

Planning and Designing the Improving Addiction Care Team (IMPACT) for Hospitalized Adults with Substance Use Disorder

Honora Englander, MD^{1,2*}, Melissa Weimer, DO, MCR^{1,3}, Rachel Solotaroff, MD, MCR², Christina Nicolaidis, MD, MPH^{1,4}, Benjamin Chan, MS¹, Christine Velez, MSW⁴, Alison Noice, MA, CADC-III³, Tim Hartnett, MSW, MHA³, Ed Blackburn, MA², Pen Barnes, MBBS, PhD¹, P. Todd Korthuis, MD, MPH¹

¹Oregon Health & Science University, Portland, Oregon; ²Central City Concern, Portland, Oregon; ³CODA, Inc., Portland, Oregon; ⁴School of Social Work, Portland State University, Portland, Oregon.

People with substance use disorders (SUD) have high rates of hospitalization and readmission, long lengths of stay, and skyrocketing healthcare costs. Yet, models for improving care are extremely limited. We performed a needs assessment and then convened academic and community partners, including a hospital, community SUD organizations, and Medicaid accountable care organizations, to design a care model for medically complex hospitalized patients with SUD. Needs assessment showed that 58% to 67% of participants who reported active substance use said they were interested in cutting back or quitting. Many reported interest in medication for addiction treatment (MAT). Participants had high rates of costly readmissions and longer than expected length

of stay. Community stakeholders identified long wait times and lack of resources for medically complex patients as key barriers. We developed the Improving Addiction Care Team (IMPACT), which includes an inpatient addiction medicine consultation service, rapid-access pathways to posthospital SUD treatment, and a medically enhanced residential care model that integrates antibiotic infusion and residential addiction care. We developed a business case and secured funding from Medicaid and hospital payers. IMPACT provides one pathway for hospitals, payers, and communities to collaboratively address the SUD epidemic. *Journal of Hospital Medicine* 2017;12:339-342. © 2017 Society of Hospital Medicine

Addiction is a national epidemic that represents both a pressing need and a significant burden to the healthcare system.¹ Hospitals are increasingly filled with people admitted for medical complications of substance use disorders (SUD).² People with SUD have longer lengths of stay (LOS) and high readmission rates.³ Hospitalization often does not address the root cause—the SUD. For example, many hospitals replace heart valves and deliver prolonged courses of intravenous (IV) antibiotics for endocarditis from injection drug use but do not offer addiction medicine consultation, medication for addiction treatment (MAT), or linkage to posthospital SUD treatment.^{4,5}

Hospitalization can provide reachable moments for initiating addiction care.⁶ Medications for opioid⁷ and alcohol use disorders⁸ can be started during hospitalization, promoting engagement in outpatient SUD care⁷ and increased uptake of MAT,^{7,9} and reducing readmissions.^{8,10} Yet, medications for SUD are underprescribed,^{11,12} and most hospitals lack inpatient addiction medicine services and pathways to timely SUD care after discharge. Furthermore, traditional SUD treatment programs are often not equipped to manage medically complex patients or they have long waitlists.¹³ Most behavioral-physical health integration occurs in ambulatory settings. This fails to engage patients who

do not access primary care. There is an urgent need for models that can improve care for hospitalized patients with SUD.

Here, we describe our experience using patient needs assessment to engage stakeholders and drive local systems change. We also describe the resulting care model, the Improving Addiction Care Team (IMPACT). Our experience provides a potentially useful example to other hospitals and communities seeking to address the national SUD epidemic.

METHODS

Setting

In 2012, Oregon transformed its Medicaid system by establishing 16 regional “coordinated care organizations” (CCOs) to improve outcomes and slow healthcare spending.¹⁴ In a CCO environment, hospitals assume increased financial risk, yet reforms have focused on the outpatient setting. Therefore, executive leadership at Oregon Health & Science University (OHSU), an urban academic medical center, asked clinician-leaders to design point-of-care improvements for Medicaid-funded adults and build on existing models to improve care for socioeconomically vulnerable adults.^{15,16} One priority that emerged was to make improvements for hospitalized adults with SUD. Of the adult inpatients at OHSU, 30% have Medicaid and 15% have SUD by administrative data alone. Before we started our work, OHSU lacked inpatient addiction medicine services.

