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UNIVERSITY OF CALIFORNIA SAN DIEGO
SAN DIEGO STATE UNIVERSITY

Delivering HIV Prevention and Harm Reduction Interventions for Middle-aged and
Older Adults within Opioid Treatment Programs in San Diego County

A Dissertation submitted in partial satisfaction of the requirements
for the degree Doctor of Philosophy

in

Interdisciplinary Research on Substance Use

by

Wayne Edward Kepner

Committee in charge:

University of California San Diego

Professor Alison Moore, Chair
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Professor John Elder
Professor Lianne Urada
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2024

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The Dissertation of Wayne Kepner is approved, and it is acceptable in
quality and form for publication on microfilm and electronically.

Co-Chair

Chair

University of California San Diego

San Diego State University

2024

DEDICATION

This dissertation is dedicated to my parents, my wife, and my family.

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LIST OF ABBREVIATIONS

CAPI	Computer-Assisted Personal Interviewing
CFAR	Center for AIDS Research
CITI	Collaborative Institutional Training Initiative
COPD	Chronic Obstructive Pulmonary Disease
HCV	Hepatitis C Virus
HIPAA	Health Insurance Portability and Accountability Act
HIV	Human Immunodeficiency Virus
IRB	Institutional Review Board
MOUD	Medications for Opioid Use Disorder
NIDA	National Institute on Drug Abuse
OENDs	Overdose Education and Naloxone Distribution programs
OOKS	Opioid Overdose Knowledge Scale
OTPs	Opioid Treatment Programs
OUD	Opioid Use Disorder
PrEP	Pre-Exposure Prophylaxis
PWID	People Who Inject Drugs
RAP	Rapid Assessment Process
SDC	San Diego County
SEM	Social Ecological Model
SUD	Substance Use Disorder
UCSD	University of California, San Diego
VA	Veterans Affairs

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To my family, I appreciate all your love, acceptance and wisdom. I hope to carry on the tradition of service to the community through compassion and a deepening of wisdom.

To my wife, thank you for constantly believing in me and for being my role model in so many areas of life. I'm not sure how others felt while going through a graduate program, but every moment with you was a joy and a blessing. I would do it again a thousand times.

To Dr. Alison Moore and Dr. Benjamin Han, thank you for making me feel like part of the team, and thank you for introducing me to the world of geriatrics. I owe you both a huge debt of gratitude.

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Chapter 2, in part, is currently being prepared for submission for publication of the material. Kepner, Wayne; Han, Benjamin H.; Zúñiga, Maria L.; Urada, Lianne; Elder, John; Moore, Alison A. The dissertation author was the primary researcher and author of this material.

Chapter 3, in part, is currently being prepared for submission for publication of the material. Kepner, Wayne; Han, Benjamin H.; Zúñiga, Maria L.; Urada, Lianne; Elder, John; Moore, Alison A. The dissertation author was the primary researcher and author of this material

VITA

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ABSTRACT OF THE DISSERTATION

Delivering HIV Prevention and Harm Reduction Interventions for Middle-aged and Older Adults
within Opioid Treatment Programs in San Diego County

by

Wayne Kepner

Doctor of Philosophy in Interdisciplinary Research on Substance Use

University of California San Diego, 2024

San Diego State University, 2024

Professor Alison Moore, Chair

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Background: Nationally, there is a sharp increase in older adults using opioids and seeking treatment for opioid use disorder (OUD). Increasing knowledge of harm reduction principles and access to harm reduction supplies and services are effective ways to reduce opioid-related harms such as overdose. However, older adults are often overlooked in harm reduction efforts; in part, due to stigmatizing beliefs that older adults do not use drugs. The increasing prevalence of OUD among older adults presents unique challenges in providing age-appropriate tailored harm reduction services. This dissertation aimed to assess knowledge, utilization, and ownership of harm reduction supplies and services among patients aged 55 and older in opioid treatment programs (OTPs) and explore the acceptability, feasibility, and implementation considerations of integrating tailored harm reduction interventions for this population.

Methods: We conducted a sequential mixed methods approach within two OTPs across three studies. Study 1 utilized cross-sectional surveys from 75 OTP patients to assess opioid overdose knowledge, naloxone ownership, and utilization of harm reduction services. Multivariable logistic regression examined correlates of naloxone ownership. Study 2 conducted qualitative interviews with 25 OTP patients to explore acceptability and perceived barriers to accessing harm reduction services. Study 3 interviewed 15 OTP providers to evaluate the acceptability, feasibility, and appropriateness of delivering age-tailored harm reduction services.

Results: In Study 1, 65% of participants owned naloxone at the time of study. However, only 9% carried naloxone and 17% had ever received overdose education. Correlates of naloxone ownership in the adjusted model included older age, familiarity with harm reduction programs, and previous personal experience of having naloxone administered; opioid overdose knowledge was not significantly associated with naloxone ownership. Study 2 revealed high acceptability of

harm reduction services among older adult patients, but identified barriers including intersectional stigma, logistical challenges, and lack of tailored and age-appropriate services. Study 3 found that OTP providers viewed integrating age-tailored harm reduction services as necessary and important but noted significant implementation challenges such as resource limitations, patient complexity, and sustainability.

Conclusions: While naloxone ownership was moderate among older adults in OTPs, there were significant gaps in naloxone carriage and low rates of having received overdose education. Patients and providers reported high acceptability and perceived need of integrating age-appropriate harm reduction interventions but identified significant multi-level barriers to care. Our findings highlight the critical need for targeted interventions, policy changes, and implementation strategies to increase access and sustainability of age-appropriate and tailored harm reduction services for older adults in OTPs.

INTRODUCTION

Opioid use disorder (OUD) is associated with younger age (ages 18-44)¹ but the prevalence of older adults with OUD^{2,3} is increasing rapidly, and at differing rates depending on socio-cultural factors.⁴⁻⁶ A study of Medicare recipients showed the rate of OUD in older adults 65 and older increased from 8.6 per 100,000 in 2013 to 22.1 per 100,000 in 2018.⁴ Rates of older adults, 55 and older, who sought treatment for OUD increased swiftly from 2004-2013 ⁷ (41.2%) and were even greater between 2013-2015 (53.5%).⁷⁻⁹ Between 1999 and 2019, the annual rate of opioid overdose deaths among those 55 and older increased 10-fold.⁸ A subset of overdose cases occur among individuals who are already enrolled in treatment for OUD, indicating that engaging in treatment does not fully mitigate the risk of overdose.^{4,10} These data suggest that current substance use trends among older adults (i.e. increases in OUD, and increases in OUD treatment utilization) may present barriers to healthy aging. This situation is exacerbated by the fact that older adults infrequently access harm reduction services (e.g. naloxone, sterile syringes, fentanyl test strips).¹¹ Given these barriers, there is an urgent need for additional research to identify how to improve harm reduction programs for older adults, thereby reducing opioid-related harms in this vulnerable population.^{2,12}

In San Diego County (SDC), opioid treatment programs (OTPs) care for an increasingly older population with chronic diseases, [e.g. Chronic obstructive pulmonary disease (COPD), hypertension, hepatitis C virus (HCV) and human immunodeficiency virus (HIV)]. Older adults living with substance use disorder (SUD), especially OUD, experience a high burden of geriatric conditions (e.g. functional impairment, cognitive decline, sensory impairment) and are high utilizers of acute healthcare, and are made vulnerable by multiple layers of stigma^{7,13}. The incorporation of HIV prevention within harm reduction strategies, such as regular HIV testing

and education on safer substance use and sexual health, is crucial. However, the ageist misconception that older adults in OTPs do not use drugs and do not engage in sexual activity is a barrier that prevents them from receiving evidence-based interventions that can reduce their risks for harms associated with infectious disease (e.g. HIV/AIDS), and substance use¹¹.

Unfortunately, few studies on harm reduction programming take into consideration the unique challenges and needs of adults over the age of 55. These data illustrate a substantial gap in knowledge about the specific barriers and facilitators of comprehensive harm reduction services among older adults engaged in treatment at OTPs.

To address this, we propose a sequential mixed-methods research study to evaluate opioid overdose knowledge, other substance use, treatment history and health characteristics and their associations to naloxone ownership among OTP patients aged ≥ 55 . Second, we will assess the acceptability, feasibility, and implementation considerations in this population to develop an intervention and model of care centered on delivering harm reduction and prevention services (e.g. education) and supplies (e.g., sterile syringes, safer smoking supplies, naloxone) in OTPs aimed at older adults in San Diego County (SDC). This study will build on our current collaborations with SDC's Behavioral Health Services, seeking to expand harm reduction services through OTPs in San Diego. This research will be the first to specifically (1) describe current harm reduction services utilization and (2) evaluate how to best deliver harm reduction interventions for older adults with OUD and will directly lead to future research to implement these interventions in SUD treatment settings.

Aim 1:

Aim #1.1: Assess current knowledge and current use of harm reduction supplies and services (e.g., sterile syringes, naloxone, safe smoking supplies, fentanyl test strips, HIV/HCV tests) via a cross-sectional survey with older adult OTP patients in SDC (n=120).

Aim #1.2: Quantify the association between participants' opioid overdose knowledge with the ownership of naloxone (defined as current ownership and whether they carry naloxone with them).

Hypothesis #1.2: Consistent with cross-sectional patterns from the existing literature, higher levels of knowledge on measures of opioid overdose knowledge will be individually and positively associated with naloxone ownership.

The data collected from Aims #1.1 and #1.2 will provide insights into the specific factors influencing the ownership and carrying of naloxone among older adults. By identifying patterns, barriers, and facilitators to naloxone ownership, these two aims can guide the qualitative research in Aim #2.

Aim #2: Explore the acceptability of and perceived challenges to accessing harm reduction supplies and services within OTPs via in-depth qualitative interviews with a socio-demographically diverse sample of older adult OTP patients in SDC (n=25).

Aim #3: Evaluate the acceptability, feasibility, and appropriateness of delivering harm reduction supplies and services to older adults within OTPs via qualitative interviews with a diverse sample of clinical and social service providers working with older adult OTP patients in SDC (n=15).

The data gathered in Aims #1.1 and #1.2, will provide a basis for Aim #3 by supplying a framework of data (e.g. existing services) to discuss with OTP staff and providers. These data will allow the qualitative investigation of key informant perspectives to be grounded in the

existing patterns of harm reduction service use, leading to a more effective and targeted investigation.

Results from this study will inform subsequent research on implementation strategies for improving the utilization of harm reduction services within OTPs in SDC and beyond. By contributing to the development of feasible, acceptable, and age-appropriate prevention services and models of care for older adults who use substances, this proposal is directly responsive to the priorities of NIDA's Division of Epidemiology, Services, and Prevention Research. It is also responsive to strategic priority research areas of the Center for AIDS Research (CFAR) (specifically, healthy aging and substance use) and will support new collaborations between investigators at UCSD and partnerships with SDC. We are committed to disseminating findings widely to scientific, academic, community, and SDC audiences while improving the care of older adults with OUD.

A. Significance of Age-Appropriate Care

Given the unprecedented number of individuals aging in our population and high rates of substance use disorders (SUD) among the Baby Boomer generation (individuals born between 1946 and 1964), the U.S. is facing an epidemic of older adults living with SUD^{3,7,14}. And while the United States (US) continues to experience the worsening epidemic of drug-related overdose, older adults remain overlooked in this crisis¹⁵. There were >30,000 unintentional drug-related overdoses among adults ≥ 65 years of age between 1999 and 2020, an increase of nearly 700%, and evidence point to stark racial and ethnic disparities in deaths attributed to opioids among older adults^{8,16}. In 2019, the opioid-overdose fatality rate for non-Hispanic Black men (55 years or older) was 40.03 per 100,000 population which was four times greater than the overall opioid

overdose fatality rate of 10.70 per 100,000 for persons of the same age.¹⁶ We are also seeing increasing numbers of older adults entering SUD treatment^{17,18}. Many older adults with opioid use disorder (OUD) also live with competing medical conditions (e.g. diabetes, heart disease) and are socially complex (e.g., suffer from social isolation, loss of family members and spouses)⁷. These data highlight the urgent need for age-specific harm-reduction strategies to manage the unique risks faced by older adults with OUD. However, there is currently a lack of understanding of harm reduction service needs among older adults living with OUD². Current harm reduction strategies may fail to address the distinct needs of the older adult population, which highlights a significant gap that requires immediate action. Strategies that focus on the harm reduction needs of older adults must be researched to ensure that this population receive care that is age-appropriate and meets their unique medical and social conditions.

A1. Older Adults in Opioid Treatment Programs

Significant increases have been observed in the proportion of older adults entering opioid treatment programs (OTPs)². Previous work in New York City shows that the percentages of patients in OTPs aged 50-59 years have increased by 425%, and by 713% for those aged ≥ 60 ^{2,19}. This mirrors national trends, including in Southern California, that have also seen large increases in adults aged ≥ 55 entering OTPs, especially for the first time and among older people who use heroin^{7,17}. This growing population of older adults with OUD has a high burden of disease and often receives fragmented care, with evidence that they experience premature aging, including a high prevalence of geriatric conditions (e.g., cognitive impairment, frailty, arthritis) and high rates of inpatient hospitalization.^{17,20,21} Despite the increasing need for services tailored for the needs of older adults with OUD, most OTPs provide only limited clinical services outside of

medications for OUD²². The lack of age-appropriate care (e.g. training of staff) of older adults from most prevention and harm reduction research and programmatic efforts has left substantial knowledge gaps made worse by the persistence of misconceptions that older adults do not inject drugs.²³ Nevertheless, due to aging-related physiological changes, increased prevalence and severity of chronic diseases, and potentially high numbers of medications used in this population, older adults are particularly vulnerable to the harmful health consequences of drug use.¹⁷ Research is thus needed to understand the harm reduction intervention needs of older adults who use drugs, including those with OUD, which is often complicated by polysubstance use. For example, polysubstance use can complicate treatment efforts due to the potential interactions between different substances. Furthermore, older adults often have comorbid chronic diseases (e.g. heart disease, diabetes) and take multiple medications which increases the potential for harmful substance-drug interactions¹⁷; interventions such as education, and the dissemination of drug-testing kits have the potential to reduce these harms. These issues are critically important in San Diego County (SDC), where males ages 55-64 years had the highest rate of methamphetamine-related overdose in 2018.²⁴

A2. Infectious Disease and HIV Prevention in OTPs

Older adults in OTPs also face vulnerabilities related to infectious diseases, such as HIV, which further highlights the need for comprehensive harm reduction strategies. Only half of all OTPs in the US offer HIV testing even though 7-10% of new HIV infections annually are attributed to injection drug use.^{25,26} Similarly, a significant proportion of people who inject drugs (PWID) report having engaged in syringe sharing and/or condomless sex²⁶ in the past year which increases the risk of acquiring HIV and other infectious diseases.²⁶ Research suggests concerning

trends among adults aged ≥ 60 ; safer sex practices have declined sharply²⁷, and HIV testing rates are low within this age group²⁸. Given these vulnerabilities, older adults who use drugs should become a focal point for both HIV prevention and harm reduction interventions. As over 50% of individuals living with HIV are aged ≥ 50 and 35% were over 50 at the time of diagnosis, addressing the needs of older adults in HIV prevention efforts is crucial.^{29,30} This approach should encompass various measures, including the provision of safer sex materials and pre-exposure prophylaxis (PrEP is a preventive strategy used to reduce the risk of acquiring HIV in individuals who are at high risk).³¹ Older adults with OUD should also be targeted for harm reduction strategies, including access to sterile syringes, fentanyl test strips and safe smoking supplies, particularly given the high prevalence of methamphetamine use in SDC. Despite these needs, older adults are often overlooked in terms of HIV screening and discussions about safer sex practices.³¹

In SDC, few OTPs offer any infectious disease prevention services outside of MOUD and drug counseling, with some providing limited, informal harm reduction services (e.g., occasional provision of naloxone). Notably, the local drug supply, including in SDC, contains increasing levels of illicitly manufactured fentanyl. Additionally, the prevalent use of psychostimulants like methamphetamine, which has long been linked to risky sexual behaviors, is also widespread in SDC. This further contributes to the elevated HIV risk among PWID. Consequently, delays in diagnosis and treatment have led to lower CD4 cell counts and higher viral loads in older adults living with HIV, compared to their younger counterparts.^{26,30} Among individuals living with HIV, OUD is associated with worse clinical outcomes, and increased HIV risk behaviors and HIV transmission.³² As OTPs care for an increasingly older population, integrating prevention

services for this population into OTPs provides an opportunity to reach an underserved yet engaged patient population.

A3. Overdose education and naloxone distribution (OENDs)

One of the main educational strategies for preventing opioid-related harms is the distribution of naloxone combined with overdose education within OTPs.^{33,34} Naloxone is an opioid-receptor antagonist that can be used to reverse the effects of an opioid overdose.³³ Overdose education and naloxone distribution programs (OENDs) are designed to educate individuals to prevent an overdose from occurring, recognize an overdose when it occurs and prevent a non-fatal overdose from progressing to a fatal overdose by using naloxone, rescue breathing, and seeking help.³³ Recent OEND interventions tailored to older adults have shown promising results but data are limited.³⁵ A virtual OEND training for older adults significantly improved measures of knowledge regarding the opioid epidemic and improved confidence in recognizing overdose and administering naloxone.³⁵ An in-person training with educational handouts around opioid risks and on the importance of naloxone had similarly outstanding results.³⁶ Research suggests that willingness to carry and use naloxone can be influenced by personal knowledge about opioid risks, confidence in recognizing an overdose, and the ability to administer naloxone effectively.^{37,38} However, current studies fail to consider older adults engaged in OUD treatment and are limited in their small sample sizes (<30). Older adults engaged with OTPs, especially new patients, encounter substantial health, social and environmental obstacles that could prevent access to essential harm reduction resources like OENDs.^{19,39} Consequently, there remains a significant gap about levels of knowledge and awareness of opioid risk, harm reduction knowledge, and naloxone use and ownership among

older adults that are engaged in treatment at OTPs. By filling this gap, providers and policymakers will have a better understanding of the unique needs of this population and can respond to prevent drug-related harms through increasing access to education, services and supplies of naloxone as informed by these data.

