Social Innovation Fund Report:
Access to Mental Health Services Through
Emergency Department Telepsychiatry
April 2012 – September 2014

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St. Elizabeth Healthcare
Access to Mental Health Services Through Emergency Department Telepsychiatry

I.   Introduction

Rising costs and lack of health insurance places the emergency department (ED) as a safety net for those who cannot find healthcare elsewhere. This is especially true for patients with mental health and substance abuse (MHSA) conditions. According to the American College of Emergency Physicians (ACEP), the "inability to access psychiatric care has caused patients needing psychiatric care to seek care in emergency departments or go without".[1] Additionally, patients with a mental health/substance abuse (MHSA) diagnosis are nearly 2.5 times more likely to be admitted through the emergency department (ED) when compared to patients with no MHSA condition.[2]

Despite significant utilization of the ED by those with mental health conditions, few specialized resources are available to the ED. According to Treatment Advocacy Center, Kentucky has a "severe" shortage of public psychiatric hospitals with only 15.6 beds per 100,000 people, compared to a national average of 17 beds per 100,000 people in 2005 (down from 340 beds/100,000 in 1955).[3] Data from 2005 indicate that 2.8 % (or 2.7 million) of more than 99 million total emergency department visits in the United States were associated with a primary mental health diagnosis.[4] In 2011, the St. Elizabeth Healthcare System reported 208,660 visits to its five emergency departments.[5] Of these, 6,954 (3.3% of the total) visits resulted in a primary mental health diagnosis, above the national average (~3%). Of those with mental health as a primary diagnosis, 39% (2,692) were admitted to the hospital for inpatient care. This exceeds the national average of 20.7% reported by the Agency for Healthcare Research and Quality.[6]

In addition to a shortage of specialized mental health services in emergency departments, patients presenting in the ED with a MHSA condition are costing patients and hospitals billions. In 2007, total MHSA expenses for adults ages 18–64 were approximately $36.5 billion, $13 billion higher than in 1997 (adjusted to 2007 dollars). In addition, a higher proportion of adults ages 18–64 reported a MHSA condition related expense in 2007 than in 1997 (12.6 versus 7.9, respectively). Among all Americans, 36.2 million people paid for mental health services totaling $57.5 billion in 2006 (this includes children and adolescents).[7] At St. Elizabeth, about half (48%) of the overall mental health population who received services from St. Elizabeth Healthcare were Medicaid or Self Pay patients. For their emergency department care, St. Elizabeth incurred financial losses for their treatment exceeding $2.5 million from April 2010 through June 2011.

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[1] American College of Emergency Physicians (ACEP) *Psychiatric and Substance Abuse Survey 2008.* Fact Sheet. Available at: http://www.acep.org/uploadedFiles/ACEP/Advocacy/federal_issues/PsychiatricBoardingSummary.pdf

[2] Healthcare Cost and Utilization Project, Statistical Brief #92. Available at: http://www.hcup-us.ahrq.gov/reports/statbriefs/sb92.pdf

[3] March, 2008:The Shortage of Public Hospital Beds for Mentally Ill Persons: A Report of the Treatment Advocacy Center http://www.treatmentadvocacycenter.org/storage/documents/the_shortage_of_publichospital_beds.pdf

[4] 2005 Nationwide Emergency Department Sample (NEDS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality.

[5] Mental health related diagnoses, for the purpose of this project, include the following the diagnoses associated with Mental Health ICD-9-CM diagnosis codes. Examples of mental health related diagnoses include: anxiety disorders, attention-deficit/hyperactivity disorders, eating disorders, mood disorders (bipolar, disthymic, and major depressive disorders), personality disorders, substance-abuse disorders and schizophrenia.

[6] Source: Center for Financing, Access and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2007

[7] Brown, E. *Health Care Expenditures for Adults Ages 18–64 with a Mental Health or Substance Abuse Related Expense: 2007 versus 1997.* Statistical Brief #319. March 2011. AHRQ, Rockville, MD.
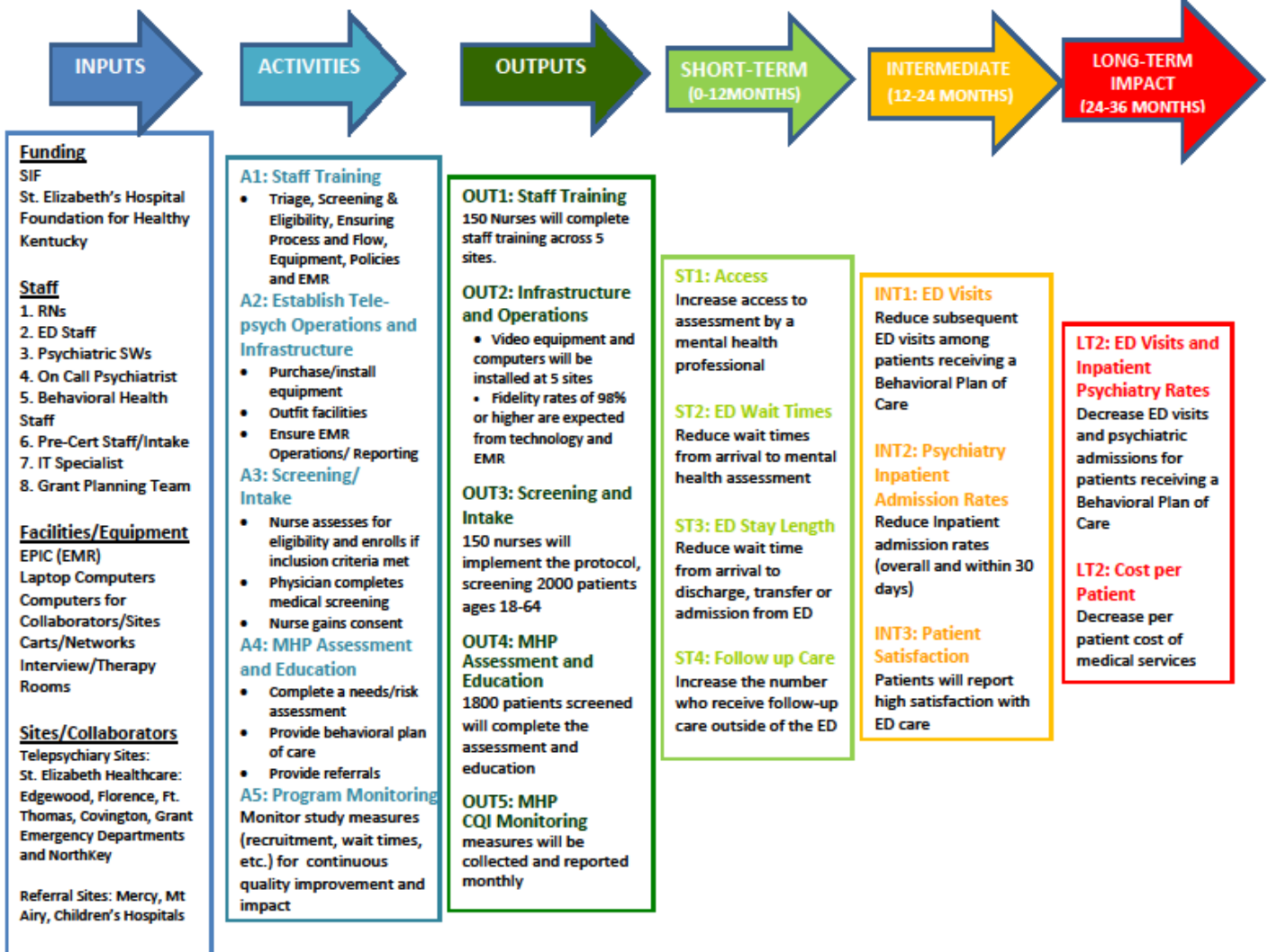
With the rapid advances in technology, telemedicine has now become a viable alternative for assessing/treating patients when services are not readily available such as specialty services in remote rural areas. As psychiatric access can be limited in outlying areas, a Telepsychiatry program is especially crucial for access for these patients. Timely, expert assessments may also lead to a reduction in inappropriate inpatient admissions, thereby reducing charges. Patients who are assessed by a mental health professional will also receive more timely and appropriate treatment and better linkages to outpatient care. This will likely reduce the number of unnecessary re-visits to the emergency department and better long-term patient health. Mental health assessments conducted by licensed mental health professionals will help to provide a standardized mental health assessment to patients presenting in emergency departments, followed by providing them with a behavioral plan of care and referrals via a Telepsychiatry program offered 24 hours daily. In addition to ensuring a quality, consistent service, a goal is also to shorten wait times in the ED and improve disposition such that ED visits, readmission rates, and costs are ultimately reduced in patients receiving these services over time compared to those who do not receive this service. It is also expected that satisfaction with the ED is maintained throughout the integration of the Telepsychiatry Service. An intermediate goal is to track a cohort of patients to assess how well they complete follow ups with referrals to community mental health resources.

