*Telehealth and Type 2 Diabetes Clinical Outcomes and Healthcare Utilization: Evidence from Louisiana*

**Appendix**

*Figure A1: CONSORT Diagram for the Quantitative Analyses*

*Figure A2: Total Telehealth Visits in the Post-Period*

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Notes: Among those using TH in the post-period, about half used it only once; we assess dose effects at 2+ vs. 1 and 3+ vs. 1 TH visits.

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## *Figure A3: Outpatient (OP) and Telehealth Utilization (2020)*



*Table A1: Propensity Score Matching (PSM) Balancing for Main Sample*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | Weighted |
| Variables | TH | NO TH | SMD | TH | NO TH | SMD |
| Age <65 | 0.194 | 0.123 | -19.4% | 0.194 | 0.192 | -0.5% |
| Age 65-74 | 0.474 | 0.472 | -0.3% | 0.474 | 0.475 | 0.2% |
| Age 75-84 | 0.258 | 0.313 | 12.2% | 0.258 | 0.257 | -0.1% |
| Age over 84 | 0.074 | 0.092 | 6.3% | 0.074 | 0.075 | 0.4% |
| Female | 0.588 | 0.528 | -12.1% | 0.588 | 0.585 | -0.6% |
| White non-Hispanic | 0.539 | 0.563 | 4.7% | 0.539 | 0.535 | -0.8% |
| White Hispanic | 0.023 | 0.029 | 3.4% | 0.023 | 0.024 | 0.6% |
| Black non-Hispanic | 0.413 | 0.380 | -6.7% | 0.413 | 0.415 | 0.4% |
| Others | 0.025 | 0.029 | 2.4% | 0.025 | 0.026 | 0.5% |
| Cardiometabolic disease | 0.991 | 0.987 | -3.6% | 0.991 | 0.991 | 0.2% |
| Lung disease | 0.302 | 0.228 | -17.0% | 0.302 | 0.298 | -0.9% |
| Alzheimer's | 0.016 | 0.012 | -3.1% | 0.016 | 0.017 | 1.2% |
| Depression | 0.289 | 0.192 | -22.9% | 0.289 | 0.285 | -1.1% |
| Cancer | 0.129 | 0.096 | -10.4% | 0.129 | 0.126 | -0.9% |
| Chronic Kidney Disease | 0.455 | 0.405 | -10.1% | 0.455 | 0.455 | 0.1% |
| Arthritis | 0.515 | 0.400 | -23.2% | 0.515 | 0.509 | -1.4% |
| Osteoporosis | 0.114 | 0.097 | -5.7% | 0.114 | 0.113 | -0.5% |
| Have any ED visits | 1.125 | 0.569 | -55.6% | 1.125 | 1.118 | -0.6% |
| Have any inpatient visits | 0.382 | 0.315 | -14.1% | 0.382 | 0.376 | -1.2% |
| Any TH before March 2020 | 0.215 | 0.157 | -15.2% | 0.215 | 0.218 | 0.5% |
| Outpatient visits per month | 0.019 | 0.014 | -3.5% | 0.019 | 0.018 | -0.5% |
| Number of HbA1c tests | 4.108 | 3.702 | -22.1% | 4.108 | 4.097 | -0.6% |
| HbA1C>8% | 0.302 | 0.265 | -8.2% | 0.302 | 0.303 | 0.2% |
| LDL>=110 (mg/dl) | 0.316 | 0.316 | -0.1% | 0.316 | 0.315 | -0.2% |
| HDL<40 (mg/dl) | 0.593 | 0.577 | -3.2% | 0.593 | 0.596 | 0.6% |
| eGFR<30 (mL/min/1.73 m2) | 0.145 | 0.113 | -9.6% | 0.145 | 0.150 | 1.2% |
| BMI>=35 (kg/m2) | 0.449 | 0.361 | -17.9% | 0.449 | 0.444 | -1.0% |
| Continuity of Care Index (#) | 0.152 | 0.215 | 36.4% | 0.152 | 0.154 | 1.4% |
| Households with computer (%) | 87.7 | 87.5 | -4.4% | 87.7 | 87.7 | -0.4% |
| Households with internet (%) | 78.4 | 78.2 | -2.8% | 78.4 | 78.4 | -0.5% |
| Housing without telephone (%) | 2.11 | 2.10 | -0.8% | 2.11 | 2.11 | 0.4% |
| Outpatient trajectory group 1 | 0.249 | 0.507 | 55.2% | 0.249 | 0.250 | 0.2% |
| Outpatient trajectory group 2 | 0.578 | 0.436 | -28.7% | 0.578 | 0.579 | 0.2% |
| Outpatient trajectory group 3 | 0.173 | 0.057 | -37.0% | 0.173 | 0.171 | -0.4% |
| N | 7,756 | 14,162 |  | 7,756 | 14,162 |  |
| Notes: Variables are shares of the main population included in that group unless otherwise specified. Samples were balanced after re-weighting; standardized mean difference (SMD) weights were all well below 10%. Additional acronyms include telehealth (TH), emergency department (ED), blood pressure (BP), low-density lipoprotein (LDL), high-density lipoprotein (HDL), body mass index (BMI), estimated Glomerular Filtration Rate (eGFR).  |

