Natural Experiments for Policy Decisions for Persons with Diabetes in the Covid-19 Era



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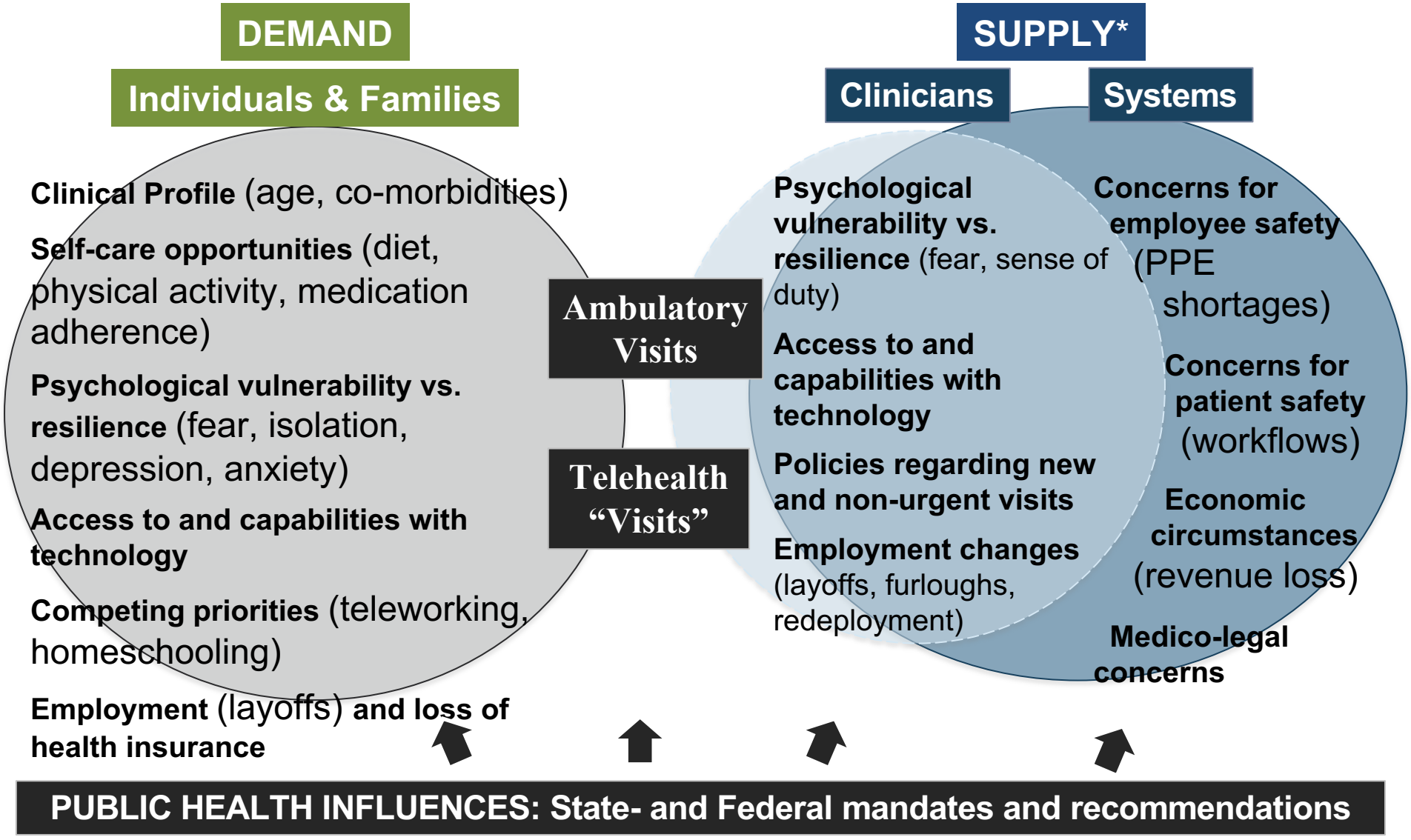
9/25/2020

Outline

- Unintended natural experiments from the pandemic:
  - Abrupt disruption of outpatient care
  - Rapid Transition to Telehealth: Rethinking DM care delivery
  - Disproportionate burden of Covid-19 on persons with Diabetes and Black and LatinX persons
  - Immediate and longer term clinical consequences of Covid-19 for persons with diabetes
  - Economic consequences of Covid-19:
    - Loss of employment/Loss of health insurance
  - Mental and physical health consequences
  - Natural experiments are needed to study these pandemic related shocks and ultimately inform both policies and clinical care delivery to mitigate harm for persons with diabetes.