Local Needs Assessment

To understand local needs and opportunities, we surveyed hospitalized adults with SUD. We used the electronic health

*Address for correspondence and reprint requests: Honora Englander, MD, Mail Code BTE 119, Oregon Health & Science University, 3181 SW Sam Jackson Park Rd, Portland, OR 97239; Telephone: 971-404-5725; Fax: 503-494-1159; E-mail: englandh@ohsu.edu

Received: September 25, 2016; Revised: February 8, 2017; Accepted: February 16, 2017

2017 Society of Hospital Medicine DOI 10.12788/jhm.2736

record to generate a list of inpatients flagged by nurses for risky alcohol or drug use. A research assistant screened consecutive adults (≥ 18 years old) and invited those who screened positive for alcohol use (Alcohol Use Disorders Identification Test–Consumption [AUDIT-C])¹⁷ or drug use (single-item screener)¹⁸ to participate. We excluded non-English speakers, incarcerated adults, people using only marijuana or tobacco, psychiatry inpatients, and people unable to consent. Surveys assessed social and demographic factors, healthcare utilization, substance use severity, and treatment experience. Participants who reported high-risk illicit drug or alcohol use¹⁹ were asked to indicate their readiness to change on a 3-point scale developed for this study. Response range included: *no interest*, *interest in cutting back*, or *interest in quitting*. A subset of participants completed in-depth qualitative interviews exploring patient perceptions of substance use treatment needs.²⁰ We obtained hospital administrative data from hospital financial services.

Partner Engagement

We identified community partners with which we had an individual or organizational relationship and a common interest and potential for collaboration. All invited partners agreed to attend initial meetings. We convened leadership and frontline staff across partners. OHSU staff included hospital nursing and social work leaders; infectious disease, hospitalist, and addiction physicians; and health services researchers. Community organizations included Central City Concern (CCC), a community organization serving people facing homelessness and addiction; CODA, Inc., a nonprofit SUD treatment agency; and Coram/CVS infusion pharmacy.

Collectively, we reviewed needs assessment findings and examples from the literature⁷⁻⁹ to develop strategies to address patient and system needs. We used patient narratives to foster alignment and prioritized areas in which integration could improve quality and costs. We assumed we would petition OHSU and/or Medicaid CCOs to finance efforts and saved potentially challenging budget discussions for later, when partnerships would be more developed. Our task force attended more than 3 large-group meetings and numerous small-group meetings to develop IMPACT.

RESULTS

Needs Assessment

Between September 2014 and April 2015, a research assistant approached 326 patients. Of these, 235 (72%) met study inclusion criteria, and 185 (78%) agreed to participate (Table 1). Of people who reported any substance use within the preceding 3 months, 58% of alcohol users and 67% of drug users said they were interested in cutting back or quitting. Fifty-four percent of participants with moderate- to high-risk opioid use and 16% with moderate- to high-risk alcohol use reported strong interest in MAT. In qualitative interviews, participants described inadequately treated withdrawal, the importance of trust and choice, and long wait times as a barriers to entering treatment after hospital discharge.²⁰

Administrative data revealed high rates of hospital re-

TABLE 1. Needs Assessment Participant Characteristics

Substance Use	n (%)
Total participants	185
Any alcohol use in the past 3 months	109/185 (59)
Any opioid use in the past 3 months	68/185 (37)
Any drug ^a use in the past 3 months	137/185 (74)
Interest in cutting back or quitting	
Alcohol	63/109 (58)
Drugs	92/137 (67)
Moderate – high risk substance use	
Alcohol	82/185 (44)
Amphetamines	74/185 (40)
Opioids	72/185 (39)
Cocaine	23/185 (12)
Past 3 month polysubstance use	113/185 (61)
Interest in MAT for alcohol use disorder among moderate-high risk users	13/82 (16)
Interest in MAT for opioid use disorder among moderate-high risk users	
Any MAT	39/72 (54)
Methadone	26/72 (36)
Buprenorphine	23/72 (32)

^aCocaine, amphetamines, inhalants, sedatives, hallucinogens, opioids.

NOTE: Abbreviation: MAT, medications for addiction treatment.

admissions and longer than expected LOS (Figure). Mean LOS was 10.26 days—4 days more than medicine patients'. Mean LOS was high among participants who required long-term IV antibiotics, particularly those with endocarditis or osteomyelitis (21.75 days; range, 1.00-51.00 days). We excluded one outlier with a 116-day hospitalization.

Intervention Design

Mapping needs to intervention components. We mapped needs assessment findings to 3 main IMPACT components: inpatient addiction medicine consultation service, pathways to posthospital SUD treatment, and medically enhanced residential treatment (MERT) (Table 2).