A3. Social Ecological Model (SEM) will guide our research to improve harm reduction strategies in older adults in treatment for an OUD

The Social Ecological Model (SEM) will be used to inform both the quantitative and quantitative portions of this study.⁴⁰ At the individual level, the SEM will be used to guide the examination of individual-level factors influencing substance related harms; these factors include: socio-economic status, substance use and treatment history, age-related health conditions (e.g. cardio-vascular disease, arthritis, diabetes), opioid overdose knowledge, and experience reversing an overdose using naloxone.

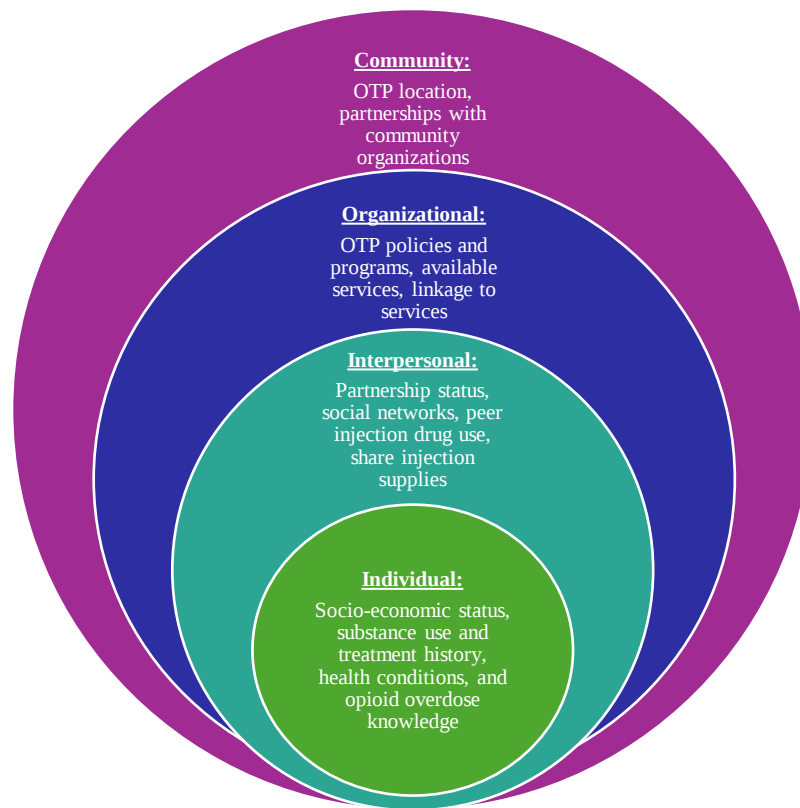


Figure 1. Social Ecological Model (SEM) of opioid treatment program factors. This figure illustrates the multilayered approach to understanding opioid treatment programs across four key levels: individual, interpersonal, organizational, and community.

At the interpersonal level, factors to consider will be how interpersonal relationships and social ties can affect older adults' vulnerability for *substance related harms* by examining the behaviors of the participant's close social network. These factors include partnership status (e.g. widowed), co-habitation with others, whether or not individuals in their social networks carry naloxone, and share injection supplies (e.g. syringes). At the organizational level, we will consider how policies and enacted programs at their respective OTPs (e.g. available harm reduction services, linkage to outside services) might be affecting their behavior. Finally, at the community level, it can be used to examine community-based resources available to older adults (i.e. availability and access to OTPs) and how community-level factors such as access to health care (e.g. insurance status), treatment and recovery organizations or other health-promoting services serve as facilitators or barriers to reducing harms and risk of overdose.

This comprehensive approach, grounded in an SEM framework, will provide an evidence-based and interdisciplinary approach to the study, enabling a more comprehensive and thorough examination of the individual, interpersonal, organizational, and community level factors involved in substance use among older adults engaged in treatment at OTPs. This SEM guided approach is aligned with our hypothesis that individual knowledge affects naloxone ownership, while simultaneously considering interpersonal, organizational and community level factors. The use of SEM recognizes that effective harm reduction strategies must encompass multiple dimensions to significantly reduce substance-related harms and overdose risk.

A4. Conceptual Model

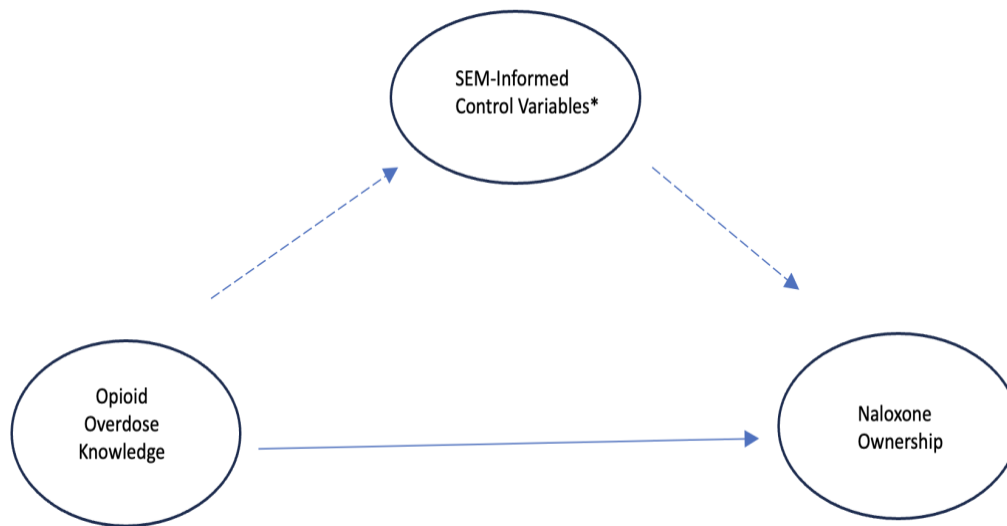


Figure 2. Conceptual model illustrating the relationship between opioid overdose knowledge and naloxone ownership controlling for variables informed by SEM; *SEM-informed control variables = age, gender, race/ethnicity, housing status, treatment history, health conditions, partnership status, social network, OTP services, and OTP location. The solid blue line represents the direct relationship between opioid overdose knowledge (independent variable) and naloxone ownership (dependent variable). The two dashed blue lines indicate control variables that are not the primary focus of the study but are considered important to account for their potential influence between the relationship of the main variables of interest.

A5. Gaps In Knowledge about Older Adults in Opioid Treatment Programs.

Most existing research about OTPs focuses on younger populations, leaving a substantial knowledge gap about the needs and experiences of older adults in treatment for OUD. Currently, there is a lack of focus on socio-demographic factors and how they relate to health-related behaviors (e.g. sexual activity, substance use, naloxone ownership) in older adults. There is also minimal research on harm reduction strategies and educational programs for older adults who may have specific needs that differ from other populations. Regarding implementation, there is a lack of research on the feasibility and acceptability of harm reduction interventions specifically for older adults leading to a gap in implementation science. Finally, there is a gap in the understanding of the perspectives of clinical and social service providers regarding the

challenges and opportunities of delivering harm reduction services to older adults. Our study aims to fill these gaps through a sequential mixed-methods approach. These data will provide critical insights into harm reduction service utilization, overdose knowledge, naloxone ownership and the acceptability and feasibility of harm reduction strategies among older adults engaged in treatment at OTPs in SDC.

B. Innovation

This project aims to first evaluate harm reduction knowledge and access to supplies and services among patients age ≥ 55 attending OTP programs in San Diego and second, to assess the acceptability, feasibility, and implementation considerations to develop an intervention and model of care centered on harm reduction and prevention services and supplies (e.g., sterile syringes, safer smoking supplies, safer sex materials, naloxone) in OTPs aimed at older adults. Our study will provide data on measures of harm reduction knowledge and examine how knowledge relates to sociodemographic factors (e.g., race/ethnicity, housing status) and harm reduction behaviors (e.g., naloxone use and ownership, utilization of sterile syringes). Successful completion of this pilot study will allow us to refine survey instruments, qualitative interview guides, and recruitment approaches to inform larger, longitudinal studies of diverse older adults in OTP. These pilot data can also help determine the mediators and moderators of harm reduction service utilization among older adults at OTPs which can be generalized to OTPs around the United States.

Specifically, this study is innovative because we will be targeting older adults attending OTPs whereas previous studies have largely excluded adults over 55 in their study populations. Our mixed-methods design combining quantitative surveys with in-depth qualitative interviews is innovative because survey data will enable us to measure harm reduction knowledge and

behaviors in our study sample while the qualitative data from patients and key informants will provide detailed insight in the acceptability and feasibility of implementing new harm reduction services tailored to older adults in OTP settings. The integration of quantitative and qualitative data will provide a comprehensive understanding of this population that is difficult to accomplish with one method alone. By focusing specifically on an understudied population and utilizing a mixed-methods approach, this pilot study will generate crucial new data to inform larger-scale research for older adults in OTP settings.

C. Approach

C.1 Research Team

Wayne Kepner, MPH, Principal Investigator (PI). Mr. Kepner is currently a PhD student in the UCSD/SDSU Joint Doctoral Program in Interdisciplinary Research on Substance Use and currently a research assistant in the Division of Geriatrics, Gerontology, and Palliative Care working with Dr. Benjamin Han and Dr. Alison Moore on research projects related to substance use and addressing unhealthy substance use in older adults. His main research interests include improving the quality of care of people with OUD and how to better deliver harm reduction and recovery support services. He has extensive experience working with recovery programs at UCSD/SDSU.

Benjamin Han, MD, MPH, Co-Principal Investigator. Dr. Han is an Assistant Professor and clinician-scientist in the Department of Medicine in the Division of Geriatrics, Gerontology, and Palliative Care. Dr. Han is an attending physician at the San Diego VA, where he is a primary care and geriatric medicine provider. He is board-certified in internal medicine, addiction medicine, and geriatric medicine. His current research, funded by NIDA, is focused on

improving chronic disease management among older adults who receive care from San Diego County's OTPs.

C.2 Study Design

Overview of Study Design

We propose an exploratory, sequential mixed methods study beginning with surveys and expanding upon survey findings using qualitative methods (see timeline in Figure 3). The data collected from the quantitative surveys (Aim #1) will provide crucial data on existing harm reduction service utilization among OTP patients which will highlight existing trends and potential gaps in care. The qualitative interviews (Aim #2) will then provide a deeper understanding of the acceptability of and perceived challenges to accessing harm reduction and naloxone-related services. Finally, the study will utilize qualitative interviews with key informants (Aim #3), adding a critical layer of professional insight. These key informant interviews will delve into the acceptability, feasibility, and appropriateness of delivering harm reduction services to older adults within OTPs. The framework for these qualitative explorations will be greatly informed by the findings from both the surveys and the patient interviews. Consequently, this study will provide pilot data to help to elucidate patterns of harm reduction service use and other characteristics of substance use behaviors in an understudied, yet growing demographic, whose access of harm reduction services may be beneficial to address common health concerns not well addressed by current programs given this age group's vulnerability due to age-related changes in physiology, concurrent medication use, comorbidity, and declining physical and cognitive function.

Screening

Potential study participants will be identified through multiple channels described above. Initial contact with the participants will include a brief description of the study highlighting its expectations and potential benefits; individuals who express interest will be screened by a research assistant to ascertain eligibility. All those meeting eligibility criteria and who agree to participate will be asked to complete informed consent.

Cultural competency and Clinical Relevance

Our team has expertise in the proposed topics and research methods and have the same vision of expanding harm reduction services and improving treatment outcomes for older adults. Dr. Han is currently conducting qualitative research with older adult (aged ≥ 65) patients in two large OTPs in SDC to learn about the challenges of aging and managing chronic diseases. Wayne Kepner has extensive experience working with community-based harm reduction and recovery programs at UCSD/SDSU.

C.3 Study Location and Participants

Study site

There are currently nine County-operated OTPs in San Diego County (SDC). Dr. Han is currently engaged in research at two OTPs, and we anticipate that more than half of all remaining OTPs ($n \geq 4$) will be interested in participating in this study, which will provide us with a large and diverse sample of patients (See Figure 3 below). We will intentionally oversample persons of racial and ethnic minoritized backgrounds. Our ongoing relationships with the SDC and community-based OTPs are crucial to the success of this project.

Eligibility criteria

For Aims #1 and #2, eligible participants will be patients treated at an OTP age ≥ 55 years, speak English, currently receiving care at an OTP, and able to provide informed consent.

We will exclude participants who are not able to provide consent. For Aim #3, eligible participants will be key informants age ≥ 18 , currently work or have experienced working with older adults at OTPs, speak English, and able to provide informed consent.

Recruitment, Enrollment, and Attrition

We will recruit a convenience sample of participants for Aims #1 & #2 from waiting rooms of the OTP, and through the aid of IRB-approved promotional material that will be posted at OTPs (e.g., flyers). Previous studies with this population, recruitment strategy, and OTP partners have been successful, so we anticipate no challenges in enrollment. To reduce barriers to enrollment, we will offer participants the option of conducting surveys on-site at the OTP in a private setting or by remote methods (e.g., phone or teleconferencing). Our previous success in the OTP setting and our relationships with the OTP organizations gives us confidence that we will achieve our target sample size of $n = 120$ (See Appendix 1). For Aim 2, we will purposely sample a socio-demographically diverse subsample of 20 participants who completed surveys for Aim 1. For Aim 3, we will recruit 15 professional key informants (e.g., OTP and local harm reduction providers) who will be individuals ≥ 18 yrs old with “on-the-ground” professional experience working with older adult OTP patients in SDC.

Remuneration and Maximizing Retention

Participants will be paid \$30 for completion of a baseline questionnaire (Aim #1). A subset of these participants will be recruited for a qualitative portion of the study and will also receive an additional \$50 upon completion of the 60-minute qualitative interview. To select participants for Aim #2, we will ensure a diverse representation based on factors such as age, sex, race/ethnicity, socio-economic status, and health characteristics. We will monitor the recruitment process to ensure that the current sample is meeting the desired diversity parameters.

If we notice a particular group is underrepresented, targeted recruitment efforts will be made to rectify the imbalance. This approach will ensure a representative and comprehensive understanding of older adults' experiences with harm reduction services.

In total, the patient participants may be compensated up to \$80 for the completion of a quantitative assessment (Aim #1) and qualitative assessment (Aim #2). Key informants will receive \$50 for a 60-minute qualitative interview (Aim #3) for maximum total of \$50. To maximize retention, we will request personal cell phone numbers and email addresses as well as contact information for a close friend or relative. Depending on their preference, we will also contact the participants through email, text, or phone to remind them of their upcoming appointment.

Contingency plan

If recruitment efforts are challenging, our contingency plan will be based on an expansion of eligibility criteria. While our main objective is to characterize patterns of substance use risk factors in older adults aged 55 year of age and older, we can expand our sample to older adults 50 year of age and older to increase enrollment eligibility. By doing so, we will still collect meaningful and useful data on older adults and meet our Aims. If these efforts fail, we will employ a snowball sampling method and provide incentives to study participants to recruit others that are engaged in OTPs that we have not reached.

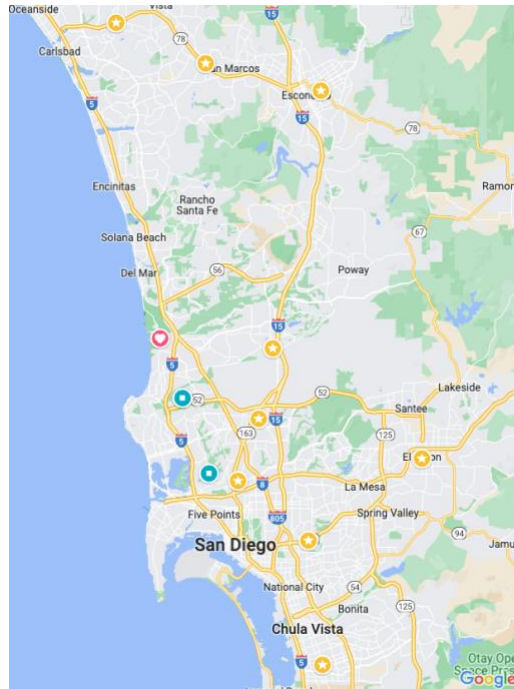


Figure 3. Geographic representation of San Diego highlighting locations of Opioid Treatment Programs (OTPs) denoted by star symbols.

C.4 Data Sources and Collection

Quantitative data collection (Aim 1):

After providing informed consent, participants will complete a computer-assisted personal interviewing (CAPI) survey lasting ~40 minutes at the OTP in a private location. If the participant prefers a telephone or teleconference interview, research assistants will administer the survey and enter the data manually into REDCap. The survey measures will include socio-demographics (e.g., age, gender, race/ethnicity, housing status), chronic disease status (e.g. diabetes, COPD, hypertension) current drug use (e.g., types of drugs used and injected, receptive syringe sharing), history of SUD treatment, duration and type of treatment for OUD received in OTPs (e.g., methadone or buprenorphine, duration in treatment program), sexual behaviors (e.g., numbers, types of partners, condom use), HIV and HCV status with last known testing. Likert

scale ratings will assess harm reduction service knowledge, previous utilization, and access (e.g., sterile syringes, safe smoking supplies, naloxone). (*See Appendix for complete quantitative survey*). Opioid overdose knowledge will be assessed by use of the Opioid Overdose Knowledge Scale (OOKS). Summary of domains/items measured and when they will be collected are outlined in the table below.

Domain	Items and data source
Demographics	Age, gender, race/ethnicity, education, housing status, and socio-economic status
Health and Treatment Status	Chronic disease, current substance use, (e.g., types of drugs used and injected, receptive syringe sharing), history of SUD treatment, duration, and type of treatment for OUD received in OTPs (e.g., methadone or buprenorphine, dose, duration in treatment program), sexual behaviors (e.g., #s, types of partners, condom use), HIV and HCV status with last known testing
Harm Reduction Services	Likert scale ratings will assess harm reduction service knowledge, previous utilization, and access (e.g., sterile syringes, safe smoking supplies, naloxone, condoms).
Opioid Overdose Knowledge	Opioid Overdose Knowledge Scale (OOKS). Domains: opioid overdose risk factors (A), signs of an opioid overdose (B), actions to be taken in an opioid overdose (C) and naloxone use (D-I).

