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## BRIDING THE GAP: TREATMENT ENGAGEMENT PROFILES AND OUTCOMES UTILIZING NOVEL MODELS

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The document mentioned above has been reviewed and accepted by the student's advisor, on behalf of the advisory committee, and by the Director of Graduate Studies (DGS), on behalf of the program; we verify that this is the final, approved version of the student's capstone including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Allison Koetter, Student

Dr. Teresa Waters, Committee Chair

Dr. Sarah Wackerbarth, Director of Graduate Studies

BRIDGING THE GAP: TREATMENT ENGAGEMENT PROFILES AND OUTCOMES  
UTILIZING NOVEL MODELS

Allison Koetter MD

A Capstone Project Submitted to the  
University of Kentucky in Partial Fulfillment  
of the Requirements for the Degree of  
Master of Public Health

College of Public Health  
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Capstone Committee:  
Dr. Teresa Waters (Chair)  
Dr. Joseph Benitez  
Dr. Martha Riddell

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## **Abstract**

**Background.** The opioid epidemic is a public health emergency that requires collaboration between both private and public sectors to increase access to and capacity for efforts directed at treatment, prevention, and recovery. The Commonwealth of Kentucky via funding from the Substance Abuse and Mental Health Services Administration (SAMHSA) created their State Targeted Response to the Opioid Crisis (Opioid STR) in order to help address these needs. The University of Kentucky, as an awardee of these funds, decided on an approach to highlight the Emergency Department (ED) bridge model, which links patients discharged from EDs and the hospital (inpatient addiction consult and education service) to treatment and recovery support services. One aspect of this model was the creation of the First Bridge Clinic, an outpatient clinic, which aims to minimize barriers to medications for opioid use disorder (MOUD) as well as to provide immediate evaluation, initiation, or continuation of MOUD treatment prior to “bridging” the patients to ongoing comprehensive treatment in the community.

**Purpose.** This capstone created a descriptive profile of patients referred to and engaging in this unique clinic. It also examined whether in-hospital initiation of MOUD or other demographic and clinical characteristics increase the likelihood of not only patients being scheduled for an intake appointment with the First Bridge Clinic, but also the likelihood of them actually keeping their first appointments.

**Methods.** A retrospective chart review of clinical data was performed. Demographic characteristics including age, sex, race, pregnancy status, veteran status, history of incarceration, homelessness, initiation of medications for OUD, type of MOUD, and the number of referrals received per yearly quarter were analyzed by descriptive statistics on all those who received a referral, those who received an appointment, and those who kept their appointments. Two-

sample t-tests and chi-square tests were used to compare characteristics of those who received and kept appointments. Logistic regression modeling was performed to examine predictor variables for scheduling a First Bridge Clinic appointment as well as for actually keeping the first appointment.

**Results.** The clinic serves a largely Caucasian population with an average age of 36 years old. People who had recently been released from a correctional facility or homeless individuals were found to be less likely to receive an appointment to the First Bridge Clinic. While people who were on MOUD at the time of referral were more likely to receive an appointment at the First Bridge Clinic, they were not more likely to keep their first appointment. Overall, there was an upward trend demonstrated over the time period of the analysis in the utilization of the clinic demonstrating a need for the services provided.

**Conclusions and Implications for Public Health Practice.** Results indicate that 1) state-level regulations for MOUD initiation may make implementation of this model more challenging in the fast-paced environment of the ED, and 2) the rural population largely served by UKhealthcare establishments may face significant barriers to follow up care. Providing same or next day outpatient appointments could potentially increase the likelihood these patients are able to initiate outpatient care.

**Keywords:** opioid use disorder, OUD, bridge, emergency department, engagement, treatment, recovery

## Table of Contents

Acronyms and Abbreviations.....	6
Introduction.....	7
Literature Review.....	9
Methods.....	16
Results.....	18
Discussion.....	26
Limitations.....	30
Recommendations.....	30
Conclusion & Implications.....	31
References.....	33
Biographical Sketch.....	35

## **Acronyms and Abbreviations**

OU.....Opioid Use Disorder

SAMHSA.....Substance Abuse and Mental Health Services Administration

IRB.....University of Kentucky Institutional Review Board

MOUD.....Medications for Opioid Use Disorder

UKHC.....University of Kentucky Healthcare

CDAR.....Center on Drug and Alcohol Research



## **Introduction**

The opioid epidemic is a public health emergency that requires expanded efforts to increase access to treatment, prevention, and recovery support services. SAMHSA funded the Commonwealth of Kentucky via the State Targeted Response to the Opioid Crisis Grant (Opioid STR) in order to help with the implementation of clinical services that would increase access to evidence-based medication treatment for opioid use disorder (MOUD), which decreases mortality but is underutilized. Two new services at the University of Kentucky (UK) were funded as a result - the outpatient First Bridge Clinic and the inpatient Addiction Consult and Education Service (ACES).