The Access to Mental Health Services through Emergency Department Telepsychiatry program is employing an innovative strategy of linking five geographically separate emergency departments to a crisis team of mental health professionals at a community-based healthcare organization to provide more timely, accurate and effective diagnosis and disposition (care or referral) to these individuals. The program addresses access to care and reduces health risks/disparities by offering psychiatric assessments via telemedicine by a mental health professional at any time, 24/7, and at any of our hospital emergency departments. The new program relieves the ED physicians from this service by providing a timely mental health assessment of the mental health patient by a mental health professional. Consequently, the mental health professional works with the on-site physician during this single ED visit to develop a detailed plan of care so that appropriate and timely mental health care assessments are conducted with the goal of improving mental health care in high risk patients. This will increase access to a mental health professional assessment, increase timeliness of a mental health assessment, decrease overall cost per patient, and decrease ED re-visits and inpatient admissions.

St. Elizabeth Healthcare operates six facilities throughout Northern Kentucky—St. Elizabeth(s) Covington, Edgewood, Falmouth, Florence, Fort Thomas, and Grant. Before implementation of the Telepsychiatry Program, three (Edgewood, Covington and Florence) of the five St. Elizabeth EDs had on-site access to mental health assessment for people who seek care at them; two (Ft. Thomas and Grant) offered no on-site access. At the three with access, service hours are limited to only 4-14 hours/day depending on the ED. St. Elizabeth's, in collaboration with NorthKey Community Care, a regional community mental health center (CMHC), established a telepsychiatry program allowing patients presenting to any of the system's five EDs with mental health needs to be assessed by a licensed mental health professional. Mental health professionals (MHP) at two fixed-site offices at the main Edgewood Campus are available via audio/visual technology to complete real time patient assessments of mental health patients at the other four EDs during the day and evening hours. Another site through NorthKey covers the night hours, thus enabling northern Kentucky residents to have access to mental health professionals 24/7.

St. Elizabeth developed the logic model below (Figure 1) from the Kellogg Foundation's Logic Model Development Guide (2004). The logic model details the process for implementing the St. Elizabeth Telepsychiatry program through inputs and activities as well as the outputs and expected short-term, intermediate, and long-term outcomes.

Figure 1: St. Elizabeth Healthcare Telepsychiatry Logic Model

INPUTS	ACTIVITIES	OUTPUTS	SHORT-TERM (0-12 MONTHS)	INTERMEDIATE (12-24 MONTHS)	LONG-TERM IMPACT (24-36 MONTHS)

Funding
SIF
St. Elizabeth's Hospital Foundation for Healthy Kentucky

Staff
1. RNs
2. ED Staff
3. Psychiatric SWs
4. On Call Psychiatrist
5. Behavioral Health Staff
6. Pre-Cert Staff/Intake
7. IT Specialist
8. Grant Planning Team

Facilities/Equipment
EPIC (EMR)
Laptop Computers
Computers for Collaborators/Sites
Carts/Networks
Interview/Therapy Rooms

Sites/Collaborators
Telepsychiary Sites:
St. Elizabeth Healthcare: Edgewood, Florence, Ft. Thomas, Covington, Grant Emergency Departments and NorthKey

Referral Sites: Mercy, Mt Airy, Children's Hospitals

A1: Staff Training
- Triage, Screening & Eligibility, Ensuring Process and Flow, Equipment, Policies and EMR

A2: Establish Tele-psych Operations and Infrastructure
- Purchase/install equipment
- Outfit facilities
- Ensure EMR Operations/ Reporting

A3: Screening/ Intake
- Nurse assesses for eligibility and enrolls if inclusion criteria met
- Physician completes medical screening
- Nurse gains consent

A4: MHP Assessment and Education
- Complete a needs/risk assessment
- Provide behavioral plan of care
- Provide referrals

A5: Program Monitoring
Monitor study measures (recruitment, wait times, etc.) for continuous quality improvement and impact

OUT1: Staff Training
150 Nurses will complete staff training across 5 sites.

OUT2: Infrastructure and Operations
- Video equipment and computers will be installed at 5 sites
- Fidelity rates of 98% or higher are expected from technology and EMR

OUT3: Screening and Intake
150 nurses will implement the protocol, screening 2000 patients ages 18-64

OUT4: MHP Assessment and Education
1800 patients screened will complete the assessment and education

OUT5: MHP CQI Monitoring
measures will be collected and reported monthly

ST1: Access
Increase access to assessment by a mental health professional

ST2: ED Wait Times
Reduce wait times from arrival to mental health assessment

ST3: ED Stay Length
Reduce wait time from arrival to discharge, transfer or admission from ED

ST4: Follow up Care
Increase the number who receive follow-up care outside of the ED

INT1: ED Visits
Reduce subsequent ED visits among patients receiving a Behavioral Plan of Care

INT2: Psychiatric Inpatient Admission Rates
Reduce Inpatient admission rates (overall and within 30 days)

INT3: Patient Satisfaction
Patients will report high satisfaction with ED care

LT2: ED Visits and Inpatient Psychiatry Rates
Decrease ED visits and psychiatric admissions for patients receiving a Behavioral Plan of Care

LT2: Cost per Patient
Decrease per patient cost of medical services

II.   Methods

The Telepsychiatry Program is offered to every individual presenting with mental health concerns that meets criteria at any one of the five St. Elizabeth Emergency Department. Patients are offered a description of the Program and must give their consent to participate. Data is collected through electronic medical records (EMR) as well as through self-report surveys given to patients.

A. Evaluation Design

The Telepsychiatry Program was evaluated based on two phases: program implementation and program impact.

