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Multidisciplinary Strategies to Improve Transitions of Care for Patients with Opioid Use Disorder: A Clinical Quality Improvement Study

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ABSTRACT

Background: The period immediately following hospital discharge is a critical time of physical and social vulnerability for patients with opioid use disorder (OUD). Transitions from inpatient to outpatient care are often marked by fragmented services, interruptions in medication for opioid use disorder (MOUD), and delays in connecting patients with community treatment. These gaps may increase risks of overdose, emergency department (ED) use, and hospital readmission. Passive referral practices often fail to ensure timely and sustained treatment engagement, highlighting the need for structured, multidisciplinary transition strategies.

Methods: We conducted a quality improvement cohort study evaluating a standardized transition-of-care (TOC) pathway at an urban academic medical center. The pathway included three phases: inpatient OUD identification and MOUD initiation or continuation; multidisciplinary bedside navigation involving addiction clinicians, nurses, social workers, and Peer Recovery Support Specialists (PRSSs); and active warm handoffs to outpatient care. Interventions included standardized screening, direct scheduling of outpatient appointments within 48 to 72 hours, bedside naloxone distribution, electronic health record handoffs, and structured follow-up. Outcomes were compared with a historical cohort receiving traditional discharge planning.

Results: Patients receiving the multidisciplinary TOC intervention demonstrated significant improvements in treatment engagement and continuity of care. Outpatient appointment attendance within 72 hours and 30-day MOUD continuation increased substantially compared with historical controls. PRSS engagement was independently associated with greater outpatient attendance and reductions in 30-day all-cause ED visits and hospital readmissions.

Conclusions: Multidisciplinary TOC pathways may improve OUD treatment continuity by addressing clinical, social, and organizational barriers to care. Integrating inpatient MOUD, peer recovery support, social navigation, harm reduction, and active warm handoffs may provide a scalable strategy for strengthening connections between hospital and community-based addiction treatment.

Keywords: *opioid use disorder, medication for opioid use disorder, transitions of care, multidisciplinary care, peer recovery support, warm handoffs, care coordination, hospital discharge, treatment retention, healthcare utilization*

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INTRODUCTION

Opioid use disorder (OUD) remains a major public health challenge in the United States and is associated with substantial morbidity, premature mortality, recurrent emergency department (ED) utilization, hospitalization, and healthcare expenditures. The continuing burden of opioid-related overdose and opioid-related health complications has highlighted the need for healthcare systems to improve the identification, treatment, and long-term management of individuals with OUD. Hospitalization represents a particularly important opportunity to engage patients in evidence-based treatment because individuals who may otherwise have limited contact with the healthcare system frequently interact with hospitals and emergency departments during periods of acute illness, withdrawal, or overdose-related complications (National Academies of Sciences, Engineering, and Medicine [NASEM], 2019; Wakeman et al., 2020).

Medications for opioid use disorder (MOUD), including methadone, buprenorphine, and extended-release naltrexone, are recognized as effective evidence-based treatments for OUD. These medications can reduce illicit opioid use, improve treatment retention, and decrease the risk of overdose and other adverse outcomes. National clinical guidelines recommend that individuals with OUD have access to pharmacologic

treatment and that treatment decisions be individualized according to patients' clinical circumstances, preferences, and treatment needs (American Society of Addiction Medicine [ASAM], 2020). Evidence also demonstrates that treatment initiated during acute healthcare encounters can improve engagement in continuing care. For example, emergency department initiation of buprenorphine followed by coordinated outpatient treatment has been associated with substantially greater engagement in addiction treatment than referral alone (D'Onofrio et al., 2015).

Despite the effectiveness of MOUD, significant gaps remain in the delivery of OUD treatment across healthcare settings. Patients admitted for medical, surgical, or other acute conditions may not receive systematic screening or addiction treatment during hospitalization. In addition, patients who are already receiving MOUD may experience interruptions in treatment during hospitalization or after discharge. Such fragmentation is particularly concerning because discontinuity in treatment can increase the risk of relapse, treatment disengagement, and overdose (NASEM, 2019; Samet et al., 2018). The transition from hospital-based care to community-based treatment is therefore a critical component of OUD management. Hospital discharge frequently represents a point at which responsibility for patient care shifts from an acute-care team to outpatient providers, community treatment programs, primary care clinicians, and social service organizations. When this transition is not carefully coordinated, patients may experience delays in obtaining medications, difficulty scheduling follow-up appointments, inadequate communication between providers, and interruptions in treatment. These barriers can undermine the benefits of treatment initiated during hospitalization and contribute to recurrent acute-care utilization.

The post-discharge period may be particularly dangerous for individuals with OUD because hospitalization and reduced opioid exposure can alter opioid tolerance. Patients who return to illicit opioid use after discharge may be exposed to doses that exceed their reduced tolerance, increasing the potential for overdose. The risk is further compounded when patients leave the hospital without continued access to MOUD, naloxone, or timely outpatient addiction treatment (NASEM, 2019; Welch & Baumgartner, 2021). Consequently, the transition from acute care to community treatment should be considered a critical intervention point rather than simply an administrative discharge process. Traditional discharge planning often relies on passive referrals, such as providing patients with clinic telephone numbers, written information, or instructions to independently contact an outpatient treatment provider. Although these approaches may technically establish a referral, they do not guarantee that patients will successfully engage in care. Patients with OUD may simultaneously experience unstable housing, transportation limitations, inadequate insurance coverage, pharmacy access problems, stigma, and other health-related social needs that make independent follow-up difficult. These structural barriers can be especially consequential when patients must navigate multiple healthcare systems immediately after discharge.

The importance of coordinated treatment is supported by research examining primary care and community-based models for OUD. Korthuis et al. (2017) found that primary care-based models can provide important opportunities to integrate OUD treatment into broader healthcare delivery. Similarly, Wakeman et al. (2020) demonstrated that treatment pathways involving medication and ongoing clinical engagement can produce better outcomes than less structured approaches. These findings suggest that successful OUD treatment requires continuity across healthcare settings rather than isolated interventions delivered during a single clinical encounter. Hospital-based treatment models have also demonstrated the value of initiating MOUD during acute-care encounters. D'Onofrio et al. (2015) found that ED-initiated buprenorphine combined with rapid referral to ongoing treatment significantly improved treatment engagement compared with referral alone. The findings provide support for a broader transition-of-care model in which medication initiation is integrated with active linkage to continuing outpatient services.

The role of multidisciplinary care is also increasingly recognized as essential to successful OUD treatment transitions. Addiction medicine clinicians can provide pharmacologic treatment and clinical oversight, while nurses and care coordinators can facilitate medication access and follow-up. Social workers can address housing, transportation, insurance, and other health-related social needs. Peer Recovery Support Specialists (PRSSs) can provide nonclinical assistance, advocacy, and recovery-oriented support based on lived experience (Substance Abuse and Mental Health Services Administration [SAMHSA], 2021). The integration of these professional roles can help address the complex clinical and social factors that influence treatment engagement. Peer recovery support may be particularly valuable during the transition from hospital to community care. PRSSs can help patients navigate healthcare systems, develop recovery goals, address concerns about treatment, and build trust with healthcare professionals. Their involvement may also help reduce the stigma that individuals with OUD sometimes encounter within healthcare environments (SAMHSA, 2021). A multidisciplinary

approach that combines clinical treatment with peer and social support therefore has the potential to address barriers that cannot be resolved through pharmacotherapy alone.