UK's First Bridge Clinic launched in 2018. This outpatient clinic aims to minimize barriers to MOUD and provide immediate evaluation and treatment (or continued treatment if MOUD already initiated) to patients discharging from the two emergency departments or inpatient hospitals of UK HealthCare (UKHC). Treatment at the First Bridge Clinic is comprehensive and interdisciplinary. In addition to providing FDA-approved pharmacotherapy for opioid use disorder (OUD), there are nurse navigators, harm reduction services, group and individual counseling, and peer and recovery support services. Clinical care data has been collected since its inception as part of the requirements of the funding agency, but also for clinical team meetings/rounding.

The inpatient Addiction Consult and Education Service (ACES) was also created using state Opioid STR funding as a means to provide inpatient addiction medicine treatment services and recovery support resources to those hospitalized at UKHC with comorbid substance use disorders. For persons with OUD, ACES provides MOUD initiation and linkage to ongoing

outpatient treatment. ACES includes case management, overdose education and naloxone distribution, group and individual counseling, and peer and recovery support services. Similar data variables as those collected for the UK First Bridge Clinic have been collected and reported to the state.

The purpose of this study is to conduct a retrospective chart review of patients receiving care through the First Bridge Clinic to augment previously collected data and to prepare an analysis of populations served and early outcomes regarding treatment initiation and engagement. These novel services are of strong interest to both the local and national stakeholders.

**Objectives:**

- To construct a descriptive profile of patients referred to and engaging in UK's outpatient First Bridge Clinic.
- To determine whether in-hospital initiation of MOUD increases the likelihood of patients being scheduled for an intake appointment with the First Bridge Clinic.
- To determine whether those who are already on MOUD are more likely to keep their scheduled appointments with the First Bridge Clinic.

## **Literature Review**

### *OUD as a National Health Crisis*

The opioid epidemic is a national health crisis affecting not only the public's health but also the social and economic well-being of the United States as a whole. Misuse of and addiction to opioids has a direct impact on an individual's life and an indirect impact on all those surrounding the affected individuals.

In the United States, drug overdoses resulted in 702,568 deaths during 1999-2017, with 56.8% of these deaths involving opioids. From 2016-2017 alone, death rates from all opioids increased, with increases driven by synthetic opioids. In 2017, drug overdoses resulted in 70,237 deaths with 47,600 of these deaths involving opioids. This is a death rate of 14.9 per 100,000 persons. The 2017 rate was 12% higher than the previous year with increases in overdose deaths seen across age groups, racial/ethnic groups, county urbanization levels, and in multiple states.<sup>1</sup>

Despite increased overdose deaths which have largely been attributed to contamination with synthetic opioids, there have been improvements in other substance use disorder (SUD)-related trends. In 2018, around 7.4% of the population aged 12 or older, or 20.3 million people, were found to have an SUD. Of those with an SUD, an estimated 2.0 million people, or approximately 0.8% of the population aged 12 and older, struggled with an OUD. This was a decrease from the estimated OUD population number in 2017 which was estimated to be 2.1

million. Furthermore, it was estimated that 3.7 % of people aged 12 and older, or 10.3 million people, misused prescription pain relievers in 2018. This estimation also decreased from estimates in 2017 which demonstrated that 11.4 million people had misused prescription pain relievers. Additionally, another downward trend was observed in 2018 compared to previous years: that of heroin usage. This observation was primarily due to the decline in heroin use among adults aged 18-25 years old. In conclusion, the downward trends demonstrated in 2018 are congruent with the increased usage of and access to medication-assisted treatment (MAT) at that time. <sup>2</sup>

### *Federal and State Responses*

As indicated above, the U.S opioid overdose epidemic continues to evolve. Significant and substantial financial resources are required to reverse these trends. To address these trends properly, the Opioid State Targeted Response (Opioid STR) grants, which were created by the 21st Century Cures Act, were developed by the Substance Abuse and Mental Health Services Administration (SAMHSA) within the Department of Health and Human Services (DHHS). This program began in 2017 and funded 57 states and territories. The grant provided formula funding with the expectation that grantees would use the funding to address the national epidemic by increasing access to treatment, reducing unmet treatment needs, and reducing opioid overdose-related deaths. These goals were to be accomplished through the provision of prevention, treatment, and recovery services for OUD. Opioid STR funding to states and territories was provided over an initial two-year time period, with roughly \$500 million being provided per year. In the first year, grantees used funding to implement effective medication-assisted

treatment, promote the use of naloxone and key prevention strategies, and build sustainable systems of recovery support services across the country. Prevention efforts included communications campaigns along with the use of proven community-based strategies. Additionally, individuals with personal experience were utilized to augment all endeavors. These people proved to enhance these recovery-based initiatives. Ultimately, states identified the need to connect more Americans with evidence-based programs and practices proven to help those with OUDs, and many sought to support the implementation of innovative models to do so.<sup>3</sup>

Initial awardees of the funding were expected to participate in the Opioid STR national evaluation. The national cross-site evaluation, conducted through contracted services, was intended to capture the complexity of the states' and territories' response to the opioid crisis within the two-year time frame of the grant. It provided SAMHSA with important information regarding the implementation and impact of the grants as well as qualitative and quantitative data components such as project director interviews and follow-up surveys plus analysis of biannual data, respectively. The baseline survey was completed by 54 of 57 (95%) of Opioid STR project directors and 55 of 57 (97%) follow-up surveys were completed. Preliminary data regarding the start-up phase of the project demonstrated that nearly 30,000 individuals received evidence-based prevention services. Of significance, the grant recipients were successful in expanding new medication access in several states and territories. Seven states added buprenorphine, six added injectable naltrexone, five added methadone, five added oral naltrexone, and four added buprenorphine/naloxone. Capacity for responding to the opioid crisis by the provision of treatment increased in all states and territories. Over 118,000 individuals received Opioid STR

funded OUD treatment services, while more than 33,000 individuals were able to access Opioid STR funded recovery support services.

