnicity vs White	0.92 (0.86-0.98)
Unknown race/ethnicity vs White	0.91 (0.86-0.96)
Non-English language	0.84 (0.78-0.90)
Medicaid vs commercial insurance	0.93 (0.89-0.97)
Medicare vs commercial insurance	1.08 (1.04-1.12)
Median household income <$50 000 vs >$100 000	1.02 (0.98-1.06)
Median household income $50 000-$100 000 vs >$100 000	1.05 (1.03-1.08)
Charlson Comorbidity Index score 1-2 vs 0	1.34 (1.31-1.37)
Charlson Comorbidity Index score ≥3 vs 0	1.46 (1.42-1.50)



Ebery et al., 2020

Telehealth and Health Disparities

- Studies from the early phase of the COVID-19 pandemic suggested that older age, non-English speaking status, rural status, Black or Asian race, Hispanic ethnicity and lower SES had lower rates of video visits.
- Other studies reported that Hispanic patients and low-income group had the largest percentage increase in telehealth utilization in response to the COVID-19 pandemic.
- While telehealth has the ability to improve access to care, there is also concern about widening already existing health disparities.

Ebery et al., 2020, Hsiao et al., 2021, Qian et al., 2021

Research Questions

- Were established patients more or less likely to have a visit during COVID, relative to the period just before COVID?

- Did patients who did or did not utilize telehealth during the COVID period differ?

Research Questions (cont.)

- Were established patients **with DM** more or less likely to have a visit during the COVID period, relative to the period before COVID?

- Did established patients **with DM** differ in terms of A1c outcomes (< 8.0% or > 9.0%) between the COVID and Pre-COVID periods?

Methods

Study Design : Retrospective Analyses

Data Source: Nebraska Medicine EHR Data (deidentified)
Mar 2017-Mar 2021

Inclusion Criteria

- Had at least one ambulatory visit associated with a provider at Nebraska Medicine
- Between 3/16/2017 and 3/15/2021

Variables Collected

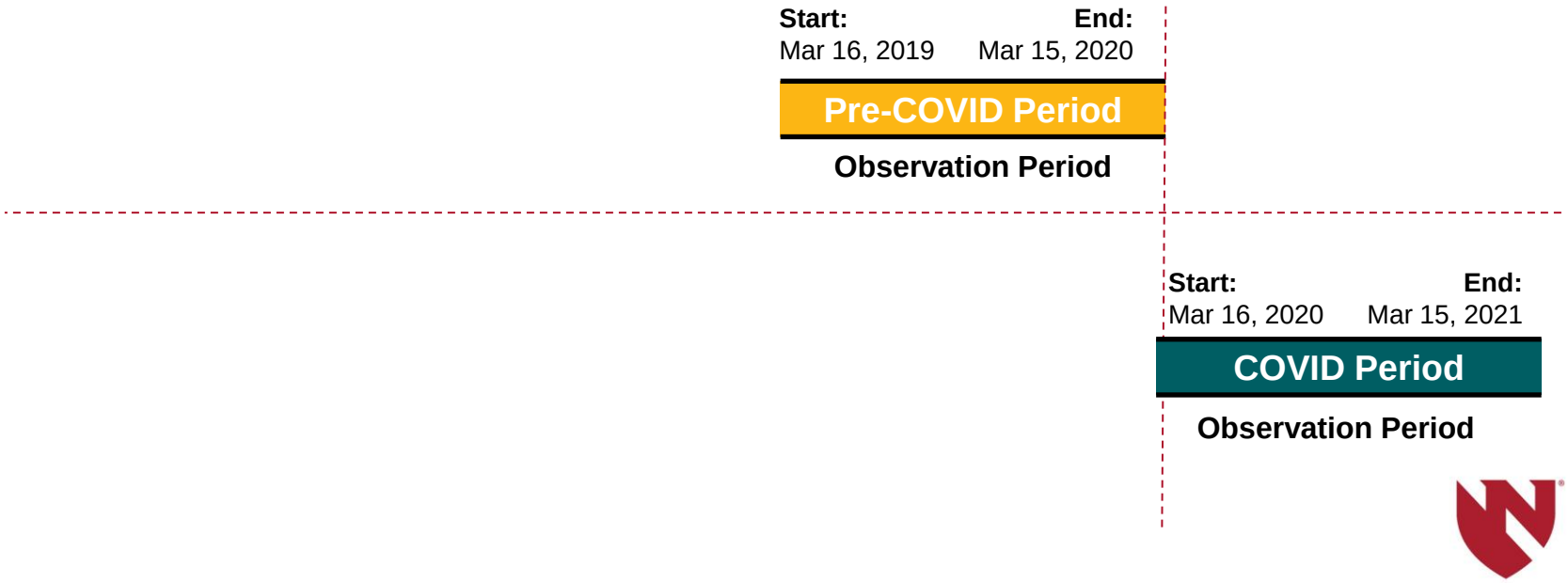
Basic Demographics:
Age, Sex, Race, Ethnicity, Zip code

ACS Census Data Associated with Zip Code:
Median income, % households with Internet

Clinical Characteristics:
Diabetes Status, A1c

Clinic Visit Characteristics:
In-person, Telehealth, ED, IP, Insurance

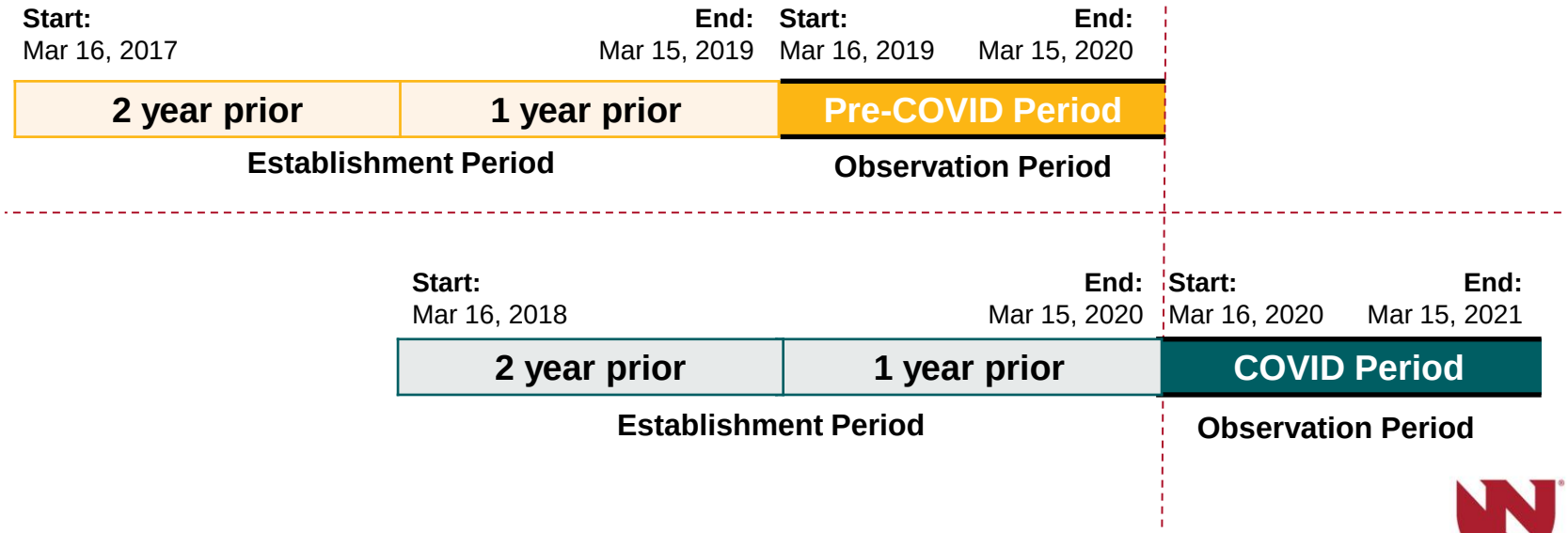
Cohorts Identified by COVID & Pre-COVID Time Periods