1. **Program Implementation**

    Elements of program implementation were evaluated using monitoring logs and survey tools. The quantity and quality of the Telepsychiatry program was measured by the number of staff trained and the number of patients receiving a screening.

2. **Impact Evaluation**

    This report details a preliminary data analysis of the impact of the Telepsychiatry program. Data were analyzed between the Target Groups (Years 1 and 2) and an Archival Comparison Group. Preliminary aggregated demographics were also included for Target Group Year 3 as a reference. The Groups are detailed below:

    - The **Archival Comparison Group** is comprised of archival data of patients seen in any of the five St. Elizabeth ED facilities for mental health concerns from April 1, 2011 to March 31, 2013 (Year 0) before the Telepsychiatry Program was implemented.
    - **Target Group Year 1** includes participants in the St. Elizabeth's Telepsychiatry Program who consented to the Telepsychiatry intervention during ED intake from April 1, 2012 to March 31, 2013.
    - **Target Group Year 2** includes participants in the St. Elizabeth's Telepsychiatry Program who consented to the Telepsychiatry intervention during ED intake from April 1, 2013 to March 31, 2014.
    - **Target Group Year 3** includes participants from the first two quarters (6 months) of the third year of operation (April to September 2014). These data were received in aggregate form and were unable to be included in the analyses.

    The proposed evaluation was to include a matched comparison group including individuals presenting at the ED with mental health concerns who were either unable or elected not to receive treatment through the St. Elizabeth Telepsychiatry Program. However, not enough patients have refused the Telepsychiatry Program in Year 1 or Year 2 to develop a matched comparison group.

B. **Data Collection**

Program implementation data were collected by survey and weekly inventories and compiled from all trainings by program administrators. Additional implementation data were pooled from relevant EPIC (St. Elizabeth's EMR) data and shared with evaluators. Program impact data were collected from relevant information pooled by an EPIC specialist on a monthly basis and shared with the evaluators. During Year 1, it was noted that some staff members were unsure of what screens on EPIC certain variables were reported and contributed to a low amount of data for that variable. An IT professional addressed this challenge in Year 2 by developing flow-sheets and adding specific data points that could be captured through our electronic health record. Specifically, a data point was added to display the time the mental health professional started his/her assessment so that the length of the assessment could be captured.

III.   **Findings**

    Data provided below details the implementation and impact findings for the St. Elizabeth Healthcare Telepsychiatry Program.

A. Program Implementation
Table 1: Summary of Implementation Indicators and Corresponding Findings: Detailed findings are provided for each question below.

Research Question		Indicator	Finding
1.	**Program Implementation:** *(Year 1 Only)* To what extent did training activities take place as planned? (Logic Model A1)		
a.	How many staff were trained?	Number of staff trained. N=150 expected.	**146** staff were trained
b.	Did staff attend all required training dates?	Number of trainings attended per staff member.	**100%** of staff attended all required trainings
c.	Did the staff think that the training was adequate? And/or did the training increase staff's comfort level with the program and using the equipment?	Ratings of 3 or greater on individual survey responses. Percentage of positive written responses.	**93%** of staff gave a rating of 3 or higher for "I am able to set up equipment and conduct a Telepsychiatric Assessment"
2.	**Program Implementation:** *(Year 1 Only)* To what extent did St. Elizabeth Healthcare establish the needed infrastructure for the ED Telepsychiatry Program? (Logic Model A2)		
a.	Was the equipment adequate for the program's needs?	Integrity and fidelity of Telepsychiatry equipment	The equipment was adequate for the Program.
b.	Was the infrastructure available within the anticipated timeframe?	Availability of equipment for patients as needed	Equipment was ready for the start of the Telepsychiatry Program and was modified as needed to reflect ED volume and patient needs.
3.	**Program Implementation:** To what extent did the screening and intake process facilitate patient access to Telepsychiatry Program services? (Logic Model A3 and A4)		
a.	How many mental health screenings were provided?	Number of mental health screenings at intake. N=2000 expected.	Screenings offered to determine eligibility Target Group Year 1 = **1920** screenings were offered to **1674** patients Target Group Year 2 = **1973** screenings were offered to **1723** patients Target Group, Year 3 (6 mos.) = **Unavailable**
b.	How many patients consent to the Telepsychiatry program at intake?	Number of patients who consent and receive Telepsychiatry services. N=1800 meet program criteria with 95% level of participation in Telepsychiatry services.	Target Group Year 1 **1314** ED visits involving **1122** patients consented to Telepsychiatry Services (**22** patients did not consent, with a **98.1%** patient participation rate) Target Group Year 2 **1359** ED visits involving **1160** patients consented to Telepsychiatry Services (**11** patients did not consent, with a **99.1%** patient participation rate)
c.	How many Telepsychiatry needs/risk assessments were provided?	Number of Telepsychiatry assessments.	Telepsychiatry Assessments Completed Target Group Year 1 = **1314** Target Group Year 2 = **1359** Target Group, Year 3 (6 mos.) = **715**
d.	How many patients received a plan of care and referral?	Number of patients with Plan of Care and/or referral.	**100%** of patients that had a telepsychiatry assessment received a plan of care and a referral to primary physicians, outpatient services at St. Elizabeth's, NorthKey, or other community mental health resources.
4.	**Program Implementation:** Are study measures being monitored across sites to ensure continuous quality improvement and impact? (Logic Model A5)		

a.	Are recruitment goals being met consistently?	Number of patients who consent and receive Telepsychiatry services.	Target Group Year 1 = **1314** ED visits involving **1122** patients consented and received Telepsychiatry Services Target Group Year 2 = **1359** ED visits involving **1160** patients consented and received Telepsychiatry Services
b.	What factors are affecting recruitment (e.g. busy ED, lower staff ratios, etc.)?	ED volume and staffing records compared to Telepsychiatry participation.	Year 1: Staffing and technology issues Year 2: Minimal complications

1. **Staff Trainings (Logic Model OUT1)**

In February 2012, 146 staff members received a mandatory educational training on the Telepsychiatry processes, as well as procedures for triage, screening, and eligibility. 100% of staff attended all required trainings. Trainings were 4 hours and took place on site in the computer rooms to display documentation. The equipment and assessments were available for staff to use and learn. 99.3 percent of trained staff members agreed or strongly agreed that they were "able to state the Telepsychiatric Program process and procedures for arrival types, safety screenings, and behavioral precautions." Additionally, 98.7 percent agreed or strongly agreed "I am able to locate the appropriate flow sheet in EMR and demonstrate accurate and complete documentation." 93.0 percent agreed or strongly agreed to "I am able to set up equipment and conduct a Telepsychiatric Assessment." All evaluation questions received an average rating of 3.4 or higher out of a possible 4. Table 2 below details the full survey results.