Disruption of Outpatient Care

The Pandemic Influences Complex Drivers of Supply and Demand



From: M. Ali and C. Mangione. Health Affairs, *In Press,* 2020

Covid-19 and the Rise of Virtual Care

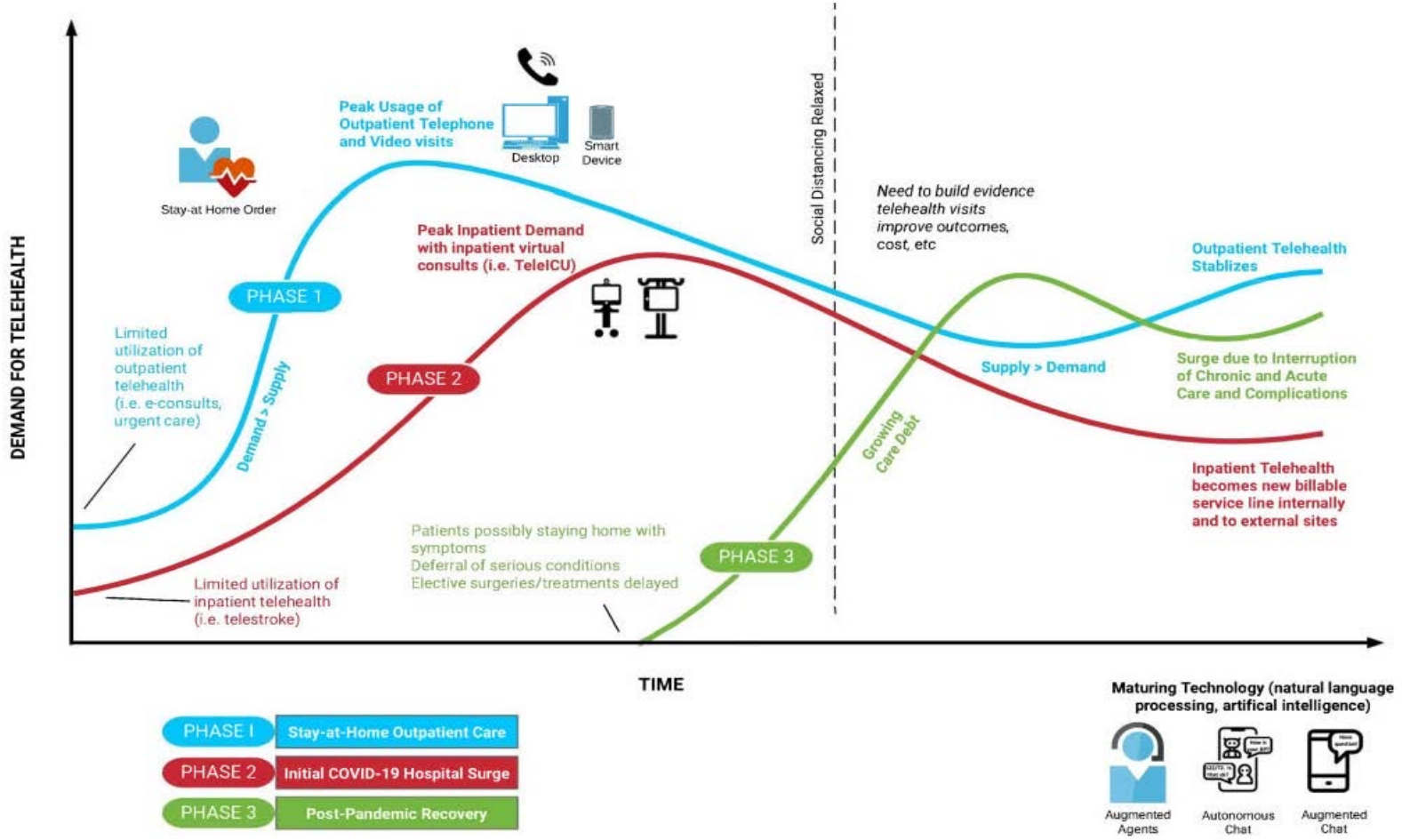
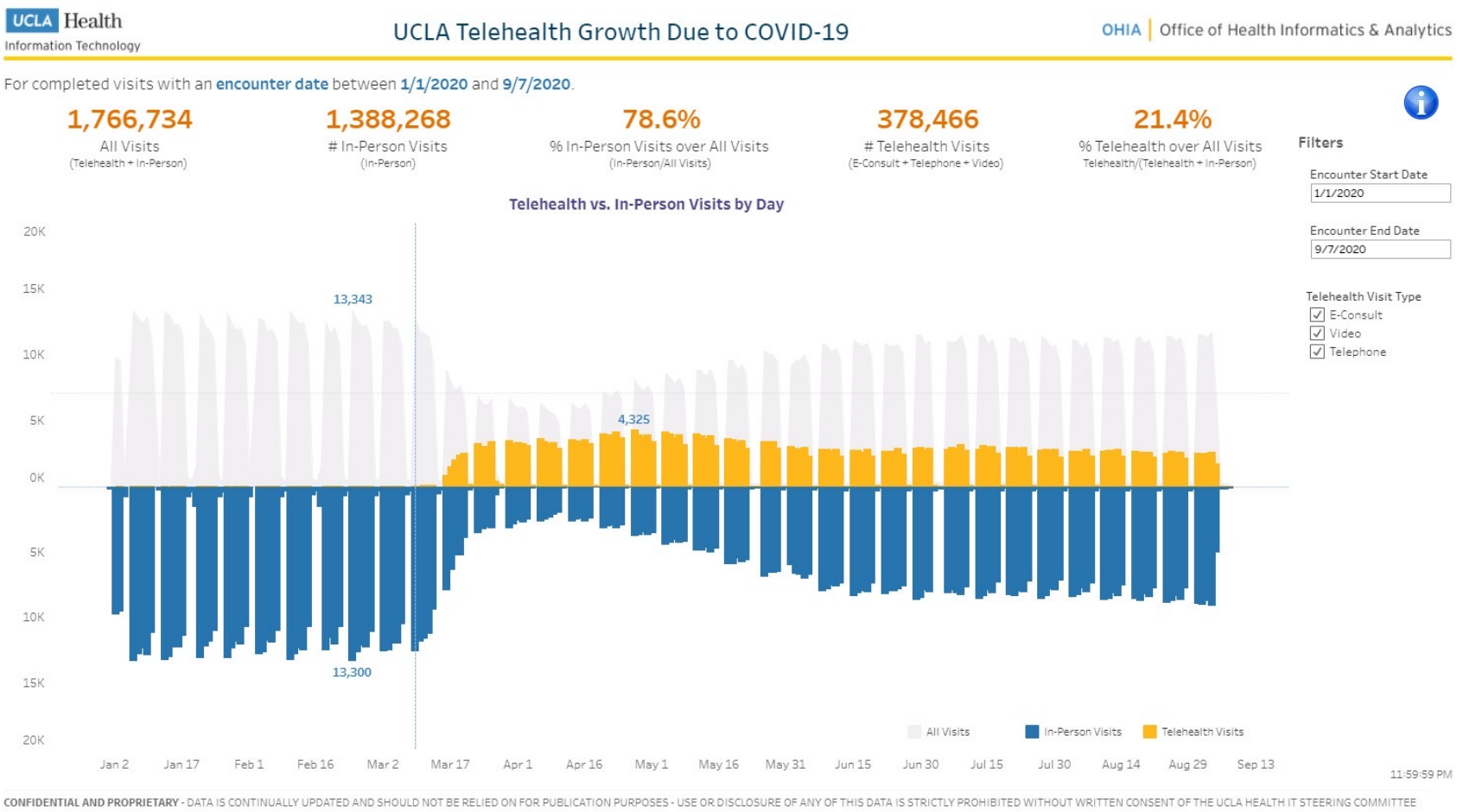