Cohorts Identified by COVID & Pre-COVID Time Periods

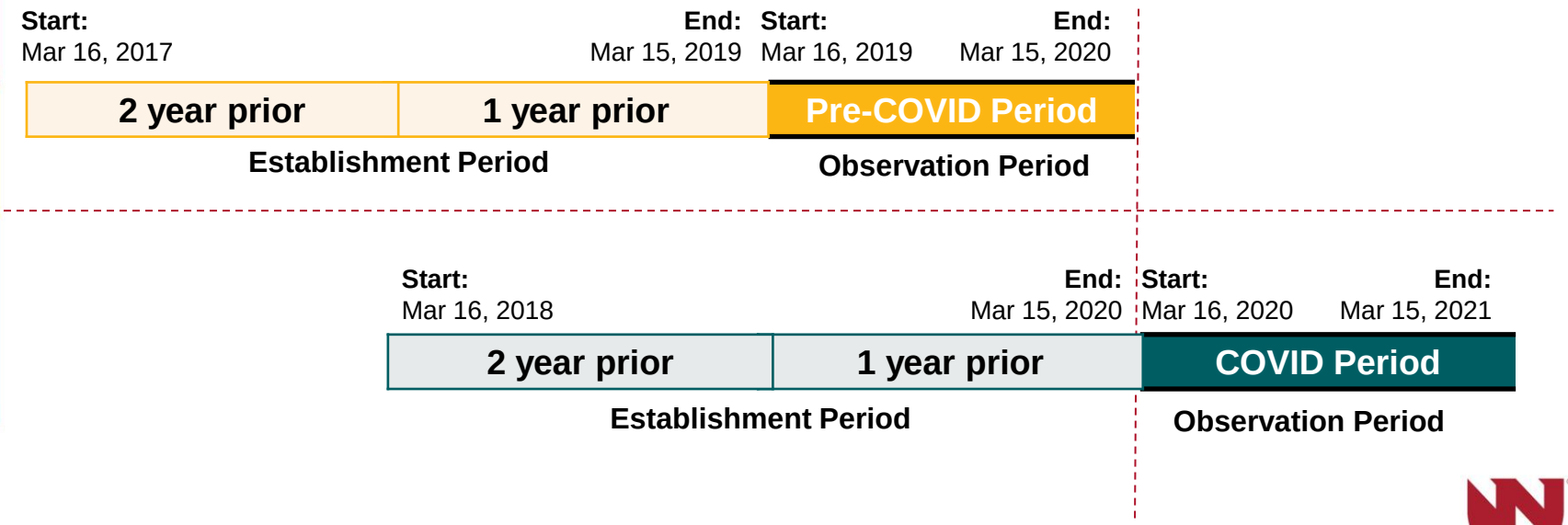
Established Patients: at least 1 outpatient visit in establishment period

New Patients: at least 1 outpatient visit in observation period but none in establishment period.



Diabetes Cohort Also Identified

Established Diabetes: At least 1 outpatient visit and diabetes mellitus (DM) in problem list during the establishment period



Data Processing

Multiple visits from one patient in a timeframe were summarized into a single observation per timeframe

- E.g. Had 4 visits, at least one Telehealth visit

Characteristics were taken at their last visit in established period (or first in period of interest if new patient)

- E.g. Insurance used at last visit in established period

Many patients were in both established periods, or both periods of interest, and thus analyses comparing different time periods may not have independent data.

Statistical Methodology

Mutually Exclusive Group Comparisons

- Chi-square, independent samples t-tests
- Logistic Regressions, with 95% CIs

Non-Mutually Exclusive Group Comparisons

- Descriptive Statistics
- General Estimating Equations, with 95% CIs

Maps

- Rates calculated within zip codes
- Inverse Distance Weighted Interpolation

Results Related to All Patients

Results – Cohort Size

Established Patients

- Pre-COVID: N=128,598
- COVID: N=125,855

New Patients

- Pre-COVID: N=65,068
- COVID: N=53,973

Research Questions

All patients seen in periods of interest

Did patients seen in the COVID period differ from those seen in the Pre-COVID period?

- Established patients
- New Patients

Statistics: Descriptive, Chi-Square, T-tests

Key Demographics

Established Patients by Period*

Characteristic	Pre-COVID (n=128,598)	COVID (N=125,855)
Mean (sd) age (years)	49.3 (21.3)	50.1 (20.8)
Female Gender (%)	59.1%	59.3%
Insurance Status (% commercial)	49.4%	49.0%
Non-White race (%)	17.7%	17.5%
Mean (sd) of zip-code median income	$67,849 (22,797)	$68,116 (22,840)
Urban w/in 30 miles (%)	71.2%	72.5%
Average (sd) zip-code internet access	87.7% (6.8)	87.8% (6.8)

*Cohorts not mutually exclusive – no statistical comparison made

Key Demographics

New Patients by Period

Characteristic	Pre-COVID (N=65,068)	COVID (N=53,973)
Mean (sd) age (years)*	40.4 (22.1)	41.0 (21.6)
Female Gender (%)	54.3%	54.2%
Insurance Status (% commercial)*	56.8%	54.9%
Mean (sd) of zip-code median income*	$67,981 (23,245)	$67,457 (23,240)
Non-White race (%)*	19.2%	19.5%
Urban w/in 30 miles UNMC*	65.0%	67.2%
Average (sd) zip-code internet access*	87.7% (6.9)	87.6% (6.9)