Figure 4. Data source and study measures for study with timeline

Qualitative data (Aims 2 & 3)

We will use semi-structured interview guides with open-ended questions and specific probes informed by our past research. Interviews with patients lasting ~60 minutes will explore the acceptability and perceived need for specific harm reduction services (e.g., Naloxone, safe injection, and smoking supplies), perceived barriers to accessing such services (including ageism), and preferences for programmatic characteristics. Aim 3 key informant interviews lasting ~60 minutes will elicit professional perspectives on the feasibility of preferred services identified in Aims 1-2 within OTPs and possible challenges for implementation. Interviews will

be conducted in-person (or virtually if required), audio-recorded, and transcribed. (*See Appendix for complete qualitative surveys*)

C.5 Data Analysis

Data Management

For our quantitative data collection, we will use REDCap, a secure web application for building and managing online surveys and databases.

Missing Data

We will examine missing data within individual measures as well larger patterns of response-level missingness by age group, race/ethnicity, or other baseline characteristic that can be used to inform sampling strategies for a larger study. All analyses will be conducted using SAS 9.4 (Cary, NC) and any effect with $p < 0.10$ will be considered meaningful.

Sample size considerations.

As Aim 1 is largely descriptive, we will use a convenience sample size of $n=120$, which we can increase if deemed necessary (i.e., fail to meet sociodemographic sample goals). Although the project will not be powered to assess sex differences or differences based on ethnicity or race, we estimate a diverse research sample given the demographics of the OTPs: 35% female, 35% identifying as Latinx/Hispanic, 30% identifying as Black/African American, and 35% identifying as White. Since this is a pilot study, data will be used to estimate effect sizes for various outcome variables (overall and by race/ethnicity) and confidence intervals to be used in power calculations for a future full-size study (Aim 1). Since we will sample from at least four OTPs in different geographical locations within San Diego County, we also anticipate a range of other sociodemographic characteristics, including household income and the number of people experiencing homelessness.

Sample sizes for Aims 2 and 3 qualitative components are based on the gold standard of thematic saturation, or the point at which we repeatedly hear similar ideas across interviews and determine through team deliberation that additional data collection will not yield significantly new insights⁴¹. The concept of thematic saturation is based on the idea that the quality of information collected is dependent more on the richness and depth of the information provided by each participant and not necessarily based on the number of people⁴¹. In the context of our study, achieving thematic saturation will mean that we have thoroughly explored the experiences, ideas, and perceptions of our participants about harm reduction interventions for older adults in OTPs. We will determine if thematic saturation has been reached through team deliberations in which we will continuously review the data collected and identify patterns and themes until no new themes emerge. Based on our extensive experience and empirical studies in the health sciences, we believe that conducting approximately 25 interviews for Aim 2 and around 15 interviews for Aim 3 will yield sufficiently rich and diverse data to fully explore the research questions and reach thematic saturation.

C.5.1 Study Variables

Main Outcome

The main outcome variable in our study is the self-report of naloxone ownership at the time of survey administration. We will dichotomize this variable (yes/no) to indicate whether the patient self-reports currently owning naloxone.

Secondary Outcome

Our secondary outcome variable is the self-report of carrying naloxone at the time of survey administration. We will operationalize this variable as dichotomous (yes/no) with a positive answer to the patient reporting carrying naloxone with them daily, most of the time or at

least half the time. Patients reporting carrying naloxone with them rarely, or never will be categorized as a negative response.

Opioid Overdose Knowledge Scale (OOKS)

Our primary independent variable (IV), opioid overdose knowledge, will be operationalized as a continuous variable using the Opioid Overdose Knowledge Scale²⁷ which is a validated instrument prevalent in the literature. Domains: opioid overdose risk factors (A), signs of an opioid overdose (B), actions to be taken in an opioid overdose (C) and naloxone use (D-I).

C.5.2 Data Analyses. Quantitative data (Aim #1):

Quantitative data (Aim #1)

Assess current knowledge and use of harm reduction services (e.g., sterile syringes, naloxone, safe smoking supplies), other substance use, treatment history and health characteristics via cross-sectional surveys with older adult OTP patients in SDC (n=120). Descriptive statistics (mean/standard deviation and median/interquartile range for continuous variables, frequencies/percentages for categorical variables) will be used to describe all variables to estimate the current knowledge and use of harm reduction services, other substance use and health characteristics (*See Table 1 above*). Specifically, along with traditional demographic information (age, gender, race/ethnicity, education, socioeconomic status) we will describe health (i.e. chronic diseases) and treatment status (i.e. duration of treatment, type of medication), harm reduction services use, and opioid overdose knowledge (OOKS). Additionally, random effects regression models will be used to examine the variability in outcomes based on OTP program.

Quantitative data (Aim #1.2, Hypothesis #1.2)

Quantify the association between opioid overdose knowledge, other substance use, treatment history and health characteristics with the ownership of naloxone. We will conduct bivariate analyses (e.g., chi-square and t-tests) to explore associations between knowledge and use of harm reduction services and demographic characteristics (e.g., gender, education, housing status, and socio-economic status). We aim to explore how these variables may influence the likelihood of owning naloxone. The cross-sectional association between opioid overdose knowledge, other substance use, treatment history and health characteristics with the ownership of naloxone will then be explored using multivariate logistic regression (for categorical outcomes, including owning naloxone [yes/no] as the dependent variable. We will use the SEM to guide our analysis by informing our control variables (See Figure 1). By applying the SEM, we will control for variables across individual (e.g. age, gender, race/ethnicity, housing status, health conditions), interpersonal (e.g. partnership status, social network), organizational (e.g. available OTP services) and community levels (OTP location). We will utilize the Bonferroni correction for multiple comparisons (i.e. use and ownership) to reduce the chance of a type I error (false positive) by adjusting the significance level of each comparison.

Qualitative data (Aims 2 & 3)

We will analyze transcripts using an intensive and iterative and systematic Rapid Assessment Process (RAP)⁴². RAP is efficient and produces similar findings as traditional inductive analyses (i.e., with one study identifying ~80% overlap in thematic findings), making it ideal for time-sensitive, sequential mixed methods projects⁴². We will first develop a template containing fields for deductive topics (based on interview guides) and emergent themes. Templates will be combined into a single matrix displaying data within each theme across each

interview, enabling rapid summaries of themes and sub-themes to inform subsequent data collection and provide preliminary data for subsequent grant proposals. We will also use RAP templates and findings to collaboratively develop a codebook and formally code transcripts using NVivo in preparation for qualitative and mixed methods manuscripts on key topics of interest.

C.6 Potential limitations and solutions

The information collected from this study will be specific to older adults in OTPs and may not be generalizable to other populations. Furthermore, these data will be collected in San Diego County and thus may not generalize to other locations. Also, the unique challenges of this population may make a harm reduction intervention unfeasible for logistical reasons even if acceptability is high. However, any barriers to harm reduction elucidated by this survey may be addressed by future studies. To increase generalizability, future studies should consider collecting data from similar populations in other locations to determine the potential effectiveness of harm reduction interventions in older adults.

C.7 Study Timeline and Dissemination

We anticipate recruitment to begin by Month 2, with all enrollments completed by Month 6. Months 6-12 will be dedicated to the development of presentations and manuscripts. We plan to disseminate findings from this study through presentations to the community, academic conferences, abstract submission and at least 3 academic manuscripts. We will also disseminate pertinent information about our findings to other OTPs throughout the country through our professional networks and social media.

	Aug	Sept Oct	Nov Dec	Jan Feb	Mar Apr	May Jun
IRB Submission	•					
Aim 1 OTP survey		•	•			
Aim 1 Quantitative analysis		•	•			
Aim 2 Qualitative interviews		•	•	•		
Aim 3 Key informant interviews		•	•	•	•	
Aim 2 & 3 Thematic analysis					•	•
Manuscript preparation					•	•

Figure 5. Timeline of study activities

D. Risks to Human Subjects

D1. Human Subjects Involvement, Characteristics, and Design

This research project proposes to: 1) conduct a sequential mixed-methods survey to collect data on participant's current knowledge and use of harm reduction services (e.g., sterile syringes, naloxone, safe smoking supplies) among older adult OTP patients in SDC (Aim #1.1); 2) quantify the association between harm reduction knowledge and the ownership and use of naloxone (Aims #1.2); 3) Explore the acceptability of and perceived challenges to accessing naloxone-related services within OTPs via in-depth qualitative interviews with a socio-demographically diverse sample of older adult OTP patients (Aim #2); and 4) evaluate the

acceptability, feasibility, and appropriateness of delivering naloxone-related services to older adults within OTPs via qualitative interviews with a diverse sample of clinical and social service providers (Aim #3).

Population

For Aims # 1 & #2, eligible participants will be age ≥ 55 , speak English, currently receive care at an OTP, and provide informed consent. To ensure that participants have agency in their consent, exclusion criteria include those that are unable to understand and communicate to study staff the basic procedures of the study. Our study will oversample individuals of diverse backgrounds to ensure that at least 33% of participants are from underrepresented racial/ethnic categories, and approximately 40% self-identify as women. For Aim #3, eligible participants will be age ≥ 18 , speak English, and will be currently employed working with older adult OTP patients in SDC, such as nurses, counselors, social workers, case managers, and program administrators.

Compensation and Recruitment

Participants will receive \$30 for the quantitative assessment. All participants invited to the qualitative portion will receive \$50. Participants will be recruited using IRB-approved flyers placed inside OTP clinics, through OTP staff and at waiting rooms. Participants of diverse ethnic and racial backgrounds will be recruited.

Data Access

Research staff (i.e. Kepner and Han) that are involved in recruiting and scheduling will have access to identifiable data. Research staff will be trained in human subject's ethics through Collaborative Institutional Training Initiative (CITI).

D2. POTENTIAL RISKS

Overview

The potential risks to participants in this study are minimal. There is a small risk of psychological discomfort, fear that refusal will affect care, and potential privacy and confidentiality concerns.

Discomfort associated with answering personal questions during study interviews

The main risks for participation in this research study, for both groups, is mainly psychological discomfort, and the disclosure of sensitive information such as substance use which may impact care. During the interview process, the subject may experience psychological discomfort in recalling events that may have been personally traumatic. Since our study is primarily concerned with risks and burdens of substance use, the possibility of a subject recounting negative memories is high. Consequently, the difficulty of recounting past trauma in a research setting under controlled circumstances and with audio recording poses a psychological risk to the subject. To alleviate this burden, our interviewer will be expertly trained in qualitative interviewing and be able to recognize symptoms of extreme unease in the subject. Furthermore, subjects will be instructed during the initial questioning that they are free to end the interview at any time if they should need.

Fear that refusal to participate will affect care or services

Since our survey will be administered at OTPs, participants may fear that not participating will affect their care. We will explicitly mention that this is not true in the screening process due to strict confidentiality procedures, and we will provide written confirmation that no records or information from the survey will be shared to the providers.

Endorsement or discussion of substance use including methadone affecting one's employment or reputation

There is a risk that professional relationships can be jeopardized due to the sensitive nature of the information collected. The data being collected may be compromised, lost, or stolen which may have negative implications for professional relationships should any critical interview questions be leaked. The potential for financial, legal, or professional damage due to the dissemination of these confidential interviews will be handled with care based on UCSD IRB requirements.

Potential breaches of confidentiality

To mitigate the risk of breaching confidentiality we will destroy audio recordings as soon as the transcription validation is complete and ensure that data is kept on a password protected device. Furthermore, each subject will be assigned a participant ID which is deidentified and can not be traced back by anyone except the PIs. Furthermore, all researchers in this study will be certified in human subjects' research. If the event of a breach of confidentiality, we will notify the Institutional Review Board of the University of California, San Diego.

Alternatives to participation

Patients will be informed that their participation in the study is voluntary and they may choose to not participate or withdraw from the study at any time without prejudice or loss of benefits to which they are otherwise entitled.

D3. INCLUSION OF WOMEN AND MINORITIES

Our study will oversample individuals of diverse backgrounds to ensure that at least 33% of participants are from underrepresented racial/ethnic categories including socio-economic factors and approximately 40% self-identify as women. The exclusion criteria for this study sample precludes the addition of minors.

D4. ADEQUACY OF PROTECTION AGAINST RISKS

Informed Consent and Assent

The informed consent process will include a detailed outline of the study processes, potential benefits, and potential risks of participation. Research associates will explain what the participants will be asked to do, the compensation and the time commitment involved. Participants will be informed that they can withdraw with no penalty at any time related to their medical care, assured that information is kept confidential, and informed of our data protection procedures as outlined by the UCSD human research protections program. They will provide contact information for the study PIs, and UCSD's Institutional Review Board ⁴³ for reporting concerns.

Protections Against Risk

This study is considered low risk due to the steps being taken to remove identifiers from these data. However, any adverse events will be reported to the PIs and to the IRB. Adverse events will be reviewed weekly in scheduled meetings with the research staff.

Data Security

All participant data will be stored in encrypted databases with restricted access that meet or exceed all HIPAA security protocols. We will conduct monthly audits to ensure the security and integrity of the data. For the Computer Assisted Personal Interviewing (CAPI) survey, we will be using an iPad device. This iPad has been by the UCSD IT department with IRB-approved University of California, San Diego (UCSD) protection measures. These measures include a strong password protection system and encryption algorithms to ensure data confidentiality and integrity. This ensures that even if the device is lost or stolen, unauthorized individuals cannot access the data.

The audio recordings for the interviews will be made using a Sony recorder model ICD-ux560. This device does not natively support encryption. However, to ensure the security and confidentiality of the recorded data, we will store the recorder in a secure location when not in use, and we will transfer the audio files to an encrypted, password-protected computer immediately after each data collection session.

The destruction of the audio recordings will occur in two steps: First, the digital files will be deleted from the computer, and then the recorder will be formatted, which will effectively erase the original audio files. This process is consistent with National Institute of Standards and Technology ⁴⁴ guidelines for media sanitization.

Potential Benefits of the Proposed Research to Research Participants and Others

The benefits to participating in this research study are minimal and no direct benefit may be gained.

Importance of the Knowledge to be Gained

To date, there is a lack of research on harm reduction services in this population. The data gained from the study will be critical to fill this gap in knowledge. This study will yield critical preliminary data to inform future research testing implementation strategies for increasing the delivery of feasible, acceptable, and appropriate harm reduction services for older adult OTP patients.

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CHAPTER 1

Naloxone ownership and opioid overdose knowledge among older adults in opioid treatment programs

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ABSTRACT:

Background: Naloxone is a critical tool for reversing opioid overdoses, but naloxone access and ownership among older adults with opioid use disorder remain understudied. The present study aims to determine correlates of naloxone ownership among older adults in opioid treatment programs (OTPs).

Methods: Cross-sectional surveys were administered in two OTPs in Southern California. Descriptive statistics and multivariable logistic regression models were used to examine factors associated with naloxone ownership among adults aged 55 and older.

Results: Approximately 65% of our sample (n = 75) reported owning naloxone. At the time of interview, 39% reported naloxone being accessible within 5 minutes, and 9% carried naloxone on them. Approximately 56% reported “always” or “mostly” carrying naloxone with them in the past 6 months. Only 17% reported ever receiving opioid overdose/naloxone training. Among the sample, 31% reported naloxone ever being used on them (7% in the past 6 months), and 36% reported ever using naloxone on another person. Of those who had used naloxone on others, the average number of times naloxone was used in the past six months was 5 (SD=19). In the multivariable model, factors significantly associated with naloxone ownership included older age and familiarity with free naloxone services; past six-month heroin or fentanyl use was marginally significant. Opioid overdose knowledge scale score was not significantly associated with naloxone ownership.

Conclusion: Our findings highlight targets for improvement in ownership, accessibility, and carriage of naloxone among older adults in OTPs. Older adults display moderate rates of naloxone ownership, but naloxone carriage rates and overdose training experience are low. Tailored education and naloxone distribution programs are needed to increase ownership and carriage rates; multiple doses of naloxone should be provided to each participant.

Keywords: naloxone, opioid overdose, older adults, methadone, harm reduction

1.1 Introduction

There has been a sharp increase in older adults using opioids and seeking treatment for opioid use disorder (OUD) in the US.^{1,2} Research suggests that rates for older adults, 55 years and older, who entered treatment for OUD have increased at an average annual rate of 8% from 2003-2012, and then swiftly increased 110% between 2012-2015.³⁻⁵ Older adults with OUD are also more likely to die from any cause compared with younger adults with OUD.⁶ Between 1999 and 2019, the annual rate of opioid overdose deaths among those 55 and older increased ten-fold.⁴ Older adults, due to the physiological changes of aging (i.e., increased sensitivity to opioids, decreased tolerance) and associated chronic conditions, may be at higher risk for overdose.⁷ In addition to medications for OUD⁸, increasing awareness of harm reduction principles (e.g. humanism, pragmatism, autonomy) and access to harm reduction supplies and services are effective ways to reduce drug-related harms.^{9,10} However, older adults are often overlooked in harm reduction efforts in part due to stigmatizing beliefs that older adults do not use drugs.¹¹

Naloxone, an opioid antagonist, is an effective means of reversing opioid overdoses, and in 2023, the US Food and Drug Administration (FDA) approved the first naloxone product for over-the-counter (OTC) use.¹² The World Health Organization (WHO) recommends that naloxone be made available to at least 90% of those at-risk of opioid overdoses.¹³ Research suggests that overdose education and naloxone distribution (OEND) programs are effective at improving rates of naloxone ownership and knowledge of opioid overdose reversal strategies.¹⁴ Community implementation of take-home naloxone programs has been demonstrated to be a feasible and effective intervention to prevent overdose deaths.^{15,16} Research suggests that

communities implementing opioid OEND programs result in lower overdose deaths due in part to high rates of naloxone utilization.¹⁷

Research suggests that older adults may experience unique challenges in utilizing harm reduction interventions, such as naloxone, compared to younger age groups.^{18,19} With the approval of naloxone for OTC use, older adults with Medicare Part D insurance (i.e., prescription drug coverage) might experience higher out-of-pocket costs, which creates barriers to access.¹⁸ Older adults are also more likely to experience barriers such as lack of transportation and financial constraints, which limit their access to naloxone.²⁰ Older adults also receive naloxone prescriptions from physicians at lower rates than younger adults.²¹ These unique barriers may reduce access to naloxone and its life-saving properties. A study using the Centers for Disease Control and Prevention's (CDC) State Unintentional Drug Overdose Reporting System (SUDORS) to investigate evidence of naloxone administration among opioid overdose deaths²² demonstrated that older adults had the second lowest proportion of naloxone administration (at the scene of death) of all age-groups, with 87% of decedents 65 and older and 83% of those 55-64 having no evidence of naloxone administration. In contrast, those aged 25-35 and 15-24 had 70.8% and 73.3% respectively.²² This illustrates that increasing ownership, accessibility, and carriage of naloxone is therefore critical to reduce the likelihood of overdose deaths in older adults.¹⁵ Furthermore, research has shown that opioid overdose education improves participants' attitudes toward naloxone and effectively reduces opioid-related mortality overdose.^{23,24} Despite the evidence-based benefits of naloxone, few studies consider the unique needs and barriers faced by adults over the age of 55 in accessing naloxone.²⁵ Our study aims to characterize the correlates of naloxone ownership and overdose knowledge among older adults aged 55 and older enrolled in two opioid treatment programs (OTPs) in Southern California. Our findings will

contribute to a better understanding of how to increase naloxone access in this vulnerable age group and help prevent opioid-related harms.