Inpatient addiction medicine consultation service. We developed this service to address patients' report of high readiness to change and interest in starting MAT in the hospital. Community partners highlighted the need for peers to increase engagement and trust. Therefore, we included a physician, a social worker, and two peers on our team. The inpatient service engages patients, advises on withdrawal and pain, performs SUD assessments, initiates MAT, and provides counseling and treatment.

Pathways to posthospital SUD treatment. As pathways from hospital to community SUD treatment were lacking, and long administrative wait times limited access to community treatment, we employed "in-reach" liaisons—community SUD treatment staff who perform in-hospital assessments to triage and coordinate care across systems. Given that patients

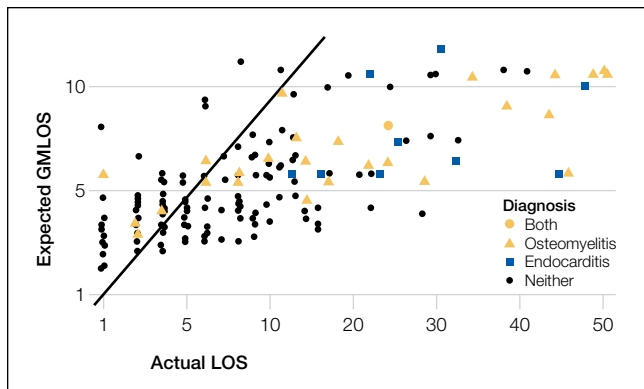


FIG. Hospital LOS among needs assessment patients.
NOTE: Abbreviations: GMLOS, geometric length of stay; LOS, length of stay.

value having treatment choices, we linked pathways to an array of MAT and abstinence-based treatments, including office-based, intensive outpatient and residential levels of care. For patients who live outside the Portland area, we developed relationships with rural stakeholders and engaged the help of the Oregon State Opioid Authority in introducing our program to SUD treatment providers around the state.

Medically Enhanced Residential Treatment (MERT). In many cases where patients required prolonged courses of IV antibiotics, hospital stays were longer for two reasons: At-home central-line self-administration of antibiotics was deemed unsafe, and patients were denied admission to a skilled nursing facility due to history of substance use. These

long LOS create an opportunity to initiate and engage patients in treatment, and to render savings by shifting care to a residential addiction treatment setting that can accommodate IV antibiotic administration and MAT. We increased residential staffing and collaborated with a home infusion pharmacy to administer daily infusions on site.

Funding the Intervention

We used administrative data to estimate potential savings and tailored a business case to CCO and hospital payers. The CCO business case centered on hospitalization as an opportunity to engage out-of-treatment adults and potentially reduce high-cost readmissions by managing physical and behavioral health needs. Working within budgeting time lines, we used data from the first 165 participants. These participants had 137 readmissions over a mean observation period of 4.5 months. Mean charge per readmission was \$31,157 (range, \$699-\$206,596) and was highest for people with endocarditis (mean, \$55,493; range, \$23,204-\$145,066) and osteomyelitis (mean, \$68,774; range, \$29,359-\$124,481). We estimated that a 10% reduction in 6-month readmissions could avoid \$674,863 in charges.

For the hospital, the primary financial incentive was reduced LOS. Given the possibility of shortening hospitalization through MERT, we estimated a 20% mean LOS reduction; for budgeting, we estimated a conservative 10% reduction. A 10% mean LOS reduction would free 205 bed-days (10% × 10.26 days mean LOS × 200 patients) and create space for another 32 inpatient admissions in year 1, assuming no change from medical patients’

TABLE 2. Key IMPACT Elements, Including Year 1 Enrollment Targets, Staff Descriptions and Roles, and Allocated Resources