Figure 1. Three phases of coronavirus disease 2019 (COVID-19) pandemic and demand for telehealth services.

Wosik J, et al. Telehealth transformation: COVID-19 and the rise of virtual care. *J Am Med Inform Assoc*. 2020;27(6):957-962. doi:10.1093/jamia/ocaa067

The Rise of Telehealth at UCLA - Unpublished Data Do Not Cite

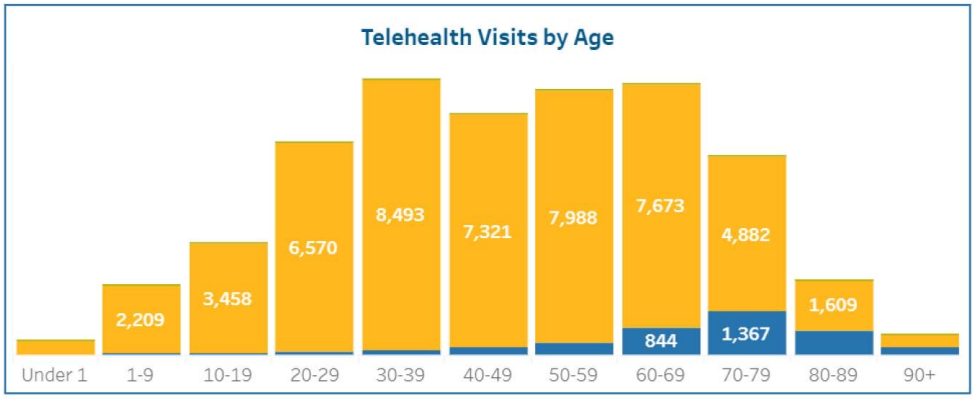


Office of Health Informatics and Analytics, UCLA Health Information Technology

UCLA Telehealth by Age – Unpublished Data Do Not Cite

For completed telehealth **visits** with an **encounter date** between **8/1/2020** and **8/31/2020**.