*p<.05 between time periods – for mean or distribution of categorical responses

Research Questions

All patients seen in established period

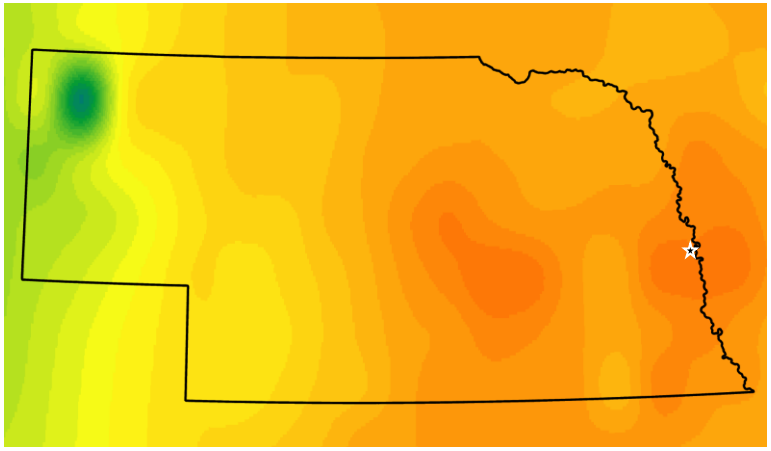
Were patients seen in the established period prior to COVID less likely to have a visit during the COVID period relative to patients in the Pre-COVID period?

- Established patients only

Statistics: Maps, General Estimating Equation

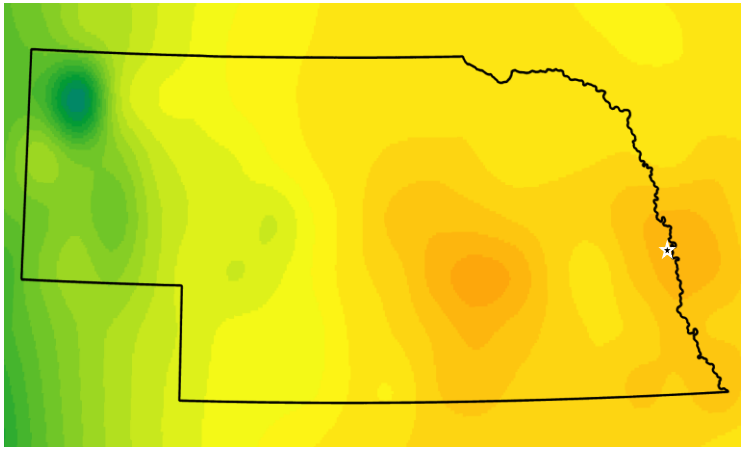
Proportion of Established Patients with Provider Visit(s): In-Person or Telehealth

Pre-COVID Visits

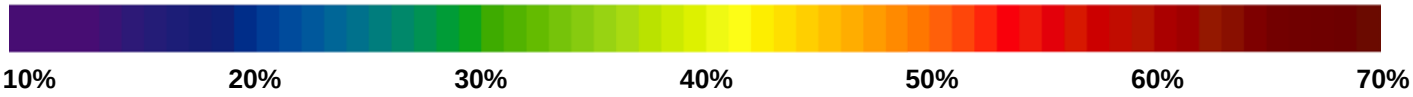


Of all patients from Pre-COVID establishment period, percent seen in Pre-COVID period

COVID Visits



Of All Patients from COVID establishment period, percent seen in COVID Period

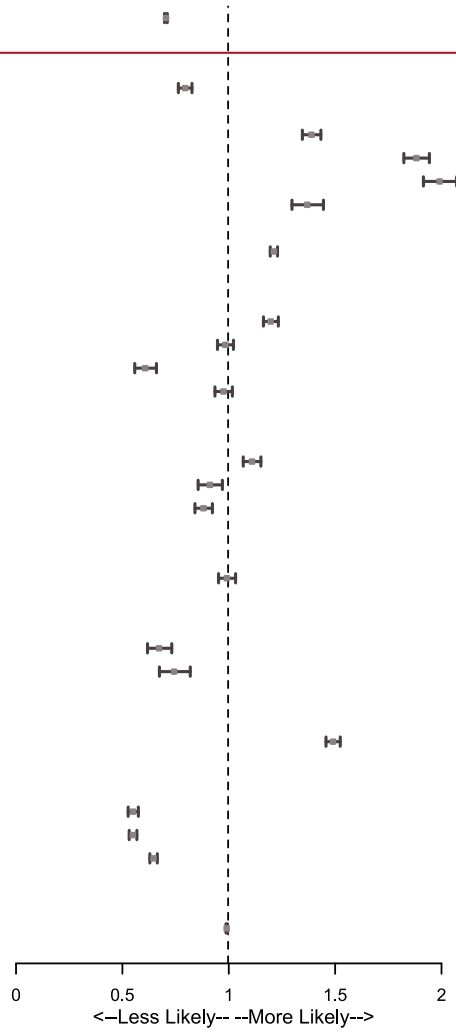


Note: White star indicates main Nebraska Medicine Campus. Maps were created based on data summarized at the zip code level. Centroids of zip codes were used for inverse distance weighting interpolation to generate estimated surfaces. For maps of percentages, zip-codes with denominators less than or equal to five were excluded to help avoid extreme percentages. Excluded zip codes are more common in the western part of the state, which can result in large areas of extreme percentages where areas with missing data are estimated by the few non-missing, extreme percentage areas around it.

Any Visit in Period – Est Pts

Adjusted Odds Ratios of Visit in Study Period

Category	Parameter	Adjusted Odds Ratio (CI)	p value
Time Period			<.0001
	COVID	0.705 (0.698, 0.711)	
	Pre-COVID		
Age			<.0001
	<19	0.795 (0.763, 0.827)	
	19 - 34		
	35 - 49	1.389 (1.346, 1.433)	
	50 - 64	1.882 (1.823, 1.943)	
	65 - 79	1.991 (1.915, 2.071)	
	>=80	1.369 (1.297, 1.445)	
Gender			<.0001
	Female	1.212 (1.195, 1.229)	
	Male		
Insurance			<.0001
	Medicare	1.197 (1.163, 1.233)	
	Medicaid	0.984 (0.947, 1.022)	
	Self Pay	0.607 (0.558, 0.660)	
	Other	0.975 (0.935, 1.017)	
	Commercial		
Race			<.0001
	Black	1.109 (1.068, 1.151)	
	Asian	0.911 (0.856, 0.970)	
	Other	0.881 (0.841, 0.923)	
	White		
Ethnicity			0.658
	Hispanic	0.991 (0.952, 1.032)	
	Non-Hispanic		
Preferred Language			<.0001
	Spanish	0.672 (0.618, 0.732)	
	Other	0.743 (0.674, 0.819)	
	English		
Diabetes Mellitus			<.0001
	Hx of DM	1.490 (1.457, 1.524)	
	No Hx of DM		
Rurality			<.0001
	Nonurban-Adjacent Rural	0.550 (0.527, 0.575)	
	Urban-Adjacent Rural	0.549 (0.532, 0.568)	
	Urban More Than 30 Miles	0.646 (0.629, 0.664)	
	Urban Within 30 Miles		
Income			<.0001
	ZIP Code Median Income (in $10,000s)	0.990 (0.987, 0.994)	