Table 2: Telepsychiatry Program Staff Education Evaluation

	Strongly Agree	Agree	Total Average Rating (out of 4)
I am able to state the Telepsychiatric Program process and procedures for arrival types, safety screening and behavioral precautions.	44.2%	**55.1**%	3.43
I am able to locate the appropriate flow sheet in EMR and demonstrate accurate and complete documentation.	**55.5**%	43.2%	3.53
I am able to describe the process and procedures for assessing proper placement for the patient.	47.0%	49.7%	3.42
I am able to communicate with the ED team the procedure for patients meeting criteria for Telepsychiatric assessment.	49.7%	47.6%	3.45
I am able to set up equipment and conduct a Telepsychiatric Assessment.	34.3%	**58.7%**	3.26
I anticipate St. Elizabeth Healthcare will see positive patient outcomes as a result of the application of my learning.	45.2%	**51.4%**	3.40
I found the room comfortable and experienced minimal distractions during the class.	**57.7**%	38.9%	3.53
I am clear about what is expected of me as a result of this educational class.	**50.0**%	45.9%	3.45

2. **Infrastructure and Operation (Logic Model OUT2)**

Telepsychiatry equipment was purchased and installed. Equipment is portable and can be easily moved to the patient's room. The camera allows the Telepsychiatry social worker to pan the room and focus on different objects or people as needed.

Equipment was modified to ensure successful implementation of the Program.   After starting the program, it was determined that the picture and sound quality would be greater if the system was hard wired instead of run over a wireless connection. Additionally, an extra Telepsychiatry unit was added at the Florence Emergency Department to deal with an increase in volume.

3. **Screening, Intake, MHP Assessment and Education (Logic Model OUT3 and OUT4)**

   All patients presenting with a mental health concern in the 5 emergency departments were screened to determine eligibility for the Telepsychiatry program. Eligibility is determined based on considerations such as; can the equipment be left in the room with the patient, can the patient cooperate with the mental health assessment, and can the patient communicate with the mental health professional. Additionally, if a patient is acutely intoxicated, requires restraint or seclusion, presents in the ED with a court ordered hold, is unstable or violent, or speaks a foreign language without a medical certified interpreter present they were also excluded.

   A total of 1920 screenings were offered to 1674 patients in year 1 and 1973 screenings were offered to 1723 patients in year 2. At intake, a nurse does a psychosocial assessment on everyone who presents with mental health concern. Then it is determined if the patient is eligible for Telepsychiatry Program or if the mental health assessment will be conducted face to face, or by a doctor.

   Although data was sparse in determining consent, we feel confident that most if not all of the persons who we do not have consent for would have consented because of the high rate of usage and the high patient satisfaction scores. In year 1, 1144 patients, over 1347 ED visits, were determined to be eligible for Telepsychiatry, and 1122 patients with 1314 ED visits consented. The patient participation rate was 98.1 percent. In year 2, 1171 patients, over 1379 ED visits, were determined to be eligible for Telepsychiatry, and 1160 patients with 1359 ED visits consented. The patient participation rate was 99.1 percent. Some consenting patients were seen in person by mental health professionals and others, in some cases, were assessed by the ED doctor. Patients were assessed by ED doctors either because of long wait times for the mental health professional, or because the ED doctor was familiar with the patient from previous visits. These factors were not captured in the data exported from EPIC and are recognized as possible confounds in the current evaluation.

   Our initial assessment found that all year 1 patients (100 percent) who received a Telepsychiatry assessment received a plan of care and a referral following their treatment in the St. Elizabeth's Emergency Department. Patients are referred to primary physicians, outpatient services at St. Elizabeth's, NorthKey, or other community mental health resources, such as Cincinnati Children's Hospital, Mercy Mt. Airy, Lindner Center of Hope, or The Ridge Behavioral Health System in Lexington.

4. **Mental Health Professional Continuous Quality Improvement Monitoring (Logic Model OUT5)**

   Telepsychiatry recruitment goals were met having 1122 patients in year 1 and 1160 patients in year 2 consenting to use the Telepsychiatry Program. In year 1, issues with staffing, such as physicians not wanting to wait for a Telepsychiatry consult and instead conducting the mental health assessment on their own, may have had an effect on recruitment.

   Any time there was an issue with equipment, it was reported to the IT department Help Desk. Before the system was fully implemented, two patients' Telepsychiatry visits were terminated due to lack of connectivity. From April 2013 to September 2014, there were 14 reports:

   - 4 hardware issues (e.g., blown fuses)
   - 4 user errors (e.g., leaving a phone off the hook)
   - 2 configuration errors necessitating changing a network setting or rebooting
   - 2 server errors
   - 2 broken screens (one from a stretcher banging into the monitor and the other was damaged by a patient) - Two new monitors are on backorder and should arrive soon. One monitor was sent from Edgewood to Ft. Thomas to accommodate for their broken monitor. The other broken screen was in Florence. Since they had two screens, they are down to one until the damaged one is replaced.

B. Program Impact

Table 3: Summary of Impact Indicators and Corresponding Findings: Detailed findings are provided for each question below.

Research Question	Indicator	Finding
Program Impact: 1. Does the St. Elizabeth Telepsychiatry Program improve ED mental healthcare?		
a. To what extent did the program increase access to assessment by a mental health professional? (Logic Model ST1)	Percentage of mental health patients who consent to Telepsychiatry care by a mental health professional in the ED.	Patients consented to Telepsychiatry care for **98.1%** of Target Group Year 1 visits and **99.1%** of Target Group Year 2 visits.
b. To what extent did the program reduce time from arrival to mental health assessment? (Logic Model ST2)	Minutes from arrival to assessment. (Wait Time)	Average wait time from arrival to assessment Target Group Year 1 = **120.9** minutes Target Group Year 2 = **109.6** minutes
c. To what extent did the program reduce time from arrival to discharge, transfer or admission (length of stay)? (Logic Model ST3)	Length of Stay (LOS) in minutes, which is recorded in minutes from the point of intake. LOS is inclusive of wait time and describes the period of time between arrival to final disposition whether this is by discharge, transfer, or admission from the ED	Average Length of Stay: Archival Comparison Group = **205.3** minutes Target Group Year 1 = **256.9** minutes Target Group Year 2 = **262.3** minutes
d. To what extent did the program increase the number of mental health patients who receive follow-up care outside the ED? (Logic Model ST4)	Follow up care received from referral service or resource.	100 patient records randomly selected 27% scheduled an outpatient appointment 20 of 27 attended their appointment 8 non-compliant patients reached Barriers: Finances, availability of appointment times, and difficulty navigating resources
Program Impact: 2. Compared to patients receiving usual care (i.e.: Assessment by an ED professional) do those individuals who elect to receive the Telepsychiatry program experience improved outcomes?		
a. To what extent did the program reduce subsequent ED visits among patients receiving a care plan? (Logic Model INT1)	Number of return visits within 2 years of receiving a Plan of Care.	Average Revisits in 30 days per Patient: Archival Comparison Group = **.17 visits** Target Group Year 1 = **.07 visits** Target Group Year 2 = **.07 visits** Average Revisits in 1 year per Patient: Archival Comparison Group = **.35 visits** Target Group Year 1 = **.17 visits** Target Group Year 2 = **.17 visits**
b. To what extent did the program reduce readmission rates within 30 days (Logic Model INT2)	Number of readmissions within 30 days.	Average Readmissions in 30 Days Per Patient: Archival Comparison Group = **.06 readmissions** Target Group Year 1 = **.05 readmissions** Target Group Year 2 = **.04 readmissions**
c. What percentage of patients report satisfaction with ED care (Logic Model INT3)	Proportion of mental health ED patients with positive responses on patient care survey.	Preliminary data shows a **95.3%** reported overall satisfaction
3. Program Impact:		
To what extent did the program decrease overall inpatient admissions for patients in the ED (Logic Model LT1)?	Number of inpatient admissions	Overall Admission Rates: Archival Comparison Group = **36.4%** Target Group Year 1 = **61.5%** Target Group Year 2 = **67.5%**

a.	To what extent, does the Telepsychiatry program reduce the costs of mental healthcare in the ED? (Logic Model LT2)	Calculated average cost per patient in ED visits and eventual disposition.	Average ED Cost per Patient (US$): Archival Comparison Group = **1624.11** Target Group Year 1 = **1947.78** Target Group Year 2 = **2087.25**

C. Demographics

The Archival Comparison Group included 5361 patients with a total of 7264 emergency department visits. The Year 1 Target Group included 1122 patients with a total of 1314 emergency department visits where patients received Telepsychiatry Services. The Year 2 Target Group included 1160 patients with a total of 1359 emergency department visits where patients received Telepsychiatry Services. Table 4 displays the demographics of all three groups.