Key Findings of Needs Assessment	Program Element and Year 1 Enrollment Target	Staff Descriptions and Roles	Allocated Resource and Staffing Rationale
Hospitalization provides reachable moments OHSU lacked expertise to assess, engage, and initiate SUD treatment Engagement and trust are key	Hospital-based addiction medicine consultation service 200 patients	Social worker performs ASAM assessment, uses motivational interviewing to engage patients, initiates evidence-based SUD treatment, and coordinates posthospital addiction care Physician advises on withdrawal and pain management and initiates MAT Peers support patient engagement in hospital and across transition to community SUD care	0.5 FTE physician—half-day weekday coverage based on projection that half the patients would need physician consultation and MAT 1.0 FTE social worker—expected case load of about 6-8 patients/day 1.4 FTE peer mentors—peers would be present 7 days/week, including some evening hours
No pathways from hospital to outpatient addiction treatment Long community wait times	“In-reach” liaison supports rapid-access pathways to community SUD care after hospital discharge 100 patients	CADCs from partner organizations “reach in” to hospital, describe community treatment options, support triage and linkage, and serve as points of contact as patients transition across hospital, jail, skilled nursing facility, and community SUD treatment	0.5 FTE CADC—at each partner site
Patients who require long courses of IV antibiotics have very long hospital stays Residential SUD treatment programs not equipped for medically complex patients	Medically Enhanced Residential Treatment brings IV antibiotics and nursing care into residential addiction setting 30 patients	Home infusion pharmacy administers daily IV antibiotics and performs weekly central catheter dressing changes Registered nurse supports care coordination and on-site infusion, basic wound care, and other nursing needs Physician prescribes MAT in residential program and provides oversight for medically complex patients Residential program coordinator manages bed flow to support timely access to residential beds Infectious disease team uses video technology to conduct weekly virtual bedside rounds	Payment for 6 days/week home infusion pharmacy costs (insurance plans cover once-weekly home infusion) 0.7 FTE registered nurse 0.1 FTE community addiction physician 0.2 FTE residential program coordinator Hospital infectious disease team supports 30 minutes/week telehealth rounds

NOTE: Abbreviations: ASAM, American Society of Addiction Medicine; CADC, certified alcohol and drug counselor; FTE, full-time equivalent; IMPACT, Improving Addiction Care Team; IV, intravenous; MAT, medication for addiction treatment; OHSU, Oregon Health & Science University; SUD, substance use disorder.

6.26 days mean LOS. The future of bundled payments further bolstered our business case, as did the potential to improve care quality, reduce nonproductive staff time, and increase institutional learning about SUD. Overall program costs approximated projected savings, and the hospital and a local CCO agreed to equally share the costs of the intervention (Table 2).

DISCUSSION

We have described an innovative approach to developing an SUD intervention for hospitalized adults. Using a process of broad stakeholder engagement, data-driven understanding of population needs, and analysis of financial incentives, we built consensus and secured funding for a multicomponent intervention across hospital and post-acute care settings. Other studies have demonstrated the feasibility and efficacy of starting a single medication for a specific indication⁷⁻⁹ (eg, methadone for opioid use disorder), yet strategies for expanding SUD services in hospitals and facilitating posthospital treatment linkages remain scarce.²¹ Our model addresses a widespread need and could be adapted to other hospitals, SUD treatment organizations, and Medicaid payers.

Our experience has several limitations. First, it took place at a single academic medical center in Oregon, a Medicaid expansion state. Second, our needs assessment involved a convenience sample of limited racial/ethnic diversity. Third, almost all patients had insurance, which could limit generalizability. Fourth, to secure funding, it was essential we had a clinical

champion who was persuasive with hospital and CCO leadership; though increasing disease burden and skyrocketing costs² may drive administrators' increased demand for ways to address SUD in hospitalized adults.

Our experience has several key implications. First, diverse partners were vital at all stages of program design, suggesting hospitals should look beyond traditional healthcare partners to address the SUD epidemic. Second, an interprofessional team that includes physicians, social workers, and peers may better engage patients and address complex system needs. Finally, a planned IMPACT evaluation will assess effects on substance use, healthcare use, and costs.

The United States faces a burgeoning SUD epidemic. Our experience describes an innovative care model and supports the idea that hospitals may play a leading role in convening partners, providing treatment, and driving population health improvements for adults with SUD.

Acknowledgment

The authors would like to acknowledge Peter Rapp and Thomas Yackel for leadership support; Tara Williams for administrative data support; Sarann Bielavitz and Naomi Wright for project management support, and Lynn Smith-Stott and Maria Michalczuk for help with model design. This work was presented at the American Society of Addiction Medicine national conference in Baltimore, MD in April 2016.

Disclosure: This work was funded by Oregon Health & Science University and CareOregon. The authors have no conflicts of interest to disclose.