1.2 Methods

Study Setting and Participants

Participants were recruited by research staff from the waiting rooms of OTPs, through referrals from OTP staff, and through IRB-approved promotional materials posted in waiting rooms. Eligible participants were patients aged ≥ 55 , receiving care at OTPs, who spoke English, and were able to provide informed consent. All participants completed surveys in private settings within the OTP and were compensated \$30 for their participation in the study. We aimed for a convenience sample of 75 total OTP patients from June 2023 to February 2024. The study protocol was approved by the institutional review board at the University of California San Diego.

Measures

Data were collected through computer-assisted personal interviews (CAPI)²⁶ lasting approximately 40 minutes. Survey measures included socio-demographic variables (age, gender, race/ethnicity, education, housing status), health and treatment status (chronic diseases, substance use types and behaviors, treatment history, medication type, HIV/HCV status), sexual behaviors, and harm reduction services knowledge, utilization, and access.

Naloxone Characteristics

Participants were asked about behaviors from the naloxone delivery cascade^{9,37}: familiarity, “Had you ever heard of naloxone (also known as Narcan) before today?”, ownership “Do you currently own naloxone (also known as Narcan)? (i.e. at home, in a car, someplace you know where it is)”, carriage “Do you have naloxone (also known as Narcan) on you right now?

(e.g. in your pocket, purse or within reach)”, accessibility “Do you have naloxone (also known as Narcan) close to you where you could get it within 5 minutes?”, frequency “In the past 6 months, how often have you had naloxone (also known as Narcan) on you where you could get it within 5 minutes?”, and training “Have you ever received education or training specifically on opioid overdose prevention and response (also known as Opioid Overdose Education and Naloxone Distribution [OEND]) programs?”

Opioid Overdose Knowledge

Opioid overdose knowledge was measured using the validated Opioid Overdose Knowledge Scale (OOKS).²⁷ Overdose knowledge was operationalized as a continuous variable using the OOKS score, which is a validated 45-item questionnaire that is prevalent in the OUD literature²⁷. The OOKS assesses knowledge across four domains in nine sections (A-I): opioid overdose risk factors (A), signs of an opioid overdose (B), actions to be taken in an opioid overdose (C), and naloxone use (D-I). The total scores on the OOKS range from 0 to 45, with higher scores indicating better knowledge about naloxone use and opioid overdose. Sub-scale scores are calculated for each domain by summing the corresponding responses for each domain. Due to the growing trend of fentanyl in the opioid supply²⁸, we modified the scale to include the word “fentanyl” alongside all mentions of “heroin.”

Data Analysis

Our dependent variable for bivariate and multivariable statistical analyses included whether or not participants owned naloxone at the time of the interview. For analysis of the OOKS, participants were grouped based on naloxone ownership (do not own vs own) and we compared the means of the OOKS total score and each sub-scale score between these two groups. Descriptive statistics included mean/standard deviation and median/interquartile range

for continuous variables, and frequencies/percentages for categorical variables. Statistical analysis began with variable selection based on an extensive literature review.²⁹ Multicollinearity was assessed using Variance Inflation Factor (VIF) scores, ensuring all VIF scores were under two.³⁰ The final model adjusted for age in years (continuous), past six-month heroin/fentanyl use, OOKS score, naloxone use on self, and familiarity with free naloxone services; variables were selected from an extensive literature review. Interaction terms were evaluated for significance as indicated by domain knowledge and Akaike Information Criterion (AIC) comparisons with a lower AIC score indicating better fit.³¹

1.3 Results

Sample Characteristics

We recruited 75 participants aged 55-75 years who had mean age of 63 years (SD=5), were mostly male (61.3%), were housed (73.3%) and had a high school education or less (73.3%) (Table 1). Individuals identifying as Hispanic comprised 60.0% of the sample, followed by non-Hispanic White (30.7%), non-Hispanic Black (8%) and non-Hispanic American Indian (1.3%) participants. Most participants reported being insured by Medicaid (57.3%) and had been in treatment for over 6 months (85.0%). The average time since the start of the current OUD treatment period was 58.3 months (SD = 59.2, median = 34.0, IQR = 69.7), with a range from 4.3 to 248.3 months. Almost half (44.0%) of the sample reported using heroin/fentanyl in the past 6 months, while 28.0% used methamphetamine, and 8.0% used prescription opioids not as prescribed. The majority (91.0%) of participants reported ever injecting drugs, with 23.0% reporting injection drug use in the last 6 months. Among those who injected in the last 6 months, 94.1% injected heroin, fentanyl, or another synthetic opioid. The majority had heard of fentanyl test strips (51.0%), but a minority reported ever hearing of pre-exposure prophylaxis (11.0%) or

receiving free clean syringes or clean pipes in the past 6 months (14.6% and 13.3%), respectively³². Sociodemographic variables stratified by naloxone ownership can be found in Table 1.

Naloxone Characteristics

All participants had heard of naloxone, more than half (65.3%) reported current ownership, with 38.7% reporting that their naloxone was either on them or close by (i.e. available within 5 minutes) (Figure 1; Table 2). However, only 9.3% of individuals reported having naloxone physically on them at the time of study (i.e. in their pocket or bag). In terms of past 6 months ownership, 56.0% reported having naloxone close by “Always” (36.0%), or “Mostly” (20.0%). In terms of use, 30.7% reported naloxone ever being used on them (6.7% in the past 6 months), and 36.0% reported using naloxone on another person. Of those who had ever used naloxone on someone else, the average number of times naloxone had been used was 5 times in the past six months.

Opioid Overdose Knowledge

For our knowledge scale (Table 3), the average OOKS score (Figure 2) for the sample was 37.23. Individuals who owned naloxone scored only slightly higher (37.64) than those who did not (36.56, $p = 0.2$). Those who owned naloxone performed slightly better ($M = 8.66$) on identifying overdose risk factors than those who did not own naloxone ($M = 8.12$, $p = 0.005$). No significant difference was observed in any of the three remaining domains.

Correlates of Naloxone Ownership

Bivariate analysis revealed significant differences in naloxone ownership related to socio-demographic variables, insurance status, OTP site, opioid use, and engagement with harm reduction services (Table 1). Insurance status was associated with naloxone ownership;

individuals with Medicare/Medicaid had the significantly higher rates of naloxone ownership (49.0%) than those with Medicaid only (46.9%) or other insurance (41.1%; $p=0.02$). Participants aged 65 or older were significantly more likely to own naloxone (42.9%) compared to those aged 60-64 (28.6%), and 55-59 (24.5%; $p=0.04$). Recent heroin or fentanyl use was significantly associated with naloxone ownership. Individuals reporting past six-month use of heroin or fentanyl reported significantly higher rates of naloxone ownership (53.0% vs 27.0%; $p=0.03$).

Our adjusted model (Table 4) showed that age in years was significantly associated with increased odds of naloxone ownership, (aOR=1.15, 95% CI: 1.03-1.31). The OOKS signs of overdose score was not significantly associated with naloxone ownership. Patients who reported not knowing where to access free naloxone had significantly lower odds of ownership than those who knew they could access naloxone through an OTP (aOR=0.06; 95% CI: 0.01-0.29). In the univariate analysis, past 6-month heroin and/or fentanyl use was significantly associated with increased odds of naloxone ownership (OR=3.07; 95% CI:1.04-9.09). However, in the multivariable model, this association was only marginally significant (aOR=4.12; 95% CI: 0.97-21.0).

1.4 Discussion

We demonstrated that older adults in OTPs report high rates of naloxone familiarity, moderate rates of naloxone ownership and accessibility, but low rates of naloxone carriage and training. These findings serve as an indicator that additional strategies are needed to improve naloxone carriage and training rates in this vulnerable population who may be at heightened risk for overdose. Our multivariable analysis demonstrated several distinct correlates of naloxone ownership including age in years, and familiarity with how to access free naloxone; past 6-month heroin and/or fentanyl use was marginally significant. These data show that age is a significant

factor that affects rates of naloxone ownership among this group. Targets for intervention could include OTPs that may have limited access to naloxone supplies, have a high proportion of middle-aged adults, or high rates of individuals reporting recent opioid use. Finally, OEND programs should be developed and tested within OTPs to increase opioid overdose knowledge in this population.

Our study found that older adults in OTPs reported moderate rates (65.0%) of owning naloxone compared to other study populations. Similarly, 57.0% reported having naloxone accessible within 5 minutes. A systematic review indicated that the pooled prevalence for current ownership of naloxone among eight study samples was 43% (CI 16-72%).¹⁵ Specifically, Zinsli et al. showed that 74% of syringe service program participants in Seattle, Washington reported naloxone ownership.³³ Moustaqim-Barrette et al. showed 71% ownership among PWUD in British Columbia³⁴, and Khan et al. reported 53% ownership among PWUD in New York City.³⁵ Goldman-Hasbun et al., reported some of the lowest ownership rates (22.6%) among young PWUD in Vancouver, Canada.³⁶ Interestingly, no study population met WHO recommended levels of 90% ownership. Compared to these study populations, older adults in OTPs in Southern California show moderate to high rates of ownership. Considering that OTP patients have frequent contact with treatment professionals, low rates of ownership among sub-groups may reflect barriers related to refills,³⁷ knowledge²⁷, or attitudes and beliefs including stigma.^{38,39} Further research is needed to examine barriers for ownership among this population using qualitative methods.

Our findings show a 9.3% naloxone carriage rate among older adults in OTPs which is low compared to other study populations.¹⁵ Rates of current naloxone carriage are very different from participant self-reported rates. For example, 56% of our sample reported “always”, or

“mostly” carrying naloxone with them in the past 6 months. Similarly, Khatiwoda et al. in North Carolina observed that 50% of OTP patients reported “always” or “mostly” carrying naloxone.⁴¹ Kozak et al. showed that 42% of OTP patients regularly carried naloxone, and Dayton et al. showed that in Baltimore, 31% of PWUD “often” or “always” carried naloxone.^{9,42} These data suggest an urgent need for additional research to understand the low rates of carriage among older adults in OTPs. A systematic review of five studies found a pooled prevalence of 20% (95% CI: 12%-31%)¹⁵ for current naloxone carriage. McDonald et al. reported that only 8% of individuals in London reported carrying naloxone on the day of the interview, and Reed et al. in Philadelphia reported 12% regularly carried naloxone.^{16,40} One consideration for the low rates of carriage in our sample is that older adults with substance use disorders (SUDs) typically have higher rates of functional impairment which may serve as a deterrent to carriage.^{43,44} Perhaps, for older adults, having naloxone nearby (e.g. in their car, or with a caretaker) is a more accurate appraisal of naloxone carriage patterns. Finally, standardized terminology regarding naloxone carriage is needed for accurate comparison between studies in the future.

In terms of knowledge, older adults had a mean total OOKS score of 37.23 (SD=3.10). Similar studies have reported that the mean OOKS score for healthcare professionals and family-members were 40.0 (SD=3.2), and 34.0 (SD=5.1) respectively. Results indicate that older adults in OTPs score in between family members (lay-people) with no opioid use experience and healthcare professionals. Stover et al., showed that after a naloxone and overdose training, the mean OOKS score for students was 36.2 (SD= 3.2) .⁴⁵ Considering that our study sample consisted of individuals with decades of experience with opioid use and treatment, this low level of knowledge, on par with young students and lay people, is concerning. Accordingly, a minority of our sample reported ever having received naloxone or overdose training (17%). Khatiwoda et

al., showed that 55% of adults in OTPs in North Carolina report ever having received overdose training.⁴¹ Kozak et al, showed that (83.5%) of OTP patients in Baltimore, Maryland reported ever receiving naloxone training. This indicates that older adults in OTPs in Southern California have moderate to low levels of knowledge about opioid overdose due, in part, to a lack of targeted education programs.⁴⁶ Targeted interventions are warranted to increase the low rates of overdose training and opioid overdose knowledge among this vulnerable population.⁴⁷

Our study demonstrated that the overall OOKS score was not significantly associated with naloxone ownership in the multivariate model. This suggests that possessing knowledge about naloxone and overdose may not be sufficient to motivate an older adult in an OTP to own, seek or carry naloxone. Other more salient factors, such as attitudes, beliefs or access, might play a more significant role in this cascade.⁴¹ For example, highly knowledgeable individuals with vast experience with opioid use might believe they are less susceptible to overdoses and thus do not need naloxone. Individuals with high levels of knowledge might also be utilizing their naloxone more frequently and have trouble refilling them due to cost. In our sample, 16% of individuals indicated that they did not know where to get free naloxone today. Khatiwoda et al., demonstrated that among those in OTPs, common barriers included: not knowing where to get naloxone, not perceiving a personal risk of overdose, concern that their children would get ahold of the kit, and fear of discrimination or prosecution by the police.⁴¹ These findings suggest that interventions to increase naloxone ownership among older adults should not only focus on increasing knowledge but also target the unique barriers faced by older adults such as barriers to refills, access to harm reduction programs, and impacts of stigma. These findings highlight the need for further qualitative research to understand the underlying motivations among older adults for not accessing naloxone in an OTP setting.

Among our sample, 36% had ever used naloxone on another person with a mean of five times (SD=19) in the last six months. These data show that among individuals receiving treatment for OUD, those with more recent opioid use have a higher perceived need for naloxone and are using them at rates of almost once a month. Multiple studies have demonstrated that recent opioid use is associated with increased rates of naloxone ownership.^{34,37,48} Potential factors leading to increased ownership rates among those reporting opioid use include increased perceived susceptibility to overdose, greater access to harm reduction resources, and a network of peers who also use opioids.^{15,49,50} However, in the multivariable model, older adults reporting past six-month opioid use were only marginally significantly more likely to report owning naloxone. As fentanyl continues to pervade the illicit opioid market, more research is needed to understand the quantities of naloxone needed per individual, how to remove barriers to refills among this population, and the association between recent opioid use and naloxone ownership.^{37,51}

Age was also associated with naloxone ownership such that each additional year of age resulted in a 13% increase in odds of ownership. Allen et al., showed that in rural West Virginia, older age was a significant factor associated with naloxone ownership.⁵² Possible factors include increased perceived need, insurance access, increased frequency of healthcare visits, employment, and social influences including stigma.^{33,34,38,40} These data suggest potential age-related differences in access to naloxone or perceived need among older adults in OTPs. To date, few studies have explored the specific barriers of naloxone ownership related to age. More qualitative research is needed to understand how older age specifically influences access, motivations and behaviors related to naloxone. Studies with larger sample sizes can also help uncover more detailed understanding of these patterns.

Finally, we showed that individuals who had familiarity with where to access free naloxone had higher odds of naloxone ownership than those who did not. In our study, those who reported that they did not know where to access free naloxone were significantly less likely to possess naloxone than those who knew that the OTP offered free naloxone. This is consistent with the literature which suggests that familiarity with harm reduction services is associated with increased naloxone possession.^{40,53,54} These findings show the importance of making older adults aware of free naloxone programs and how to access them. Older adults have been shown to face drug-related intersectional stigma which may increase fear of judgement or discrimination and reduce naloxone access and competency.⁵⁵ Partnerships with community organizations such as senior centers and retirement communities may help ameliorate some of these concerns.

The present study had several limitations. First, these data are specific to older adults in OTPs in SDC and may not be generalizable to other populations. Second, its cross-sectional design and convenience sampling preclude any causal inferences. Third, the modest sample size limited the statistical power of our analysis which may have affected our ability to detect small but meaningful associations. Larger studies with bigger sample sizes must validate these findings and provide a deeper analysis of this population. Finally, the study's Southern California location may affect generalizability when considering the diversity of factors related to naloxone ownership.

Older adults in OTPs report high rates of naloxone familiarity, moderate rates of naloxone ownership, accessibility, and frequency, but low rates of carriage and training. We identified key correlates of naloxone ownership such as age and familiarity with naloxone programs. We also showed that opioid overdose knowledge (i.e., OOKS) was not significantly associated with naloxone ownership, and that past 6-month opioid use was marginally

associated. Our results highlight the need for integrating overdose education into routine care at OTPs and expanding access for naloxone to middle aged and older adults through targeted interventions that connect patients to naloxone distribution programs. Further research is needed into the motivations and determinants specific to older adults through longitudinal and qualitative approaches. Future research should utilize longitudinal study designs to explore changes in naloxone ownership over time. Qualitative studies should also be explored to understand the unique barriers (e.g., stigma) and facilitators of naloxone ownership in this population. Specific interventions should be created that seek to increase naloxone ownership among older adults. Finally, policy changes should be studied to understand the effects of naloxone accessibility specifically for older adults.