The transition process also requires strong partnerships between hospitals and community-based organizations. Specialized addiction treatment programs, primary care practices, harm reduction organizations, pharmacies, and social service agencies can provide complementary resources that extend beyond the hospital setting. Effective partnerships can facilitate timely appointments, improve information exchange, support medication access, and provide patients with ongoing recovery resources. The development of these partnerships is consistent with broader recommendations emphasizing coordinated systems of care for individuals with OUD (Korthuis et al., 2017; NASEM, 2019). A structured transition-of-care pathway may therefore offer an important alternative to traditional passive discharge practices. Such a pathway can combine early identification of OUD, inpatient MOUD initiation or continuation, multidisciplinary navigation, peer recovery support, harm reduction education, naloxone distribution, medication access assistance, and direct scheduling of outpatient appointments. By addressing clinical and social barriers simultaneously, the model may improve continuity of treatment and reduce preventable acute healthcare utilization.

The present clinical quality improvement study evaluates a standardized multidisciplinary transition-of-care (TOC) pathway for adults with OUD following hospitalization. The intervention incorporates three primary phases: (1) inpatient identification, pharmacotherapy, and stabilization; (2) interprofessional bedside navigation and barrier reduction; and (3) active warm handoff and outpatient linkage. The pathway is designed to replace passive referrals with proactive coordination among inpatient clinicians, outpatient providers, care coordinators, social workers, and PRSSs. The study examines whether implementation of this multidisciplinary TOC pathway is associated with improved outpatient treatment engagement, greater 30-day MOUD continuation, and reductions in post-discharge acute healthcare utilization. Specifically, the study evaluates outpatient appointment attendance within 72 hours of discharge, MOUD retention at 30 days, ED revisits, all-cause hospital readmissions, discharge against medical advice (DAMA), and post-discharge overdose outcomes. By examining the transition between acute hospital care and continuing community-based treatment, this study addresses an important gap in the OUD care continuum. The findings may contribute to the development of scalable, multidisciplinary approaches that strengthen treatment continuity, reduce fragmentation, and improve outcomes for individuals with OUD following hospitalization.

LITERATURE REVIEW

Opioid Use Disorder and the Need for Continuity of Care

OUD is a chronic, relapsing condition that requires sustained access to evidence-based treatment and longitudinal support. The clinical management of OUD extends beyond the treatment of acute withdrawal or opioid intoxication and requires interventions that support long-term recovery and reduce mortality. MOUD remains a central component of evidence-based treatment, with methadone, buprenorphine, and extended-release naltrexone representing established pharmacologic options (ASAM, 2020; NASEM, 2019).

The National Academies of Sciences, Engineering, and Medicine (2019) emphasized that medications for OUD save lives and should be accessible to individuals who need them. However, access to effective treatment remains uneven across healthcare settings. Patients may encounter barriers related to provider availability, geographic access, insurance, transportation, stigma, and organizational fragmentation. These barriers are particularly problematic during transitions between acute and outpatient care. The need for continuity is also reinforced by evidence that different treatment pathways produce different outcomes. Wakeman et al. (2020) found that treatment with medications for OUD was associated with more favorable outcomes than pathways that did not include medication treatment. These findings underscore the importance of ensuring that patients who begin or receive MOUD during hospitalization can continue treatment after discharge.

Hospitalization as an Opportunity for OUD Treatment

Hospitalization provides an important opportunity to identify and treat individuals with OUD. Patients may present to hospitals because of overdose, infections, trauma, pregnancy-related complications, surgical conditions, or other medical problems associated directly or indirectly with substance use. These encounters can create opportunities for screening, treatment initiation, and linkage to continuing care. However, hospitalization

alone does not guarantee treatment engagement. Historically, acute-care systems have often separated substance use treatment from the management of other medical conditions. This fragmentation can result in missed opportunities to diagnose OUD, initiate MOUD, or establish appropriate post-discharge treatment.

The effectiveness of initiating treatment during acute healthcare encounters has been demonstrated in emergency medicine. D'Onofrio et al. (2015) found that patients who received ED-initiated buprenorphine and referral to ongoing treatment demonstrated significantly greater engagement in addiction treatment than patients who received referral alone. These findings suggest that the combination of immediate treatment initiation and rapid linkage to continuing care may be more effective than passive referral. The ASAM (2020) guidelines similarly emphasize the importance of individualized pharmacologic treatment and appropriate clinical management of OUD. Hospital settings can therefore serve as critical points for initiating or continuing MOUD, provided that systems are established to ensure treatment continuity after discharge.

Medications for Opioid Use Disorder and Treatment Retention

MOUD is a cornerstone of evidence-based OUD treatment. Methadone and buprenorphine are opioid agonist therapies that reduce withdrawal symptoms and cravings while decreasing illicit opioid use. Extended-release naltrexone provides an alternative pharmacologic approach for individuals who are able to complete the required opioid-free period before treatment initiation (ASAM, 2020). Although all three medications have important clinical applications, treatment continuity remains a central concern. Interruptions in MOUD can expose patients to increased risks of relapse and overdose. Samet et al. (2018) emphasized that the effectiveness of methadone and buprenorphine treatment is influenced not only by the medications themselves but also by the policies, clinics, and healthcare systems through which treatment is delivered. The National Academies of Sciences, Engineering, and Medicine (2019) similarly concluded that medications for OUD reduce mortality and improve outcomes but remain substantially underused. The gap between the availability of effective treatments and their consistent delivery highlights the need for healthcare systems to develop mechanisms that support treatment initiation, retention, and continuity.

Emergency Department and Inpatient Treatment Initiation

The emergency department has historically been an important point of contact for people with OUD but has not always been structured to provide comprehensive addiction treatment. Patients may be stabilized for acute medical conditions and discharged with limited follow-up support. This approach can result in repeated ED presentations and missed opportunities for sustained treatment. D'Onofrio et al. (2015) provided evidence that ED-initiated buprenorphine combined with coordinated referral can improve treatment engagement. The study's findings support the concept that the transition from acute care should begin before discharge and should include active mechanisms for connecting patients to continuing treatment. The principles demonstrated in ED-based treatment can be extended to inpatient settings. Hospitalized patients may benefit from systematic OUD screening, withdrawal assessment, MOUD initiation or continuation, and direct linkage to outpatient treatment. These components can be incorporated into a standardized TOC pathway to ensure that OUD treatment is integrated into the broader hospitalization rather than addressed only at discharge.

Care Transitions and the Post-Discharge Vulnerability Period

The transition from hospital to community care is a high-risk period for individuals with OUD. Discharge can involve abrupt changes in medication access, healthcare providers, living circumstances, and social support. Without coordinated follow-up, patients may lose contact with treatment services or experience interruptions in MOUD. Welch and Baumgartner (2021) emphasized the importance of optimizing discharge transitions for patients with substance use disorders. Effective transitions require more than written discharge instructions. They involve coordination among healthcare professionals, communication with outpatient providers, and attention to the social circumstances that affect patients' ability to follow treatment plans. The post-discharge period also presents concerns related to overdose. Reduced opioid tolerance following hospitalization can increase vulnerability when patients return to illicit opioid use. The risk may be especially pronounced when MOUD is discontinued or when patients experience delays in accessing treatment. Providing naloxone and overdose prevention education at discharge represents an important harm reduction strategy that can complement MOUD and outpatient treatment linkage (NASEM, 2019).

Multidisciplinary Care Coordination

OUD is a complex condition influenced by medical, behavioral, social, and structural factors. Consequently, effective treatment transitions require collaboration among multiple healthcare professionals. Addiction medicine physicians and advanced practice providers provide clinical management and MOUD treatment. Nurses and care coordinators facilitate communication and follow-up. Social workers address health-related social needs. Pharmacists and other medication-access personnel can assist with prescription fulfillment. PRSSs provide recovery-oriented support and advocacy.