The national cross-site evaluation identified three main themes: state policy, partnerships and collaborations, and sustainability. *State Policy*: Preliminary findings indicated that states reported policy challenges when trying to implement opioid interventions. Furthermore, state budget and legislative cycles, as well as protracted timeframes for hiring and procurement at the state level presented implementation delays. *Partnerships and Collaborations*: While approximately 70% of states and territories already operated an opioid task force, STR funds were used to enhance these collaborations. The national evaluation identified this as being key in adequately addressing OUD. Of interesting note, these collaborations were often initiated with the support of state and territory leadership, including the governor and legislature. Collaborations often included opioid workgroups with inter-departmental and inter-agency participation. Small scale partnerships and community coalitions were also found to be effective. *Sustainability*: The issue of sustainability was a key point in the successful implementation of the Opioid STR programs and interventions. While it was known, at the time of implementation, that Medicaid coverage and reimbursement for OUD and substance use disorder services was important to the delivery of MOUD and recovery services, the cost of medications and difficulties in obtaining authorization for insurance payments presented significant barriers. Provider perceived burdens in obtaining reimbursement as well as high deductible plans were also barriers to getting needed treatment to individuals. <sup>4</sup>

Of the states selected within each DHHS region to be sub-recipients of the cross-site study, Kentucky was one of two states identified as implementing novel treatment approaches to combat the opioid crisis. Kentucky's approach highlights the ED bridge model, which links patients discharged from EDs to treatment and recovery support services. Kentucky began by implementing this model in three hospitals in three regions of the state, each with rates of overdose exceeding the national average. UK was one of those three institutions, creating the First Bridge Clinic in 2018 with state and federal support. The data collected from this clinic will serve as a foundation for the remainder of this paper.

### *OUD in Kentucky*

Kentucky has been significantly affected by the opioid epidemic and considered to be one of the most affected states in the country. In 2016, the age-adjusted drug overdose fatality rate in Kentucky was 33.5 deaths per 100,000 people, or 1,419 opioid overdose deaths. The overdose death rate rose to 37.2 per 100,000 in 2017, an 11% increase from 2016. Kentucky was ranked fifth in the nation for drug overdose fatality rate that year.<sup>5</sup> Other needs demonstrated by the Commonwealth of Kentucky prior to STS grant funding included the rapidly rising rates of Neonatal Abstinence Syndrome and Hepatitis C.<sup>6,7</sup> As a result, the opioid epidemic in Kentucky was determined to be a top priority across both private and public sectors including all levels of government, local, state, and federal.<sup>8</sup>

### *The Emergency Department (ED) Bridge Model*

The evidence-based ED bridge model<sup>9 10</sup> involves providing services following overdose or opioid-related complications, including screening, brief intervention, buprenorphine/naloxone induction, and linkage to ongoing care. In a randomized clinical trial, ED-initiated buprenorphine treatment versus brief intervention and referral alone resulted in a significant increase in engagement with addiction treatment, a reduction in self-reported illicit opioid use, and a decreased utilization of inpatient addiction treatment services.<sup>11</sup> Numerous studies have documented that buprenorphine is an effective treatment for opioid withdrawal as well as an agent that increases the likelihood of treatment engagement and retention; this research has led to the medication's widespread adoption.<sup>12 13</sup>

When the Commonwealth of Kentucky sought to implement their ED bridge program, they chose three hospitals in three regions of the state, each with rates of overdose deaths exceeding the national average.<sup>14</sup> Kentucky's bridge model was inclusive of the following four elements:

- Training and support of providers, including physicians, nurse practitioners, and hospital staff, to support hospital-based buprenorphine inductions for patients in acute opioid withdrawal (inpatient or ED).
- Peer Support Specialists or other care navigator as members of the ED team. Evidence has demonstrated the capacity of peers in promoting treatment engagement following hospital discharge.<sup>15</sup>
- A transitional outpatient clinic ("bridge clinic") providing medical and psychiatric care for patients leaving the hospital.
- Allocation of funds for the distribution of naloxone in the ED and inpatient setting.<sup>16 17</sup>



### *UKHealthcare's First Bridge Clinic*

UK was chosen as one of the three recipients for the ED bridge model funding. UKHC launched the First Bridge Clinic in January 2018, created through a partnership between the Center on Drug and Alcohol Research (CDAR), UKHC, and the Kentucky Cabinet of Health and Family Services (KCHFS). The primary goal of the First Bridge Clinic was to save lives by connecting individuals who presented to the ED or inpatient hospital service with complications of OUD (e.g., overdose, withdrawal, abscess, or life-threatening infections such as endocarditis) to treatment. Other goals included the provision of on-demand access to evidence-based care, including efforts to decrease obstacles to care. And finally, the clinic attempts to stabilize the patient, provide ancillary services, and ultimately BRIDGE them to treatment in the community.