1.5 Acknowledgements

Chapter 1, in part, is currently being prepared for submission for publication of the material. Kepner, Wayne; Han, Benjamin H.; Zúñiga, Maria L.; Urada, Lianne; Elder, John; Moore, Alison A. The dissertation author was the primary researcher and author of this material

1.6 Tables and Figures

Table 1. Sociodemographic, health and harm reduction service characteristics of older adults in opioid treatment programs stratified by naloxone ownership (n=75)

Variable	Full Sample N = 75	Do Not Own Naloxone N = 26	Own Naloxone N = 49	p
<u>Age in years</u> Mean (SD)	63 (5.0)	61 (5.0)	63.7 (5.4)	0.04*
<u>Age groups</u>				0.04*
55 – 64	26 (34.7%)	14 (53.8%)	12 (24.5%)	
60 – 64	18 (24.0%)	4 (15.4%)	14 (28.6%)	
65 or older	31 (41.3%)	7 (26.9%)	21 (42.9%)	
<u>Gender</u>				0.50
Man	46 (61.3%)	16 (61.5%)	30 (61.2%)	
Woman	28(37.3%)	9 (34.6%)	19 (38.8%)	
Transgender Woman	1 (1.3%)	1 (3.8%)	0 (0.0%)	
<u>Race/Ethnicity</u>				0.58
Hispanic (Non-White)	45 (60.0%)	15 (57.7%)	30 (61.2%)	
NH White	23 (30.7%)	8 (30.8%)	15 (30.6%)	
NH Black	6 (8.0%)	3 (11.5%)	3 (6.1%)	
NH American Indian	1 (1.3%)	0 (0.0%)	1(2.0%)	
<u>Marital status</u>				0.70
Single/Not Married	37 (49.3%)	11 (42.3%)	26 (53.1%)	
Married	9 (12.0%)	4 (15.4%)	5 (10.2%)	
Widowed/Divorced	29 (38.7%)	11 (42.3%)	18 (36.7%)	
<u>Sexual orientation</u>				0.90
Lesbian, Gay or Bisexual	5 (6.7%)	2 (7.7%)	3 (6.1%)	
Heterosexual/Straight	70 (93.3%)	24 (92.3%)	46 (93.9%)	
<u>Education</u>				0.70
High school graduate or less	55 (73.3%)	20 (76.9%)	35 (71.4%)	
Some college or more	20 (26.7%)	6 (23.1%)	14 (28.6%)	
<u>Insurance</u>				0.02*
Medicaid Only	43 (57.3%)	20 (76.9%)	23 (46.9%)	
Medicare/Medicaid	29 (38.7%)	5 (19.2%)	24 (49.0%)	
Other (VHA/Private/None)	3 (4.0%)	1 (3.8%)	2 (4.1%)	

Table 1 Continued. Sociodemographic, health and harm reduction service characteristics of older adults in opioid treatment programs stratified by naloxone ownership (N=75)

Variable	Full Sample N = 75	Do Not Own Naloxone N = 26	Own Naloxone N = 49	p
Unhoused	20 (26.7%)	9 (34.6%)	11 (22.4%)	
Housed	55 (73.3%)	17 (65.4%)	38 (77.6%)	
<u>Time in Treatment (Most Recent)</u>				0.50
Under 6 months	11 (15.0%)	5 (19.2%)	6 (12.2%)	
Over 6 months	64 (85.0%)	21 (80.8%)	43 (87.8%)	
Years since start of current treatment with MOUD (M/SD)	4.6 (5.0)	4.3 (5.0)	4.8 (5.0)	0.40
Years since start of first treatment with MOUD (M/SD)	25.0 (17.0)	27.0 (16.0)	24.0 (18.0)	0.40
<u>Health Conditions</u>				
HIV diagnosis	1 (1.3%)	1 (3.8%)	0 (0.0%)	0.30
Hepatitis B diagnosis	9 (12.0%)	2 (7.7%)	7 (14.3%)	0.50
Hepatitis C diagnosis	39 (52.0%)	12 (46.2%)	27 (55.1%)	0.60
Ever received HCV treatment	24 (61.5%)	8 (66.7%)	16 (59.3%)	0.70
Number of health conditions (M/SD)	2.7 (2.0)	2.4 (1.6)	2.9 (2.2)	0.60
<u>HIV/Hepatitis C Testing</u>				
Ever had HCV test	68 (91.0%)	22 (84.6%)	46 (93.9%)	0.50
Years since last HCV test (M/SD)	2.5 (4.1)	2.4 (4.6)	2.6 (3.8)	0.70
Ever had HIV test	73 (97.0%)	25 (96.2%)	48 (98.0%)	0.90
Years since last HIV test (M/SD)	2.7 (4.7)	2.9 (5.3)	2.6 (4.3)	0.90
<u>Harm Reduction Service Utilization</u>				
Ever received overdose/naloxone training	13 (17.3%)	5 (19.2%)	8 (16.3%)	0.80
Heard of fentanyl test strips	38 (51.0%)	6 (23.1%)	32 (65.3%)	0.001**
Awareness of Pre-Exposure Prophylaxis (PrEP)	8 (11.0%)	3 (11.5%)	4 (8.2%)	0.20
Received free clean syringes (past 6 months)	11 (14.6%)	1 (3.8%)	10 (20.4%)	0.002**
Received free clean pipe (past 6 months)	10 (13.3%)	1 (3.8%)	9 (18.4%)	0.009**
<u>Where To Access Free Naloxone</u>				0.001**
Opioid Treatment Program	41 (37.3%)	9 (35%)	32 (65%)	
Harm Reduction / Syringe Service Program	8 (7.3%)	2 (7.7%)	6 (12%)	
Community Clinic/Pharmacy	14 (12.7%)	5 (19%)	9 (18%)	
I don't know	12 (10.9%)	10 (38%)	2 (4.1%)	
<u>Substances Used in Last 6 Months</u>				
Tobacco/Nicotine	56 (75.0%)	20 (77.0%)	36 (73.0%)	0.90
Alcohol	22 (29.0%)	7 (27.0%)	15 (31.0%)	0.90
Heroin/Fentanyl	33 (44.0%)	7 (27.0%)	26 (53.0%)	0.03*
Prescription opioids not as prescribed	6 (8.0%)	1 (3.8%)	5 (10.0%)	0.30
Cocaine	3 (4.0%)	2 (7.7%)	1 (2.0%)	0.30
Crack	3 (4.0%)	2 (7.7%)	1 (2.0%)	0.50
Methamphetamine	21 (28.0%)	6 (23.0%)	15 (31.0%)	0.90
Cannabis	24 (32.0%)	8 (31.0%)	16 (33.0%)	0.90
Sedatives	9 (12.0%)	3 (12.0%)	6 (12.0%)	
<u>Injection Drug Use</u>				
Ever injected drugs	68 (91.0%)	23 (88.0%)	45 (92.0%)	0.70
Injection drug use in the last 6 months	17 (23.0%)	3 (12.0%)	14 (29.0%)	0.08
<u>Types of Drugs Injected in the Last 6 Months</u>				0.05
Heroin, Fentanyl, or another synthetic opioid	16 (21.0%)	3 (11.5%)	13 (26.5%)	
Methamphetamine	2 (2.6%)	1 (3.8%)	1 (2.0%)	

Note. NH = Non-Hispanic; M = Mean; SD = Standard Deviation; VHA = Veterans Health Administration; MOUD = Medications for Opioid Use Disorder; HCV = Hepatitis C Virus; PrEP = Pre-Exposure Prophylaxis; * indicates statistical significance at the 0.05 level.; ** indicates statistical significance at the 0.01 level.; *** indicates statistical significance at the 0.001 level.

Table 2. Naloxone characteristics among older adults in opioid treatment programs

<u>Naloxone characteristics</u>	
Naloxone ever heard	75 (100.0%)
Naloxone ownership	49 (65.3%)
Naloxone availability nearby (i.e. can get within 5 minutes)	29 (38.7%)
Naloxone carriage (i.e. have on you right now)	7 (9.3%)
<u>Frequency of carrying naloxone (past 6 months)</u>	
Always	27 (36.0%)
Mostly	15 (20.0%)
Sometimes	9 (12.0%)
Never	24 (32.0%)
<u>Naloxone source</u>	
Harm Reduction / Syringe Service Program	8 (10.7%)
Health clinic/pharmacy	14 (18.7%)
Opioid treatment program	41 (54.7%)
I don't know	12 (16.0%)
<u>Naloxone use behavior</u>	
Naloxone ever used on you	23 (30.7%)
Naloxone used on you (past 6 months)	5 (6.7%)
Naloxone ever used on others	27 (36.0%)
Number of times naloxone used on others (past 6 months) (M/SD)	5 (19.0)
Ever received overdose/naloxone training	13 (17.3%)

Table 3. Opioid Overdose Knowledge Scale (OOKS) scores for older adults in opioid treatment programs stratified by naloxone ownership

Characteristic	Full Sample N = 75 (M/SD)	Do Not Own Naloxone N = 26 (M/SD)	Own Naloxone N = 49 (M/SD)	<i>p</i>	Difference Between Groups
<u>Opioid Overdose Knowledge Scale</u>					
OOKS Total Score	37.2 (3.10)	36.56 (3.18)	37.64 (3.12)	0.2	1.08
Overdose risk factors	8.47 (0.81)	8.12 (0.97)	8.66 (0.67)	0.005	0.54
Signs of overdose	7.63 (1.39)	7.92 (1.19)	7.40 (1.48)	0.12	-0.52
Actions to take	9.67 (1.07)	9.52 (1.08)	9.74 (1.09)	0.3	0.22
Naloxone score	11.47 (2.01)	11.00 (2.10)	11.83 (1.93)	0.10	0.83

M = Mean; SD = Standard Deviation

Table 4. Adjusted odds ratios (aOR) for factors associated with naloxone ownership among middle aged and older adults in opioid treatment programs

Characteristic	Univariate O.R. [95% C.I.]	Multivariate aOR [95% C.I.]	Multivariate <i>p</i> value
Age	1.10 [1.00, 1.21]	1.15 [1.03, 1.31]	0.02*
OOKS score	1.12 [0.95, 1.32]	0.98 [0.77, 1.23]	0.80
Where to access free naloxone			
Opioid Treatment Program	—	—	
Harm Reduction / Syringe Service Program	0.84 [0.15, 4.68]	0.37 [0.05, 3.30]	0.30
Community Health Clinic / Pharmacy	0.51 [0.14, 1.88]	0.43 [0.10, 1.94]	0.30
I don't know	0.06 [0.01, 0.29]	0.06 [0.01, 0.29]	0.002**
Past 6 months heroin/fentanyl use			
No	—	—	
Yes	3.07 [1.04, 9.09]	4.12 [0.97, 21.0]	0.07

O.R. = Odds Ratio; aOR = Adjusted Odds Ratio; C.I.= Confidence Interval; OOKS, Opioid Overdose Knowledge Scale; * indicates statistical significance at the 0.05 level.; ** indicates statistical significance at the 0.01 level.

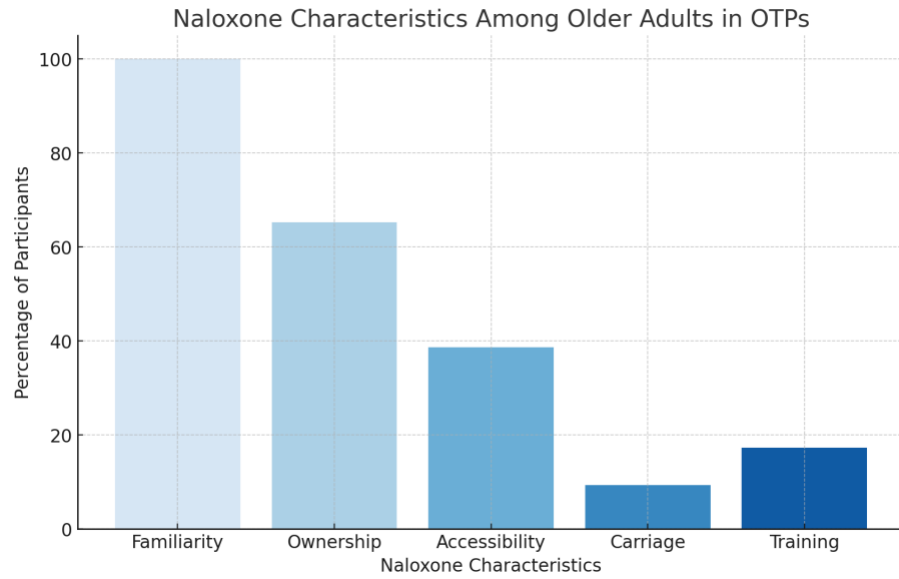


Figure 6. Naloxone characteristics

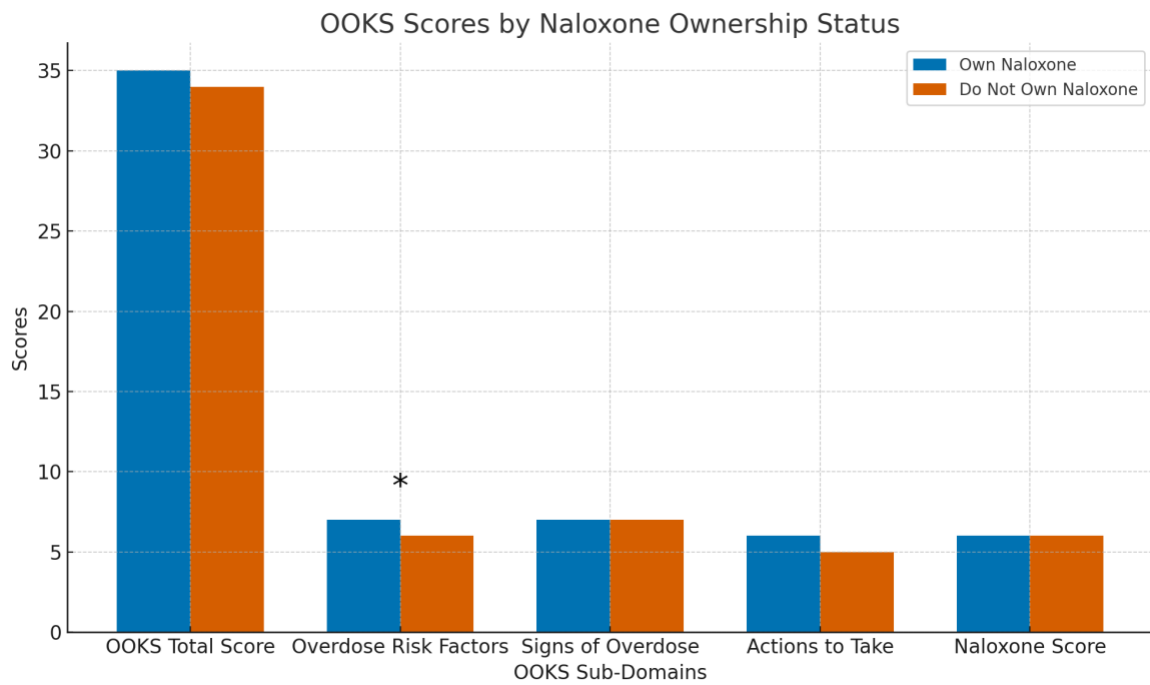


Figure 7. OOKS Score by Naloxone Ownership

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CHAPTER 2

Acceptability, Barriers, and Facilitators to the Implementation of Harm Reduction Interventions for Older Adults in Opioid Treatment Programs: A Qualitative Study of Patient Experiences

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Abstract:

Background: Harm reduction interventions are effective tools to reduce the harms associated with substance use among patients receiving treatment at opioid treatment programs (OTPs). Older adults, however, are often overlooked in harm reduction services research and their unique clinical profile can serve as a barrier to proper care.

Objective: The present study aims to qualitatively examine the acceptability of and facilitators and barriers to accessing harm reduction interventions among older adults within OTPs.

Methods: We conducted semi-structured interviews of 25 adults aged 55 and older in two OTPs in Southern California. Interviews explored patients' attitudes towards harm reduction

services, perceived barriers to access, and recommendations for tailoring services to meet the unique needs of older adults.

Results: Patients reported a high level of acceptability and perceived need for harm reduction services within OTPs. Specific services such as naloxone distribution, overdose education, and HIV/HCV testing were viewed as convenient, beneficial and potentially lifesaving. However, significant barriers to accessing services were identified, including stigma (e.g. law enforcement, healthcare providers), lack of age-appropriate services, and logistical challenges such as transportation. Patients emphasized the importance of tailored harm reduction education and services that address the unique needs, experiences, and drug use patterns of older adults. The age and experience of providers emerged as key determinants of engagement, highlighting the value of cultural competency.

Conclusions: Older adult patients in OTPs expressed a high level of acceptability and need for harm reduction services. However, significant barriers exist, particularly related to stigma, logistical barriers, and lack of age-appropriate services. These findings can inform the development and implementation of patient-centered, age-appropriate harm reduction interventions to reduce harms among older adults in OTPs.