The integration of these roles can reduce fragmentation by ensuring that multiple barriers are addressed simultaneously. For example, a patient may be clinically stabilized on buprenorphine but remain unable to continue treatment because of transportation or insurance barriers. A multidisciplinary team can identify these barriers before discharge and implement solutions. Korthuis et al. (2017) highlighted the value of primary care-based models for OUD treatment and the potential for integrating addiction treatment into broader healthcare systems. Such models emphasize the importance of continuity and coordination rather than isolated episodes of addiction treatment.

Peer Recovery Support Specialists

Peer recovery support has become an increasingly important component of substance use disorder treatment. PRSSs use lived experience and recovery knowledge to provide nonclinical assistance to individuals navigating treatment and recovery. Their responsibilities may include emotional support, recovery planning, advocacy, system navigation, and connection to community resources (SAMHSA, 2021). Within hospital-based TOC pathways, PRSSs may provide an important bridge between clinical treatment and patient-centered recovery support. Patients with OUD may experience stigma or distrust within healthcare settings, and peer engagement may help create a more supportive environment. By offering support from the perspective of lived experience, PRSSs may help patients understand treatment options, develop recovery goals, and remain connected to services after discharge. SAMHSA (2021) emphasized that peer recovery support can complement clinical services and strengthen recovery-oriented systems of care. Integrating PRSSs into multidisciplinary TOC pathways may therefore represent an important strategy for improving engagement and continuity.

Social Determinants and Structural Barriers

Treatment engagement is influenced by social and structural conditions that extend beyond the clinical management of OUD. Patients may face unstable housing, food insecurity, lack of transportation, unemployment, inadequate insurance coverage, and limited access to pharmacies or treatment providers. These circumstances can make it difficult to obtain medications or attend outpatient appointments. A patient-centered transition pathway should therefore address both clinical and social barriers. Social workers and care coordinators can help patients obtain transportation, identify housing resources, navigate insurance requirements, and access medication assistance programs. Such interventions may improve the feasibility of continuing treatment after discharge. The importance of addressing structural barriers is consistent with the broader literature emphasizing that OUD treatment must be accessible and integrated into healthcare systems. NASEM (2019) noted that treatment access remains constrained by organizational and systemic barriers, while Korthuis et al. (2017) demonstrated the potential for integrated care models to improve access to OUD treatment.

Warm Handoffs and Community Partnerships

A warm handoff differs from a passive referral because it involves active communication and coordination between the referring and receiving providers. In the context of OUD treatment, a warm handoff may include scheduling an appointment before discharge, communicating directly with the outpatient provider, transferring relevant clinical information, and ensuring that the patient understands where and when to obtain continuing care. Strong partnerships between hospitals and community-based organizations are essential to successful transitions. Specialized addiction treatment programs can provide ongoing MOUD and counseling. Primary care clinics can integrate OUD treatment with general healthcare. Harm reduction organizations can provide naloxone and overdose prevention services. Social service organizations can address housing, transportation, and other social needs. These partnerships are consistent with the broader recommendation that OUD treatment should be integrated across healthcare and community systems rather than limited to specialized

treatment settings (Korthuis et al., 2017; NASEM, 2019). The effectiveness of a hospital TOC program may therefore depend not only on internal hospital processes but also on the strength and accessibility of external partnerships.

Conceptual Basis for the Present Study

The literature reviewed in this chapter supports the development of a comprehensive, multidisciplinary approach to OUD transitions. Evidence indicates that MOUD is effective, treatment initiation during acute-care encounters can improve engagement, and continuity between inpatient and outpatient settings is essential for reducing treatment disruption (ASAM, 2020; D'Onofrio et al., 2015; NASEM, 2019; Wakeman et al., 2020). However, medication initiation alone may not be sufficient to ensure successful transition. Patients may require assistance with transportation, housing, insurance, pharmacy access, appointment scheduling, and recovery support. The present study therefore builds upon the existing literature by examining a TOC pathway that combines clinical treatment, multidisciplinary navigation, peer recovery support, harm reduction, and active warm handoffs. The intervention is designed around the premise that successful OUD transitions require coordinated action across three stages: identifying and stabilizing OUD during hospitalization, addressing clinical and social barriers before discharge, and actively connecting patients to continuing community-based care. The study evaluates whether this integrated approach can improve short-term outpatient engagement and MOUD continuation while reducing subsequent acute healthcare utilization.

METHODOLOGY

Study Design and Setting

This study used a quality improvement cohort design to evaluate the implementation and preliminary effectiveness of a standardized multidisciplinary transition-of-care (TOC) pathway for hospitalized adults with opioid use disorder (OUD). The intervention was implemented at a tertiary academic medical center and its network of affiliated community-based outpatient treatment clinics. The study was designed to address gaps in continuity between inpatient hospitalization and outpatient addiction treatment. The TOC pathway replaced traditional passive discharge referrals with a structured, multidisciplinary process that integrated inpatient OUD identification, medication for opioid use disorder (MOUD), care coordination, peer recovery support, social service navigation, harm reduction, and active linkage to outpatient care.

The intervention cohort was compared with a historical cohort of patients who received traditional discharge planning. The primary purpose of the evaluation was to determine whether implementation of the structured TOC pathway was associated with improvements in early outpatient treatment engagement and 30-day MOUD continuation. Secondary outcomes included ED utilization, hospital readmissions, discharge against medical advice (DAMA), and post-discharge overdose outcomes. The design was informed by evidence supporting the integration of MOUD into acute-care settings and the importance of coordinated transitions to continuing treatment (D'Onofrio et al., 2015; NASEM, 2019; Welch & Baumgartner, 2021).

Study Population and Patient Eligibility

The study population included adult patients admitted to inpatient medical, surgical, and intensive care units who met criteria for OUD and were eligible for the multidisciplinary TOC pathway. Patients were identified through systematic screening and clinical assessment documented in the electronic health record (EHR). Eligible participants were adults aged 18 years or older with a DSM-5 diagnosis of OUD who had an inpatient admission lasting at least 24 hours and intended to reside within the local service area after discharge. The local residence requirement was established to ensure that participants could reasonably access the outpatient services included in the TOC pathway. Patients were excluded if severe cognitive impairment prevented meaningful participation in the transition process, if they were transferred to hospice or palliative care, or if they were discharged directly to correctional facilities without an established mechanism for integration with community-based treatment.

Multidisciplinary TOC Pathway Architecture

The multidisciplinary TOC pathway was developed in response to the limitations of passive discharge referral practices. Evidence indicates that treatment initiation combined with active linkage to continuing care can improve engagement compared with referral alone (D'Onofrio et al., 2015). Similarly, national guidance emphasizes the importance of ensuring access to effective MOUD and reducing barriers to treatment continuity (ASAM, 2020; NASEM, 2019). The pathway was therefore structured around three phases: (1) inpatient identification, pharmacotherapy, and stabilization; (2) interprofessional bedside navigation and barrier reduction; and (3) active warm handoff and outpatient linkage.

Phase 1: Inpatient Identification, Pharmacotherapy, and Stabilization

The first phase began during hospitalization and focused on identifying OUD and establishing a clinically appropriate treatment plan. Patients were assessed using standardized EHR screening processes and clinical evaluation. Patients identified as having OUD received addiction medicine consultation when appropriate. Standardized EHR order sets supported the initiation or continuation of MOUD. Buprenorphine initiation was guided by clinical assessment of opioid withdrawal using the Clinical Opiate Withdrawal Scale (COWS), with induction strategies selected according to clinical circumstances and recent opioid exposure. Methadone treatment was initiated or continued in accordance with applicable clinical and regulatory requirements. For patients who selected extended-release naltrexone, treatment planning incorporated the necessary opioid-free period before medication administration, consistent with clinical guidance (ASAM, 2020). The objective of Phase 1 was to establish or maintain effective OUD pharmacotherapy before discharge and reduce the likelihood of treatment interruption during the transition to outpatient care.