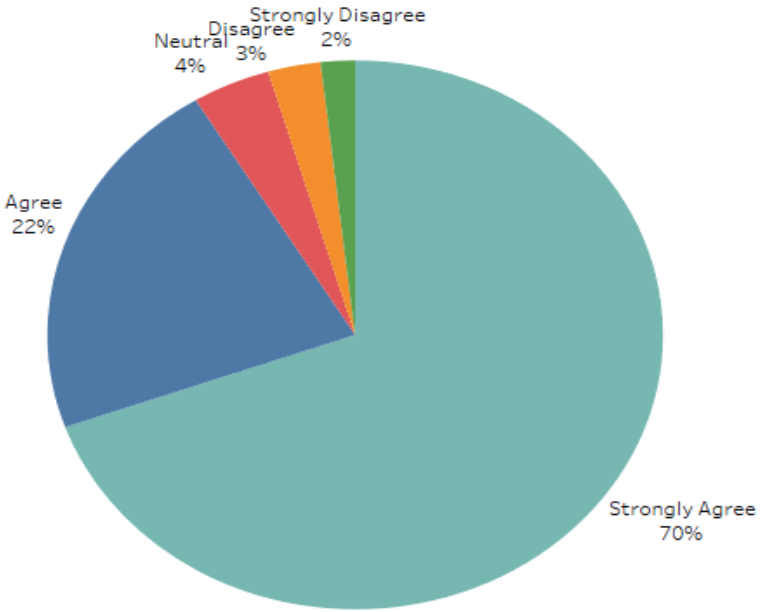


Office of Health Informatics and Analytics, UCLA Health Information Technology

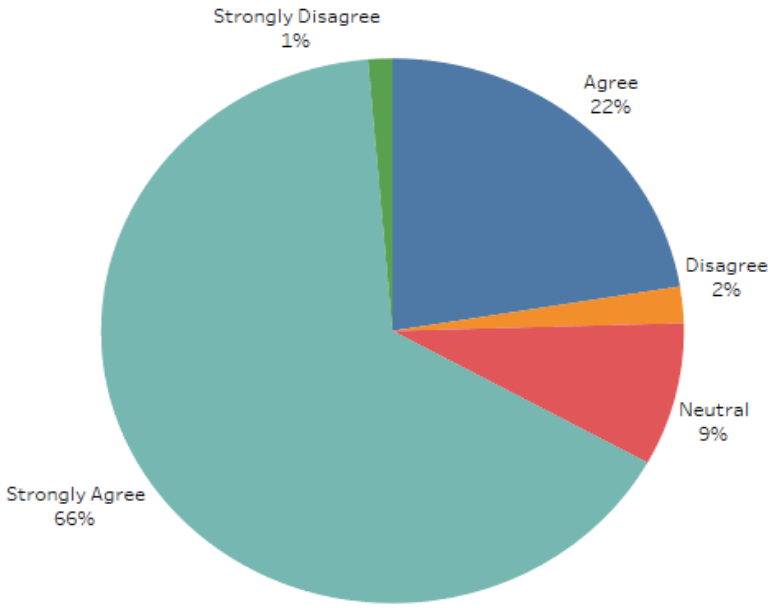
Patient Satisfaction Survey Results for Video Visits

After every video visit, a patient is sent survey asking about their experience. In August 2020 we had 2,926 responses from >55K visits.

Overall, I was satisfied with my Video Visit Session:



Given the option, I would choose to have a Video Visit again in the future:



A Natural Experiment

What does the abrupt disruption in outpatient care and rise of virtual care mean for prevention of diabetes & deliver of diabetes processes of care?

- A1c checks
- Fasting lipids
- Microalbuminuria checks
- Foot exams
- Flu shots/Pneumococcal Vaccination
- Dilated Eye Exams

- Blood pressure monitoring
- Consideration of ASA
- BMI/Lifestyle counseling
- Medication management & adherence

Lab Visit
In Person
Telehealth

Disproportionate Burden of Covid-19 for Persons with Cardiometabolic Diseases and for Blacks and LatinX

One of the earliest case series from NYC reported a higher prevalence of men, Blacks, LatinX, and persons with Obesity or Diabetes among 5,700 hospitalized persons.

Table 1. Baseline Characteristics of Patients Hospitalized With COVID-19

	No. (%)
Demographic information	
Total No.	5700
Age, median (IQR) [range], y	63 (52-75) [0-107]
Sex	
Female	2263 (39.7)
Male	3437 (60.3)
Race[a]	
No.	5441
African American	1230 (22.6)
Asian	473 (8.7)
White	2164 (39.8)
Other/multiracial	1574 (28.9)
Ethnicity[a]	
No.	5341
Hispanic	1230 (23)
Non-Hispanic	4111 (77)
Preferred language non-English	1054 (18.5)
Comorbidities	
Metabolic disease	
Obesity (BMI ≥ 30)	1737 (41.7)
No.	4170
Morbid obesity (BMI ≥ 35)	791 (19.0)
No.	4170
Diabetes[e]	1808 (33.8)

[a] Race and ethnicity data were collected by self-report in prespecified fixed categories

[e] Assessed based on a diagnosis of diabetes mellitus and includes diet-controlled and non–insulin-dependent diabetes.

Richardson S, et al. Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area. *JAMA.* 2020;323(20):2052–2059. doi:10.1001/jama.2020.6775

Summary measures and univariable association of sociodemographic characteristics with SARS-CoV-2 infection from HM CURATOR

Characteristics	Overall (N=20228)	SARS-CoV-2-negative (n=18 677)	SARS-CoV-2-positive (n=1551)	OR (95% CI)*
Age, mean (SD)	51.1 (19.0)	51.0 (19.1)	52.1 (18.1)	1.00 (1.00 to 1.01)
Race (%)†				
White	62.3	62.9	55.7	Reference category
Black	21.6	21	28.8	1.55 (1.37 to 1.75)
Asian	9.2	9.1	9.7	1.20 (1.00 to 1.44)
Mixed/other	1.3	1.2	1.5	1.36 (0.88 to 2.11)
Hispanic (%)‡	17.8	16.8	29.2	2.02 (1.79 to 2.27)
CCI categories (%)				
Hypertension	47.2	47.1	48.4	1.06 (0.95 to 1.17)
Diabetes (without complications)	24.2	23.7	30.3	1.40 (1.24 to 1.57)
Obesity	28	28.2	25.2	0.86 (0.76 to 0.96)

