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# 1-year cost of anxiety/depression treatment: Telehealth vs. face-to-face in nationwide cohort

Daniel Brinton, PhD M. Dooley, PhD; K. Simpson, DrPh; J. McElligott, MD; J. Harvey, PhD

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# Background

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- Telehealth adoption experienced exponential growth following the COVID public health declaration
- Telehealth is believed to decrease costs for health systems & patients

## **Telehealth growth**



## **Research Aim**

### Understand the

- Cost
- Treatment patterns
- Episode of care duration

Differences between those who utilized telehealth vs. traditional face-to-face care for anxiety/depression

# Methods

# **Design, Setting, and Participants**

- **Design**: Non-randomized quasi-experimental retrospective study
- **Dataset**: 2020-2021 MarketScan<sup>®</sup> nationwide commercial payer data
- **Population**:Adults (18+) with a primary diagnosis of anxiety or depressionInsurance: 3 months pre-index, 12 months post-index



**Exclusions**: Renal failure, solid tumors, metastatic cancer, treatment arm crossover

**Comparison: Outcomes**<sup>†</sup>:

Telehealth vs. Face-to-face Costs (12-months) Total costs Cost per visit Treatment patterns E&M appointment volume Talk therapy volume Episode of care duration

### **Methods**

# **Analytical details: Control for selection bias**

- Propensity score weighted
  - Age, sex
  - Charlson score
  - Elixhauser conditions
  - Anxiety, depression, both
  - Comorbid mental health conditions:
    - ADHD (F90.*x*)
    - Adjustment disorders (F34.2*x*)
    - Affective disorders (F34.*x*)
    - Bipolar disorder (F31.*x*)
    - Obsessive-compulsive disorder (F42.*x*)
    - Phobic anxiety disorders (F40.*x*)
    - Schizophrenia (F20/F21/F25)
    - Substance use disorder (F10-F19)
  - Inpatient mental health visits

- Electroconvulsive therapy (ECT)
  - CPT 90870
- Repetitive transcranial magnetic stimulation (rTMS)
  - CPT 90867, 90868, 90869
- 2+ Anti-depressants prescribed together
  - SNRI, SSRI, TCA, atypicals
- 2+ Anti-anxiety medications prescribed together
  - Benzodiazepines
- Socioeconomic/misc. factors
  - MHSA coverage
  - Live in an MSA
  - Geographical region

# **Analytical details: Control for selection bias**

# Severity adjustment measures

- Anxiety, depression, both
- Comorbid mental health conditions:
  - ADHD (F90.*x*)
  - Adjustment disorders (F34.2*x*)
  - Affective disorders (F34.*x*)
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# **Analytical details: Control for selection bias**

### • Propensity score weighted

- Inverse probability of treatment weighting to create stabilized weights
- *a priori*-defined covariates used in propensity score & analysis models
- Baseline/clinical characteristics that can impact group selection are balanced between groups
- Standardized mean differences of  $\leq 0.1$  signified covariate balance

# **Analytical details**

- Cost Analyses
  - Generalized linear model
  - Gamma-distributed log-transformed link function (Manning, Basu, & Mullahy, 2005)
  - Doubly-robust methods
- Count models
  - Negative-binomial or Poisson generalized linear models
  - Chosen based on model fit; deviance closest to unity (1.0)
  - Non-weighted methods

\* Preliminary

# **Results\***

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comparisons Jnweighted

		Face-to-Face	Telehealth
n		272,331	315,386
Age		$39.6 \pm 13.2$	$38.4 \pm 12.8$
Male		31.7	29.0
Charlson Score			
	0	99.2	99.3
	1	0.4	0.4
	2	0.3	0.2
	3+	0.1	0.1
MHSA Coverage		91.7	89.9
Lives in Metro St	tatistical Area?	67.5	85.2
Region			
	Northeast	8.8	18.8
	North central	23.6	24.8
	South	53.6	36.9
	West	13.6	19.2
	Unknown	0.4	0.3
Diagnosis			
-	Anxiety	53.6	46.2
	Depression	23.3	24.1
	-		

All values expressed as n, mean  $\pm$ s.d., or %

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Table 2. Elixhauser conditions

	Face-to-Face	Telehealth
n	272,331	315,386
Elixhauser	$0.9 \pm 1.2$	$0.9 \pm 1.2$
Alcohol Abuse	1.2	1.5
Blood Loss Anemia	0.2	0.2
COPD	3.3	3.9
Cardiac Arrhythmia	2.2	1.8
Coagulopathy	0.3	0.4
Congestive Heart Failure	0.4	0.3
Deficiency Anemia	1.1	1.1
Diabetes, Complicated	1.9	1.8
Diabetes, Uncomplicated	2.8	2.6
Drug Abuse	1.5	1.4
Fluid/Electrolyte Disorder	0.9	0.8
HIV/AIDS	0.2	0.2
Hypertension, Complicated	0.3	0.2
Hypertension, Uncomplicated	9.2	7.1
Hypothyroidism	3.9	3.8
Liver Disease	0.9	0.8
Lymphoma	0.1	0.1
Obesity	5.1	5.2
Other Neurological Disorder	1.0	1.0
Paralysis	0.1	0.1
Peptic Ulcer Disease, excludes bleeding	0.1	0.1
Peripheral Vascular Disorder	0.4	0.3
Psychoses	0.4	0.4
Pulmonary Circulation Disorder	0.2	0.2
Rheumatoid Arthritis	1.5	1.5
Valvular Disease	0.6	0.5
Weight Loss	0.4	0.4

