TOWARD SOLVING THE SCHISM BETWEEN ABSTINENCE-BASED AND MEDICATION-ASSISTED APPROACHES IN THE TREATMENT OF OPIOID USE DISORDER

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Abstract

Opioid overdose and addiction have risen dramatically during the past 20 years in the United States necessitating a concerted and marked national response. Classified as a national public health emergency in 2016, approaches to solving the current crisis have focused on reducing supply of both prescribed and illicit opioids into the environment as well reducing demand through prevention, treatment, and recovery support efforts. Most notably, the latter efforts have emphasized the use of medications, such as buprenorphine, methadone, and extended release naltrexone. A strong scientific evidence base exists supporting the use of these medications to prevent overdose death, and as first line, best-practice, treatments. Yet, slow rates of medication adoption and implementation have been observed in clinical settings during the past 10 years, despite dramatic increases in opioid overdose deaths (only 29% of all opioid and non-opioid specific treatment programs offered buprenorphine in 2017). Several factors may help explain this slow uptake, but one prominent one has been skepticism and even opposition among some "abstinence-based" sectors of the treatment field and recovery community who perceive such medications as unhelpful, even harmful. Because so many lives are at stake, debate on the issue has been intense, even disdainful, with each side sometimes blaming the other with accusations of malpractice. A question seldom asked, is why such disparate views exist and persist among professionals within the same field, and what can be done about it. Improved awareness of the basis for each side's viewpoint, could enhance understanding and ultimately increase unity and therapeutic momentum toward a more rapid end to the current opioid crisis. Using a diffusion of innovation science framework, this paper explores the origin and nature of the opposition to the adoption of opioid use disorder medications in clinical practice culminating in several suggestions regarding how abstinence-based and medication-based approaches to helping remedy the current opioid crisis might recognize the value of both as distinct or synergistic pathways to remission and long-term recovery.

1. Introduction: Killing more than Pain - From Poppies to panacea, to public health emergency

The discovery of the pain-killing potential of opium poppy-based tinctures and, later, more potent pharmaceutically-enhanced analogues, has been both an immense blessing and at the same time a worrisome curse. Driven by a humane effort to adequately address pain coupled with aggressive pharmaceutical marketing of ostensibly "non-addicting" opioids, between the late 1990s and 2018 in the United States, rates of population exposure to potent and seductive opioids increased dramatically and along with it, opioid overdose deaths, creating one the largest overdose death epidemics in modern history – possibly ever. According to the United States' Centers for Disease Control and Prevention (CDC), in 2017 the number of overdose deaths involving opioids (including prescription opioids and illegal opioids like heroin and illicitly manufactured fentanyl) increased by 9.6% and currently is 5 times higher than in 2000 [1]. In 2017, approximately 47,600 of the more than 70,237 individuals who died from overdose died from opioid overdose (130 people per day). Overdose is now the leading cause of death for persons under age 50 in the United States [2]. In addition, 11.5 million Americans misused prescription opioids and 2.1 million met medical criteria for an opioid use disorder in 2016. These rates may underestimate the true prevalence of opioid use disorder as they are based on household data which excludes institutionalized, homeless, or incarcerated individuals [3].

Classified as a national public health emergency in 2016, approaches to solving the current opioid crisis have focused on reducing supply of both prescribed and illicit opioids into the environment as well as reducing demand for opioids, through prevention, treatment, and recovery support efforts. Most notably, the latter efforts have emphasized the use of medications, such as buprenorphine, methadone, and extended release naltrexone. A strong scientific evidence base exists supporting the use of these medications to prevent overdose death, and as first line, best-practice, treatments. Yet, slow rates of medication adoption and implementation have been observed in clinical settings during the past 10 years, despite dramatic increases in opioid overdose deaths (only 29% of all opioid and non-opioid specific treatment programs offered buprenorphine in 2017) [4]. Several factors may help explain this slow uptake, but one prominent one has been skepticism, even opposition, among some "abstinence-based" sectors of the treatment field and recovery community who perceive such medications as unhelpful, even harmful. Because so many lives are at stake, debate on the issue has been intense, even disdainful, with each side sometimes blaming the other with accusations of malpractice. A question seldom asked, however, is why such disparate views exist and persist among professionals within the same field, and what can be done about them. Arguably, improved awareness of the basis for each side's viewpoint, could enhance understanding and ultimately galvanize unity and therapeutic momentum toward a more rapid end to the current opioid crisis.

The purpose of this paper is try to clarify some of the reasons for these differences and what can be done about them. To begin, in order to provide context, the major objectives of current national efforts to bring an end to the opioid crisis are described followed by a brief review of the scientific evidence for medication-based and abstinence-based treatment approaches as major components of these national efforts. Subsequently, a "Diffusion of Innovation" conceptual framework [5, 6] is introduced as a model that may help explain some of the reasons for these differences in attitudes and clinical approaches. In the final section, some solutions for creating a unified response that recognizes the potential significance of both sides of the debate are offered.