Vahidy FS, et al. BMJ Open 2020;10:e039849. doi:10.1136/ bmjopen-2020-039849

Increased Odds of SARS-CoV-2 Positivity by Race/Ethnicity

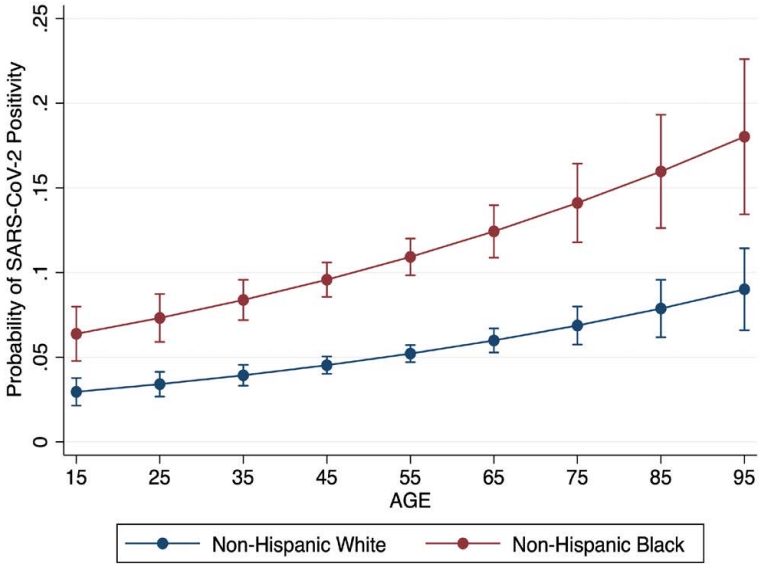


Figure 1 Adjusted probability and 95% CI of positive SARS-CoV-2 PCR in non-Hispanic black versus non-Hispanic white by increasing age. SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

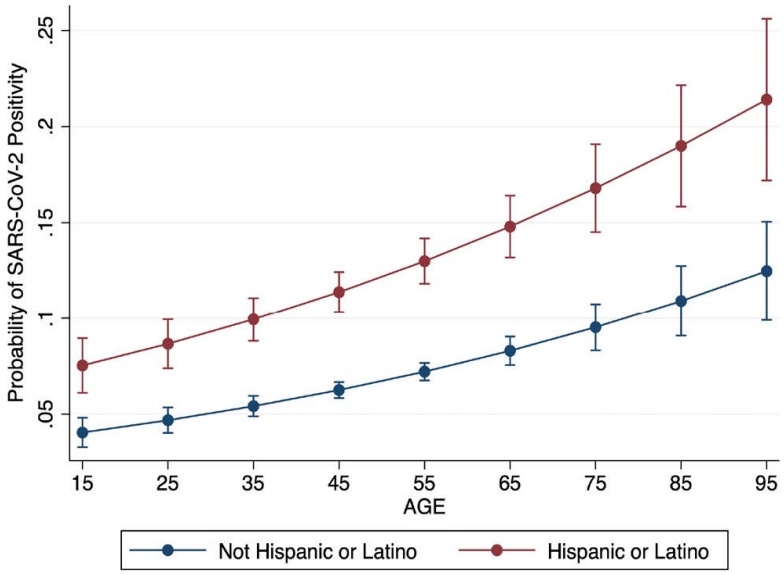


Figure 2 Adjusted probability and 95% CI of positive SARS-CoV-2 PCR in Hispanic versus non-Hispanic by increasing age. SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

Vahidy FS, et al. BMJ Open 2020;10:e039849. doi:10.1136/ bmjopen-2020-039849

COVID-NET Data from 14 States

TABLE. Underlying conditions and symptoms among adults aged ≥18 years with coronavirus disease 2019 (COVID-19)–associated hospitalizations — COVID-NET, 14 states,* March 1–30, 2020†

	Age group (yrs), no./total no. (%)			
Underlying condition	**Overall**	**18–49**	**50–64**	**≥65 years**
Any underlying condition	159/178 (89.3)	41/48 (85.4)	51/59 (86.4)	67/71 (94.4)
Hypertension	79/159 (49.7)	7/40 (17.5)	27/57 (47.4)	45/62 (72.6)
Obesity§	73/151 (48.3)	23/39 (59.0)	25/51 (49.0)	25/61 (41.0)
Diabetes mellitus	47/166 (28.3)	9/46 (19.6)	18/56 (32.1)	20/64 (31.3)

§ Obesity is defined as calculated body mass index (BMI) ≥30 kg/m2, and if BMI is missing, by International Classification of Diseases discharge diagnosis codes. Among 73 patients with obesity, 51 (69.9%) had obesity defined as BMI 30–<40 kg/m2, and 22 (30.1%) had severe obesity defined as BMI ≥40 kg/m2.