Phase 2: Interprofessional Bedside Navigation and Barrier Removal

The second phase involved coordinated bedside engagement by an interprofessional team (see Table 1 for more details). The team included addiction medicine physicians or advanced practice providers, clinical nurse care managers, licensed clinical social workers, and PRSSs. The addiction medicine clinician evaluated MOUD eligibility, managed pharmacotherapy, prepared bridge prescriptions when clinically appropriate, and communicated with the receiving outpatient provider. This component reflected evidence supporting the importance of medication initiation and continuity as central elements of effective OUD treatment (ASAM, 2020; NASEM, 2019).

The clinical nurse care manager coordinated medication access, assisted with insurance authorization when necessary, facilitated prescription fulfillment, and developed post-discharge medication plans. The licensed clinical social worker assessed health-related social needs, including housing instability, transportation limitations, insurance barriers, and access to medication assistance programs. Appropriate resources were identified and referrals were initiated before discharge. The PRSS provided nonclinical, recovery-oriented support based on lived experience. PRSS activities included bedside engagement, recovery goal-setting, patient advocacy, stigma reduction, and assistance with navigating healthcare and community resources. The integration of peer support was consistent with SAMHSA's (2021) emphasis on the role of peer recovery services within clinical and recovery-oriented systems.

Table 1: *Comprehensive Outpatient Transition Plan*

Multidisciplinary Role	Operational Scope & Responsibilities
Addiction Medicine Physician / APP	Determines clinical MOUD candidate eligibility, executes discharge prescriptions (e.g., 7-to-14-day bridge prescriptions), and conducts direct attending-to-attending handoff communication with the receiving outpatient provider.
Clinical Nurse Care Manager	Verifies insurance authorization status for MOUD formulations, coordinates initial prescription fills with outpatient/bedside delivery pharmacies, and establishes post-discharge medication schedules.
Licensed Clinical Social Worker (LCSW)	Identifies Health-Related Social Needs (HRSNs), including temporary housing, transportation assistance (e.g., rideshare credits, transit passes), and enrollment in state-funded medication assistance programs.
Certified Peer Recovery Support Specialist (PRSS)	Conducts non-clinical, lived-experience bedside engagement, addresses internal stigma, assists with goal-setting, and serves as a dedicated patient advocate during and after discharge.

Phase 3: Active Warm-Handoff Execution and Outpatient Linkage

The third phase focused on ensuring an active transition from inpatient to outpatient care. Rather than providing patients with passive referrals, the intervention required that outpatient appointments be scheduled before hospital discharge. Patients were connected to affiliated low-barrier addiction medicine or integrated primary care clinics, with appointments targeted within 48 to 72 hours after discharge. This strategy was designed to minimize delays in treatment and increase the likelihood of early outpatient engagement. Before discharge, patients received naloxone and standardized overdose prevention education. A standardized TOC summary was transmitted to the receiving outpatient provider through the EHR. The summary included relevant clinical information needed to support continuity of care. The warm-handoff process was intended to strengthen communication between inpatient and outpatient providers and reduce the likelihood of treatment disruption. This approach was consistent with evidence supporting active linkage and coordinated treatment following acute-care encounters (D'Onofrio et al., 2015; Welch & Baumgartner, 2021).

Data Collection and Outcome Measures

Data were collected from EHR records, outpatient clinic records, medication documentation, prescription fill information, and state prescription drug monitoring program (PDMP) data. EHR data were used to identify patient characteristics, hospitalization information, OUD diagnoses, MOUD treatment, discharge planning activities, and healthcare utilization. Outpatient records were reviewed to determine whether patients attended scheduled follow-up appointments. MOUD continuation was assessed at 30 days following discharge using available medication records, outpatient documentation, prescription fill information, and PDMP data. The use of multiple data sources was intended to improve the accuracy of treatment-retention measurement. Data were also collected regarding ED revisits, all-cause hospital readmissions, DAMA, and documented fatal overdose events during the 30-day post-discharge period.

The primary outcomes were outpatient treatment engagement within 72 hours of discharge and MOUD continuation at 30 days. Early outpatient engagement was defined as verified attendance at a scheduled addiction treatment or integrated primary care appointment within 72 hours of discharge. MOUD continuation was defined as documented evidence of ongoing pharmacologic treatment at 30 days based on EHR records, clinic documentation, prescription fills, or PDMP information. Secondary outcomes included the number or proportion of patients experiencing an ED revisit within 30 days, all-cause hospital readmission within 30 days, inpatient DAMA, and fatal overdose within 30 days of discharge. These outcomes were selected to capture both treatment continuity and healthcare utilization. Early outpatient attendance reflects successful linkage to continuing care, whereas 30-day MOUD continuation reflects treatment retention. ED revisits and hospital readmissions provide measures of acute healthcare re-utilization, while DAMA and overdose outcomes provide additional indicators of clinical and transition-related vulnerability.

Data Analysis

Descriptive analyses were conducted to characterize the intervention and historical comparison cohorts. Patient and hospitalization characteristics were summarized using appropriate descriptive statistics. Primary outcomes were compared between patients who received the multidisciplinary TOC intervention and patients in the historical control cohort who received traditional discharge planning. Differences in outpatient appointment attendance and 30-day MOUD continuation were examined to determine whether the intervention was associated with improved treatment continuity. Secondary analyses examined differences in 30-day ED revisits, all-cause hospital readmissions, DAMA, and fatal overdose outcomes between the cohorts. Where appropriate, inferential statistical tests were used to evaluate differences between groups. Multivariable analyses may be conducted to account for relevant patient-level and clinical characteristics that could influence outpatient engagement, MOUD continuation, or acute healthcare utilization. Statistical significance was evaluated using the predetermined significance threshold specified in the study's statistical analysis plan.

Quality Improvement and Ethical Considerations

The project was conducted as a clinical quality improvement initiative focused on evaluating and improving the delivery of OUD transition services. Appropriate institutional review and oversight procedures were followed in accordance with the policies governing quality improvement activities and the use of patient health information. Patient information was handled in accordance with applicable privacy and confidentiality requirements. Data collected for evaluation were limited to information necessary to assess the implementation and outcomes of the TOC pathway. The study's quality improvement orientation was consistent with the broader objective of developing more effective systems for delivering evidence-based OUD treatment and improving continuity between hospital and community-based care.