2. Major Objectives of National Efforts to End the Opioid Crisis

Supply and demand reduction efforts have three major goals in addressing the current opioid crisis: 1. Prevent new cases of opioid use disorder; 2. Eliminate overdose deaths from current opioid exposure; and, 3. increase the availability, accessibility, quality, and effectiveness of treatment for opioid use disorder to reduce the overall burden of disease and disability and enhance functioning and quality of life for those individuals and families suffering from opioid addiction.

2.1. Preventing new cases of Opioid Use Disorder

For any desirable commodity, including opioids - that have the potential to reduce pain and anxiety and produce intense euphoria - availability, accessibility, and price are major factors influencing consumption. Other things being equal, the more available, accessible, and cheaper a desirable product is, the greater its consumption. Consequently, a major focus in preventing new cases of opioid use disorder has been to reduce the supply of potent and seductive opioids into the environment. These efforts have included international efforts to stem the influx of lethal illicit opioids (e.g., fentanyl), and domestic efforts to reduce the internal oversupply of prescription opioids responsible for the initial large increase and first wave of opioid overdose deaths that continue to exact a high toll [7]. An unintended short-term risk of reductions in prescription opioid supply, however, is that some may turn to more potent and lethal heroin and fentanyl which could increase overdose risk. Community "take back" programs and other opioid disposal programs have been initiated to provide safe ways for disposal of unused opioid prescription pills in the general population, and prescription monitoring programs have targeted licensed prescribers to help reduce overprescribing and ultimately reduce the incidence of new opioid use disorder cases.

2.2. Preventing Premature Mortality

From the standpoint of preventing the tragedy of premature mortality for those with opioid use disorder, "demand reduction" focused interventions have been shown to be by far the most effective. First, and most critically, treatment with medications such as buprenorphine and methadone have been shown to reduce mortality risk by between 70% and 90%, respectively, in rigorously conducted systematic reviews of the clinical science literature [8]. Although comparatively newer and not studied as extensively, it is likely that extended release naltrexone (e.g., Vivitrol) confers similar life-preserving benefits in reducing overdose deaths while people take it. However, because acquired tolerance decreases when people are taking the naltrexone (an opioid mu receptor *antagonist*), it may increase overdose risk if people do relapse to opioids [9, 10]. As detailed further below, the quality of the scientific evidence of these medications' ability to reduce mortality is a powerful reason to support rapid and widespread dissemination of their use among individuals with opioid use disorder.

2.3. Preventing Relapse and Enhancing remission, quality of life, and functioning

While proven to prevent premature death from overdose, buprenorphine, methadone, and extended release naltrexone medications also have demonstrated clinical efficacy, in enhancing opioid abstinence, functioning, and quality of life [11, 12]. These interventions are often used in combination with various forms of psychosocial treatment and recovery support services. There are also "abstinence-based" treatment approaches comprised of withdrawal management ("detoxification" settings), residential and outpatient treatment, and sober living and other recovery support services (e.g., mutual-help organizations, recovery coaching, Recovery Community Centers).

3. Evidence for Medication-based and Abstinence-Based Treatment Approaches

3.1. Medication-Based Approaches

The most scientifically rigorous systematic quantitative reviews of placebo controlled randomized trials indicate that buprenorphine is an effective medication in the maintenance treatment of heroin addiction, retaining people in treatment at any dose above 2 mg, and suppressing illicit opioid use (at doses 16 mg or more). However, compared to methadone, buprenorphine retains fewer people when doses are flexibly delivered and at low fixed doses. If fixed, medium or high, doses are used, buprenorphine and methadone appear no different in effectiveness (retention in treatment and suppression of illicit opioid use) [13]. For prescription opioid addiction, similar results have been found (although the quality of evidence is not as good as it is for heroin addiction). Another rigorous systematic review of clinical trials, for example, found little to no difference between how well methadone and buprenorphine worked to keep people in treatment, to reduce opioid use, or in the side effect profile. The conclusion was that buprenorphine keeps more people in treatment, reduces opioid use, and has fewer side effects compared to abstinence-based approaches of detoxification or psychological treatment alone [14]. Recent randomized, placebo controlled trials of once a month injectable buprenorphine/naloxone formulations also show strong benefits relative to placebo [15] and similar benefit relative to daily oral buprenorphine [16]. In the Haight et al study [15], participants' average percent abstinence (as measured by proportion of negative urine samples) was between 41%-43% for once per month injectable buprenorphine, compared with just 5.0% for placebo. All patients in the study received weekly individual drug counseling.