Garg S, et al. Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease 2019 - COVID-NET, 14 States, March 1-30, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(15):458-464. Published 2020 Apr 17. doi:10.15585/mmwr.mm6915e3

Blacks who test positive for SARS-Cov-2 are more likely to have cardiometabolic diseases

Table 1. Characteristics of 3481 Patients Who Tested Positive for Coronavirus Disease 2019 (Covid-19) by April 11, 2020.*

Characteristic	White Non-Hispanic (N=1030)	Black Non-Hispanic (N=2451)
Age — yr	55.5±18.5	53.6±16.1
Sex — no. (%)		
Male	471 (45.7)	923 (37.7)
Female	559 (54.3)	1528 (62.3)
Coexisting conditions†		
Obesity — no. (%)§	407 (39.5)	1320 (53.9)
Diabetes — no. (%)	112 (10.9)	454 (18.5)
Hypertension — no. (%)	246 (23.9)	828 (33.8)

* Plus–minus values are means ±SD. Race and ethnic group were reported by the patient. Percentages may not total 100 because of rounding. COPD denotes chronic obstructive pulmonary disease, and HIV the human immunodeficie ncy virus.

† Absence of diagnoses recorded in the medical record was assumed to mean absence of the conditions.

§ Obesity was determined by the presence of diagnosis codes or a body-mass index (BMI) of 30 or more that was recorded during previous clinical encounters (1727 patients had a BMI of ≥30; 1071 had a BMI of <30; and 683 had missing data).

Price-Haywood EG et al. N Engl J Med 2020;382:2534-2543

Blacks are more likely to require intensive care with Covid-19

From Table 2.

Characteristic	White Non-Hispanic (N = 319)	Black Non-Hispanic (N = 1063)
Level of hospital care — no. (%)‡		
Critical care: intensive care units	94 (29.5)	380 (35.7)
Ventilator	67 (21.0)	297 (27.9)
No ventilator	27 (8.5)	83 (7.8)
Noncritical care: medicine–surgical units	225 (70.5)	683 (64.3)
Clinical outcome — no. (%)		
Still admitted	13 (4.1)	49 (4.6)
Discharged alive from hospital	210 (65.8)	784 (73.8)
Died	96 (30.1)	230 (21.6)
Median length of hospital stay (IQR) — days §	7.0 (3.0–13.0)	6.0 (3.0–12.0)

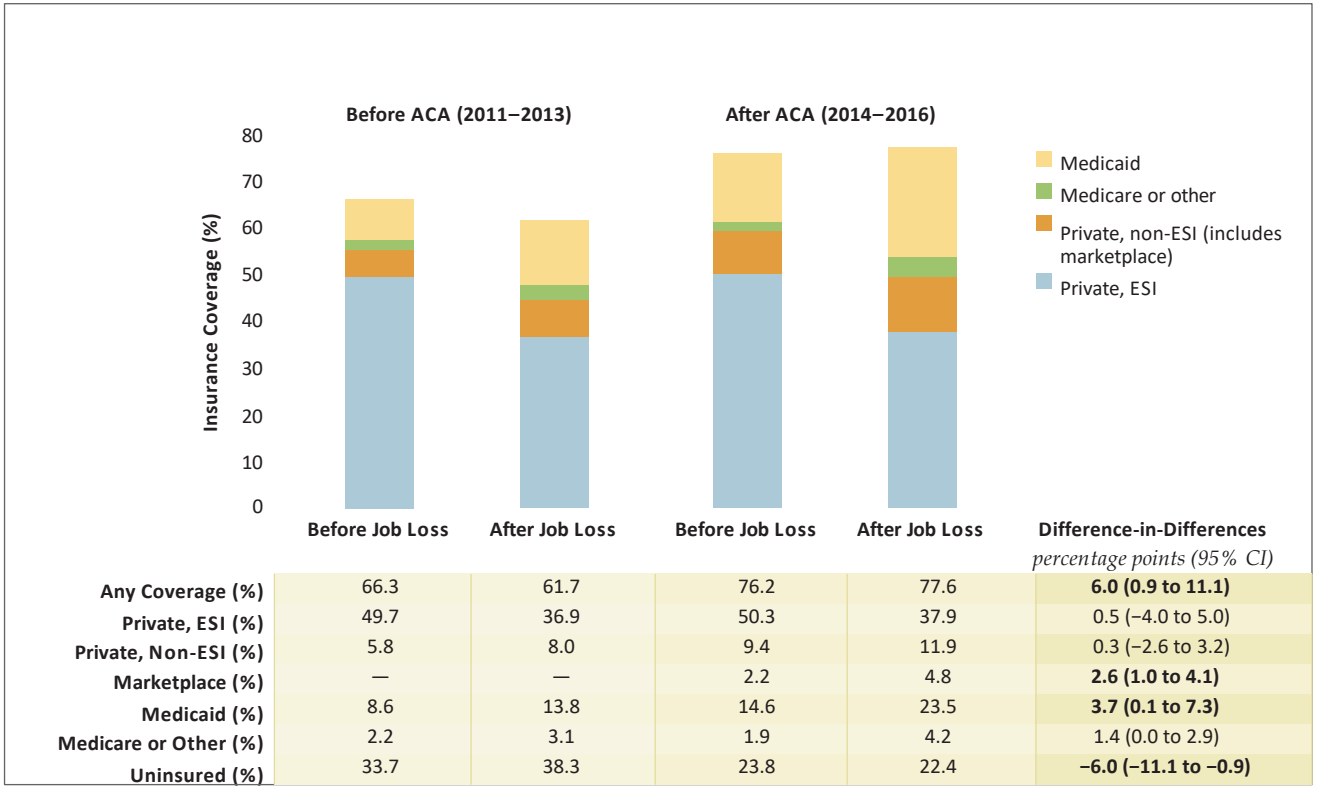
‡ Shown is the highest level of hospital care received at any time during the hospital course.
§ Only deceased or discharged patients were used for calculations of length of hospital stay.