Research Questions

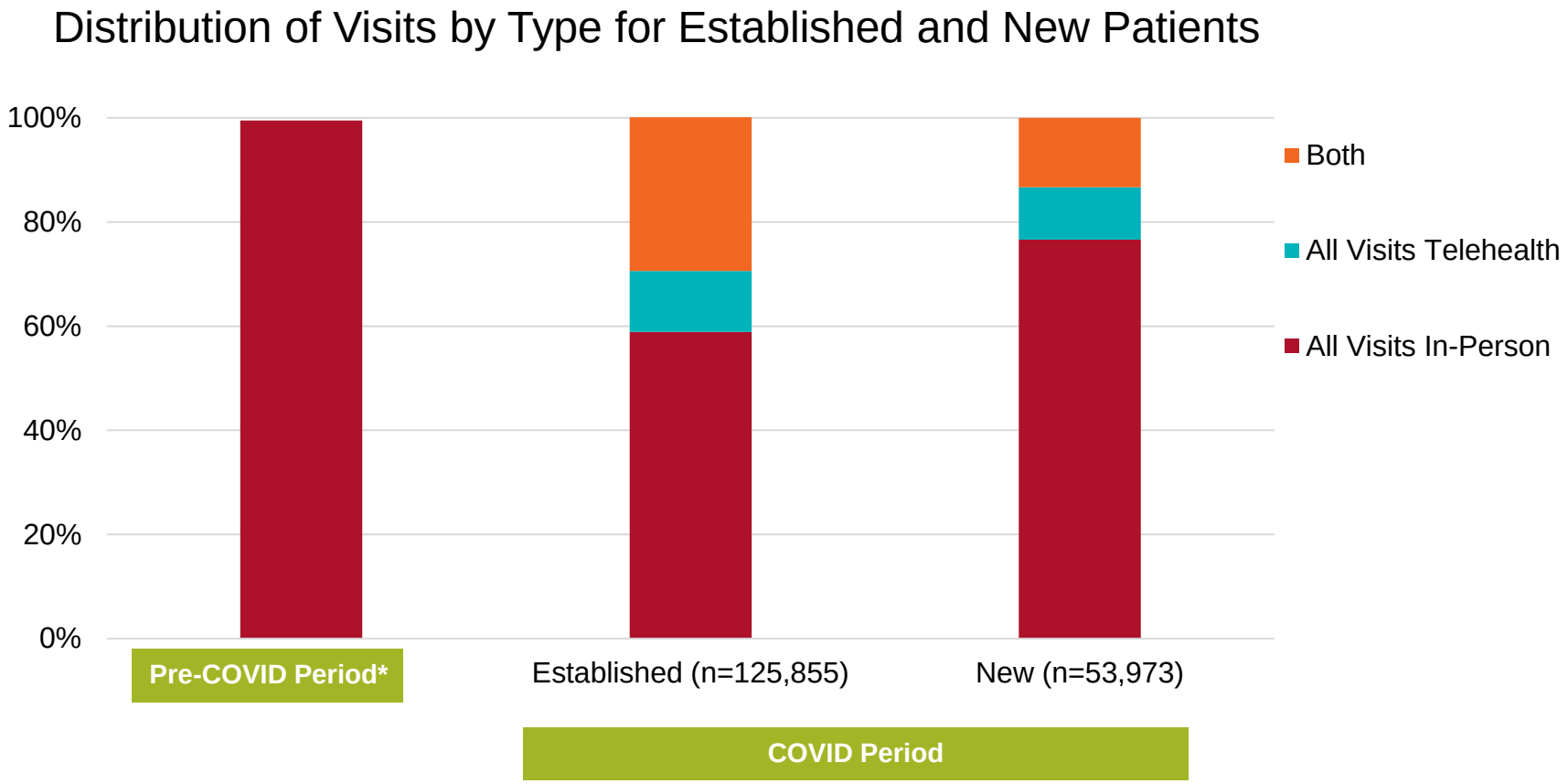
All patients seen in period of interest

Did patients with a telehealth provider visit during the COVID-period differ from those with only in person visits?

- Established patients
- New patients

Statistics: Logistic Regression

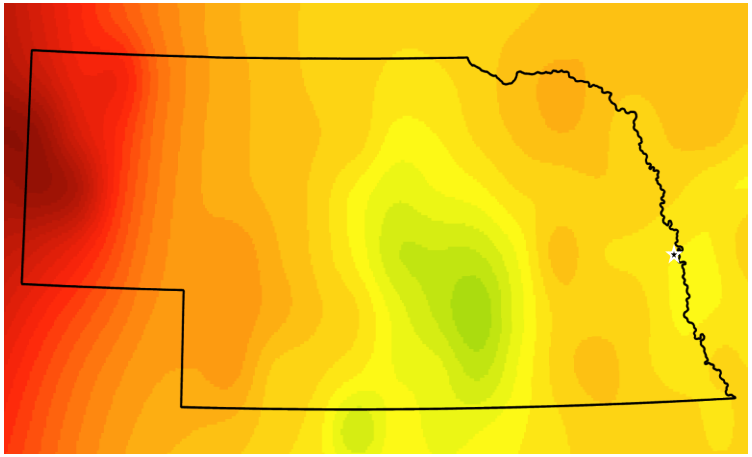
In-Person vs Telehealth Provider Visits



*≥ 99% of new & established patients had only In-Person visits in the pre-covid period.

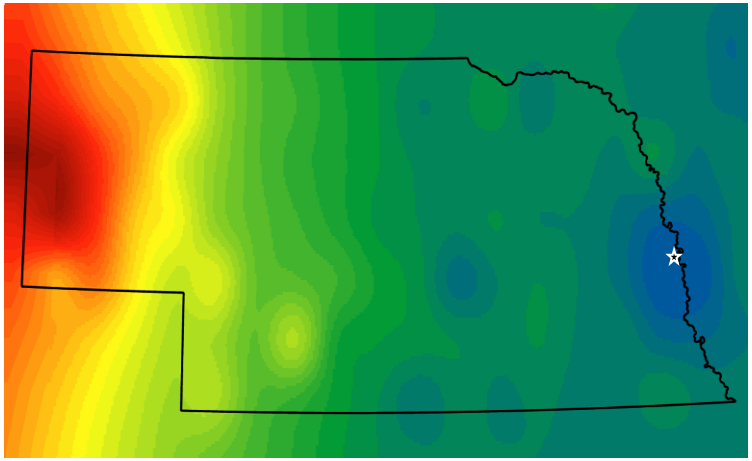
Proportion of Patients with at Least 1 Telehealth Visit During COVID Period