All values expressed as n or %

*Elixhauser conditions for metastatic cancer, solid tumor w/o mets, and renal failure not reported as these were exclusion criteria* 

### Results

### Table 3. Patient comorbid mental health conditions

	Face-to-Face	Telehealth
n	272,331	315,386
ADHD (F90)	3.4	5.0
Adjustment disorders (F43.2 <i>x</i> )	4.0	6.3
Affective disorders (F34)	1.0	1.9
Bipolar (F31)	1.8	2.0
Phobic anxiety disorders (F40)	0.6	1.4
Schizophrenia (F20/F21/F25)	0.2	0.2
Substance use disorder (F10-F19)	2.6	2.8

All values expressed as n or %

### Table 4. Patient pre-period treatments / medications

	Face-to-Face	Telehealth
n	272,331	315,386
Electroconvulsive Therapy (ECT)	0.03	0.02
Repetitive Transcranial Magnetic	0.06	0.05
Stimulation (rTMS)		
2+ Antidepressants Rx	4.79	7.58
2+ Antianxiety Rx	0.11	0.14

All values expressed as n or %

## **Results of Propensity Score Weighting**



**Standardized Mean Differences** 

Outcomes <sup>†</sup>
Costs (12-months)
Total costs
Cost per visit
Treatment patterns
E&M appointment volume
Talk therapy volume
Episode of care duration

Face-to-Face	Telehealth
\$733	\$1,463
(728-738)	(1,452-1,472)

**Difference** \$730 (95% CI: 724-734)

Outcomes <sup>†</sup>
Costs (12-months)
Total costs
Cost per visit
Treatment patterns
E&M appointment volume
Talk therapy volume
Episode of care duration

Face-to-Face	Telehealth
\$186	\$209
(185-187)	(207-210)

**Difference** \$23 (95% CI: 22-23)

### **Outcomes**<sup>†</sup>

Costs (12-months) Total costs Cost per visit

Treatment patterns

### E&M appointment volume

Talk therapy volume Episode of care duration

Face-to-Face	Telehealth
0.97	1.67
(0.97 - 0.98)	(1.66-1.68)

**Difference** 0.70 appointments (95% CI: 0.69-0.70)

### **Outcomes**<sup>†</sup>

Costs (12-months) Total costs Cost per visit

Treatment patterns

E&M appointment volume Talk therapy volume

Episode of care duration

Face-to-Face	Telehealth
2.45	5.63
(2.43-2.48)	(5.58-5.68)

**Difference** 3.18 appointments

(95% CI: 3.15-3.20)

### **Outcomes**<sup>†</sup>

Costs (12-months) Total costs Cost per visit Treatment patterns E&M appointment volume Talk therapy volume Episode of care duration

Face-to-Face	Telehealth
207.3	245.6
(206.5-208.0)	(244.9-246.3)

**Difference** 38.3 days (95% CI: 38.3-38.4)

## **Clinic types for anxiety/depression care**



## **Provider types for anxiety/depression care**



# Discussion

# **Summary of Findings**

- Patients managed by telehealth had more severe and complex disease
- They were more likely to live in a metropolitan area and to receive care from a psychiatrist
- Their mean number of talk therapy visits were greater (5.6 vs. 2.5)
- As were their mean number of E&M visits (1.7 vs. 1.0)
- Thus, total annual care cost was greater for patients treated via telehealth (\$1,463 vs. \$733)
- However, cost per visit did not differ greatly (\$209 vs. \$186)

# **Summary of Findings**

- Prior research has shown dose-response effect for therapy, with 8-10 sessions required to achieve reliable change among 50% of patients *(Chen & Keenan-Miller; 2021)*
- Normal face-to-face mental health has higher no-show rates than other medical specialties (*Dantas et al., 2018*)
  - Median across specialties: 23%
  - Psychiatry/mental health: 22-35%
  - Those with psychiatric disturbances or taking psychiatric medications more likely to no-show
- Transitioning to telehealth has been show to decrease no-show rates, comparing prepandemic to pandemic period *(Muppavarapu et al., 2022)* 
  - This means better care for the patient and improved revenues for the provider/facility

# Limitations

- Because of the longer episode of care among telehealth patients, unobserved confounding may exist
- Unobserved differences in symptom severity due to non-report of anxiety/depression instrument results in billing data (e.g. HAM-D, GAD-7, Sheehan disability scale)

# Thanks!



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### Antianxiety

### 🗏 Benzo

Alprazolam Chlordiazepoxide Hydrochloride Clorazepate Dipotassium Diazepam Halazepam Lorazepam Oxazepam Prazepam Quazepam

#### Antidepressant

#### 

Isocarboxazid

Phenelzine Sulfate

Tranylcypromine Sulfate

### 

Bupropion Hydrochloride

#### Other\_Anti\_Dep

Vortioxetine Hydrobromide

#### 🗆 SARI

Nefazodone Hydrochloride Trazodone Hydrochloride

#### SNRI

Desvenlafaxine Succinate Duloxetine Hydrochloride Levomilnacipran Hydrochloride Venlafaxine Hydrochloride

#### SSRI

Citalopram Hydrobromide Escitalopram Oxalate Fluoxetine Hydrochloride Fluvoxamine Maleate Paroxetine Sertraline Hydrochloride

Vilazodone Hydrochloride

### **TCA**

Amitriptyline Clomipramine Hydrochloride Desipramine Hydrochloride Doxepin Hydrochloride Imipramine Nortriptyline Hydrochloride Protriptyline Hydrochloride Trimipramine Maleate

#### 🗆 TeCA

Amoxapine Maprotiline Hydrochloride Mirtazapine

### **Medications listed**