Once patients are successfully engaged with the First Bridge Clinic, they receive a multitude of wraparound services, including medical, psychiatric, psychosocial and recovery support services. Naloxone training is provided along with harm reduction training and buprenorphine education. The multidisciplinary team, including a nurse navigator, licensed therapists, certified adult peer support specialists, waived physicians and nurse practitioners, works together to identify, engage, and retain patients with OUD in treatment. The idea of “bridging” care begins at the first visit. Patient’s preferences are considered. An online service that locates treatment centers throughout the state with availability is utilized in order to connect patients with treatment close to their homes that is affordable and works with their insurance. Warm hand-offs and follow-ups are provided for all transitions. Ultimately, the clinic aims to

provide treatment in a safe, patient-centered, non-judgmental environment to empower patients to achieve remission and recovery.

### *Summary*

The UK First Bridge Clinic seeks to increase access to medication treatment for OUD in order to decrease mortality and morbidity. By applying patient-centered, evidence-based interventions aligned with SAMHSA’s new Treatment Improvement Protocol 63 “Medications for Opioid Use Disorder,”<sup>18</sup> the clinic has been able to provide much-needed services to address local needs.

Patients served by UK’s Bridge Clinic are often complex with a myriad of medical, psychiatric, and psychosocial needs in addition to OUD. Because of the early success of UK’s First Bridge Clinic, additional research is needed to better understand the populations served and opportunities for dissemination. This capstone will serve as a starting point to inform this need. By creating a demographic profile of patients’ receiving referral to The First Bridge Clinic, we will be taking the first step into ascertaining its effectiveness. And finally, because treatment engagement as a primary outcome is important as it is the beginning step to a life of recovery, we will endeavor to identify and characterize significant predictors of treatment initiation.

## **METHODS**

We conducted a retrospective chart review of clinical data that has been collected as part of the usual course of patient care. The data utilized were collected from October 1, 2018 to February 29th, 2020. This data has also been used to fulfill requirements by the funding sponsor Kentucky Department of Behavioral Health, Developmental and Intellectual Disabilities. As the clinical data had not been used for research prior to this project, we requested approval from the UK Institutional Review Board (IRB). The project (IRB number 57593 “Bridging the gap: Novel Models”) was approved by the UK IRB on 3/20/2020.

Data captured for First Bridge Clinic patients included the following: age, sex, race, pregnancy status, veteran status, history of incarceration, initiation of medications for OUD, date of initiation, type, dose, and duration of medication used, the treatment setting in which MOUD began, whether naloxone was dispensed, whether relapse prevention education was provided, whether peer support or recovery coaching was utilized, whether self-help and support groups were utilized, whether recovery housing was utilized, continuing care, employment support, and 30-day retention in care after starting at the First Bridge Clinic.

Data came primarily from the clinical care surveillance system used by the First Bridge Clinic. This system pulled data from the electronic medical record of UKHealthCare which included Allscripts Sunrise Clinical Manager, Allscripts outpatient AEHR, McKesson PACS system, lab tracker data base, paper charts, billing system, STS database, the UKHC Enterprise Data Warehouse, and the Social Security Death Index.

Data were collected and entered into Microsoft Excel. Descriptive statistics (mean  $\pm$  standard deviation or numbers and percentages) were calculated for demographic characteristics; this analysis was conducted for the entire study population, for all those who received and did not receive an appointment, and for all those who kept and did not keep their first appointment. Two-sample t-tests (continuous variables) and chi-square tests (categorical variables) were used to compare characteristics (1) for individuals receiving appointments versus those who did not and (2) for individuals who kept their appointment versus those who did not. Logistic regression analysis was performed to examine predictor variables for scheduling and keeping first appointments with the First Bridge Clinic.

Overall sample size, which was the total number of patients referred to the First Bridge Clinic, was 974. Sample sizes for the analyses of patients with scheduled appointments and kept appointments are listed in their respective tables. A p-value of 0.05 was used for statistical significance. Seven subjects were excluded from analysis as they still had appointments pending.