Established Patients

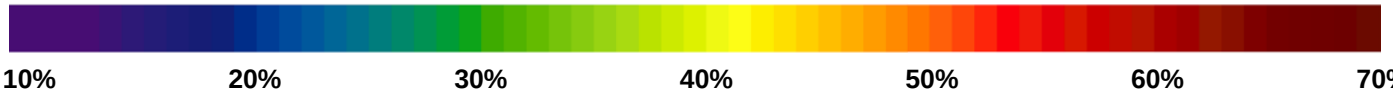


Percent of established patients seen in COVID period with at least 1 telehealth visit

New Patients



Percent of new patients seen in COVID period with at least 1 telehealth visit



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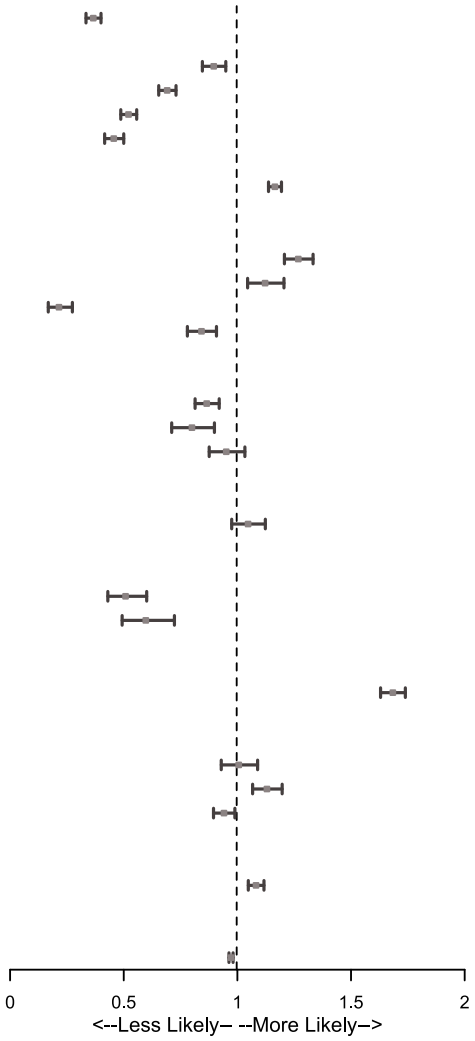
Telehealth Visit – Established Pts

Adjusted Odds Ratios of Telehealth Visit in Study Period for Established Patients

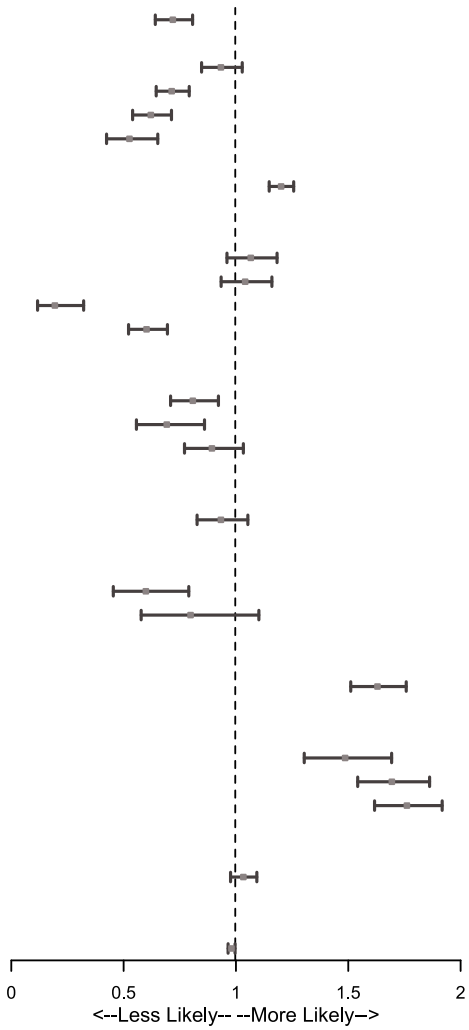
Category	Parameter	Adjusted Odds Ratio (CI)	p value
Age			<.0001
	< 19	0.366 (0.334, 0.4)	
	19 - 34		
	35 - 49	0.896 (0.846, 0.949)	
	50 - 64	0.691 (0.654, 0.730)	
	65 - 79	0.521 (0.487, 0.557)	
	>=80	0.456 (0.416, 0.500)	
Gender			<.0001
	Female	1.165 (1.137, 1.194)	
	Male		
Insurance			<.0001
	Medicare	1.268 (1.207, 1.333)	
	Medicaid	1.122 (1.045, 1.205)	
	Self Pay	0.215 (0.168, 0.274)	
	Other	0.842 (0.780, 0.908)	
	Commercial		
Race			<.0001
	Black	0.865 (0.814, 0.920)	
	Asian	0.800 (0.711, 0.899)	
	Other	0.951 (0.876, 1.033)	
	White		
Ethnicity			0.204
	Hispanic	1.047 (0.975, 1.123)	
	Non-Hispanic		
Preferred Language			<.0001
	Spanish	0.508 (0.430, 0.601)	
	Other	0.597 (0.493, 0.723)	
	English		
Diabetes Mellitus			<.0001
	Hx of DM	1.684 (1.630, 1.739)	
	No Hx of DM		
Rurality			<.0001
	Nonurban-Adjacent Rural	1.006 (0.929, 1.089)	
	Urban-Adjacent Rural	1.130 (1.067, 1.197)	
	Urban more than 30 Miles	0.941 (0.895, 0.989)	
	Urban within 30 Miles		
Internet			0.259
	ZIP Code Internet Utlization	1.082 (1.048, 1.117)	
Income			0.013
	ZIP Code Median Income (in $10,000s)	0.972 (0.963, 0.981)	



Telehealth Visit - New Pts

Adjusted Odds Ratios of Telehealth Visit in Study Period for New Patients

Category	Parameter	Adjusted Odds Ratio(CI)	p value
Age			<.0001
	< 19	0.719 (0.641, 0.807)	
	19 - 34		
	35 - 49	0.933 (0.847, 1.028)	
	50 - 64	0.714 (0.645, 0.792)	
	65 - 79	0.621 (0.540, 0.713)	
	>=80	0.526 (0.424, 0.652)	
Gender			<.0001
	Female	1.201 (1.148, 1.257)	
	Male		
Insurance			<.0001
	Medicare	1.066 (0.960, 1.183)	
	Medicaid	1.041 (0.934, 1.160)	
	Self Pay	0.194 (0.117, 0.322)	
	Other	0.602 (0.522, 0.695)	
	Commercial		
Race			<.0001
	Black	0.808 (0.709, 0.922)	
	Asian	0.692 (0.557, 0.860)	
	Other	0.893 (0.771, 1.033)	
	White		
Ethnicity			0.261
	Hispanic	0.933 (0.827, 1.053)	
	Non-Hispanic		
Preferred Language			<.0001
	Spanish	0.599 (0.454, 0.790)	
	Other	0.798 (0.578, 1.102)	
	English		
Diabetes Mellitus			<.0001
	Hx of DM	1.630 (1.511, 1.758)	
	No Hx of DM		
Rurality			<.0001
	Nonurban-Adjacent Rural	1.486 (1.304, 1.693)	
	Urban-Adjacent Rural	1.694 (1.542, 1.862)	
	Urban More Than 30 Miles	1.761 (1.617, 1.918)	
	Urban Within 30 Miles		
Internet			0.259
	ZIP Code Internet Utlization	1.033 (0.976, 1.093)	
Income			0.013
	ZIP Code Median Income (in $10,000s)	0.980 (0.965, 0.996)	



Results Related to Patients with Diabetes

Results – Cohort Size

Established Diabetes Patients*

- Pre-Covid: N=30,871
- COVID: N=32,500

*Patients with diabetes diagnosis in the establishment period

Research Questions

All DM patients seen in established period

Did patients with DM seen in the COVID period differ from those seen in the Pre-COVID period?