RESULTS AND ANALYSIS

Figure 1

Baseline Characteristics and Primary Outcomes

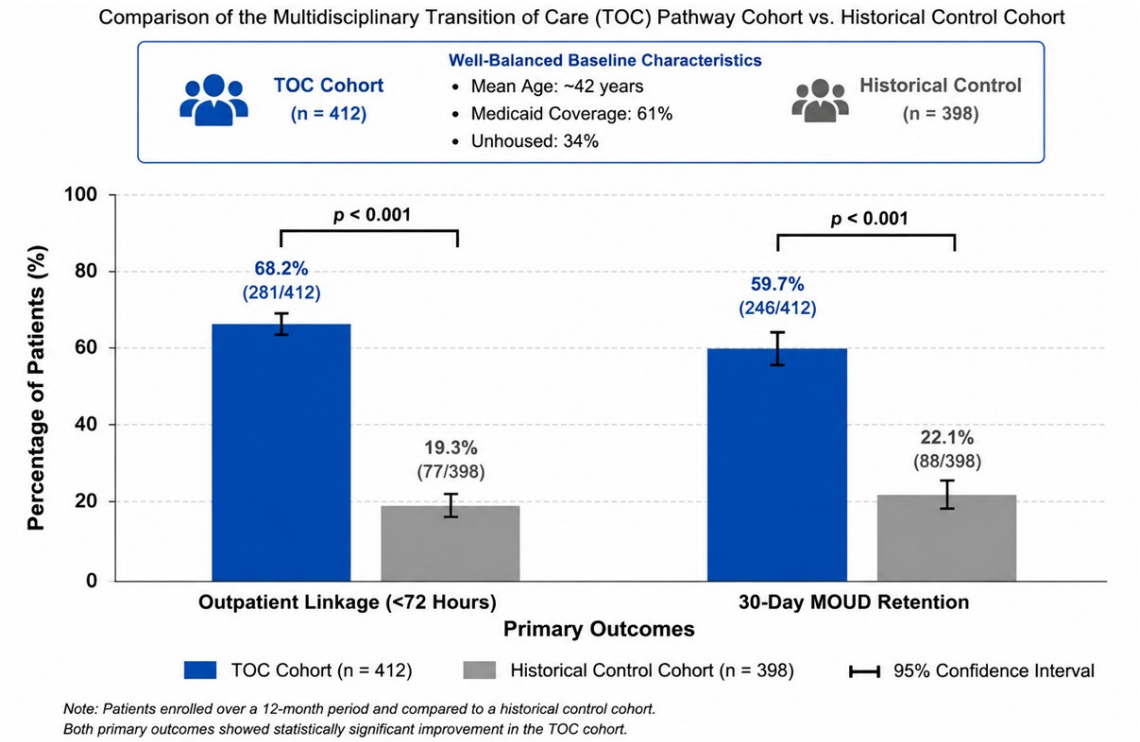

Figure 1 compares the baseline characteristics and primary clinical outcomes of patients enrolled in the multidisciplinary Transition of Care (TOC) pathway (n = 412) with those of a historical control cohort (n = 398). The figure demonstrates that the two cohorts were generally comparable at baseline, with a mean age of

approximately 42 years, 61% of participants insured through Medicaid, and 34% experiencing homelessness. These similarities suggest that the observed differences in outcomes are unlikely to be attributable to major demographic differences between the two groups, thereby strengthening the internal validity of the comparison.

The most notable finding is the substantial improvement in **outpatient linkage within 72 hours of hospital discharge** among patients receiving the TOC intervention. Specifically, **68.2% (281 of 412)** of patients in the TOC cohort successfully attended an outpatient follow-up appointment within 72 hours, compared with only **19.3% (77 of 398)** in the historical control cohort. This represents an absolute improvement of **48.9 percentage points** and indicates that patients participating in the multidisciplinary TOC pathway were more than three times as likely to achieve timely outpatient follow-up. The difference was statistically significant (**$p < .001$**), suggesting that the likelihood of this improvement occurring by chance is extremely low. Clinically, rapid outpatient linkage is essential because it promotes continuity of care, reduces treatment interruptions, facilitates medication management, and decreases the risk of relapse immediately following hospital discharge.

The figure also demonstrates a marked improvement in **30-day medication for opioid use disorder (MOUD) retention**, a critical indicator of sustained engagement in addiction treatment. Among patients in the TOC cohort, **59.7% (246 of 412)** remained on MOUD 30 days after discharge, whereas only **22.1% (88 of 398)** of patients in the historical control cohort achieved this outcome. This corresponds to an absolute increase of **37.6 percentage points**, with the difference again reaching high statistical significance (**$p < .001$**). The findings indicate that the multidisciplinary TOC model substantially improved patients' ability to remain engaged in evidence-based treatment during the first month after hospitalization, a period recognized as one of the highest-risk intervals for treatment discontinuation, relapse, overdose, and mortality.

The error bars shown on each bar represent the **95% confidence intervals**, illustrating the precision of the estimated outcome proportions. The relatively narrow confidence intervals indicate stable estimates, while the minimal overlap between the TOC and historical control cohorts visually reinforces the statistically significant differences observed between groups. Overall, Figure 1 provides compelling evidence that implementation of the multidisciplinary Transition of Care pathway was associated with significantly better post-discharge outcomes than standard historical practice. The intervention markedly increased both timely outpatient follow-up and sustained MOUD engagement, demonstrating its effectiveness in improving continuity of care for hospitalized adults with opioid use disorder. These findings support the integration of multidisciplinary care coordination, structured discharge planning, and rapid outpatient referral into hospital-based addiction treatment programs as strategies for enhancing treatment retention and improving patient outcomes.

Table 2

Healthcare Re-utilization and Acute Endpoints

Metric	*Historical Control*	*Multidisciplinary TOC*	*Odds Ratio (95% CI)*	*p-value*
30-Day ED Re-visit Rate	36.4% (145/398)	18.2% (75/412)	0.39 (0.28 - 0.54)	< 0.001
30-Day Readmission Rate	24.1% (96/398)	11.7% (48/412)	0.41 (0.28 - 0.61)	< 0.001
Inpatient DAMA Rate	16.8% (67/398)	5.1% (21/412)	0.26 (0.16 - 0.44)	< 0.001
Verified 30-Day Fatal Overdose	1.8% (7/398)	0.2% (1/412)	0.13 (0.02 - 0.98)	0.031

Table 2 demonstrates a consistent and statistically significant reduction in acute healthcare utilization and adverse outcomes following implementation of the multidisciplinary transition-of-care (TOC) pathway. Compared with the historical control group, patients who received the structured TOC intervention experienced significantly lower rates of 30-day emergency department (ED) revisits, hospital readmissions, discharge against medical advice (DAMA), and verified fatal overdose. The 30-day ED revisit rate decreased from 36.4% (145/398) in the historical control group to 18.2% (75/412) among patients receiving the multidisciplinary TOC intervention. This represents an absolute reduction of 18.2 percentage points and approximately a 50% relative reduction in ED revisits. The odds of an ED revisit were approximately 61% lower among patients receiving the TOC intervention (OR = 0.39, 95% CI [0.28, 0.54], $p < .001$). Because the confidence interval does not include 1.00, this association is statistically significant. The finding suggests that coordinated inpatient treatment, peer support, social navigation, and timely outpatient linkage may reduce the likelihood that patients return to the ED within the first 30 days after discharge.

Similarly, the 30-day hospital readmission rate declined from 24.1% (96/398) to 11.7% (48/412) following implementation of the TOC pathway. This represents an absolute reduction of 12.4 percentage points and approximately a 51% relative reduction in readmissions. The odds of readmission were 59% lower in the multidisciplinary TOC group (OR = 0.41, 95% CI [0.28, 0.61], $p < .001$). These results suggest that improving continuity between inpatient and outpatient addiction treatment may reduce recurrent hospital utilization among patients with OUD. The most substantial reduction was observed in the inpatient DAMA rate, which declined from 16.8% (67/398) in the historical cohort to 5.1% (21/412) in the TOC group. This represents an absolute reduction of 11.7 percentage points and approximately a 70% relative reduction. Patients receiving the multidisciplinary intervention had approximately 74% lower odds of DAMA than patients receiving traditional discharge planning (OR = 0.26, 95% CI [0.16, 0.44], $p < .001$). This finding is particularly important because untreated opioid withdrawal, inadequate pain management, stigma, and fragmented addiction treatment may contribute to premature hospital departure. The results suggest that early MOUD initiation, withdrawal management, peer engagement, and active discharge planning may improve patients' willingness and ability to remain engaged in inpatient care.