References

- Volkow N, Frieden TR, Hyde PS, Cha SS. Medication-assisted therapies—Tackling the opioid-overdose epidemic. *N Engl J Med*. 2014; 370:2063-2066.
- Ronan MV, Herzig SJ. Hospitalizations related to opioid abuse/dependence and associated serious infections increased sharply, 2002-12. *Health Aff (Millwood)*. 2016;35(5):832-837.
- Walley AY, Paasche-Orlow M, Lee EC, et al. Acute care hospital utilization among medical inpatients discharged with a substance use disorder diagnosis. *J Addict Med*. 2012;6(1):50-56.
- Rosenthal ES, Karchmer AW, Thiesen-Toupal J, Castillo RA, Rowley CF. Suboptimal addiction interventions for patients hospitalized with injection drug use-associated infective endocarditis. *Am J Med*. 2016;129(5):481-485.
- Fanucchi L, Lofwall MR. Putting parity into practice—integrating opioid-use disorder treatment into the hospital setting. *N Engl J Med*. 2016;379(9):811-813.
- Pollini RA, O'Toole TP, Ford D, Bigelow G. Does this patient really want treatment? Factors associated with baseline and evolving readiness for change among hospitalized substance using adults interested in treatment. *Addict Behav*. 2006;31(10):1904-1918.
- Liebschutz JM, Crooks D, Herman D, et al. Buprenorphine treatment for hospitalized, opioid-dependent patients: a randomized clinical trial. *JAMA Intern Med*. 2014;174(8):1369-1376.
- Wei J, Defries T, Lozada M, Young N, Huen W, Tulsy J. An inpatient treatment and discharge planning protocol for alcohol and dependence: efficacy in reducing 30-day readmissions and emergency department visits. *J Gen Intern Med*. 2015;30(3):365-370.
- Shanahan CW, Beers D, Alford DP, Brigandi E, Samet JH. A transitional opioid program to engage hospitalized drug users. *J Gen Intern Med*. 2010;25(8):803-808.
- Pecoraro A, Horton T, Ewen E, et al. Early data from Project Engage: a program to identify and transition medically hospitalized patients into addictions treatment. *Addict Sci Clin Pract*. 2012;7:20.
- National Center on Addiction and Substance Abuse; Addiction Medicine: Closing the Gap between Science and Practice. June 2012. <http://www.centeronaddiction.org/addiction-research/reports/addiction-medicine-closing-gap-between-science-and-practice>. Accessed May 2, 2016.
- Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, US Department of Health and Human Services. *Results From the 2010 National Survey on Drug Use and Health: Summary of National Findings*. Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, US Dept of Health and Human Services; 2011. NSDUH series H-41, HHS publication SMA 11-4658. <https://www.samhsa.gov/data/sites/default/files/NSDUHNationalFindingsResults2010-web/2k10ResultsRev/NSDUHresultsRev2010.pdf>. Published September 2011. Accessed March 31, 2017.
- Vestal C. Few doctors are willing, able to prescribe powerful anti-addiction drugs. <http://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2016/01/15/few-doctors-are-willing-able-to-prescribe-powerful-anti-addiction-drugs>. Published January 15, 2016. Accessed May 2, 2016.
- McConnell KJ. Oregon's Medicaid coordinated care organizations. *JAMA*. 2016;315(9):869-870.
- Englander H, Kansagara D. Planning and designing the Care Transitions Innovation (C-TraIn) for uninsured and Medicaid patients. *J Hosp Med*. 2012;7(7):524-529.
- Englander H, Michaels L, Chan B, Kansagara D. The Care Transitions Innovation (C-TraIn) for socioeconomically disadvantaged adults: results of a cluster randomized controlled trial. *J Gen Intern Med*. 2014;29(11):1460-1467.
- Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol Use Disorders Identification Test. *Arch Intern Med*. 1998;158(16):1789-1795.
- Smith PC, Schmidt SM, Allensworth-Davies D, Saitz R. A single-question screening test for drug use in primary care. *Arch Intern Med*. 2010;170(13):1155-1160.
- Humeniuk R, Ali R, Babor TF, et al. Validation of the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST). *Addiction*. 2008;103(6):1039-1047.
- Velez CM, Nicolaidis C, Korthuis PT, Englander H. "It's been an experience, a life learning experience": a qualitative study of hospitalized patients with substance use disorders. *J Gen Intern Med*. 2017;32(3):296-303.
- Gryczynski J, Schwartz RP, O'Grady KE, Restivo L, Mitchell SG, Jaffe JH. Understanding patterns of high-cost health care use across different substance user groups. *Health Aff (Millwood)*. 2016;35(1):12-19.