- Patients seen in the established period

Statistics: Descriptive, Chi-Square, T-tests

Key Demographics

Patients with Diabetes seen in the Established Period by Period*

Characteristic	Pre-COVID Established Period (n=30,871)	COVID Established Period (N=32,500)
Mean (sd) age (years)	60.9 (15.8)	61.0 (15.7)
Female Gender (%)	54.4%	54.1%
Insurance Status (% non-commercial)	65.1%	65.4%
Non-White race (n, %)	22.2%	22.2%
Mean (sd) of zip-code median income	$63,777 (20,743)	$64,093 (20,852)
Urban w/in 30	65.9%	67.0%

*Cohorts not mutually exclusive – no statistical comparison made

Research Questions

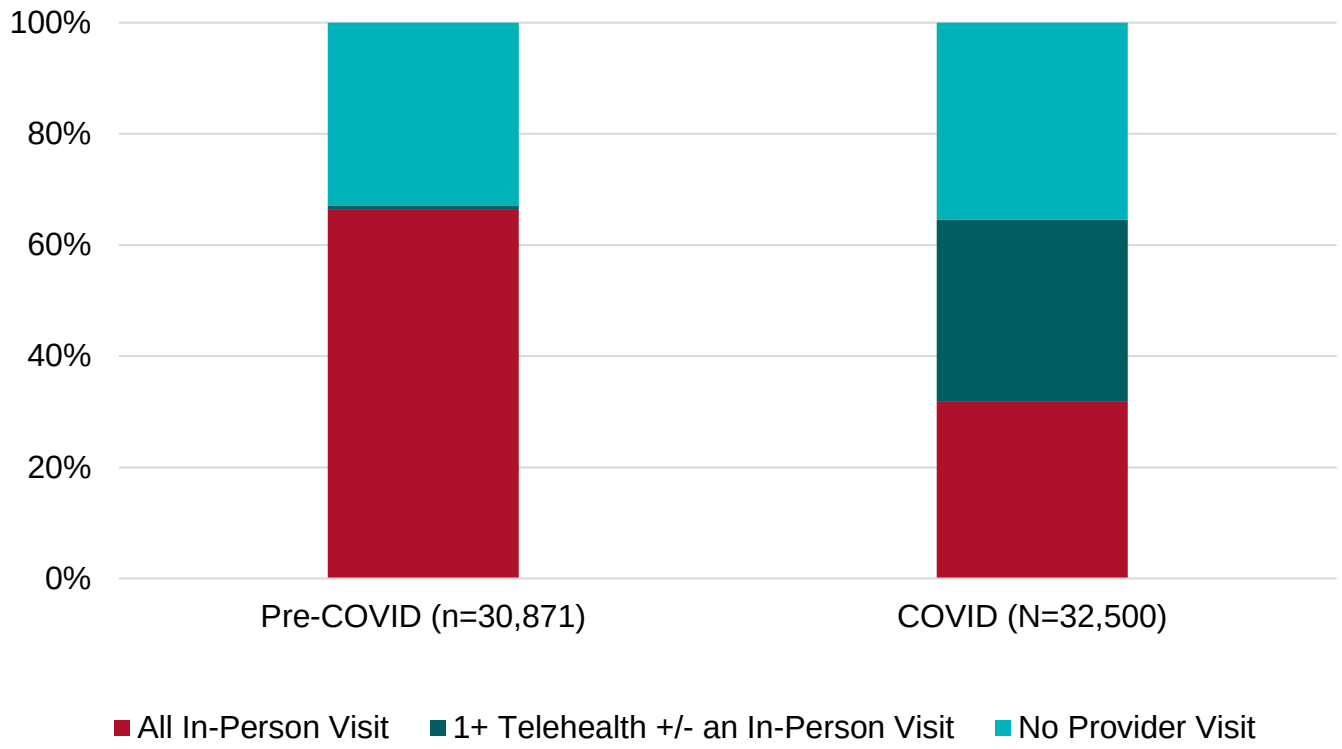
Patients with DM seen in established period

Did access to care differ between the COVID and Pre-COVID period for previously established patients with DM?