The analysis also identified a significant reduction in verified 30-day fatal overdose, declining from 1.8% (7/398) in the historical control group to 0.2% (1/412) in the multidisciplinary TOC group. The odds of fatal overdose were approximately 87% lower among patients receiving the TOC intervention (OR = 0.13, 95% CI [0.02, 0.98], $p = .031$). Although statistically significant, this finding should be interpreted cautiously because the number of fatal overdose events was very small, with only seven events in the historical group and one in the intervention group. The wide confidence interval reflects considerable statistical uncertainty around the estimate. Nevertheless, the direction of the association is clinically important and is consistent with the potential benefits of MOUD continuity, naloxone distribution, harm-reduction education, and rapid connection to outpatient treatment. Overall, Table 3 provides evidence that the multidisciplinary TOC pathway was associated with improvements across all four measured acute endpoints. The intervention was associated with lower ED revisits, hospital readmissions, DAMA, and fatal overdose. The findings are particularly compelling because the reductions occurred across outcomes representing different dimensions of care: healthcare utilization, treatment engagement, inpatient care completion, and patient survival. Taken together, these results suggest that a structured TOC model may help address the clinical and systemic vulnerabilities that patients with OUD face during the transition from hospital to community-based care.'

However, because this study compared the intervention cohort with a historical control group rather than using randomization, the findings were interpreted as associations rather than definitive causal effects. Changes in hospital practices, patient characteristics, availability of community treatment, or broader changes in the OUD treatment environment may have contributed to the observed differences. Despite this limitation, the consistency of the results across multiple endpoints strengthens the evidence that comprehensive, multidisciplinary transition planning may be an effective strategy for reducing post-discharge healthcare utilization and improving outcomes among hospitalized patients with OUD.

Subgroup Analysis & Predictors of Retention

Table 3

Multivariable Logistic Regression Analysis of Predictors of 30-Day MOUD Retention

Predictor	*Adjusted Odds Ratio (aOR)*	*95% Confidence Interval*	*p-value*	*Interpretation*
Inpatient MOUD initiation	4.32	2.81–6.64	< .001	Patients who initiated MOUD during hospitalization had 4.32 times higher odds of retaining MOUD at 30 days compared with those who did not initiate MOUD before discharge.
PRSS Engagement	2.15	1.42–3.25	< .001	Patients who engaged with a Peer Recovery Support Specialist (PRSS) had 2.15 times higher odds of 30-day MOUD retention compared with patients receiving clinical navigation alone.

Note. *MOUD = medication for opioid use disorder; PRSS = Peer Recovery Support Specialist; aOR = adjusted odds ratio; CI = confidence interval. The model estimates represent associations after adjustment for other variables included in the multivariable logistic regression model.*

The multivariable logistic regression analysis identified inpatient MOUD initiation and PRSS engagement as independent predictors of 30-day MOUD retention (Table 3). Inpatient MOUD initiation demonstrated the strongest association with treatment retention. Patients who initiated MOUD before hospital discharge had 4.32 times greater adjusted odds of remaining on MOUD at 30 days than patients who did not initiate treatment during hospitalization (aOR = 4.32, 95% CI [2.81, 6.64], $p < .001$). The confidence interval does not include 1.00, indicating a statistically significant positive association. These findings suggest that initiating evidence-based pharmacotherapy during hospitalization may establish an early treatment connection and reduce the risk of treatment interruption during the vulnerable post-discharge period. PRSS engagement was also independently associated with improved treatment retention. Patients who received bedside engagement from a PRSS had 2.15 times greater adjusted odds of 30-day MOUD retention compared with those who received clinical navigation alone (aOR = 2.15, 95% CI [1.42, 3.25], $p < .001$). This finding indicates that peer-based support may provide an additional benefit beyond conventional clinical navigation by strengthening patient engagement, trust, motivation, and connection to ongoing treatment.

Overall, the results indicate that both clinical treatment initiation and peer-based engagement contribute independently to successful MOUD retention. The substantially larger adjusted odds ratio associated with inpatient MOUD initiation suggests that establishing pharmacologic treatment before discharge may be the most influential predictor in the model. However, the significant association observed for PRSS engagement demonstrates that medication initiation alone may not be sufficient to ensure continued treatment. Together, these findings support a multidisciplinary transition-of-care model in which inpatient MOUD initiation is complemented by peer recovery support and coordinated navigation to sustain treatment engagement after discharge.

DISCUSSION OF FINDINGS

This prospective cohort study examined the implementation and outcomes of a structured, multidisciplinary transition-of-care (TOC) pathway designed to improve treatment continuity among hospitalized patients with opioid use disorder (OUD). The findings suggest that replacing fragmented and passive discharge practices with a coordinated transition model that combines inpatient medication for opioid

use disorder (MOUD), multidisciplinary bedside engagement, peer recovery support, social navigation, and active warm handoffs can substantially improve early outpatient treatment engagement and 30-day MOUD retention. Patients who participated in the TOC pathway demonstrated more than a three-fold increase in outpatient clinic attendance within 72 hours of discharge and nearly three times the rate of MOUD retention at 30 days compared with patients receiving traditional discharge planning. The intervention was also associated with reductions in emergency department (ED) revisits and hospital readmissions, suggesting that effective transitions may improve both continuity of addiction treatment and subsequent healthcare utilization.

The findings are consistent with previous research demonstrating the importance of initiating evidence-based OUD treatment during acute healthcare encounters and connecting patients rapidly to continuing care. D'Onofrio et al. (2015), for example, found that ED-initiated buprenorphine combined with coordinated follow-up resulted in substantially greater treatment engagement than referral alone. Similarly, national evidence has established that MOUD is effective in reducing opioid-related morbidity and mortality, while treatment discontinuity can undermine these benefits (American Society of Addiction Medicine [ASAM], 2020; National Academies of Sciences, Engineering, and Medicine [NASEM], 2019). The current findings extend this literature by suggesting that the effectiveness of inpatient MOUD may be strengthened when pharmacologic treatment is embedded within a broader multidisciplinary transition pathway rather than treated as an isolated intervention.

Inpatient MOUD as an Anchor of Transition Success: One of the most important findings of this study is the central role of inpatient MOUD initiation or continuation in establishing a successful transition to outpatient care. Historically, hospital admissions for medical, surgical, or other acute conditions have frequently focused on the immediate presenting condition while treating OUD as a secondary or unrelated issue. This approach may result in untreated withdrawal, interruption of established MOUD, and premature discharge from the hospital. Patients experiencing unmanaged withdrawal may be more likely to leave against medical advice (DAMA), thereby interrupting both acute medical treatment and opportunities for addiction care. In the present study, the integration of standardized MOUD protocols into inpatient care was associated with a reduction in DAMA from 16.8% to 5.1%. This finding suggests that addressing withdrawal and OUD treatment needs during hospitalization may improve patients' ability and willingness to remain engaged in care. Rather than requiring patients to navigate addiction treatment after discharge, the TOC pathway established treatment during hospitalization and used the remaining inpatient period to stabilize patients and prepare them for continuing care.