KEY WORDS: aging; opioid use disorder; methadone; harm reduction; implementation

2.1 Introduction

Opioid use disorder (OUD) is associated with younger age (18-44)¹ but the prevalence of older adults with OUD^{2,3} is increasing rapidly.⁴⁻⁶ The prevalence of opioid use disorder (OUD) among adults aged 65 and older increased from 8.6 per 100,000 in 2013 to 22.1 in 2018.⁷ The rate of fatal drug overdoses among people 65 years and older quadrupled from 3.0 per 100,000 population (1060 deaths) in 2002 to 12.0 per 100,000 (6702 deaths) in 2021, with highest rates among non-Hispanic African American individuals (30.9 per 100,000).⁸ The increase in OUD prevalence among older adults has significant implications for both public health and clinical practice.⁹ An increasing number of older adults are also entering treatment for OUD; research from New York City shows that the percentages of patients in opioid treatment programs (OTPs) aged 50-59 years have increased by 425%, and by 713% for those aged ≥ 60 .¹⁰ The sharp increase in risky or harmful substance use among older adults presents a barrier to healthy aging made worse by the fact that older adults infrequently access harm reduction services.¹¹

Harm reduction interventions aim to reduce the adverse consequences of substance use among persons who use drugs (PWUD)¹². For older adults, harm reduction interventions can be especially beneficial due to their increased vulnerability from aging-related physiological changes, and increased prevalence and severity of chronic diseases,^{9,10} Examples of evidenced-based harm reduction interventions include naloxone distribution, overdose education, HIV and HCV testing, drug checking and provision of sterile injection equipment.¹³ Multiple studies, focused on clinicians' perspectives, have identified key barriers to harm reduction implementation in addiction care.¹⁴ However, additional research on patients' perspectives are critical for informing health care interventions for vulnerable populations living with stigmatized conditions, such as OUD.^{15,16} Older adults face a variety of health-related challenges such as

logistical impediments, intersectional stigma, and financial barriers which all serve as barriers to accessing healthcare.^{11,17,18} Incorporating this unique clinical profile into harm reduction intervention development has the potential to improve care for older adults in OTPs; patient acceptability of interventions is essential for effective implementation and sustainability¹⁹. Qualitative studies exploring patients' perspectives on integrated substance use disorder (SUD) and HIV care have demonstrated that patients preferred the convenience of an integrated, team-based model^{20,21}. However, to date, we know little from older adult patients regarding their preferences on how to best integrate harm reduction interventions for older adults into OTPs.

The main objective of this study is to explore the acceptability of and perceived challenges to accessing harm reduction services within OTPs. We will conduct in-depth qualitative interviews with a socio-demographically diverse sample of older adult patients. Currently, older adults in OTPs suffer from the misconception that older adults do not use drugs, which may limit their access through lack of age-appropriate services and increased intersectional stigma.^{22,23} Older adults are also more financially constrained and have more physical and logistical challenges which may prevent them from accessing community-based harm reduction services.^{9,10} Finally, a lack of patient awareness and education about the importance of accessing harm reduction services are a considerable concern among this population^{24,25}. Consequently, additional research is needed to qualitatively explore the experiences and perceptions of older adults in OTPs regarding harm reduction services.

The growing population of older adults with OUD requires a unique treatment strategy due to this population's high burden of disease, and high rates of inpatient hospitalization. The lack of age-appropriate care of older adults from most prevention and harm reduction research and programmatic efforts has left substantial knowledge gaps and allowed the persistence of

misconceptions that older adults do not use drugs. Consequently, qualitatively exploring older adult acceptability and perceived need will help inform the development of age-appropriate strategies that meet the unique needs of older adults in OTPs.

2.2 Methods

Study Design

From June 2023 to February 2024, we conducted one-on-one, in-person, semi-structured qualitative interviews with 25 patients, 55 years of age and older, at two OTPs in San Diego County (SDC), California. Interview questions focused on the acceptability, and perceived challenges to accessing harm reduction interventions (e.g., HIV prevention, infectious disease testing, naloxone distribution and overdose education, sexual health, safe injection supplies).

Setting and Procedures

For the site-selection process, we presented our study protocol to OTP directors representing all registered OTPs in SDC. We partnered with the SDC Department of Public Health, who sponsored the meeting and helped solicit partners for the study. Representatives from eight out of nine OTP sites volunteered to participate. After consultation with OTP directors, we chose two OTPs to maximize socio-demographic diversity. Our two participating OTPs were located on opposite sides of the city and represented a diverse patient population.

Participant Recruitment

We recruited OTP patients, 55 and older, who were currently receiving treatment with medications for opioid use disorder (MOUDs) at the OTPs. Eligibility criteria included ability to speak English, and ability to provide written informed consent. We recruited through IRB-approved flyers, referrals from OTP staff, and announcements in waiting areas. Interested participants were screened by a research assistant for eligibility. Selected participants were

compensated \$30 for their time. The informed consent process included a detailed outline of the study processes, potential benefits, and potential risks of participation. The study was approved by the University of California, San Diego Institutional Review Board and Behavioral Health Services for the County of San Diego.

Data Collection

We conducted semi-structured interviews in private rooms within the OTPs to ensure confidentiality and participant comfort. Each interview lasted approximately 45 minutes and was conducted by trained research staff experienced in qualitative methods and sensitive to the unique challenges faced by older adults with OUD. The principal investigator (B.H.H.), is a board-certified geriatric and addiction medicine physician and trained in qualitative methods. The interviews were conducted by the PI and a trained research associate (W.E.K). None of the participants were under the clinical care of the principal investigator.

The interview guide was created based on an extensive literature review and expert consultation. The interview guide included open-ended questions and prompts about participants' beliefs, attitudes, and experiences with harm reduction interventions. After the first interview, BHH and WEK reviewed the transcripts, debriefed the information, and adjusted the ordering of questions and added probes for subsequent interviews. This iterative process continued for the first 5 interviews, allowing the study team to better address the study objectives by adapting to emerging responses. All interviews were audio-recorded with participants' consent and transcribed verbatim for analysis.

Data Analysis

Interview transcripts were imported into NVivo version 14. A team-based approach was employed for codebook development.²⁰ NVivo software was used to organize the data and

facilitate the identification of patterns and relationships within the themes. The coding team consisted of two trained research associates (W.E.K., N.S.) who developed a codebook through an iterative process of independent open coding, team meetings, and codebook refinement. Two research analysts (W.E.K., N.S.) coded the same two transcripts and met regularly to compare code application, discuss emergent findings, resolve discrepancies through consensus, and refine the preliminary codebook until the coding structure was stable. Consultations with a multidisciplinary team (e.g., epidemiologist, addiction medicine physician, gerontologist) helped ensure a variety of viewpoints for purposes of reflexivity. Using the final codebook, one analyst (W.E.K.) independently coded the remaining 23 interview transcripts.

2.3 Results

A total of 25 patient interviews were completed from two OTPs. We identified themes and representative quotes that illustrate the acceptability of and perceived challenges to accessing harm reduction supplies and services within OTPs. Patients reported a high level of perceived need and acceptability of harm reduction interventions, including naloxone distribution, overdose education, fentanyl test strips, HIV/HCV testing and treatment, sexual health services, and sterile injection supplies. Older adult patients recognized the positive benefits of these services in preventing overdose, preventing infectious disease transmission and improving overall health. Patients reported an appreciation for the enhanced privacy, comfort, safety and convenience of receiving services within the OTP. Barriers to accessing harm reduction services included lack of transportation, concerns about stigma, and lack of tailored and age-appropriate services.

3.1 Older adult patients reported a high level of perceived need and acceptability of harm reduction interventions in OTPs.

While perceived acceptability differed by intervention type (e.g., naloxone distribution, infectious disease testing and treatment, sterile injection equipment provision), patients expressed overall positive attitudes towards being offered harm reduction services in OTPs as illustrated in this quote:

“I'm all for harm reduction...it saves lives in terms of HIV, in terms of overdosing, and it helps people get off the narcotics.”

A subset of patients, however, expressed concerns around privacy and stigma.

3.1.1 Naloxone distribution

Naloxone distribution within OTPs was viewed by most patients as necessary and highly beneficial. Participants noted that the OTP was an ideal location to receive naloxone kits and overdose education due to privacy and safety concerns of older adults. They expressed appreciation for receiving naloxone at no cost and had positive views about its widespread availability. Most patients recognized the need for owning naloxone due to their proximity to other patients, friends and family who were at high-risk of overdose.

One participant stated:

“Even though people are on methadone, there's a lot of people that are still using the fentanyl.”

Participants reported concern about the increasing number of overdoses in the community which resulted in a sense of fear. Participants thus emphasized the critical need of carrying naloxone as an emergency treatment for opioid overdoses.

A participant reported:

“It's good to have in your car, 'cause you could be driving down the street, someone could be screaming or something and if you had it, then you could save someone's life.

One participant described positive sentiments about owning naloxone for the benefit of others:

"I think it's a good thing [naloxone]. ... because you just never know somebody could OD. Even if you're in a sober living people relapse, and you have it there. I have four and I gave a couple away to other people.

Many participants noted a lack of adequate naloxone supply. One participant said:

“I wish I had a whole box of them. You know what I mean? I had 10 of them and I used six on one guy. And then I used the rest on somebody else.”

Another said:

"I think a person should walk away with at least five [boxes]."

Participants expressed concern over the efficacy of a single dose of naloxone:

“Because it takes more than just one Narcan [naloxone] to keep that person alive. Seriously, it's crazy. And I'm, like, why? Why is that? You know because it's not made for fentanyl.”

Another patient shared their personal challenge to accessing naloxone:

“No one's ever offered me any Narcan [naloxone]. Ever. Since I've been here.”

3.1.2 Overdose education and naloxone training

Patients expressed enthusiasm about the possibility of opioid overdose education and naloxone training being provided at the OTP. Participants illustrated the benefits of knowing how to properly respond in the event of an overdose, as illustrated in this quote:

"Well, nobody else didn't know what to do. It made me feel good. People looked at me like, you know what they're doing. I done helped a whole lot of people with Narcan [naloxone]. I know how to use it. I know that."

One participant provided suggestions about the best way to frame an overdose training class for older adults:

"Tell 'em to come on down, you know. You might not be a user, but you can save someone's life."

Another patient provided an alternative strategy for disseminating overdose related information:

"I think maybe pamphlets or something, I don't know about a class or anything. But pamphlets, explaining what the supplies you have are for."

3.1.3 Fentanyl test strips

Participants recognized the utility of fentanyl test strips (FTS) due to the changing drug supply, which increasingly contains illicitly manufactured fentanyl. Many older adult patients

expressed concern about not knowing what was in the drug supply and conveyed the need for FTS to avoid accidental ingestion.

Patients shared their experiences with fentanyl contamination in the drug supply:

“... I had a personal experience with somebody testing positive, my wife, for fentanyl, and she is dead set against it, so she must have got it through the meth we were using at the time.”

Another patient reported:

“Because people are overdosing like crazy. Yeah. It's dangerous. And people think that they're just buying crystal or something, and there's fentanyl. I didn't know about the test strips, but they go to smoke crystal, and then they overdose and die because there's fentanyl in it.”

One patient described a situation where they utilized FTS:

“These pills that I was getting from this guy ... it seemed like stronger than the usual. And I tested one of his pills with that strip, and it had fentanyl in it.”

Another patient shared an experience in which FTS would have been useful:

"... I wish I had it when I was actively using because I would've not gotten the fentanyl in my system like I did."

3.1.4 HIV and Hep C prevention and treatment

Participants were generally in favor of being offered HIV and Hepatitis C related interventions (e.g. testing, counseling) at the OTP. Preventative medications (e.g. PrEP) had

mixed reactions with some patients in favor and others ambivalent. Most patients had personal experience with hepatitis C infections. Interferon based Hepatitis C treatments were described negatively, but most patients were aware of newer treatments that had less side effects. Overall, patients highlighted the difficulty of managing multiple chronic conditions in a fragmented healthcare system and expressed interest in receiving more treatment within the OTP.

Most patients described being told that they might be at a higher risk for infectious diseases as illustrated in this quote:

"My doctor said, "Wow, you've been an IV user for so many years," and being promiscuous, and my sexual orientation. I was at a high rate for HIV."

Many older adult patients described long histories dealing with HIV and Hepatitis C epidemics:

"Well, there was a lot of AIDS that was going around as a younger generation. Then we had Hep C... unfortunately, now a lot of my friends that I grew up with have already passed because of the Hep C and AIDS."

Another patient detailed a long history of living with Hepatitis C:

"Yes. I was diagnosed with hepatitis C when I was in prison. I carried it for, like, maybe 17 years. I just recently when I'd seen my doctor, she said that she was going to put me a cure for that. I don't know, it's a pill or an injection, she didn't really explain it to me too well.

Some patients reported past anxiety about receiving Hepatitis C treatment:

“At first I didn't wanna do it [Hepatitis C treatment]. I wouldn't even try it because when my dad did it ... it wasn't real easy and it almost killed him. I wouldn't even be in my conversation. We even ain't gonna talk about it 'cause I'm not gonna do it. That's how I was sick to hear it.”

Patients also noted the challenges of living with multiple chronic conditions:

“Cause I got Hep C, you know? So, I have to go see a doctor for my lungs 'cause I smoke. I got like emphysema. So, I gotta go see a specialist for that. And I have to go see a lung doctor too. A lung doctor and a liver doctor for my Hep C.”

Another said:

“I still get overwhelmed with the doctor's appointment and medicine and pills.”

3.1.5 Sexual health

While some participants reported that they are no longer sexually active, most patients expressed a high level of interest in being offered sexually transmitted infection (STI) testing, and sexual health supplies (e.g. condoms, lubricants). Patients shared their experiences engaging in high-risk sexual activities during their past advocated for increased for sexual health interventions in OTPs.

Patients expressed concern about STIs due to their high-risk behaviors:

"I did a lot of time in prison. Um, so I would test like every six months... even my doctor said that's weird, um, how I caught it because, um, all the years I did in prison -- and doing needles -- I was at a high risk of -- of catching hep C -- and I never caught it"

One patient shared their experience with wanting to get tested for STIs:

"That was in prison. Just before I got out. I knew I was getting out, so I didn't want to come out here with anything that was gonna infect anybody else. And if I had it, I wanted to know. Because I've been fixing dope for so long."

Participants highlighted the need for sexual health interventions in OTPs:

"...it would be good too because you got a lot of women make money that way, and they don't get tested. They don't check up on themselves. And I think that it's convenient for them because they're dosing already so why not take the test?"

Another said:

"Never. I've never gotten no free condoms [at an OTP]."

3.1.6 Sterile injection supplies

Participants had mixed opinions on the need of sterile injection supplies at OTPs. Some emphasized the benefits of providing needles to prevent infectious disease transmission, while others suggested that the potency of fentanyl might have decreased the frequency of injection behavior which would reduce its utility. Most participants discussed the positive benefits of

getting clean injection equipment while noting potential concerns that could be raised by the OTP providers.

One participant noted the usefulness of new and sterile syringes:

“Having dull needles, it's horrible, and it sucks to tear up your arm, just because you can't find the right supplies. There's probably billions of needles in the world, so why can't I find a clean one?”

Another shared personal experiences with using discarded needles:

" I mean I've used some pretty dirty needles before. I found 'em on the street before and cleaned it up and used it."

Patients expressed support for obtaining injection supplies at the OTP rather than relying on riskier options:

“I would rather somebody get them here than pick one up off the street.”

Patients frequently mentioned past experiences with syringe programs. One patient said:

"The outfit programs, the clean ones, keeps people from getting, hep C and AIDS and abscesses. I've had a abscess before. Kinda painful. I thought I was gonna lose my arm. That's a decent program."

3.2.1 Older adults noted significant challenges to accessing harm reduction services in OTPs such as logistics, stigma, and lack of tailored interventions for older adults.

Patients reported significant barriers to accessing harm reduction interventions in OTPs and in the community. Mobility issues and limited resources were identified as potential challenges. Stigma from law enforcement and OTP providers were noted as potential concerns as illustrated in this quote:

“...definitely the stigma is one reason I didn't want to access the [harm reduction] services.”

3.2.2 Logistical challenges

Patients with mobility issues reported significant barriers to accessing interventions such as lack of transportation, loss of driving privileges, or reliable public transportation. Safety concerns and medical transportation barriers prevented some from traveling to community-based services. Social isolation and lack of social support were also noted as barriers to accessing services both within the community and at the OTP.

One patient described their challenge with taking public transportation to the OTP:

“I had to walk like two miles, off the one bus that was running, to get here when our money was getting low, so that was hard. I was coming every day...that's a challenge.”

Another patient shared:

“That bus takes forever. Couple hours. It's an all-day affair. And then, if I have to come here [OTP], and then I gotta go to my regular doctor, I won't get back till nighttime. I've gotten to the point where I'll be stuck without a bus because the bus stopped running.”

3.2.2 Stigma from law enforcement

Fear of stigma from law enforcement about the possession of harm reduction supplies was expressed by some patients. Participants shared prior experiences with law enforcement about perceived stigma about naloxone possession.

One participant said:

"The biggest challenge, I think, for me, would be, like I said before, that the police will see it [naloxone] in my bag and they think I'm a drug addict when I'm trying just to help somebody."

One participant shared a negative experience with law enforcement:

"They came and I got harassed... officers came out. I got harassed for having Narcan."

3.2.3 Stigma from OTP providers

Patients reported concern about receiving sterile injection supplies at the OTP due to provider stigma. Patients were concerned about losing privileges such as take-homes doses through random drug screens that were perceived as being targeted towards those who were under suspicion of using illicit substances. One patient said:

"But then they'd find out I'm using--I guess test [name] in a couple days. 'Cause he's using. He asked for straw and foil this morning. So, that's kind of like telling on yourself."

Another patient shared:

"I don't think that [syringe services] would be too popular. With the clients. No, because they're gonna see that they're putting themselves in 'front street' with the counselors. And, "Oh,

you're still using? So, why your piss test coming clean?" if you're asking for syringes, that means you're using, but yet your test is coming clean"

3.2.5 Lack of tailored interventions for older adults

Patients highlighted the need for harm reduction education and services that were tailored to the unique needs, preferences and experiences of older adults. Current harm reduction programs were noted as being seemingly geared toward younger populations or not tailored to any age group at all. Many patients also expressed a desire for interventions adapted to those with long histories of criminal justice involvement. Many participants noted that harm reduction programs and education sessions should be taught by those with lived experience. Younger providers were viewed as less capable or effective than older ones.

One patient shared their view on current harm reduction intervention efforts:

“...everybody is not the same, everybody has a different drug history, familial problems and things like that and I think things should be tailored to the client. So many things are cookie-cutter right now.”

The same participant shared suggestions on what a comprehensive program for older adults would look like:

"Depending on the person, provide services first of all. Do they have medical? Do they a stable home environment? Do they have a support group? Make individualized plans too, everybody's different -- meet the client where they're at.