Statistics: General Estimating Equation

In-Person vs Telehealth Visits – Diabetes Cohort

Distribution of Visits by Type for Previously Established Patients with Diabetes

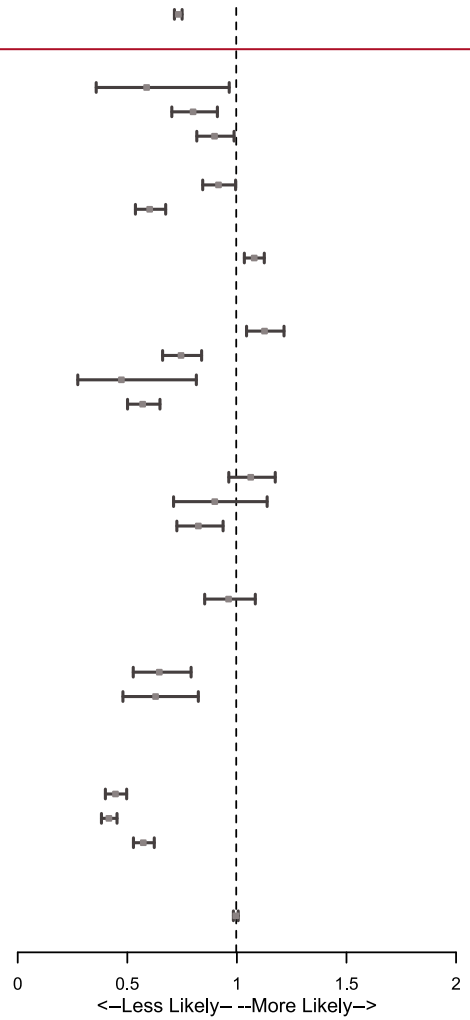


Pre-COVID and COVID groups not mutually exclusive

Any Visit - DM cohort

Adjusted Odds Ratios of Any Visit During Study Period in Diabetic Cohort

Category	Parameter	Adjusted Odds Ratio (CI)	p value
Time Period			<.0001
	COVID	0.733 (0.715, 0.750)	
	Pre-COVID		
Age			<.0001
	< 19	0.588 (0.358, 0.965)	
	19 - 34	0.800 (0.703, 0.911)	
	35 - 49	0.898 (0.817, 0.987)	
	50 - 64		
	65 - 79	0.916 (0.844, 0.994)	
	>=80	0.602 (0.537, 0.675)	
Gender			0.0004
	Female	1.079 (1.034, 1.125)	
	Male		
Insurance			<.0001
	Medicare	1.126 (1.044, 1.215)	
	Medicaid	0.745 (0.661, 0.839)	
	Self Pay	0.473 (0.274, 0.815)	
	Other	0.570 (0.501, 0.649)	
	Commercial		
Race			0.0001
	Black	1.063 (0.963, 1.175)	
	Asian	0.899 (0.711, 1.138)	
	Other	0.824 (0.726, 0.937)	
	White		
Ethnicity			0.523
	Hispanic	0.962 (0.853, 1.084)	
	Non-Hispanic		
Preferred Language			<.0001
	Spanish	0.646 (0.527, 0.791)	
	Other	0.629 (0.480, 0.824)	
	English		
Rurality			<.0001
	Nonurban-Adjacent Rural	0.446 (0.400, 0.497)	
	Urban-Adjacent Rural	0.416 (0.382, 0.453)	
	Urban More Than 30 Miles	0.573 (0.528, 0.623)	
	Urban Within 30 Miles		
Income			0.392
	ZIP Code Median Income (in $10,000s)	0.995 (0.984, 1.006)	



Research Questions

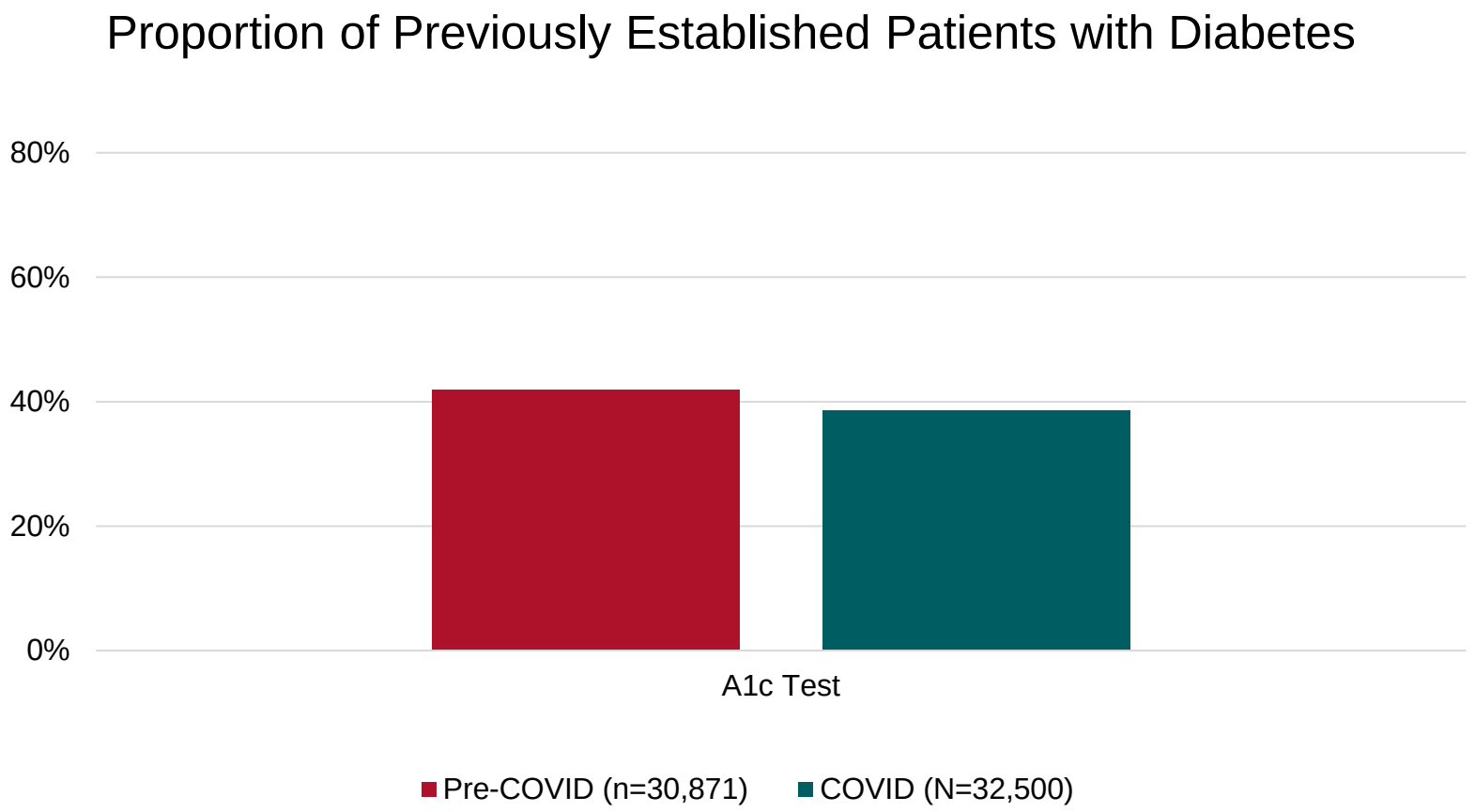
Established patients with DM seen in period

Did glycemic control differ between the COVID and Pre-COVID period for established patients with DM?