## **Results**

Table 1 displays the demographic characteristics of the First Bridge Clinic patient population. Average age was 36 years old. There were slightly more males (57%) than females and the population was largely white (90.8%) with only 6.4% of the population black or African American, 0.3% Asian, 0.2% Native Hawaiian or Pacific Islander, 0.5% more than one race, and 1.8% unknown. Pregnancy status was known on 246 female patients and only 2 (0.8%) were pregnant. Veteran status (defined as being a veteran, a service member, or a family member of a

veteran) was known for 400 study patients and only 1 person was a veteran. Of 417 patients asked whether they had been released from a correctional facility in the past 30 days, only 4 answered yes. Ten of 427 patients reported homelessness. There were 253 patients on MOUD at the time of referral to the First Bridge Clinic. The majority of these patients were started on MOUD while in the hospital, either by the inpatient ACES service or in the emergency department. Buprenorphine was the preferred MOUD as 98.4% of the 253 individuals were started on this medication. There was only 1 person on methadone at the time of referral and 3 on naltrexone. Volume of quarterly referrals to the First Bridge Clinic increased from the beginning of 2018 (clinic inception) to the end of 2019.

**Table 1. Demographic Characteristics of All patients Receiving First Bridge Clinic Referral**

<b>Characteristic</b>	<b>N=974*</b>
Age (yr) ± SD	36 ± 9.9
<b>Characteristic (Categorical)</b>	
Male sex, No. (%)	555 (57%)
Race, No. (%)	
White	884 (90.8%)
Black or African American	62 (6.4%)
Asian	3 (0.3%)
Native Hawaiian or Pacific Islander	2 (0.2%)
More Than One Race	5 (0.5%)
Unknown	18 (1.8%)
Hispanic Or Latino, <sup>a</sup> No. (%)	7 (0.7%)
Pregnant, <sup>b</sup> No. (%)	2 (0.8%)
Veteran, Service Member, or Family Member, <sup>c</sup> No. (%)	1 (0.3%)
Released from Correctional Facility in the past 30 days, <sup>d</sup> No. (%)	4 (1%)
Homeless, <sup>e</sup> No. (%)	10 (2.3%)
MOUD Initiated, No. (%)	
No	721 (74.0%)
Yes	253 (26%)
Type of MOUD, <sup>f</sup> No. (%)	
Buprenorphine	249 (98.4%)
Methadone	1 (0.4%)
Naltrexone	3 (1.2%)
Yearly Quarters, <sup>g</sup> No. %	
1 (Jan-Mar) 2018	25 (2.8%)
2 (Apr-Jun) 2018	51 (5.8%)
3 (Jul-Sept) 2018	109 (12.4%)
4 (Oct-Dec) 2018	135 (15.4%)
1 (Jan-Mar) 2019	99 (11.3%)
2 (Apr-Jun) 2019	155 (17.7%)
3 (Jul-Sept) 2019	158 (18.0%)
4 (Oct-Dec) 2019	146 (16.6%)

\*N is the sample size of people receiving referral to the First Bridge Clinic unless indicated by alphabetic superscripts.

<sup>a</sup> N=973 patients. 1 subject with missing data.

<sup>b</sup> N=246 female patients. 173 female patients with missing data.

<sup>c</sup> N=400 patients. 574 patients with missing data.

<sup>d</sup> N=417 patients. 557 patients with missing data.

<sup>e</sup> N=427 patients. 547 patients with missing data.

<sup>f</sup> N=253 patients. 609 not began on MOUD at time of referral.

<sup>g</sup> N=878. 96 patients from 2020 were removed as quarter 1 was not complete at time of analysis.

Table 2 displays the characteristics of patients who received and those who did not receive an appointment to the First Bridge Clinic. The variables of age, sex, race, release from a correctional facility in the past 30 days, homelessness, whether a patient was already on MOUD, and the type of MOUD given were all significantly different between the two groups. Statistical significance was not determined for yearly quarters.

**Table 2. Comparison of Demographic Characteristics Between Patients Who Received and Who Did Not Receive an Appointment to the First Bridge Clinic**

<b>Characteristic (Continuous)</b>	<b>No Appointment Scheduled, N=484*</b>	<b>Appointment Scheduled, N=490*</b>	<b>P-value</b>
Average Age (yr) ± SD	35.94 ± 9.89	37.75 ± 9.82	<b>0.004</b>
<b>Characteristic (Categorical)</b>			
Sex, No. (%)			<b>0.036</b>
Male	292 (60.3%)	263 (53.7%)	
Female Sex	192 (39.7%)	227 (46.3%)	
Race, No. (%)			<b>0.04</b>
White	430 (88.8%)	454 (92.7%)	
Minorities	54 (11.2%)	36 (7.3%)	
Hispanic Or Latino, <sup>a</sup> No. (%)			0.247
No	478 (99.0%)	488 (99.6%)	
Yes	5 (1.0%)	2 (0.4%)	
Pregnant, <sup>b</sup> No. (%)			0.49
No	47 (100.0%)	197 (99.0%)	
Yes	0 (0.0%)	2 (01.0%)	
Veteran, Service Member, or Family Member, <sup>c</sup> No. (%)			0.879
No	9 100%)	390 (99.7)	
Yes	0 (0%)	1 (0.3%)	
Released from Correctional Facility in the past 30 days, <sup>d</sup> No. (%)			<b>&lt;0.0001</b>
No	6 (75%)	407 (99.5%)	
Yes	2 (25%)	2 (0.5%)	
Homeless, <sup>e</sup> No. (%)			<b>&lt;0.0001</b>
No	16 (80.0%)	401 (98.5%)	
Yes	4 (20.0%)	6 (1.5%)	
Already on MOUD, No. (%)			<b>&lt;0.0001</b>
No	478 (98.8%)	243 (49.6%)	
Yes	6 (1.2%)	247 (50.4%)	
Type of MOUD, <sup>f</sup> No. (%)			<b>&lt;0.0001</b>
Buprenorphine	5 (83.3%)	244 (98.8%)	
Methadone	1	0	
Naltrexone	0	3	
Yearly Quarters, <sup>g</sup> No. (%)			
1 (Jan-Mar) 2018	6 (1.37%)	19 (4.33%)	
2 (Apr-Jun) 2018	25 (5.70%)	26 (5.92%)	
3 (Jul-Sept) 2018	72 (16.40%)	37 (8.43%)	
4 (Oct-Dec) 2018	62 (14.12%)	73 (16.63%)	
1 (Jan-Mar) 2019	51 (11.62%)	48 (10.93%)	
2 (Apr-Jun) 2019	77 (17.54%)	78 (17.77%)	
3 (Jul-Sept) 2019	78 (17.77%)	80 (18.22%)	
4 (Oct-Dec) 2019	68 (15.49%)	78 (17.77%)	