Adequate resources could not be acquired to conduct a third year of evaluation for the Telepsychiatry program. However, we were able to gather aggregated participation data for the first two quarters of the third year of operation. Demographics for these individuals are illustrated below in Table 4. Across both quarters (April to September 2014), 715 Telepsychiatry assessment visits were recorded.

Table 4: Demographics*

Demographics		Archival Comparison N=5361	Target Year 1 N=1122	Target Year 2 N=1160	Target Year 3 N=715
Gender	Female	2590 (48.3%)	523 (46.6%)	499 (43.0%)	325 (45.5%)
	Male	2771 (51.7%)	539 (48.0%)	612 (52.8%)	390 (54.5%)
	Unknown	0 (0.0%)	60 (5.3%)	49 (4.2%)	0 (0.0%)
Age	18 - 39 years	3217 (60.0%)	622 (55.4%)	690 (59.5%)	419 (58.6%)
	40 - 64 years	2144 (40.0%)	414 (36.9%)	419 (36.1%)	296 (41.4%)
	Unknown	0 (0.0%)	86 (7.7%)	51 (4.4%)	0 (0.0%)
Race	White/Caucasian	4944 (92.2%)	972 (86.6%)	1017 (87.7%)	648 (90.6%)
	Black/African-American	285 (5.3%)	71 (6.3%)	67 (5.8%)	47 (6.6%)
	Native American/Hawaiian or API	12 (0.2%)	1 (0.1%)	1 (0.1%)	2 (0.3%)
	Asian	12 (0.2%)	2 (0.2%)	5 (0.4%)	1 (0.1%)
	Other	4 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Unknown	104 (1.9%)	76 (6.8%)	70 (6.0%)	17 (2.4%)
Ethnicity	Non-Hispanic	5254 (98.0%)	1051 (93.7%)	1093 (94.2%)	703 (98.3%)
	Hispanic	86 (1.6%)	11 (1.0%)	18 (1.6%)	11 (1.5%)
	Unknown	21 (0.4%)	60 (5.3%)	49 (4.2%)	1 (0.1%)
Language	English	5279 (98.5%)	1058 (94.3%)	1109 (95.6%)	713 (99.7%)
	Spanish	23 (0.4%)	1 (0.1%)	2 (0.2%)	2 (0.3%)
	Other	5 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Unknown	54 (1.0%)	63 (5.6%)	49 (4.2%)	0 (0.0%)
Insurance / Payment Type	Private Insurance	1517 (28.3%)	252 (22.5%)	263 (22.7%)	146 (20.4%)
	Medicaid	946 (17.6%)	207 (18.4%)	261 (22.5%)	383 (53.6%)
	Medicare	618 (11.5%)	128 (11.4%)	141 (12.2%)	133 (18.6%)

Demographics		Archival Comparison N=5361	Target Year 1 N=1122	Target Year 2 N=1160	Target Year 3 N=715
	Self-pay	2214 (41.3%)	410 (36.5%)	417 (35.9%)	43 (6.0%)
	Other government (VA, Tricare)	64 (1.2%)	8 (0.7%)	18 (1.6%)	10 (1.4%)
	Unknown	2 (0.0%)	117 (10.4%)	60 (5.2%)	0 (0.0%)

*Chi squared analyses were performed to analyze demographic differences between groups ("unknown" and 3rd year demographics were excluded). Insurance Payment Type significantly differed by group, $\chi^2(8, N=7464) = 35.58$, $p<.001$. There were no significant differences between groups for gender, age, race, ethnicity, and language.

D. Short-Term (0-12 Months)

Once the Telepsychiatry program was successfully implemented and MHP hours were expanded at all 5 emergency departments, short-term outcomes were monitored to assess increased access to a MHP for patients presenting in the ED with a mental health concern, a reduction in ED wait times and ED length of stay, and an increase in the number of mental health patients receiving follow-up care in the ED.

1. Access: (Logic Model ST1)

Prior to the Telepsychiatry Program, only three of the five Emergency Departments had on-site access to a mental health professional and service hours were limited. Implementing the Telepsychiatry Program increased access to a MHP for patients presenting in all five of the Emergency Departments with a mental health concern at any time. Telepsychiatry provides an opportunity to standardize the assessment and referral process across sites, ensuring that patients receive a plan of care.

During intake, a nurse does a psychosocial assessment to determine any mental health concerns. Following this assessment, the patients presenting with mental health concerns is screened for Telepsychiatry and asked to consent. Patients eligible for Telepsychiatry consented to using the program 98.7 percent of visits in Year 1 and 99.3 percent of visits in Year 2.

2. ED Wait Times (Logic Model ST2)

In year 1, data collection for Telepsychiatry patient's ED wait times began in January 2013 and is only available for a limited number of patients because it took some time to improve the reporting process in EPIC to obtain accurate data. Wait times were collected for the entirety of year 2. More reliable median wait times are reported along with means due to a large amount of variability. The median wait time from arrival to mental health assessment is 93 minutes in Year 1 and 88 in Year 2 (Table 5).

Table 5: Emergency Department Wait Times (Minutes) – January 2013 to March 2014

	Target Group Year 1			Target Group Year 2		
	Median	**Mean**	**Standard Deviation**	**Median**	**Mean**	**Standard Deviation**
Door to Mental Health Assessment Order	38	58.6	87.30	35	53.0	64.20
Mental Health Assessment Order to Mental Health Professional	76	98.9	87.79	80	99.5	85.03
Door to Mental Health Professional	97	128.9	134.17	102	129.4	109.29
Door to Mental Health Assessment Start	93	120.9	102.72	88	108.7	81.48
Mental Health Assessment Start to Complete	51	59.9	36.64	-	-	-

3. ED Stay Length (Logic Model ST3)

Data was analyzed to compare the difference in length of stay for patients in Year 0 before Telepsychiatry (Archival Comparison Group) to Years 1 and 2 during Telepsychiatry (Target Groups). More reliable median wait times are reported along with means due to a large amount of variability. In addition, two outliers were removed prior to the analysis due to invalid length of stay times (values were negative). The Year 1 Target Groups' median length of stay was 54 minutes per visit longer than the comparison group and the Year 2 Target Groups' median length of stay was 64 minutes per visit longer than the comparison group (Table 6). Finally, Table 7 shows length of stay by common primary diagnoses. Similar to the overall patter, the higher lengths of stay for Target group patients were present within patients of similar diagnoses. It should be noted that this could be due to a more thorough assessment occurring with the Telepsychiatry Program.