- A1c < 8.0%
- A1c > 9.0%

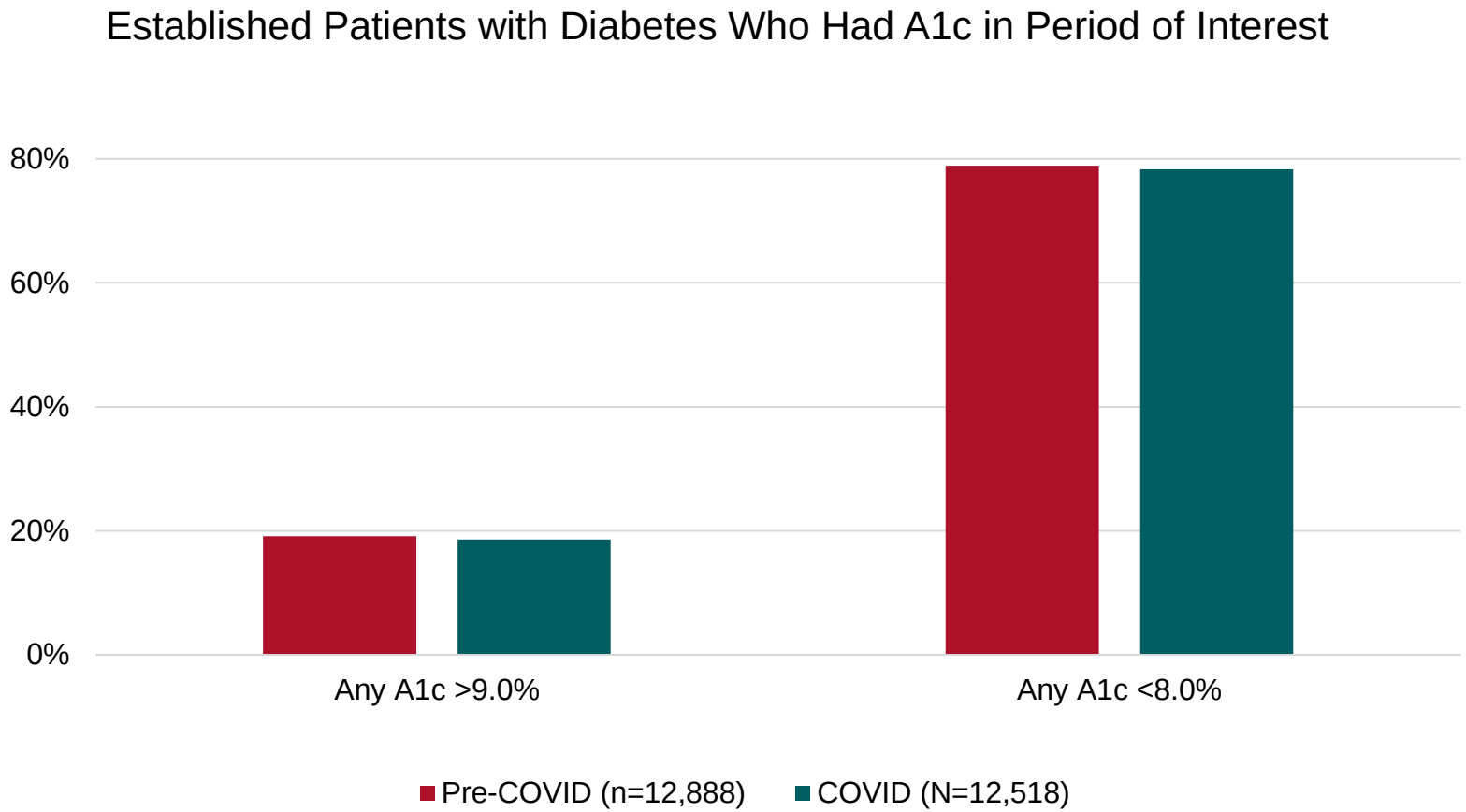
Statistics: General Estimating Equation

Diabetes Quality Measures during Observation Period



Pre-COVID and COVID groups not mutually exclusive

Diabetes Quality Measures during Observation Period



AOR for COVID Period: 0.97
(95% CI: 0.92, 1.02)

AOR for COVID Period: 0.91
(95% CI: 0.87, 0.96)

Pre-COVID and COVID groups not mutually exclusive

Limitations and Future Opportunities

- Retrospective single academic healthcare system study
- Differences in subspeciality care were not addressed
- We did not study differences between telephone vs video visits
- Direct patient outcomes were not studied

Conclusions

Telehealth accounted for up to 30% of ambulatory care provider visits during the COVID period

Patient demographics and geographics were similar between periods, but the proportion with **a provider visit of any type was lower during the COVID** period.

Among new patients, telehealth was utilized more by patients who did not live in Omaha.

Patients from zip codes with lower median incomes had a higher odds of utilizing telehealth within both new and established patients.

Conclusions

Disparities related to telehealth included: **older age, uninsured status, minority race/ethnicity, & non-English speakers**

Despite having a lower odds of having a visit during the COVID period, established patients with DM who had their A1Cs measured during the COVID period did not have a significantly higher odds of having an A1c over 9.0%.

Overall, further studies and policies are needed to address health inequities in telehealth

Thank you!

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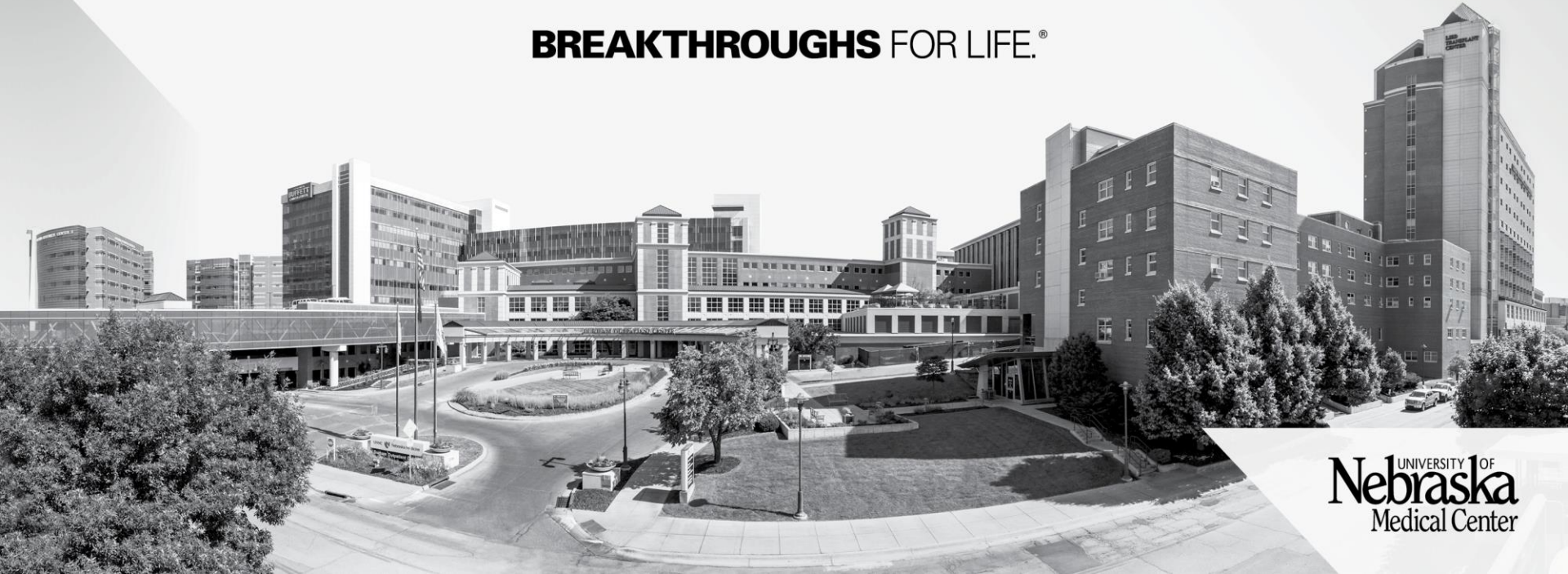

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