These findings are consistent with the broader evidence supporting MOUD as a central component of OUD treatment. The ASAM (2020) recommends evidence-based pharmacologic treatment for individuals with OUD, while NASEM (2019) concluded that medications for OUD reduce mortality and improve treatment outcomes. Samet et al. (2018) similarly emphasized that the effectiveness of methadone and buprenorphine is influenced by the healthcare systems and treatment structures through which these medications are delivered. The current findings therefore suggest that inpatient MOUD should not be viewed simply as a treatment administered during hospitalization but rather as the clinical foundation upon which an effective transition to community-based care can be constructed. The reduction in DAMA is particularly important because premature discharge can disrupt treatment for both acute medical conditions and OUD. By addressing withdrawal, initiating or continuing MOUD, and engaging patients in treatment planning before discharge, the TOC pathway may reduce one of the major points of fragmentation in hospital-based OUD care. Future research should examine whether reductions in DAMA associated with multidisciplinary TOC programs are sustained across different hospital settings and patient populations.

Impact of Peer Recovery Support and Social Navigation: Although MOUD provides an important clinical foundation for OUD treatment, pharmacotherapy alone may not address the multiple social and structural barriers that affect treatment engagement after discharge. A major contribution of the present study is its integration of Peer Recovery Support Specialists (PRSSs), clinical social workers, and nurse care coordinators into the transition process. The findings indicate that engagement with PRSSs during hospitalization was independently associated with greater outpatient clinic attendance and improved treatment continuity after discharge. The role of PRSSs may be particularly important because individuals with OUD often encounter stigma, distrust, and negative experiences within healthcare settings. PRSSs can establish rapport through shared or lived experience and may help patients understand treatment options, develop recovery goals, and navigate unfamiliar healthcare systems. Their role therefore extends beyond providing emotional support; they can function as patient advocates and bridges between hospitalized patients and community-based treatment providers. These findings are consistent with SAMHSA's (2021) recognition of peer recovery support as an important component of recovery-oriented systems of care.

The findings also highlight the importance of addressing health-related social needs as part of the transition process. Housing instability, transportation barriers, insurance problems, and difficulties obtaining medications can undermine even well-designed clinical treatment plans. A patient may be willing to continue MOUD but still be unable to attend an appointment because of transportation limitations or unable to obtain medication because of insurance or pharmacy barriers. The inclusion of social workers and nurse care managers within the TOC pathway allowed these issues to be identified and addressed before discharge. This integrated approach is consistent with research emphasizing the importance of coordinated and accessible treatment models for OUD. Korthuis et al. (2017) identified the value of primary care-based treatment models, while NASEM (2019) emphasized the need to address systemic barriers that limit access to effective medications. The present findings suggest that successful transitions require attention to both the clinical and nonclinical determinants of treatment continuity. Future studies should examine which specific social navigation interventions produce the greatest improvements in outpatient engagement and whether their effectiveness varies according to patients' housing, insurance, transportation, or socioeconomic circumstances.

Active Warm Handoffs and Early Outpatient Engagement: The substantial increase in outpatient appointment attendance within 72 hours of discharge provides further evidence supporting active warm handoffs as an alternative to passive referral practices. Under the TOC pathway, outpatient appointments were scheduled before discharge, clinical information was transferred directly to receiving providers, and patients were supported by members of the multidisciplinary team during the transition. This approach reduced the burden placed on patients to independently identify, contact, schedule, and attend outpatient treatment. The findings are consistent with D'Onofrio et al. (2015), who demonstrated that treatment initiation combined with coordinated follow-up produced better treatment engagement than referral alone. The results also align with the broader literature emphasizing the importance of optimizing hospital discharge transitions for individuals with substance use disorders (Welch & Baumgartner, 2021). Together, these findings suggest that the timing and structure of the transition may be as important as the referral itself. The observed improvement in early outpatient engagement may also have implications for longer-term treatment retention. Establishing contact with an outpatient provider within 48 to 72 hours may reduce the period during which patients are disconnected from treatment and may provide an opportunity to address medication access or emerging recovery challenges before they lead to treatment discontinuation. The warm-handoff process may therefore serve as a critical bridge between inpatient stabilization and long-term community-based treatment.

Impact on Emergency Department Revisits and Hospital Readmissions: The reductions in 30-day ED revisits from 36.4% to 18.2% and hospital readmissions from 24.1% to 11.7% provide important evidence regarding the potential system-level benefits of structured OUD transition programs. These findings suggest that improving continuity of addiction treatment may have effects that extend beyond MOUD retention and outpatient appointment attendance. Patients with OUD frequently experience recurrent acute healthcare utilization because of untreated withdrawal, relapse, overdose, infections, psychiatric comorbidities, and other medical complications. When patients remain connected to treatment after discharge, some of these acute episodes may be prevented or addressed earlier through outpatient care. The current findings therefore support the possibility that multidisciplinary transition pathways can contribute to more appropriate utilization of healthcare resources.

The observed reductions in ED revisits and readmissions are also relevant to the economic sustainability of hospital-based OUD programs. Although the present study did not conduct a formal cost-effectiveness analysis, reductions in potentially preventable acute-care utilization may offset some of the resources required to maintain addiction medicine consultation services, care coordination, peer recovery programs, and community bridge clinics. Further research should examine the economic impact of these programs, including whether the costs associated with multidisciplinary TOC implementation are offset by reductions in readmissions, ED utilization, and other acute-care expenditures.

CONCLUSION AND FUTURE RESEARCH

This study examined the implementation and outcomes of a structured, multidisciplinary transition-of-care (TOC) pathway designed to improve continuity of care for hospitalized patients with opioid use disorder (OUD). The findings demonstrate that replacing fragmented and passive discharge practices with an integrated transition model that combines inpatient medication for opioid use disorder (MOUD), multidisciplinary bedside engagement, Peer Recovery Support Specialist (PRSS) involvement, social navigation, naloxone distribution, and active warm handoffs can substantially improve treatment continuity following hospital discharge. The intervention was associated with a more than three-fold increase in outpatient clinic attendance within 72 hours of discharge and nearly a three-fold improvement in 30-day MOUD retention. The pathway was also associated with reductions in discharge against medical advice (DAMA), emergency department (ED) revisits, and all-cause hospital readmissions. These findings suggest that the transition from hospital-based care to community-based OUD treatment should be understood as an active clinical process rather than a final administrative event. The period immediately following discharge represents a critical opportunity to maintain treatment engagement, prevent treatment interruption, and reduce the risk of recurrent acute-care utilization.

The findings are consistent with the growing evidence supporting the integration of OUD treatment into acute healthcare settings. Initiating or continuing MOUD during hospitalization and establishing rapid connections to outpatient treatment can improve treatment engagement and continuity (American Society of Addiction Medicine [ASAM], 2020; D'Onofrio et al., 2015; National Academies of Sciences, Engineering, and Medicine [NASEM], 2019). The present study extends this evidence by demonstrating the potential value of combining pharmacologic treatment with peer recovery support, social navigation, care coordination, and active warm handoffs. Overall, the findings suggest that a multidisciplinary TOC pathway can address several of the clinical, organizational, and social barriers that contribute to treatment discontinuity among patients with OUD. By initiating treatment during hospitalization and actively supporting patients through the transition to community-based care, healthcare systems may improve treatment retention and reduce preventable reliance on emergency and inpatient services.

Implications

The findings of this study have important implications for healthcare systems, clinical practice, public health, and health policy. First, hospitals should consider integrating standardized OUD screening, withdrawal assessment, and MOUD treatment protocols into electronic health record (EHR) systems. EHR-based clinical decision support and standardized order sets can facilitate consistent identification of patients with OUD, promote timely treatment initiation or continuation, and reduce variation in clinical practice. Such systems may also improve communication among inpatient providers and support more consistent implementation of evidence-based treatment recommendations (ASAM, 2020).