Table 6: Length of Stay in Minutes Per ED Visit

	Median	**25th Percentile**	**75th Percentile**	**Mean (SD)**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
Archival Comparison Group (N=7262)	179.0	111	265	205.3 (137.4)	202.2	208.5
Target Group Year 1 (N=1235)	233.0	174	311	256.9 (132.8)	249.5	264.3
Target Group Year 2 (N=1359)	243.0	181	321	262.3 (114.6)	256.2	268.4

Table 7: Length of Stay in Minutes Per ED Visit by Common Primary Diagnoses

Primary Diagnosis	Archival Comparison Group (N=7264)				Target Group Year 1 (N=1314)				Target Group Year 2 (N=1359)			
	% with Diagnosis	Mean LOS (SD)	95% CI		% with Diagnosis	Mean LOS (SD)	95% CI		% with Diagnosis	Mean LOS (SD)	95% CI	
			Lower Bound	Upper Bound			Lower Bound	Upper Bound			Lower Bound	Upper Bound
Schizophrenia	2.1%	227.8 (136.2)	207.8	247.8	1.6%	210.5 (90.7)	136.9	254.2	1.8%	236.3 (68.8)	185.5	287.0
Acute Depression	3.4%	239.6 (89.7)	223.8	255.5	4.9%	253.1 (95.1)	221.2	285.0	4.3%	272.5 (95.5)	240.1	304.9
Psychotic Disorder	3.4%	249.3 (108.7)	233.5	265.1	3.6%	276.7 (122.6)	239.2	314.2	4.0%	263.5 (96.6)	230.0	297.1
Anxiety Disorder	14.6%	122.3 (67.8)	114.6	129.9	3.2%	176.2 (103.2)	118.5	202.6	3.7%	201.6 (94.8)	166.4	236.8
Opioid Abuse	3.2%	162.1 (118.3)	145.7	178.6	1.9%	228.5 (73.8)	178.8	278.3	2.0%	229.3 (111.2)	181.4	277.2
Alcohol Abuse	15.5%	269.0 (196.7)	261.6	276.4	3.0%	372.2 (214.1)	340.5	423.5	4.0%	328.2 (194.1)	294.3	362.0
Chronic Depression	14.8%	222.8 (125.5)	215.2	230.4	20.7%	243.4 (104.5)	228.0	258.8	17.8%	254.2 (115.9)	238.2	270.2
Suicidal Ideation	8.5%	252.1 (104.1)	242.1	262.1	25.7%	267.2 (107.6)	253.6	280.9	31.1%	277.8 (100.2)	265.7	289.9
Other	34.5%	187.9 (124.0)	183.1	192.8	35.3%	256.2 (159.1)	240.8	271.6	31.3%	252.5 (117.3)	241.3	263.7

4. Follow-up Care (Logic Model ST4)[8]

To determine if patients that participated in Telepsychiatry services followed through with outpatient referrals, 100 patient records with visits between January 2013 and June 2013 were randomly selected and evaluated to assess compliance. In addition, non-compliant patients (i.e., patients that did not schedule and attend an outpatient appointment) were contacted via telephone to discuss barriers.

Of the 100 selected patients, 27 scheduled an outpatient appointment and 20 of those 27 attended their appointment. Of the 80 non-compliant patients, 59 were called to discuss barriers. Eight (14%) patients were successfully reached where they indicated finances, availability of appointment times, and difficulty navigating resources as their primary barriers.

Note that 6 patients within this sample already had an outpatient appointment scheduled prior to their Telepsychiatry assessment. Taking this into consideration, the remaining 94 patients were used to create 95% confidence intervals. Based on these data, it estimated that 15-32% of patients with outpatient referrals will schedule an appointment and approximately 54-89% of those patients will attend their appointment. The average time for patients to schedule an appointment from the time of their Telepsychiatry assessment is estimated to be 3.8-11.4 days.

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[8] Outpatient follow-up data was acquired and computed by C. Faith Denigan of Northern Kentucky University as part of a clinical cap-stone project entitled "Emergency Department Telepsychiatry Referrals and Perceived Barriers" completed in April of 2014.

These findings are preliminary and were gathered using a qualitative survey. A new follow-up survey will be developed that will make use of more quantitative measures. The implementation and analysis of the new follow-up data will be carried out beyond the scope of this grant.

E. **Intermediate Outcomes (12-24 Months)**

As the Telepsychiatry program accrues more patients, intermediate outcomes should include reduced rates of return ED visits and readmission rates as well as higher rates of patient satisfaction with ED care.

1. **ED Visits (Logic Model INT1)**

Analyses were conducted to determine whether or not Telepsychiatry Program reduce a patient's revisit rate to St. Elizabeth Emergency Departments. Compared to the Archival Comparison Group receiving usual care (i.e., Assessment by a ED physician), Year 1 and 2 Target patients receiving a Telepsychiatry plan of care showed a reduction in subsequent ED visits over both 30 day and 1 year periods.

A one-way analysis of variance (ANOVA) showed that revisits within 30 days differed between groups, $F(2, 7640) = 16.16$, $p<.001$ (Table 8). The sample achieves greater than 99% power to detect a small effect size ($f = 0.07$). A Bonferroni post hoc analysis indicated that Target Years 1 and 2 had significantly fewer revisits within 30 days than the Archival Comparison group ($p<.001$).

Table 8: Number of Revisits within 30 Days per Patient

	Mean	SD	95% Confidence Interval	
			Lower Bound	Upper Bound
Archival Comparison Group (N=5361)	.17	.85	.15	.20
Target Group Year 1 (N=1122)	.07	.32	.05	.09
Target Group Year 2 (N=1160)	.07	.31	.05	.09

In addition to the 30 days analysis, a one-way ANOVA showed that subsequent ED visits were more common among patients in the baseline group across one year, $F(2, 7640) = 27.26$, $p<.001$ (Table 9). The sample achieves greater than 99% power to detect a small effect size ($f = 0.08$). A Bonferroni post hoc analysis indicated that Target Years 1 and 2 had significantly fewer revisits within one year than the Archival Comparison group ($p<.001$).

Table 9: Number of Return Visits within 1 Year per Patient

	Mean	SD	95% Confidence Interval	
			Lower Bound	Upper Bound
Archival Comparison Group (N=5361)	.35	1.13	.32	.39
Target Group Year 1 (N=1122)	.17	.55	.14	.20
Target Group Year 2 (N=1160)	.17	.54	.14	.20

2. Psychiatry Inpatient Admission Rates (Logic Model INT2)

Overall, patients participating in the Telepsychiatry program (Target Groups Years 1-2) had higher rates of admission into both St. Elizabeth's facilities and higher rates of transfers to non-St. Elizabeth's facilities than the Archival Comparison Group (Table 10). It should be noted that the Target Group data includes patients admitted to St. Elizabeth Hospital and St. Elizabeth Mental Health units. Data detailing patient's location after being admitted to St. Elizabeth was not available for the Archival Comparison Group. This difference in data collection could contribute to an increase in admissions due to specificity for the Target Group.