*Table A2: Telehealth and LDL*

|  |  |
| --- | --- |
|  | Mean post-LDL |
|  | Value | <100 mg/dl | <110 mg/dl |
| TH | -0.841\*\* | 0.007\* | 0.006 |
| [-1.353, -0.330] | [0.001, 0.013] | [-0.004, 0.016] |
| 0.002 | 0.029 | 0.217 |
| Mean | 83.5 | 0.75 | 0.82 |
| % Impact | -1.01 | 0.93 | 0.75 |
|  | Decline of LDL |
|  | >=15 mg/dl | >=10 mg/dl | >=5 mg/dl |
| TH | 0.011 | 0.003 | -0.001 |
| [-0.000, 0.022] | [-0.005, 0.011] | [-0.013, 0.011] |
| 0.06 | 0.521 | 0.904 |
| Mean | 0.26 | 0.36 | 0.48 |
| % Impact | 4.1 | 0.72 | -0.15 |
| N control | 12,676 | 12,676 | 12,676 |
| N treatment | 6,831 | 6,831 | 6,831 |

Notes: Estimates followed by 95% CI and p-value. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Baseline characteristics and facility fixed effects were included as covariates. Standard errors were clustered at the facility level. Means are the pandemic-era sample outcome average value. % Impact refers to the estimated value divided by the mean multiplied by 100.

*Table A3: Telehealth and Blood Pressure and Hypertension*

|  |  |  |
| --- | --- | --- |
|  | Blood Pressure | Hypertension |
|  | Diastolic (mm/Hg) | Systolic (mm/Hg) | Normal | Elevated | Stage 1 | Stage 2 |
| TH | -0.331\*\* | -0.249 | 0.007 | -0.005 | -0.010 | -0.004 |
| [-0.576, -0.086] | [-0.597, 0.100] | [-0.004, 0.017] | [-0.013, 0.002] | [-0.021, 0.001] | [-0.012, 0.003] |
| 0.009 | 0.159 | 0.214 | 0.183 | 0.063 | 0.276 |
| Mean | 73.45 | 133.5 | 0.13 | 0.25 | 0.44 | 0.27 |
| % Impact | -0.45 | -0.19 | 5.25 | -2.07 | -2.35 | -1.56 |
| N control | 17, 180 | 17, 180 | 17, 180 | 17, 180 | 17, 180 | 17, 180 |
| N treatment | 9, 135 | 9, 135 | 9, 135 | 9, 135 | 9, 135 | 9, 135 |

Notes: Estimates followed by 95% CI and p-value. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Baseline characteristics and facility fixed effects were controlled. Standard errors were clustered at the facility level. Means are the pandemic-era sample outcome average value. % Impact refers to the estimated value divided by the mean multiplied by 100.

*Table A4: Telehealth and BMI*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | BMI (kg/m2) | Underweight | Normal | Overweight | Obese |
| TH | 0.151\*\* | 0.001 | 0.001 | -0.002 | 0.000 |
| [0.041, 0.262] | [-0.001, 0.003] | [-0.004, 0.007] | [-0.014, 0.011] | [-0.010, 0.009] |
| 0.008 | 0.463 | 0.638 | 0.786 | 0.940 |
| Mean | 31.2 | 0.01 | 0.14 | 0.32 | 0.53 |
| % Impact | 0.48 | 9.87 | 0.95 | -0.55 | -0.07 |
| N control | 17, 227 | 17, 227 | 17, 227 | 17, 227 | 17, 227 |
| N treatment | 9, 126 | 9, 126 | 9, 126 | 9, 126 | 9, 126 |

Notes: Estimates followed by 95% CI and p-value. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Baseline characteristics and facility fixed effects were controlled. Standard errors were clustered at the facility level. Means are the pandemic-era sample outcome average value. % Impact refers to the estimated value divided by the mean multiplied by 100.