Another participant shared what they believed was a common challenge for older adults:

“People thinking -- I know my tolerance-- but you don't know what's been put in it. It's so much different than it used to be. So that's I think the challenge for the people that are in my age group --is the difference. It's so different now compared to when I was first in my addiction and it was real heroin. They didn't have fentanyl back then.”

Many older adults also shared that their preferences for OTP provider characteristics:

“I think that a drug counselor should be a person that has been through that lifestyle. Not a person that just gets it out of the book. Because they don't know what we're feeling. They don't know what we've been through or what we feel. They only understand what they read.”

Another shared:

“Some of these counselors, they don't know what they're talking about. And some do. And the ones that do are the ones that already got out of that junk and using and all that, and they became a counselor. Those are the ones that know where you're coming from and everything. Not the other ones that are going by the book. They just got out of college and they try to do everything by the book. And they don't know what they're talking about.”

When interviewees were asked if they were interested in providing peer support or overdose education at the OTPs, many expressed optimism and enthusiasm for the prospect. Participants shared that their own experience and age would be a facilitator to patient engagement:

“I think they’d be accepting of it. And they might feel, because of my age, they could accept it more.they [older adults] might be more accepting and realize that I knew what I was talking about when I describe my past.”

2.4 Discussion

4.1 Overview of key findings

Considering the aging of the US population, and the increase in older adults seeking treatment for OUD, older adult patients’ perspectives on harm reduction services in OTPs is understudied. We explored the acceptability of and perceived challenges to implementing harm reduction interventions for this population. Patients expressed positive attitudes about interventions such as naloxone distribution, overdose education, fentanyl test strips, infectious disease testing and treatment, and sexual health services. However, patients also identified significant challenges to accessing harm reduction services, including logistical barriers (e.g. transportation issues, mobility limitations), stigma from law enforcement and suspicion from OTP providers (i.e. sterile injection supplies), and a lack of interventions tailored for older adults.

4.2 Perceived need and acceptability of harm reduction services

In general, older adults in OTPs report a high level of perceived need and acceptability of harm reduction interventions with some key differences by intervention type. Older adults, just like other populations, are concerned about the presence of fentanyl in the drug supply and recognize the benefit of emergency naloxone.²⁷ To date, research on older adult perspectives on naloxone ownership is limited. Our findings also add to the literature by demonstrating that overdose education and naloxone training were valued by older adults to help community

members and others at-risk of overdose. Similarly, older adults viewed fentanyl test strips as a source of safety and control from a dangerous and constantly shifting drug supply. Finally, older adults reported a clear demand for HIV prevention, infectious disease testing, and sexual health services integrated within OTPs. However, attitudes on sterile injection equipment were mixed; some acknowledge their benefits while others noted a decrease in injection frequency due to the presence of fentanyl in the drug supply.^{27,28} Our study provides essential insights into the specific needs and preferences of older adults in OTPs and begins to fill the gap in the literature.

4.3 Importance of privacy, confidentiality, and trust

Our findings also showed that older adults viewed the OTP setting as ideal for delivering harm reduction services due to the enhanced privacy offered by the clinic. Older adults in OTPs are often faced with intersectional stigma which may prevent them from seeking outside services.¹¹ Our study demonstrated that the safety and familiarity of the OTP clinic may serve as a facilitator to accessing additional services they would not seek out otherwise. The benefits of staff trust as a stabilizing force has been well established for older adults experiencing homelessness.²⁹ Our study adds to the literature by demonstrating that patient and provider trust also extends into harm reduction services in OTPs.

Finally, concerns about privacy and the intersectional stigma associated with specific services such as sterile injection equipment are not well documented in the older adult literature.^{30,31}

Additional research on this area is warranted to further examine how urine screening and punitive measures can effect harm reduction service seeking behaviors by older adult patients.

4.4 Barriers to accessing harm reduction services

Older adults face multiple logistical challenges that serve as barriers to accessing interventions at the OTP. Research on transportation, funding and functional limitations for older adults is well-documented, but the specific barriers unique to the OTP experience have not been explored²⁹. Our study showed that the inconsistency of medical transportation services are key barriers to accessing harm reduction interventions for older adults. While medical transport can serve as a reliable method for some, challenges remain due to inconsistent coverage of services. Receiving services at an OTP can offer a sense of comfort, safety, and reliability providing a stable environment where they can express their concerns with trusted healthcare providers.

4.5 Tailored interventions for older adults

Our findings highlight the critical need for harm reduction interventions that are specifically tailored to address the unique experiences, needs, and challenges faced by older adults in OTPs. Prior research has suggested that services tailored for older adults may benefit from incorporating a social equity lens. For example, older adults who have recently been released from long prison sentences may not be aware of infectious disease treatment advancements, harm reduction interventions, and changes to the current drug supply. Many older adults grew up in a different political era of drug policy and may benefit from increased education about the acceptability and utility of prevention, treatment, and harm reduction. Educating older adults, particularly those with a history of incarceration, about these advancements could increase their willingness to seek testing and treatment for infectious diseases (e.g., hepatitis C) within OTPs. Continuing education of providers to ensure cultural humility of the cultural values and beliefs of older adults will be critical for the success of these interventions³². The importance of incorporating harm reduction providers with lived experience

emerged as a salient topic. Patients viewed increased age and experience as important facilitators for increasing engagement among older adult populations.

Older adults in OTPs are more likely to have multiple chronic conditions such as cardiovascular disease, diabetes, and chronic obstructive pulmonary disease⁹. Older adults with OUD also suffer from mental health issues such as depression, post-traumatic stress disorder and cognitive decline. Harm reduction interventions servicing older adults must be integrated with chronic disease and mental health management to address this unique clinical profile. Interventions integrating HIV and SUD care for older adults can be used as effective guides to incorporate chronic disease management into OUD care^{33,34}. Peer support interventions and programs that address older adults' social isolation can create socially supportive environments that encourage patient engagement and increase uptake of harm reduction services^{35,36}.

4.6 Building on existing literature and implications

Our findings build on existing research describing older adults' perspectives receiving harm reduction interventions. Older adults in treatment are increasing in number and they have a unique profile³⁷. For example, prior studies have shown that older adults in OTPs report avoiding seeking medical care due to intersectional stigma about substance use¹¹. Our findings also suggest that older adults view stigma as a barrier to seeking out harm reduction services. Interventions that limit opportunities of anticipated, or enacted stigma may especially benefit older adults who may have decades of negative experiences with the medical system³⁸. Examples include mobile services, delivery services (e.g., mail) and integrated harm reduction services within OTPs³⁹. Online harm reduction services have been shown to be successful in reaching PWID and may ameliorate concerns from older adults about facing stigma. Current mail-services

are reaching primarily younger patients.⁴⁰ Adapting such interventions to include mail-in requests and facilitating mail-in services in OTPs for older adults warrants additional research. Changes to state and local laws with additional funding support and partnerships with community-based organizations are needed.³⁹

Our findings also show that logistical barriers such as transportation are significant challenges for older adults. National studies show that mean distance to community based syringe service programs (SSPs) are associated with risky behaviors; individuals with farther distances to travel to the nearest SSPs report syringe-sharing behavior.⁴¹ Findings from our study indicate that transportation is a critical barrier for older adults to access services. While medical insurance might cover transportation to and from OTPs, they may not cover transportation to community based SSPs, which are not considered medical appointments. Providing services at OTPs that are traditionally offered at SSPs would reduce the logistical burden faced by older adults living without reliable transportation.

Bessen et. al., also reported that interviewees had mistaken beliefs about the legal ramifications of naloxone possession and use.⁴² Our findings show that older adults have similar concerns regarding legal repercussions of naloxone possession. Additional education addressing such concerns are warranted. Stigma around naloxone possession is a common phenomenon well-documented in the literature.⁴³ Interventions to reduce naloxone stigma should also target older adults. Opioid overdose education and naloxone distribution (OEND) programs are effective at reducing legal misconceptions and successful at increasing rates of naloxone ownership.⁴⁴ However, the extent to which older adults are accessing OEND programs is unclear and preliminary reports suggest a gap in care. Further research is warranted to examine older adult utilization of OEND and to adapt such programs for the unique needs of older adults.

Finally, Han et al demonstrated that older adults report concern that symptoms of chronic conditions were not being adequately treated at OTPs.¹¹ Our findings also show that older adults in OTPs viewed chronic disease symptoms as challenges to their quality of life and reported fragmented care. Considering that OTP patients have frequent contact with OTP providers, the opportunity for integrated care is ideal for improving the health outcomes of older adults. Chronic disease management has been shown to be effective in OTP settings. The burden on health systems makes this an ideal candidate for reform. Patients with long histories of criminal justice involvement could benefit from tailored education about the advent of new treatments.

Conclusion

Our study provides critical insights into the perspectives of older adults on harm reduction services in OTPs. Our findings suggest that patients have a high level of perceived need and acceptability for various harm reduction interventions but face significant barriers to accessing these services (e.g. logistics, stigma, lack of tailored interventions). The OTP setting is viewed by many as an ideal location for delivering harm reduction services due to enhanced privacy and trust between patients and providers. Adapting harm reduction interventions to address concerns about stigma and logistical barriers will be essential to ensure engagement. Integrating harm reduction services within OTPs is crucial to improve patient outcomes and quality of life. Collaboration between providers, policymakers and community-based organizations will be critical to develop and implement effective strategies that meet the unique needs of this vulnerable population.

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CHAPTER 3

Integrating harm reduction interventions for older adults in opioid treatment programs: staff and provider perspectives

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Abstract

Background: An increasing number of older adults receive medications for opioid use disorder from opioid treatment programs (OTPs). However, research on age-appropriate harm reduction interventions delivered through OTPs for older adults is limited.

Objective: To explore staff and providers' perspectives on the acceptability, feasibility, and appropriateness of integrating harm reduction interventions for older adults in OTPs.

Methods: From June 2023 to February 2024, we conducted one-on-one, in-person, semi-structured qualitative interviews with 15 healthcare providers and staff (e.g. nurses, case managers, counselors) at two OTPs in San Diego, California. Interview questions focused on HIV prevention, infectious disease testing, naloxone distribution and overdose education, sexual health, and sterile injection supplies. Interviews were recorded, transcribed, systematically

coded, and analyzed to identify major themes and subthemes through thematic analysis until thematic saturation was reached.

Results: Four main themes emerged: (1) Significant barriers prevent older adults from accessing harm reduction interventions. Providers identified intersectional stigma and ageism as significant barriers to implementation. Accessibility, transportation, and technological barriers were also noted as barriers to successful integration. (2) Comprehensive and individualized care approaches are needed to effectively serve older adults. Providers suggested integrating services tailored to the unique needs of older adults and emphasized the value of cultural competence and a philosophy of harm reduction. (3) Strong patient-provider relationships are critical for successful engagement. Trust between older adult patients and providers was highlighted as a key facilitator for successful delivery of harm reduction interventions. Peer support models were viewed as a possible innovative strategy to increase engagement. (4) Complex needs, limited resources, and sustainability are implementation challenges for harm reduction programs serving older adults. Although participants recognized the importance of age-appropriate interventions, respondents noted challenges, including the complexity of caring for older adults, cost of supplies, space limitations, and sustainability.

Conclusions: OTP providers and staff reported the importance of developing targeted, age-appropriate harm reduction interventions for older adults. Further research is needed to study specific interventions to ensure cost-effectiveness and sustainability.

KEY WORDS: aging; opioid use disorder; methadone; harm reduction; implementation

3.1 Introduction

The extent to which harm reduction interventions are meeting the needs of older adults in opioid treatment programs (OTPs) is unclear. Evidence suggests that there are gaps in care among this vulnerable population due, in part, to the increased rates of co-morbidities and chronic conditions compared to younger adults.^{1,2} Harm reduction interventions are often integrated within OTPs to provide direct services to people who use drugs (PWUDs).³⁻⁵ Examples of harm reduction services offered in OTPs include HIV and Hepatitis C prevention and screening, overdose prevention education, sexual health programs, provision of sterile injection supplies and naloxone distribution.⁶⁻⁸ Current research is lacking on the extent that harm reduction services are meeting the unique needs of adults aged 55 and older within OTPs. Older adults often have more chronic illnesses, functional limitations and less defined social networks than younger adults.^{9,10} Finally, older adults are using substances at increased rates¹¹, and the aging of the Baby Boomer generation has resulted in a growing demographic of older adults in treatment for opioid use disorder (OUD).^{12,13} Consequently, there is a critical need for additional research to examine whether harm reduction services are meeting the unique needs of older adults in OTPs.

Older adults who use drugs are oftentimes overlooked in harm reduction efforts due to a lack of understanding on the types of services that meet their needs and preferences². Ageism¹⁴ by providers might lead to an underestimation of the needs of older adult patients while the stigma associated with being an older adult who has an OUD may prevent the patient from feeling comfortable reaching out for help.^{15,16} Age-related changes such as mobility limitations and memory decline can serve as a barrier to engage with traditional harm reduction strategies that may have been designed for younger populations.¹⁷ For example, mobile clinics that service

high-trafficked areas may not be accessible to an older adult with limited ability to get around and who also faces transportation limitations. The lack of age-appropriate strategies (e.g. trained professionals, adapted health literature) within OTPs may serve as an additional layer of barriers faced by older adults. Currently, there is a paucity of data on how best to adapt, implement, or integrate harm reduction services for older adults in OTPs. Research is thus needed to rigorously examine the unique needs and preferences of older adults to develop age-appropriate strategies for this vulnerable population.

The present study aimed to explore the acceptability, feasibility, and appropriateness of delivering harm reduction interventions to older adults within OTPs thereby beginning to fill a significant gap in the literature. Specifically, this study explored perceived facilitators and barriers of integrating harm reduction interventions from the perspective of key informants of OTPs. Examining provider perspectives is a crucial element of implementation science as a strategy to design interventions that are both effective and adaptable to the unique needs of older adults in OTPs.¹⁸ The potential benefits of tailored harm reduction services include increased uptake of services through the reduction of barriers which can lead to better health outcomes such as a lower incidence of infectious disease and reduced overdose mortality rates¹⁹. Increasing service utilization is critical given this age group's vulnerability due to age-related changes in physiology, concurrent medication use, comorbidity, and declining physical and cognitive function.^{9,12} By examining these implementation factors, future programs can benefit from the identification of facilitators and barriers which may lead to better implementation outcomes. Without this critical information, older adults may continue to face barriers to receiving proper care within OTPs.

3.2 Methods

Study Design

From June 2023 to February 2024, we conducted one-on-one, in-person, semi-structured qualitative interviews with 15 healthcare providers and staff (e.g. nurses, case managers, counselors) at two OTPs in San Diego, California. Interview questions focused on HIV prevention, infectious disease testing, naloxone distribution and overdose education, sexual health, and clean consumption supplies.

Setting and Participants

Our study was conducted in two OTPs located in San Diego County (SDC). We chose OTP site locations that serviced a socio-demographically diverse set of patients. We employed purposive sampling to recruit a varied sample ($n = 15$) of clinical and social service providers (e.g. nurses, counselors, case managers, administrators) to capture a diverse set of roles and years of service. Participants were recruited through direct outreach by OTP staff, and word-of-mouth within the OTPs. Participants were provided with detailed information about the study and provided written consent. All interviews were conducted in private rooms within the OTP to maintain privacy. The study was approved by the University of California, San Diego Institutional Review Board and Behavioral Health Services for the County of San Diego.

Data Collection

The principal investigator (B.H.H.), is a board-certified geriatric and addiction medicine physician trained in qualitative methods. The interviews were conducted by the PI and a trained research associate (W.E.K). None of the participants were under the clinical care of the principal investigator. The interview guide was created by the study team and focused on: (1) connecting and delivering harm reduction services to older adults; (2) implementation, feasibility,

acceptability, and appropriateness of harm reduction programs in OTPs; (3) anticipated challenges in adopting or adapting harm reduction programs in OTPs. After the first interview, BHH and WEK debriefed the sessions, reviewed the transcripts, and adjusted the ordering of questions and added probes to enhance the richness of data collection for subsequent interviews. This iterative process continued for the first 5 interviews, allowing us to better address the study objectives by adapting to emerging responses. Interviews lasted approximately 45 minutes, were audio-recorded and transcribed verbatim. Participants were compensated \$50 for their time.

Data Analysis

Interview transcripts were imported into NVivo version 14. A team-based approach was employed for codebook development.²⁰ The coding team consisted of two trained research associates (W.E.K., B.R.B) who developed a codebook through an iterative process of independent open coding, team meetings, and codebook refinement. The same two transcripts were coded in their entirety by both analysts (W.E.K., B.R.B) who met regularly to compare code application, discuss emergent findings, resolve discrepancies through consensus, and refine the preliminary codebook until the coding structure was stable. Regular debriefings and consultations with external experts (e.g. geriatrician, addiction medicine physician, gerontologist) were used for purposes of reflexivity. Consultations with a multidisciplinary team helped ensure a variety of viewpoints. Using the final codebook, one analyst (W.E.K.) independently coded the remaining thirteen interview transcripts.

3.3 Results

Fifteen semi-structured interviews were completed with staff and providers from two OTPs. Specifically, our sample consisted of nurses (n=4), counselors (n=7), administrative staff (n=2), a director (n=1), and a case manager (n=1). The mean years of service for key informants

was 8.2 years (SD=5.4). Results suggested that, in general, interviewees emphasized the significance of integrating harm reduction interventions for older adults in OTPs suggesting high acceptability and appropriateness. However, many barriers to implementation were identified, and respondents suggested possible solutions to address these feasibility concerns.

We present four main themes that emerged from our qualitative interviews: (1) Significant barriers prevent older adults from accessing harm reduction interventions; (2) Comprehensive and individualized care approaches are needed to effectively serve older adults; (3) Strong patient-provider relationships are critical for successful engagement; and (4) Complex needs, limited resources, and sustainability are implementation challenges for harm reduction programs serving older adults.

Theme 1: Significant barriers prevent older adults from accessing harm reduction interventions.