Table 10: Overall Admission Rates per Visit

	Admitted to a St. Elizabeth Facility	Transferred to a Non-St. Elizabeth Facility
Archival Comparison Group (N=7264)	36.4%	2.8%
Target Group Year 1 (N=1312)	61.5%	3.4%
Target Group Year 2 (N=1358)	67.5%	0.8%

In addition to the admission rates, one-way ANOVAs were conducted to compare the difference in readmission and transfer rates between groups. There were no significant differences between groups on readmission rates within a year or within 30 days (Tables 11-12). A significant difference was present between groups for transfers to non-St. Elizabeth facilities, $F(2, 7640)=10.92$, $p<.001$ (Table 13). A Bonferroni post hoc analysis indicated that Target Year 2 had significantly fewer transfers to non-St. Elizabeth facilities than both the Archival Comparison group ($p<.001$) and Target Group Year 1 ($p=.001$).

Table 11: Readmission Rates over 30 Days per Patient

	Mean	SD	95% Confidence Interval	
			Lower Bound	Upper Bound
Archival Comparison Group (N=5361)	.06	.34	.05	.07
Target Group Year 1 (N=1122)	.05[1]	.24	.04	.06
Target Group Year 2 (N=1160)	.04[2]	.22	.03	.06

[1]Did not significantly differ from Archival Comparison group ($p=.859$)
[2]Did not significantly differ from Archival Comparison group ($p=.272$)

Table 12: Readmission Rates within 1 Year per Patient

	Mean	SD	95% Confidence Interval	
			Lower Bound	Upper Bound
Archival Comparison Group (N=5361)	.09	.42	.08	.10
Target Group Year 1 (N=1122)	.08[1]	.34	.06	.10
Target Group Year 2 (N=1160)	.10[2]	.36	.08	.12

[1]Did not significantly differ from Archival Comparison group ($p=1.00$)

Table 13: Patients Transferred to a Non-St. Elizabeth Facility

	Mean	SD	95% Confidence Interval	
			Lower Bound	Upper Bound
Archival Comparison Group (N=5361)	.04	.20	.03	.04
Target Group Year 1 (N=1122)	.04[1]	.20	.03	.05
Target Group Year 2 (N=1160)	.01[2]	.11	.00	.02

[1]Did not significantly differ from Archival Comparison group (*p*=.859)
[2]Significantly fewer transfers than the Archival Comparison group (*p*<.001)

3. Patient Satisfaction (Logic Model INT3)

Patients were given a survey related to patients' satisfaction with various aspects of emergency department care, such as patient care, time spent, etc. Nurses hand out satisfaction surveys after patients see the mental health professional. Data were collected for 55 patients in Year 1 and 9 patients in Year 2. Due to the limited Year 2 sample size, all patient satisfaction data were merged and analyzed together (*n* = 64).

Of the patients surveyed (Table 14), 79.7 percent strongly agreed that "staff prepared me for the video process" and 70.3 percent strongly agreed that it was "easy to talk to a mental health professional over the video equipment." Overall, 71.9 percent strongly agreed that overall they were satisfied. In addition, data was collected from all of St. Elizabeth's emergency departments to assess overall patient satisfaction (Table 15). Telepsychiatry patients were more satisfied with their emergency department experience (71.9 percent strongly agree) than other patients seen in the emergency department in 2013 (51.8 percent) and 2014 (55.2 percent).

Table 14: Telepsychiatry Patient Satisfaction Survey Results

	Strongly Disagree	Disagree	Agree	Strongly Agree
Staff Prepared me for the video process	1.6%	-	18.8%	79.7%
Easy to talk with MHP over the video equipment	-	3.1%	26.6%	70.3%
Sound/Image quality were good	-	1.6%	23.4%	75.0%
Time with MHP was private	1.6%	4.7%	23.4%	70.3%
Felt MHP cared about my problem	-	1.6%	25.0%	73.4%
Was comfortable receiving assessment by video	3.1%	4.7%	23.4%	68.8%
Satisfied with services	3.2%	-	28.6%	68.3%
Would be comfortable using video again	1.6%	4.7%	26.6%	67.2%
Assessment by video are of value	1.6%	4.7%	35.9%	57.8%

Overall was satisfied		-	4.7%	23.4%	71.9%

Table 15: Overall Emergency Department Patient Satisfaction Data

2013	**Florence** N=1500	**Ft. Thomas** N=1200	**Covington** N=1200	**Edgewood** N=2400	**Grant** N=900	**Average Rating** N=7200
Overall ED rating (% rating 9 or 10 out of 10)	54.4%	58.6%	58.9%	62.7%	57.0%	58.9%
Would Recommend (% saying yes)	69.7%	70.9%	72.9%	77.5%	66.9%	72.7%
Instructions or Explanations of Treatment/Tests from Nurses (% rating excellent)	49.6%	50.5%	50.7%	50.1%	49.4%	50.1%
Instructions or Explanations of Treatment/Tests from Doctors (% rating excellent)	49.5%	50.9%	49.7%	50.8%	48.52%	50.1%
Overall Quality of Care (% rating Excellent)	49.1%	50.8%	51.8%	55.0%	48.7%	51.8%
2014 (YTD)	**Florence** N=937	**Ft. Thomas** N=750	**Covington** N=750	**Edgewood** N=1500	**Grant** N=563	**Average Rating** N=4500
Overall ED rating (% rating 9 or 10 out of 10)	57.7%	66.7%	65.6%	66.7%	64.5%	64.4%
Would Recommend (% saying yes)	68.5%	74.7%	73.3%	78.0%	71.1%	73.8%
Instructions or Explanations of Treatment/Tests from Nurses (% rating excellent)	49.0%	53.6%	52.1%	51.5%	52.8%	51.6%
Instructions or Explanations of Treatment/Tests from Doctors (% rating excellent)	52.5%	55.7%	51.0%	53.7%	54.8%	53.5%
Overall Quality of Care (% rating Excellent)	50.6%	58.8%	54.4%	55.7%	57.4%	55.2%

F. Long-Term Impact Outcomes (24-36 months)

1. Readmission Rates Within 2 Years

As noted in Table 12 above, the mean rate of readmissions within 2 years of receiving a plan of care was .10 (N=1160) while Year 1 was .08 (N=1122). The Bonferroni post-hoc analysis indicated that Target Group Year 2 did not differ from Year 1 (p=983) in contrast to our predictions.

2. ED Cost Analysis (Logic Model LT2)

Average ED costs per patient were calculated (adjusted for inflation) to determine if the Telepsychiatry program successfully reduced ED costs (see Table 16). A one-way ANOVA was conducted to examine ED costs by year of operation, yielding a significant difference between groups, $F(2, 7632) =$ 245.57, p<.001. A Bonferroni post-hoc test showed that each year significantly differed from one

another at a significance level of $p<.001$. The data demonstrates a significant increase in costs for each successive year, in contrast to the logic model (LT2).