*Table A5:* *Telehealth & COC*

|  |  |  |
| --- | --- | --- |
|  | Continuity of Care Index | Proportion of patients with high continuity (>=0.5) |
| TH | -0.010\*\*\* | -0.018\*\*\* |
| [-0.015, -0.006] | [-0.026, -0.011] |
| <0.001 | <0.001 |
| Mean | 0.25 | 0.14 |
| % Impact | -4.12 | -12.72 |
| N control | 17, 202 | 17, 202 |
| N treatment | 9, 423 | 9, 423 |

Notes: Estimates followed by 95% CI and p-value. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Baseline characteristics and facility fixed effects were controlled. Standard errors were clustered at the facility level. Means are the pandemic-era sample outcome average value. % Impact refers to the estimated value divided by the mean multiplied by 100.

*Table A6: Telehealth & Complications and Utilization*

|  |  |  |
| --- | --- | --- |
|  | Complications | Utilization |
|  | Proportion of patients with related IP/ED visits with: | Proportion of patients with: |
|  | CHD | Stroke | MACE | IP | ED |
| TH | 0.003 | 0.005\* | 0.005 | 0.024\*\*\* | -0.003 |
| [-0.004, 0.010] | [0.001, 0.009] | [-0.002, 0.011] | [0.018, 0.031] | [-0.011, 0.004] |
| 0.444 | 0.024 | 0.155 | <0.001 | 0.351 |
| Mean | 0.33 | 0.16 | 0.07 | 0.08 | 0.16 |
| % Impact | 0.84 | 2.91 | 6.82 | 30.79 | -2.16 |
| N control | 20,663 | 20,663 | 20,663 | 20,663 | 20,663 |
| N treatment | 9,524 | 9,524 | 9,524 | 9,524 | 9,524 |

Notes: N control = 20,663; N treated = 9,524. Estimates followed by 95% CI and p-value. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Baseline characteristics and facility fixed effects were controlled in regressions. Standard errors were clustered at the facility level. Means are the pandemic-era sample outcome average value. % Impact refers to the estimated value divided by the mean multiplied by 100. Additional acronyms and abbreviations include Major Adverse Cardiovascular Events (MACE) and Coronary Heart Disease (CHD). Additional acronyms include emergency department (ED) and telehealth (TH).

*Table A7:* *Aim 2 Telehealth Associations (Research Sample vs. Multiple Imputations)*

|  |  |  |
| --- | --- | --- |
|  |  | Any Telehealth During COVID-19 |
|  | Original | Estimates | 95% CI | P-value |
| HbA1c (%) | -0.080\*\*\* | -0.040\* | [-0.077, -0.004] | 0.032 |
| HbA1c Share <7% | 0.013\* | 0.072\*\*\* | [0.055, 0.088] | <0.001 |
| LDL (mg/dL) | -0.841\*\* | -0.968\* | [-1.899, -0.038] | 0.042 |
| Systolic BP (mmHg) | -0.249 | -0.408\* | [-0.774, -0.042] | 0.029 |
| BMI (kg/m2) | 0.151\*\* | 0.173\*\* | [0.073, 0.273] | 0.001 |
| COC | -0.010\*\*\* | -0.011\*\*\* | [-0.016, -0.005] | <0.001 |
| MACE | 0.005 | 0.010\*\* | [0.004, 0.016] | 0.001 |
| Any inpatient admission | 0.024\*\*\* | 0.030\*\*\* | [0.022, 0.037] | <0.001 |
| Any ED | -0.003 | 0.004 | [-0.005, 0.014] | 0.389 |
| N treatment | - | 12,303 |
| N control | - | 39,571 |
| Total | - | 51,874 |

Notes: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Estimates that either lose or gain statistical significance using multiple imputations are bolded. Additional acronyms include low-density lipoprotein (LDL), body mass index (BMI), blood pressure (BP), Major Adverse Cardiovascular Events (MACE), emergency department (ED), continuity of care (COC).

*Table A8: Additional Robustness Checks*

|  |  |  |
| --- | --- | --- |
|  | Including All Non-Louisiana ZIP Codes | Include Only Those with 2+ A1c Readings (Post-March 2020) |
|  | Mean A1c | A1c<7% | Mean A1c | A1c<7% |
| TH | -0.086\*\*\* | 0.015\* | -0.092\*\*\* | 0.017\* |
| [-0.117, -0.055] | [0.003, 0.027] | [-0.135, -0.048] | [0.003, 0.031] |
| <0.001 | 0.014 | <0.001 | 0.016 |
| Mean | 6.93 | 0.63 | 7.05 | 0.58 |
| % Impact | -1.24 | 2.39 | -1.3 | 2.92 |
| N control | 14,836 | 14,836 | 8,441 | 8,441 |
| N treatment | 8,034 | 8,034 | 5,134 | 5,134 |
| Notes: Estimates followed by 95% CI and p-value. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Means are the pandemic-era sample outcome average value. % Impact refers to the estimated value divided by the mean multiplied by 100. |