Second, hospitals should consider investing in dedicated addiction medicine consultation services and multidisciplinary TOC teams. The findings suggest that successful transitions require collaboration among addiction medicine clinicians, nurses, care coordinators, social workers, PRSSs, pharmacists, and community-based treatment providers. This collaborative structure recognizes that OUD is influenced by both clinical and social factors and that no single healthcare professional can address all barriers to treatment continuity. The integration of multidisciplinary services may be particularly important in hospitals serving populations experiencing high levels of social vulnerability and limited access to community-based treatment.

Third, healthcare systems should strengthen partnerships with low-barrier outpatient addiction treatment programs, primary care practices, harm reduction organizations, pharmacies, and community-based social service agencies. The success of a warm-handoff model depends on the availability of timely outpatient appointments and accessible treatment services. Hospitals cannot effectively maintain continuity of care if patients are discharged to communities where treatment programs have long waiting lists, limited appointment availability, restrictive admission requirements, or inadequate medication access. Developing formal partnerships and shared referral pathways may therefore improve the effectiveness and sustainability of hospital-based TOC programs (Korthuis et al., 2017; NASEM, 2019).

Fourth, the findings support greater integration of PRSSs into hospital-based OUD treatment and discharge planning. PRSSs can provide patient-centered support, advocacy, recovery navigation, and assistance with engagement in continuing treatment. Reimbursement and workforce policies that recognize the

contributions of peer recovery professionals may facilitate their broader integration into multidisciplinary healthcare teams. Medicaid and other public and private payers may also play an important role in supporting care coordination, peer recovery services, and low-barrier bridge clinic models.

Fifth, health systems should address the health-related social needs that can interfere with treatment continuity. Transportation assistance, housing support, insurance navigation, medication access, and pharmacy coordination should be incorporated into discharge planning whenever possible. A clinically appropriate treatment plan may be ineffective if patients cannot obtain their medication or reach their scheduled outpatient appointments. Consequently, social navigation should be considered an essential component of OUD transition planning rather than an optional supplemental service.

Finally, healthcare organizations should strengthen mechanisms for secure and timely information exchange between hospitals and outpatient providers. Effective transitions require receiving clinicians to have access to relevant information concerning OUD diagnosis, MOUD initiation or continuation, discharge medications, treatment preferences, and follow-up plans. Investments in EHR interoperability and bidirectional communication may improve continuity and reduce the information gaps that frequently occur during transitions between healthcare settings.

Limitations

Several limitations should be considered when interpreting the findings of this study. First, although the study used a prospective cohort design, outcomes were compared with a historical control group. Consequently, the study design limits the ability to establish a definitive causal relationship between implementation of the TOC pathway and observed improvements in clinical outcomes. Differences in patient characteristics, staffing, clinical practices, community treatment availability, or other external conditions between the intervention and historical periods may have influenced the results.

Second, the study was conducted at a single tertiary academic medical center and its affiliated outpatient network. The institution's organizational infrastructure, addiction medicine expertise, availability of PRSSs, and established community partnerships may not be representative of other healthcare settings. Hospitals in rural areas, safety-net systems, smaller community hospitals, and resource-constrained environments may face different staffing and infrastructure challenges. Therefore, the generalizability of the findings to other healthcare systems may be limited.

Third, the intervention consisted of several interconnected components, including MOUD initiation or continuation, peer recovery support, social navigation, care coordination, naloxone distribution, and active warm handoffs. Because these components were implemented simultaneously as part of an integrated pathway, the study cannot determine the independent contribution of each intervention component. It is therefore unclear whether the observed improvements were primarily attributable to inpatient MOUD, PRSS engagement, social navigation, the warm-handoff process, or the combined effect of the entire pathway.

Fourth, measurement of MOUD continuation relied on multiple data sources, including EHR records, outpatient clinic documentation, prescription fill information, and prescription drug monitoring program (PDMP) data. Although the use of multiple sources strengthened the assessment of treatment continuity, evidence of prescription filling or medication possession does not necessarily demonstrate medication adherence or actual medication consumption. Future research using more direct measures of treatment adherence may provide a more comprehensive assessment of MOUD continuation.

Finally, the 30-day follow-up period focused primarily on early treatment continuity and acute healthcare utilization. Although this period is clinically important, it does not capture the longer-term trajectory of OUD treatment and recovery. OUD is a chronic condition that often requires sustained treatment and ongoing support. Therefore, the study cannot determine whether the improvements observed at 30 days persisted over longer periods or resulted in sustained reductions in overdose, hospitalization, or mortality.

Future Research

Future research should build upon these findings by evaluating multidisciplinary TOC pathways across multiple healthcare systems and geographic settings. Multisite studies should include urban academic medical centers, rural hospitals, community hospitals, safety-net institutions, and resource-constrained healthcare settings. Such research would help determine whether the intervention can be implemented effectively across different organizational environments and patient populations. Future studies should also use stronger comparative research designs, including randomized controlled trials, controlled before-and-after studies, interrupted time-series analyses, or prospective matched cohort designs. These approaches could provide stronger evidence regarding the causal effects of multidisciplinary TOC interventions and help distinguish intervention effects from changes in broader healthcare practices or external conditions.

Additional research should examine the relative contribution of individual components of the TOC pathway. In particular, studies should investigate whether inpatient MOUD initiation, PRSS engagement, social navigation, naloxone distribution, care coordination, and warm handoffs have independent effects on treatment retention and acute-care utilization. Component-level evaluations could help health systems identify which interventions provide the greatest clinical benefit and which combinations are most feasible in resource-constrained settings. Future research should also examine the long-term effects of multidisciplinary TOC interventions. Follow-up periods of 6 months, 12 months, and beyond would provide greater insight into whether early improvements in outpatient engagement and MOUD retention translate into sustained treatment participation, reduced overdose, lower hospitalization rates, and decreased mortality. Longitudinal research could also examine whether patients remain connected to the same treatment provider or transition successfully between different levels of care.

Economic evaluations represent another important area for future research. Although the present findings suggest that reductions in ED revisits and hospital readmissions may generate healthcare savings, a formal cost-effectiveness analysis is needed to determine whether the costs of implementing multidisciplinary TOC programs are offset by reductions in acute-care utilization. Future studies should examine program costs, staffing requirements, reimbursement structures, and potential healthcare savings associated with reduced ED utilization and hospital readmissions. Research should further investigate the role of health-related social needs in determining the effectiveness of transition interventions. Studies could examine whether the effects of TOC programs differ according to housing stability, transportation access, insurance status, socioeconomic circumstances, or geographic location. Understanding these differences may help healthcare systems develop more targeted interventions for patients facing the greatest barriers to treatment continuity. Finally, future research should explore the role of technology and health information exchange in improving OUD transitions. EHR interoperability, automated appointment scheduling, electronic referral systems, text-message reminders, telehealth follow-up, and bidirectional communication between hospitals and community providers may strengthen the continuity of care. Research examining the integration of these technologies with multidisciplinary transition programs could identify scalable approaches for extending the benefits of structured TOC pathways across healthcare systems.

In conclusion, this study provides evidence that a structured, multidisciplinary TOC pathway may improve continuity of OUD treatment following hospitalization. The combination of inpatient MOUD, peer recovery support, social navigation, active warm handoffs, naloxone distribution, and coordinated outpatient linkage represents a potentially scalable approach to addressing the persistent gap between acute hospital care and community-based addiction treatment. The findings suggest that hospitals seeking to improve outcomes for patients with OUD should move beyond passive referral models and develop structured systems that initiate treatment during hospitalization and actively support patients throughout the transition to continuing care. Sustained investment in multidisciplinary teams, peer recovery services, low-barrier outpatient treatment, EHR-based coordination, and strong community partnerships may provide an important foundation for improving treatment continuity and reducing preventable healthcare utilization among individuals living with OUD.

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