Table 16: Average ED Costs Per Patient in US Dollars

	Mean	SD	95% Confidence Interval	
			Lower Bound	Upper Bound
Archival Comparison Group (N=5357)	1624.11	780.66	1603.20	1645.02
Target Group Year 1 (N=1118)	1947.78	575.75	1913.99	1981.56
Target Group Year 2 (N=1160)	2087.25	592.49	2053.12	2121.38

$F(2, 7632) = 245.57, p<.001$

G. Longitudinal Analysis

It was recognized, during Year 1, that some patients visited St. Elizabeth emergency departments across multiple years of operation. In order to better understand the impact of the Telepsychiatry program, longitudinal analyses were conducted to determine patient outcomes from the Archive Comparison Group (Year 0) to Target Group Year 2. A total of 49 eligible, consenting patients visited St. Elizabeth emergency departments during all 3 observed years of ED operation. A summary of the program's longitudinal impact can be seen below (Table 17).

Table 17: Summary of Longitudinal Impact Measures

		Archival Comparison Group (Year 0)	Target Group (Year 1)	Target Group (Year 2)
Average Length of Stay Per Visit (in minutes)	Mean (SD)	236.4 (138.3)	266.1 (125.8)	291.5 (119.5)
	95% CI	196.7, 276.1	229.9, 302.2	257.1, 325.8
Average Number of Revisits Within 1 Year	Mean (SD)	2.1 (2.4)	0.6 (1.1)	0.6 (1.0)
	95% CI	1.4, 2.8	0.3, 0.9	0.3, 0.9
Average Number of Revisits Within 30 Days	Mean (SD)	1.1 (1.9)	0.2 (0.7)	0.2 (0.6)
	95% CI	0.5, 1.6	0.0, 0.4	0.0, 0.4
Average Number of Readmissions Within 1 Year	Mean (SD)	0.7 (1.1)	0.3 (0.6)	0.4 (0.8)
	95% CI	0.4, 1.0	0.1, 0.5	0.2, 0.6
Average Number of Readmissions Within 30 Days	Mean (SD)	0.5 (0.7)	0.1 (0.4)	0.1 (0.3)
	95% CI	0.3, 0.7	0.0, 0.2	0.0, 0.2
Average Number of Transfers to a Non-St. Elizabeth Facility	Mean (SD)	0.2 (0.6)	0.0 (0.3)	0.0 (0.0)
	95% CI	0.0, 0.4	0.0, 0.1	0.0, 0.0

1. ED Stay Length

Since patients often had multiple visits within a year, each patient's average length of stay per visit was calculated for each year and compared across the three observed years of ED operation. A repeated measures ANOVA showed that length of stay had a marginally significant difference across the three years, $F(2, 96) = 2.861, p=.062$. Though not significant, LOS increased in a linear pattern from Year 0 to Year 2 (see Table 17).

2. ED Visits

Repeated measures ANOVAs were conducted to determine whether or not a patient's revisit rate within a year and within 30 days changed from Year 0 to Year 2. Revisits within a year showed a significant change across ED years of operation, $F(2, 96) = 16.401$, $p<.001$. A Bonferroni post-hoc test indicated that revisits within a year were significantly more common in Year 0 than both Year 1 ($p<.001$) and Year 2 ($p<.001$). Revisits within 30 days also showed a significant difference across ED years of operation, $F(2, 96) = 8.190$, $p=.001$. A Bonferroni post-hoc test indicated that revisits within 30 days were significantly more common in Year 0 than both Year 1 ($p=.008$) and Year 2 ($p=.016$). See Table 17 for descriptive statistics.

3. Psychiatry Inpatient Admission Rates

Repeated measures ANOVAs were conducted to determine whether readmission rates within a year, readmissions within 30 days, and transfers to Non-St. Elizabeth facilities changed over time. Readmissions within a year showed a significant change across ED years of operation, $F(2, 96) = 3.902$, $p=.023$. A Bonferroni post-hoc test indicated that readmissions within a year were significantly more common in Year 0 than Year 1 ($p=.013$). Readmissions within 30 days also showed a significant difference across ED years of operation, $F(2, 96) = 7.764$, $p=.001$. A Bonferroni post-hoc test indicated that revisits within 30 days were significantly more common in Year 0 than both Year 1 ($p=.009$) and Year 2 ($p=.013$). Finally, the number of transfers to Non-St. Elizabeth facilities were marginally significant across ED years of operation, $F(2, 96) = 2.777$, $p=.067$. Descriptive statistics in Table 17 indicate a drop in transfers from Year 0 to Year 1, but no transfers in Year 2.

IV. Summary

- Staff members at all five emergency departments attended all required trainings and 93 percent of those staff felt they were able to use the Telepsychiatry process and equipment.
- The Telepsychiatry Program **increased access to a mental health professional** by implementing a process to ensure patients are screened for mental health concerns and referred to a mental health professional as needed. For patients eligible to receive Telepsychiatry, patients consented to receiving services in 98.1 percent of visits in year 1 and 99.1 percent of visits in year 2.
- Infrastructure was built to sustain the Telepsychiatry Program and increased to meet the needs of the emergency department volume.
- The Target Groups (Years 1 and 2) had **longer lengths of stay and higher rates of admission**, in contrast to our logic model predictions. Table 7 indicated that this trend was present across patients with similar primary diagnoses. It is possible that the thoroughness of the mental health assessment increased patients' length of stay; however, due to missing data for the length of assessments for the Archival Comparison group and Target Year 2, this possibility could not be explored in depth. As such, data collection will require improvement to sufficiently capture determinants of longer stays at EDs.
- The Target Groups (Years 1 and 2) showed **a significantly lower rate of return visits to the emergency department** within 30 days and within 1 year.
- There were **no significant differences between groups for readmissions within 30 days and 1 year.** Target Group Year 2 had **fewer transfers to non-St. Elizabeth's facility than Target Group Year 1 and the Archival Comparison Group**.

- Of 100 randomly selected patients, 100 received referrals to providers or outside community mental health agency for follow up. Of these, 27 (27%) scheduled an outpatient appointment and 20 of those 27 (74%) who made an appointment reported attending their appointment. According to 8 non-compliant patients, finances, availability of appointment times, and difficulty navigating resources were their primary barriers.
- ED costs **significantly increased each successive year**, in contrast to the logic model (LT2).
- Longitudinal analyses indicated that **return visits and readmission rates within 30 days and within a year significantly decreased** over time. Differences in length of stay and transfers were marginally significant.
- Patients are reporting **95.3 percent satisfaction rate with the Telepsychiatry Program**. However, the sample size was very low (*n*=64).

V.   Lessons Learned

- Keep Telepsychiatry program small at start-up. St. Elizabeth's Telepsychiatry program began with 5 participating emergency departments. This allowed for opportunities to specialize optimal processes and expand the program from that point.
- At minimum, utilize practitioners full-time to maintain efficiency.
- Start-up costs included staff training and payments to NorthKey for night coverage.
- Consider costs and minimum technology requirements when selecting equipment. The telecommunication equipment used was larger than necessary. In addition, the individual components came as part of a package that was not readily compatible with smaller models making replacement costly and complicated.
- Ensure that all participating sites have compatible software (e.g., EPIC) to ensure information is transferred with ease.

VI.   Next Steps

St. Elizabeth is further promoting the model by:

- Improving upon the follow-up survey by adding more quantitative elements.
- Expanding to New Horizons Medical Center in Owenton, Kentucky. Owen County is a secondary service area for St. Elizabeth currently served by NorthKey.
- Providing service in additional communities (without St. Elizabeth facilities). This way the program can assure more equitable access to services beyond the primary service region.
- Expanding telemedicine services to cardiology and endocrinology.