\*N is the sample size of patients either not receiving or receiving appointments to the First Bridge Clinic unless indicated by alphabetic superscripts.

<sup>a</sup> N= 973 patients. 1 subject with missing data.

<sup>b</sup> N= 246 female patients. 173 female patients with missing data.

<sup>c</sup> N= 400 patients. 574 patients with missing data.

<sup>d</sup> N= 417 patients. 557 patients with missing data.

<sup>e</sup> N= 427 patients. 547 patients with missing data.

<sup>f</sup> N=365 patients. 609 patients with missing data.

<sup>g</sup> N= 878 total patients. Subject referral dates from 2020 were removed due to incomplete quarter at time of analysis. There were 439 patients who did not have appointments scheduled, and there were 439 patients who did have appointments scheduled.

Table 3 displays the characteristics of those subjects who did not and did keep their first appointment with the First Bridge Clinic. The only statistically significant difference between these two groups was age.

**Table 3. Comparison of Demographic Characteristics of All Patients Who Kept Their First Appointment Vs. Those Who Did Not to the First Bridge Clinic**

<b>Characteristic (Continuous)</b>	<b>Did Not Keep Appointment, N=208*</b>	<b>Kept Appointment, N=282*</b>	<b>P-value</b>
Average Age (Yr) ± SD	36.59 ± 9.08	38.52 ± 10.20	<b>0.028</b>
<b>Characteristic (Categorical)</b>			
Sex, No. (%)			0.574
Female Sex, No. (%)	99 (47.60%)	127 (45.00%)	
Male Sex, No. (%)	109 (52.40%)	155 (55.00%)	
Race, No. (%)			0.921
White	193 (92.80%)	261 (92.60%)	
Minorities	15 (7.20%)	21 (7.40%)	
Hispanic Or Latino, No. (%)			0.224
No	208 (100.0%)	280 (99.3)	
Yes	0 (0.0%)	2 (0.7%)	
Pregnant, <sup>a</sup> No. (%)			0.285
No	72 (100.0%)	125 (98.4%)	
Yes	0 (0.0%)	2 (1.6%)	
Veteran, Service Member, or Family Member, <sup>b</sup> No. (%)			0.513
No	117 100.00%)	273 (99.60%)	
Yes	0 (0.00%)	1 (0.40%)	
Released from Correctional Facility in the past 30 days, <sup>c</sup> No. (%)			0.567
No	127 (99.20%)	280 (99.60%)	
Yes	1 (0.80%)	1 (0.40%)	
Homeless, <sup>d</sup> No. (%)			0.419
No	129 (99.2%)	272 (98.2%)	
Yes	1 (0.8%)	5 (1.8%)	
Already on MOUD, No. (%)			0.735
No	105 (50.50%)	138 (48.90%)	
Yes	103 (49.50%)	144 (51.10%)	
Type of MOUD, <sup>e</sup> No. (%)			0.141
Buprenorphine	103 (100.00%)	141 (97.9%)	
Methadone	0	0	
Naltrexone	0	3	
Yearly Quarters, <sup>f</sup> No. (%)			
1 (Jan-Mar) 2018	7 (3.87%)	12 (4.65%)	
2 (Apr-Jun) 2018	7 (3.87%)	19 (7.36%)	
3 (Jul-Sept) 2018	13 (7.18%)	24 (9.30%)	
4 (Oct-Dec) 2018	21 (11.60%)	52 (20.16%)	
1 (Jan-Mar) 2019	20 (11.05%)	28 (10.85%)	
2 (Apr-Jun) 2019	29 (16.02%)	50 (19.38%)	
3 (Jul-Sept) 2019	43 (23.76%)	36 (13.95%)	
4 (Oct-Dec) 2019	41 (22.65%)	37 (14.34%)	

\*N is the sample size of patients either not keeping or keeping appointments to the First Bridge Clinic unless indicated by alphabetic superscripts.