Price-Haywood EG et al. N Engl J Med 2020;382:2534-2543

Natural Experiment:

Given the increased probability of Covid-19 infection, hospitalization, and disease severity, does infection with Covid-19 change the long term clinical trajectory for persons with Diabetes?

The ACA is a Buffer after job loss for retaining health insurance



	Before ACA (2011–2013)		After ACA (2014–2016)		
	Before Job Loss	After Job Loss	Before Job Loss	After Job Loss	Difference-in-Differences, percentage points (95% CI)
Any Coverage (%)	66.3	61.7	76.2	77.6	**6.0 (0.9 to 11.1)**
Private, ESI (%)	49.7	36.9	50.3	37.9	0.5 (−4.0 to 5.0)
Private, Non-ESI (%)	5.8	8.0	9.4	11.9	0.3 (−2.6 to 3.2)
Marketplace (%)	—	—	2.2	4.8	**2.6 (1.0 to 4.1)**
Medicaid (%)	8.6	13.8	14.6	23.5	**3.7 (0.1 to 7.3)**
Medicare or Other (%)	2.2	3.1	1.9	4.2	1.4 (0.0 to 2.9)
Uninsured (%)	33.7	38.3	23.8	22.4	**−6.0 (−11.1 to −0.9)**

Pre- and Post-ACA Health Insurance Coverage among Nonelderly Adults with Job Loss.

Bold type indicates a differences-in-differences estimate that is significant at P<0.05 (see the Supplementary Appendix for details). Data are from the Medical Expenditure Panel Survey for 2011–2016. The sample included all adults 19 to 64 years of age who had any employment in the first round of the survey but had become unemployed by the final round (pre-ACA, N = 1350; post-ACA, N = 1103). Participants were interviewed in five rounds over 2 years. The mean age of the full population-weighted cohort was 39.7 years, and 57.5% of participants were female, 13.5% were Black, and 17.7% were Hispanic. Insurance types were mutually exclusive and were defined according to the following hierarchy: (1) employer-sponsored insurance (ESI), (2) Medicaid, (3) mar- ketplace or nongroup insurance, (4) Medicare or other, and (5) uninsured. Percentages may not total 100 because of rounding. CI denotes confidence interval.

Agarwal SD, Sommers BD. Insurance Coverage after Job Loss - The Importance of the ACA during the Covid-Associated Recession [published online ahead of print, 2020 Aug 19]. *N Engl J Med*. 2020;10.1056/NEJMp2023312. doi:10.1056/NEJMp2023312

But what has happened in the pandemic?

TABLE 2 Changes in Insurance Status, Food Insecurity, and Food Assistance Programs, Before and After March 2020

Insurance status[a]	Before March 2020, % (95% CI)	Since March, 2020, % (95% CI)	*P*
			,.001
Employer-sponsored insurance	62.7 (59.4 to 66.1)	59.6 (56.3 to 63.0)	
Medicaid or CHIP	22.7 (19.7 to 25.7)	23.3 (20.3 to 26.3)	
Private insurance	3.3 (2.1 to 4.5)	4.5 (3.2 to 5.8)	
Exchange plan	1.8 (1.0 to 2.6)	2.7 (1.6 to 3.7)	
TriCare	3 (1.9 to 4.0)	3.2 (2.0 to 4.4)	
Uninsured	4.1 (2.6 to 5.5)	3.5 (2.2 to 4.8)	
Other	2.4 (1.4 to 3.4)	3.3 (2.1 to 4.5)	,.001
Food insecurity[a]			
None	67.4 (64.2 to 70.6)	64.0 (60.7 to 67.3)	
Mild	26.7 (23.7 to 29.7)	28 (25.0 to 31.1)	
Moderate	4.6 (3.1 to 6.1)	6.2 (4.4 to 8.1)	
Severe	1.3 (0.4 to 2.2)	1.8 (0.7 to 2.8)	
Food assistance programs[b]			
Food stamps or SNAP	10.1 (8.0 to 12.1)	9.5 (7.5 to 11.6)	.256
WIC	5.8 (4.0 to 7.6)	5.8 (4.0 to 7.6)	1.000
Food banks	4.6 (3.1 to 6.2)	4.9 (3.3 to 6.5)	.002
Free or reduced-price school lunch P-EBT[c]	17.5 (14.8 to 20.1)	—	
	—	5.0 (3.5 to 6.5)	
Free food from school	—	15.4 (12.9 to 17.8)	
None	74.4 (71.3 to 77.5)	70.2 (67.0 to 73.4)	.001

CHIP, Children's Health Insurance Program; —, not applicable.