Key informants noted that older adults faced several significant barriers to accessing harm reduction services. Multiple sources of intersectional stigma and ageism were frequently cited by interviewees as a unique barrier faced by older adults in OTPs. Older adults may be avoiding harm reduction services to avoid stigma or feeling a sense of shame. One participant noted that stigma may stem from the reactions of younger people in the programs:

"They're ashamed to even go [to a harm reduction program]. Even here sometimes you see the younger people that are here, and they look. It's like, oh, man, if I'm ever that old and I'm still here, like, it's that stigma."

Providers also reported that patients' past negative experiences in the medical system influenced their willingness to disclose the severity of their substance use disorder as illustrated

in this quote: “They're so afraid of the stigma -- and the history and -- of the trauma -- repeated traumatic experiences with other medical providers, medical facilities, what have you.”

One participant even noted their own self-bias during the interview as a barrier to offering sexual health services to older adults.

“...it's good for me to remind myself and so, medical providers, should get the reminder like, “Hey, don't forget. Your geriatric population's having sex. You gotta ask them about protection.”

These quotes serve to illustrate the multi-dimensional aspects of stigma faced by older adults in OTPs that serve as barriers to care. The sources of stigma, as noted by interviewees, can be other patients or medical providers.

Interviewees also reported that accessibility and transportation were major obstacles for older adult patients. One provider spoke to the difficulty of locating those experiencing homelessness:

“A medical transportation, they will [only] pick you up at the same place. So, we can't set standing appointments if you're going to be moving around and in different areas all the time. Also, to have that medical transportation, there needs to be a phone. These patients need to have a phone so that they can call. So, if they don't have a phone, and they're moving around, they miss a week's worth of dosing, or their appointments for transportation.”

The provider further illustrated the severe consequences faced by patients who repeatedly miss transportation appointments:

“They might get blacklisted from the medical transportation. 'Cause they didn't call and let them know that they're not going to be there. But they don't have a phone. And they're not at the right address or destination.”

Technological barriers were also noted as a serious limitation for older adults who had trouble accessing information about available community-based harm reduction resources through digital methods like phone apps.

“..they gotta go online to go get their free naloxone, you know?”

Non-digital methods such as phone calls were noted as an easier and preferred method for communication and information gathering for older adults.

Theme 2: Comprehensive and individualized care approaches are needed to effectively serve older adults.

A comprehensive care approach emerged as a major theme that participants suggested as an effective way to care for older adults, especially when considering co-morbidities. Harm reduction interventions such as increased screening, testing and referral to care were viewed by many as an integral part of caring for older adults in the OTPs. Many participants expressed enthusiasm for integrating additional health related services (e.g. HIV testing and counseling, sexual health services, opioid overdose education) within the OTP as part of a holistic care plan especially treating infectious disease conditions. Overall, participants noted that caring for older adults with co-morbidities requires a multidisciplinary approach. Many providers noted they were already attempting to implement an integrated care approach in their current practice for treating and or screening co-occurring conditions. For example:

“My goal every time I see a client, "Do you have a PCP? Who are you with?" I ask them, especially if it is HIV, I make sure they're connected, and then once they say who their doctor is, "Hey, since you're at A, B, and C, do you know that there's case management and, advocates

there and people that you could speak to? Cause I make a point to go up to the website online to show them so they see what I see.”

An example was provided by one provider of how older adults might benefit from a collaborative care model when discussing new treatments for Hepatitis C.

“Even if the counselors could call in a medical staff, and we can have like an intervention together -- I think that that might be helpful. And where it's more individualized, I think that would be more effective for the elderly population.”

Providers noted the importance of adopting a harm reduction philosophy to reduce mortality risk.

“The more experienced counselors get it. I guess the more seasoned and educated counselors understand that, you know, yes, some of the patients are going to test positive, and that's okay. Because the more time they're here, the less time they're out there using. But they're going to use, and that's fine. But that's why it's called "risk reduction," for reducing the risk of overdose. The more time they're here, the less time they're using.”

A significant concern among providers was the difficulty of providing care to older adults who may be showing symptoms of cognitive decline which can lead to forgetfulness, missed appointments for treatment, or screening of medical conditions at community health clinics.

“I could tell that he had a lot of symptoms of... ‘cause I can’t diagnose dementia, but it seemed like he had a lot of symptoms.”

“...as you get older you start to develop -- some people have dementia, Alzheimer’s. They might forget that they have an appointment scheduled.”

A potential solution to this issue was to invite family members who could serve as sources of comfort and to remind them of appointments.

"If they allow bringing in a -- bringing in a family member -- or a close friend. Letting them know, you know, having them come in, ask what we've planned. Outline the plan for them so that there's somebody else that reminds them, "Oh, you have an appointment today."

Theme 3: Strong patient-provider relationships are critical for successful engagement.

One of the most important elements of successfully implementing harm reduction services for the older adult population, as noted by interviewees, is the patient-provider relationship. Providers considered their frequent contact as a facilitator to trust-building.

Participants noted that once trust was established, patients were more open and receptive to bring up personal issues that older adults are often reluctant to discuss with those they do not trust.

"They just connect really quick --with the ones that open up. They're like...I think I have syphilis...then I sent them to the neighborhood clinic. And so far, this year, in the last four months I've had four with positive syphilis. And I think they get checked here."

However, social isolation and geriatric conditions such as memory decline among older adults were noted as barriers to establishing trust because these conditions make it more difficult for providers to establish a relationship

"And so, there's another issue about trust. ...there's people who they're open about a lot of things in their life. And there are other people who seem to be low in trust. They may be socially isolated. They only talk to their family and no one else. What do we do about that?"

Peer support also emerged as a strategy to increase patient-provider trust among older adults because peer support specialists were viewed as neutral members of the organization that were not compelled to report substance use behaviors to authority figures. Peer specialists were described by one provider as people that patients could “relate [to] with no other strings attached.” As one provider illustrated:

“... they're afraid that if they ask a counselor for a syringe or something like that. That we're going to report them.”

Barriers to peer support for older adults included a lack of trained peer support specialists:

“I don't think there's enough peer support for seniors. Because that's relatively a new population. So it's not as established as our youths, or our pregnant, our neo program. This is a new population coming up. So I don't think enough of it is understood.”

Theme 4: Complex needs, limited resources, and sustainability are implementation challenges for harm reduction programs serving older adults.

The final theme was related to the complexity needs, resources, and sustainability of specific harm reduction interventions for older adults as implementation challenges. In general, interviewees had a favorable view of harm reduction interventions within OTPs for older adults. Interviewees presented challenges to the feasibility of integrating additional interventions within OTPs for older adults. Considerable external pressures (e.g. local attitudes) and inner setting limitations (e.g. funding and space) were noted as potential barriers. Potential solutions to these issues were strong partnerships with external entities that could help deliver services to this

population. Intervention deliverers, however, would have to evaluate intervention success measures (e.g. reach) to ensure sustainability of services.

“And this would be the perfect place for it because we've got a lot of need -- people that are using needles. When you're using, [you] get yourself into situations. Whether it's, different relationships. Sexually. And so I think this would be the perfect place for it.”

Many providers expressed concern that the current system was insufficient to meet the complex needs of older adults which may include cognitive decline. One provider expressed frustration with assisting a patient who had significant memory issues, unstable housing, and was underinsured.

“And it’s hard to help them, you know. He had memory issues -- I had to remind him of all his appointments. But now he’s at a house that wants to let him go because he needs a higher level of care, -- we have a system that’s broken, ‘cause I have no one I can connect him to, what do I do? But that’s the biggest challenge that I feel. Like, social services has failed us.

The same provider expressed frustration at the lack of social services for older adults

“...he's the one I would have trouble with because the dementia, and there's not enough services. And I'd even try to reach out to insurance company 'cause they're supposed to have some kind of, you know, extra support to help them with, you know, linking them to appropriate services. Failure.”

Participants noted a lack of space for delivering harm reduction services, storing harm reduction supplies and tests (e.g. for HIV counseling, naloxone), and challenges to follow-up care.

“The biggest issue [is] space. It's the office space, you know. Having a designated office for somebody, if you want them to do this job, they're gonna need an office.”

One provider noted that older adults who test positive for HIV or Hepatitis C would need additional care:

“...the test would be simple, but the follow through with the treatment, getting the prescriptions, storing the medications.”

While participants were generally in favor of integrating harm reduction services, many also noted significant barriers that could effect sustainability. External factors such as local attitudes and potential pushback from neighbors were noted as key barriers to the sustainability of having a service, such as providing sterile injection equipment.

“Because then you have, like, NIMBYism, like, "Not in my backyard." And then you're gonna see needles, and then in a perfect world, right, you won't have, oh, horrible a***** neighbors [laugh] that are like, "You know, look at these horrible people using drugs" instead of, "Wow, look at these people trying to get," you know, "clean." And unfortunately, they're gonna find needles, right? So it's like you're it's a catch-22. I feel like it would be amazing. I think it would be brilliant, but we're not in a perfect world.”

Sustainability was also noted as a concern due to potential funding limitations and concerns about reach and recipient impact.

“That’s what has taken away my mobile medical unit. I used to have it every week, but I couldn’t keep the numbers up. So, they were like, "Well, it costs too much money to have this whole mobile medical unit here, and a MA, and a driver when you only see three people.”

One participant noted that funding challenges limited their ability to deliver adequate services:

“Reimbursement. Exactly. It’s a money thing, you know? We have people asking for it all day, you know. Even elderly and younger patients. You know, "You got any Narcan?" And, if

they've already got their first box here, we just give them a prescription. I've heard a couple of times they're having a hard time getting it from the pharmacy.”

Participants noted that older adults face significant financial barriers to accessing harm reduction services. One participant said:

“... they're starting to sell Naloxone, over the counter at Walmart. I asked her how much are they charging for it? And I think it's like \$54. And me personally, I don't see many [older adults] taking that \$54 that they have in their pocket.”

While many interviewees noted funding and resources as barriers, others shared potential solutions to these challenges such as forming partnerships with community organizations.

3.4 Discussion

Our study revealed four main themes related to integrating harm reduction interventions for older adults within OTPs. First, we identified common barriers to service access such as intersectional stigma, transportation difficulties, and technological barriers. Second, providers emphasized the importance of a comprehensive care approach which treats patients in a holistic manner by incorporating cultural humility and adopting a harm reduction philosophy. Third, building patient-provider trust through engagement strategies such as peer support, motivational interviewing and trauma-informed care is critical for establishing rapport among this population. Fourth, interviewees noted potential implementation barriers such as negative local attitudes, limited office space, funding concerns, and the need to evaluate intervention reach and impact to ensure sustainability. Our findings suggest that providers report high acceptability and appropriateness about integrating harm reduction services for older adults in OTPs. However, interviewees note feasibility barriers due to the complexity of intervention characteristics, the patient population, and funding limitations.

Theme 1: Significant barriers prevent older adults from accessing harm reduction interventions.

While literature on older adult services in OTPs is rare, research from geriatric and general population studies support our findings from Theme 1: overcoming barriers to access. Research suggests that transportation is a common barrier for OTP patients of all ages.²¹ Geographical inequality has been noted by other health professionals as a barrier to general older adult healthcare.²² Interventions that consider mobility limitations and transportation barriers will be critical for this population. Case managers can work with patients to find suitable transportation through medical insurance services when eligible. Policy experts can lobby for increased coverage of medical transportation for harm reduction and OTP services. Telehealth options can also be leveraged when geographical barriers are present.²³ Technological barriers are also common for older adults in many addiction care settings²⁴, but older adults have been shown to be motivated to use health-related apps and online services.²⁵ Strategies that prioritize a user-centered design to optimize digital interventions to better suit older adults in OTPs are needed.²⁶ Educational materials about available community-based harm reduction services can also be distributed to senior centers where older adults might congregate.²⁷

Intersectional stigma is defined as the synergistic effect of multiple forms of oppression that, when combined, create distinct social and structural inequities.²⁸ Ageism and stigma among healthcare professionals has been shown to be prevalent²⁹, and its effects are associated with negative health outcomes¹⁴ for older adults. A qualitative study of older adults living with HIV demonstrated that patients reported suffering from intersectional stigma related to age and perceived substance use. Han et al., showed that older adults in OTPs report avoiding medical

care due to multiple intersectional stigmas and ageism.¹ Older adults in OTPs also report using the emergency department to avoid SUD-related stigma from outpatient medical professionals.¹ Intersectional stigma in other forms, such as stigma regarding sex workers, has also been documented in the OTP literature.²¹ Evidence-based interventions to reduce ageism include education and intergenerational contact and should be adapted for OTPs.¹⁴ Continuing education on older adult health should be encouraged for OTP staff.

Theme 2: Comprehensive and individualized care approaches are needed to effectively serve older adults.

Evidence that healthcare providers support a comprehensive care approach (e.g. cultural humility, harm reduction model, multidisciplinary teams) for older adults is well supported by the medical literature.^{30,31} Cultural humility (*i.e.* a process of self-reflection that involves understanding and respecting different cultural identities and perspectives) is critical for patients of racialized/minoritized backgrounds who may experience ambivalence about MOUDs.³² Corry et al., showed that health professionals believed that an integrated, whole person approach was an effective strategy to care for older adults at risk of functional decline in a primary care setting.²² A recent study in Canada interviewed staff and providers who worked with older adults that have experienced abuse. Results showed that providers frequently integrate humanistic principles such as harm reduction into their professional practices with older adults³³ as a form of holistic care.³⁴ These studies show that our findings about providers' recommendations to treat OTP patients in a holistic manner is supported by current literature in the field.

Current treatment models that are fragmented and fail to consider person-centered holistic approaches to OUD care are insufficient to meet the current demands of the aging OTP

population. Instead, OTPs should offer multiple services beyond OUD treatment such as primary care, mental health services, and social support services.²⁶ Considering that older adults often have multiple coexisting conditions, this integrated care model would treat the person in a holistic manner.²⁷ In its absence, a collaborative care model in which OTPs coordinate care with physicians, psychiatrists, and social workers can provide a multidisciplinary model that would better serve the older adult population.³⁵ Finally, harm reduction services should be adapted to meet the unique needs of older adults. Examples include transportation assistance or delivery services, mobile health units and peer support services for those with mobility limitations. Caregiver involvement, adapted communication material, and specialized training for providers can also help create a more inclusive and effective environment for patients with cognitive impairments. By addressing the unique needs of this population, harm reduction programs can enhance patient engagement, increase service utilization, and improve health outcomes.

Theme 3: Strong patient-provider relationships are critical for successful engagement.

The importance of the patient-provider relationship in addiction specialty care is well-supported in the SUD literature. The patient-provider relationship has been shown to be related directly to longer addiction treatment duration.³⁶ Han et al., reported that older adults may be reluctant to discuss their SUD diagnosis with their providers due to low levels of patient-provider trust.¹ Harvey et al., showed that Veterans Health Administration providers recommended improving communication between patients and providers to improve adoption of harm reduction services.⁴ Adapted onboarding processes for older adults may be beneficial for establishing initial rapport and reducing cognitive load. Additional feedback mechanisms can help facilitate better communication between patients and providers. Family and caretaker

engagement, when appropriate, can also help build a more stable network of support both within the OTP and in the community.

Peer support models in addiction care are becoming more common^{37,38}, but research on its efficacy in older adult populations is needed. A comprehensive review of peer support models in older adults with chronic conditions found mostly positive but nonsignificant results.³⁹ Additional research is needed to understand in what ways older adults can benefit from peer support services at OTPs.

Theme 4: Complex needs, limited resources, and sustainability are implementation challenges for harm reduction programs serving older adults.

Implementation challenges such as complexity of caring for older adults, resource allocation and sustainability are common barriers to integrating harm reduction interventions.^{22,27,40} The complexity of implementing harm reduction services for older adults is magnified by the presence of multiple and complex conditions including arthritis and chronic pain that may limit mobility and prevent access to care.^{9,17,41} Most OTPs only offer fragmented care and services that are limited to SUD treatment whereas older adults may require management of co-occurring chronic health issues.¹⁷ Moreover, many patients with OUD have been excluded from skilled nursing facilities due to the complexity of caring for older adults with OUD.^{17,42} Consequently, adapting harm reduction interventions for older adults may be complex due to the varying needs of this population and the limited resources of OTPs. To address funding sustainability, OTPs might consider collaborative funding models involving government institutions, community organizations, and healthcare systems which would create a more stable funding base. The sustainability of interventions is also contingent on adapting to the changing

needs of the population, which requires evaluation and feedback mechanisms.⁴³ Therefore, OTPs could benefit from increased data collection and performance metrics to identify areas for improvement. Finally, OTPs could engage in advocacy work and educate stakeholder about the necessity of delivering harm reduction interventions at OTPs. This could create broader community support and engagement which could influence policy decisions at the local level and increase opportunities for collaboration that could aid in sustainability. More research is desperately needed to develop strategies to integrate geriatric models of care that are sustainable for older adults in OTPs.

Our study adds to the literature by providing evidence of facilitators, barriers, and implementation considerations of integrating harm reduction services in OTPs for older adults. Overall, we showed that providers reported high levels of acceptability and appropriateness of integrating harm reduction interventions in OTPs and shared their feasibility concerns. The current literature is limited on this topic, and our study has started to fill the gap in the research. Continued research in this area is critical to provide age-appropriate interventions for this growing demographic.

Strengths and limitations

Strengths of our study include a qualitative approach which provides valuable insights into perspectives and experiences from providers within OTPs. We identified emergent themes that are likely to be relevant to the successful implementation of harm reduction interventions for older adults in other OTP locations. The focus on older adult populations fills a considerable gap in the literature which is critical for this growing demographic. Findings from our study may be limited to the two OTPs we studied. Specific local attitudes, organizational structures, and

patient/provider characteristics may not be generalizable to other locations; barriers and facilitators may be specific to these sites.

Conclusion

Our study explored provider's perspectives on integrating harm reduction interventions in OTPs for older adults. We identified key barriers and highlighted the importance of holistic, culturally sensitive care. Providers reported high acceptability and appropriateness of harm reduction services and noted implementation challenges such as complexity, sustainability, and funding. Future research is needed to evaluate the effectiveness of age-appropriate interventions that are cost-effective and tailored to the unique needs of this population.

3.5 Acknowledgements

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