<sup>a</sup> N= 199 female patients who had scheduled appointments.

<sup>b</sup> N= 391 patients who had scheduled appointments.

<sup>c</sup> N= 409 patients who had scheduled appointments.

<sup>d</sup> N= 407 patients who had scheduled appointments.

<sup>e</sup> N= 247 patients who had scheduled appointments.

<sup>f</sup> Out of 439 total patients. Subject referral dates from 2020 were removed due to incomplete quarter at time of analysis. There were 181 patients who did not keep their appointments as 27 patients who did not keep their appointment in 2020 were removed. There were 258 patients who did keep their appointments as 24 patients who kept their appointments in 2020 were removed.

Statistically significant findings from Table 2 were used to inform variables (age, sex, race) included in the logistic regression model shown in Table 4. Other variables that were statistically significant were not included because of high numbers of missing values.

<b>Table 4. Logistic Regression Model for Appointments Scheduled</b>			
	<b>Odds Ratio</b>	<b>P-Value</b>	<b>95% CI</b>
<b>Age</b>	1.024	<b>0.002</b>	1.009-1.039
<b>Male Sex</b>	0.814	0.193	0.597-1.110
<b>White Race</b>	1.403	0.224	0.813-2.422
<b>MOUD Already</b>	81.969	<b>&lt;0.0001</b>	35.894-187.188

Findings in Table 4 suggests that those who were on MOUD at the time of referral, defined as those who were either initiated onto MOUD in the ED or while an inpatient, or those who were already on MOUD at the time they were seen in the hospital (ED or inpatient), were significantly more likely to receive an appointment to the First Bridge Clinic. Older age was also associated with increased likelihood of an appointment.

To determine whether those already on MOUD were more likely to keep their first appointment with the First Bridge Clinic, the same predictor variables (age, sex, race, MOUD already) were included into the logistic regression model. The results (Table 5) suggest that those already on MOUD did not have a statistically significant increased likelihood of keeping this first appointment. Once again, older age was associated with increased likelihood of keeping first appointment.

<b>Table 5. Logistic Regression Model for Appointments Kept</b>			
	<b>Odds Ratio</b>	<b>P-Value</b>	<b>95% CI</b>
<b>Age</b>	1.021	<b>0.03</b>	1.002-1.041
<b>Male Sex</b>	1.077	0.689	0.749-1.548
<b>White Race</b>	0.917	0.808	0.458-1.837
<b>MOUD Already</b>	1.102	0.597	0.768-1.583

## **Discussion**

Previous empirical research demonstrates the difficulty of engaging people with OUD in treatment.<sup>19</sup> Furthermore, there is disagreement over the definition of successful treatment. In this study, we sought to determine whether MOUD induction in the hospital setting (ED/inpatient) would increase the likelihood that a person would present to their First Bridge Clinic appointment as previous literature suggests.<sup>20</sup> We found no significant difference in appointment adherence between those who were already on MOUD in the hospital setting versus

those who were not (Table 5). However, those who were already on MOUD at the time of referral were much more likely to be referred for an appointment (Table 4). This finding is very important in that it highlights that people are being given proper follow-up for treatment of their OUD. Getting an actual concrete appointment as opposed to a list of potential referral facilities could ultimately help to engage a highly stigmatized and vulnerable population.

Our findings are consistent with the primarily rural population served by the UK Chandler and Good Samaritan hospitals; these patients face significant transportation barriers that may limit their ability to keep appointments. We have found that rural patients given next day follow-up appointments are more likely to return for their outpatient visit.<sup>21</sup> However, the large majority of First Bridge Clinic patients were scheduled for appointments that were several days to a few weeks after initial referral date.

It is also important to note that many patients referred to The First Bridge Clinic are dealing with other very serious sequelae of their substance abuse such as infective endocarditis, abscesses, or other health conditions that could preclude their ability to successfully attend their first scheduled follow up appointment. The inpatient consult service, ACES, is the largest source of referrals to the clinic. Those presenting to the ED, but not receiving subsequent hospital admission, are likely better able to attend their follow up appointments. Increased referrals from ED providers could substantially reduce no-show rates.

And finally, Kentucky administrative regulations regarding induction onto buprenorphine also made successful implementation of the ED bridge model challenging. Currently,

administrative regulation requires any dispensing physician to obtain and record a complete patient evaluation, including a comprehensive laboratory work up including screening for HIV and HCV, as well as other administratively heavy and time consuming tasks.<sup>22</sup> Due to the emergent and fast-paced environment of the ED, these regulations likely inhibited referrals. In contrast, the inpatient consult service, composed largely of board-certified addiction medicine physicians and data-waivered providers, was better positioned to meet the state-mandated requirements.

Analysis of patient demographics reveals a largely Caucasian population, consistent with the location of the study site. UKHC hospitals in Lexington, Kentucky primarily serve a rural Appalachian population, lacking racial diversity. This fact may affect generalizability of study results.