[a] Global *P* value reported from an exact multinomial test for symmetry between paired before and since March 2020 responses.

[b] *P* values reported from McNemar tests for symmetry between each paired before and since March 2020 response.

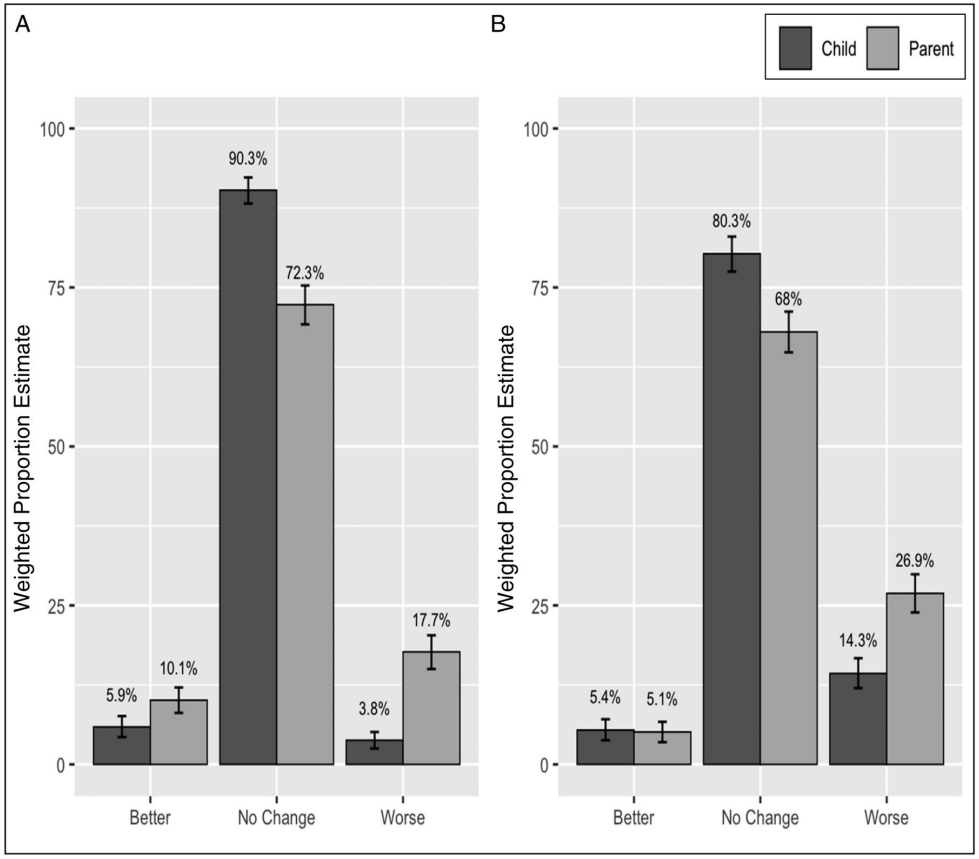
[c] Only families who qualified for free or reduced-price school meals pre–COVID-19 were eligible for P-EBT enrollment.

Patrick SW, Henkhaus LE, Zickafoose JS, et al. Wellbeing of Parents and Children During the COVID-19 Pandemic: A National Survey. Pediatrics. 2020;146(4):e2020016824

Natural Experiment:

How does the loss of employment and change or loss of health insurance affect the immediate and long term health of persons at risk for diabetes and those who have diabetes?

The Physical and Mental Health Consequences of a Pandemic



Parental physical and mental health and child physical and behavioral health changes since March 2020. A, Parental and child physical health changes. B, parental mental health and child behavioral health changes. Differences in health status between parents and children $P < .001$ by Rao-Scott corrected χ^2 test.

Patrick SW, Henkhaus LE, Zickafoose JS, et al. Wellbeing of Parents and Children During the COVID-19 Pandemic: A National Survey. Pediatrics. 2020;146(4):e2020016824

Summary

- The Covid-19 Pandemic has created many natural experiments:
  - The rise of telehealth, possibly a positive change for DM management
  - The disproportionate burden of Covid-19 on persons with diabetes and those who have historically experienced the worst health disparities with diabetes creates a number of natural experiments that if studies could inform health policies designed to improve health equity
  - Covid-19 itself is a clinical natural experiment that needs to be studied to better understand the immediate and long terms consequences of the condition for persons with cardiometabolic disease
  - The economic consequences and disruption of health insurance is a natural experiment that if studied could inform health policies for persons at greatest risk of diabetes and for those who have diabetes.
  - The mental and physical health consequences from the pandemic for those with and without infection with SARS-CoV-2 is a natural experiment that is likely to place a disproportionate burden on those at risk for diabetes or who have diabetes.

Thank you!

Questions?