The receipt of appointment analysis revealed several statistically significant differences in patients who did and did not receive appointments (Table 2). Patients who were of older age, male sex, and white race were more likely to receive appointments. Unfortunately, recently incarcerated individuals, as well as individuals who were homeless, were less likely to receive an appointment. Homeless people are known to use the ED for routine, non-emergent medical needs, and furthermore, they are three times more likely to use the ED than non-homeless people.<sup>23</sup> They also often have substance abuse issues.<sup>24</sup> Therefore, one would think, homeless individuals would receive follow up appointments as a priority. However, homeless people often face significant barriers to accessing health care. Competing demands for shelter, food, and safety supersede the need to obtain primary medical care for many homeless individuals.<sup>25</sup> Poor

compliance with provider recommendations can contribute significantly to provider burnout and frustration. We can therefore conclude that perhaps provider dissatisfaction and bias contributed to the small number of referrals given to homeless individuals.

The comparison of demographic characteristics between patients who received an appointment and those who did not also illuminated that those started on MOUD were more likely to receive an appointment. In addition, there was a statistically significant difference found between the groups for the variable type of MOUD. Those on buprenorphine were more likely to receive a scheduled appointment. Ultimately, these results are congruent with the patient population receiving referral: individuals with an OUD. The fact that patients who were either inducted onto a highly controlled substance or who were already receiving an MOUD received a referral appointment indicates that this population is being given the opportunity for proper follow up care.

Finally, Information on the yearly quarters was included into the analysis to highlight the increasing utilization of the First Bridge Clinic over time. Upward trends are demonstrated through the year 2018 and 2019. It appears that quarter 1 in 2019 demonstrated a slight backwards pattern, but resumed to the upward trend by quarter 2 (Table 1). While no statistical analysis was conducted when comparing groups of those who received appointments and those who kept appointments, overall, there appeared to be upward trends, with a few exceptions, demonstrated for all groups. These overall upward trends demonstrate that provider and institutional acceptance grew overtime. Familiarity and comfort with the model appeared to be adopted as part of the care for those with OUD over the two year period.

## **Limitations**

We were unable to control for other factors that may affect receipt of appointment or no show. For example, we did not have information on whether or not a patient received peer support, recovery services, or social support ancillary services in the hospital setting. Data on the patient's hospital course has not yet been linked to the outpatient Bridge Clinic's database, but could provide useful information in the future. Furthermore, the study lacks concrete information on when MOUD was initiated: in the inpatient/ED setting or prior to hospital presentation. We were also unable to differentiate the referral source between the ED and the inpatient consult service. Finally, we were unable to include additional important outcomes, including MOUD initiation after referral to the First Bridge Clinic and 30-day retention rates.

## **Recommendations**

Our primary recommendation is for additional analyses. The variable of interest, MOUD at the time of referral, was not found to increase the likelihood of presentation for first follow up appointment with the First Bridge Clinic. Because this finding is somewhat incongruent with previous evidence, we recommend constructing a survival model to determine if increasing the length of time between initial referral and scheduled follow up appointments significantly reduces appointment adherence. If significant, implementation of a fast-track follow up system could be vitally important to improve treatment engagement outcomes.



Increasing ED referrals to The First Bridge Clinic are also paramount. We recommend continued work with state government, which was so vital to the implementation of the program, to reduce MOUD-associated administrative burdens to ED providers. In addition, frequent and reassuring feedback and education to ED staff regarding the positive and potentially impactful outcomes of the program could increase the referrals, as well as debunk myths and stigma of addiction.

Future efforts to engage especially vulnerable populations, including homeless and those recently incarcerated, are needed. Reasons for reduced referrals for members of this population should be elucidated and addressed.

### **Conclusions and Implications for Public Health Practice**

The volume of visits to the First Bridge Clinic was demonstrated to increase over time highlighting the substantial need for this unique service. Significant administrative and bureaucratic barriers had to be overcome at all levels of government as well as both the private and public sector to be able to implement an ED-initiated MOUD program at the University of Kentucky. The creation of an inpatient consult service has helped augment referrals to the First Bridge Clinic as significant institutional and state level regulations have made utilization by UKHealthcare's EDs challenging. Streamlining the referral process could help to overcome this impediment, thus substantially increasing referrals. While the consult service seemingly provided a sufficient referral source, oftentimes these patients had many medical comorbidities and illnesses that could have interfered with their ability to attend their first scheduled outpatient appointments. Patients receiving referrals directly from the ED are likely to have fewer

comorbidities and better able to seek follow up outpatient care. Therefore, increased referrals from the ED could substantially reduce no-show rates at the First Bridge Clinic. Additionally, rural patients face many barriers to follow up care. Providing same or next day outpatient appointments can increase the likelihood they are able to initiate outpatient care. In conclusion, amongst other factors, MOUD as a component in increasing a patient's likelihood for attendance at their first follow up appointment was not found to be significant. However, patients already on MOUD were more likely to be referred for outpatient treatment suggesting that interventions which increase MOUD initiation in the hospital will ultimately result in more people engaging in outpatient treatment.

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## Biographical Sketch

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