Antagonists, such as naltrexone, that block the mu opioid receptor (instead of agonizing it like buprenorphine or methadone) thus preventing the reinforcing effects from opioids should they be used, have been tested among individuals with opioid use disorder. A systematic review of oral naltrexone found it be no better than placebo or detoxification [17], presumably due to the lack of compliance with oral/daily administration. Once per month injectable extended release naltrexone, in contrast, fares better, especially when it is administrated following initial medically supervised withdrawal to achieve 7-10 days of opioid abstinence. In intent-to-treat analyses buprenorphine is more effective as a treatment for opioid use disorder, however among the subset of patients who are able to complete medically supervised withdrawal extended-release naltrexone has similar, or superior, efficacy to buprenorphine in preventing relapse to illicit opioids and should be considered of equal clinical utility when used following initial opioid withdrawal [9, 10].

In sum, there is overall generally high quality, consistent, experimental evidence supporting agonist and extended release antagonist medication treatment for opioid use disorder. These are among the most effective treatments for any substance use disorder and given the quality and quantity of the scientific evidence should be considered first-line approaches in addressing opioid addiction.

Despite these findings, it is important to acknowledge also, however, that while the evidence is very strong for the utility of medications, they are not cure-alls. About 40-60% of patients, on average, show a good clinical response, indicating about the same amount do not. This suggests additional strategies may be needed to enhance compliance with existing medications (e.g., providing incentives to complete a monthly injectable medication formulation), or to provide different or additional medications, or abstinence-based psychosocial treatments, in order to enhance non-response. In addition, it is

estimated that about 20-40% of patients in treatment for opioid use disorder do not want to take any medications to treat their opioid use disorder [18, 19]. The question then becomes, what alternatives should be offered to such patients? Long-term residential/sober living, recovery coaches? Some of these are described below.

3.2. Abstinence-based Approaches

"Detoxification", stabilization, and psychological treatments (e.g., Cognitive-Behavioral Therapy [CBT]; Twelve-Step Facilitation [TSF]; Motivational Interviewing [MI]-based interventions) without medications tend not to perform as well [13] and while popular, little is known about the efficacy of mutual-help organizations, such as SMART Recovery or Narcotics Anonymous, in facilitating and aiding OUD remission [20]. Other kinds of recovery support settings (recovery residences) and services (recovery coaches, recovery community centers) have shown benefits for patients with substance use disorder more generally, that include – but are not specific to- individuals with opioid use disorder[21, 22]. High quality research on recovery residences, for instance, indicate strong effects in terms of reduced substance use and criminal activity, and increased employment, making them highly effective and cost-effective[23], but empirical knowledge about their utility *specifically* for opioid use disorder and relative to agonist or extended release antagonist medication remains unclear.

Adding specialized behavioral addiction counseling (e.g., CBT for addiction) to agonist medication therapies that already come with brief 20-45 minute prescriber counseling and check-up – a manualized intervention known as "Medical Management" (MM) - have not been shown to enhance outcomes among OUD patients [24]. The failure to show additional benefit for specific addiction counseling on top of more general MM and medications (e.g., buprenorphine/naloxone) may be because MM is likely to mobilize the same kinds of therapeutic mechanisms (e.g., recovery motivation, active coping, increased recovery self-efficacy) that are mobilized by all active interventions [25, 26] and, thus, adding an additional specific intervention does not confer additional benefit. Similar kinds of null effects have been found in other studies where specialized psychosocial addiction interventions are increased in intensity (e.g., from 5 hours of therapeutic contact to 20 hours) but do not confer increased therapeutic benefit [27]. Some evidence exists, however, for adding contingency management and community reinforcement approaches to medications, especially when MM counseling/monitoring is less intense[28]. There is some preliminary evidence for potential therapeutic synergy from *extended* community-based interventions, such as Narcotics Anonymous (NA) participation in addition to buprenorphine or methadone [29]. At least one large observational study found that opioid use disorder patients on buprenorphine/naloxone (Suboxone), who engaged more in NA had significantly better retention on the medication and higher abstinence rates [30].

More studies are needed in these areas to help determine which individuals with opioid use disorder in particular may benefit from these community services to aid long-term remission and recovery either as a distinct pathway (e.g., for those not wishing to take medications) or in combination with, or subsequent to successful tapering from, medications.

Engagement in treatment and ongoing recovery supports reduces the likelihood of ongoing opioid use and its associated harms [29, 31, 32]. Lowering the barriers to treatment access through integrating addiction care into the medical system, ensuring insurance parity for services, and restructuring care models to focus on engagement and retention increase the likelihood that individuals with opioid use disorder will get care and reduce or stop ongoing opioid use [31].

4. Understanding the Reasons for attitude and practice differences Between Medication-based and Abstinence-Based Approaches to addressing the Opioid Crisis: The Diffusion of Innovations Framework

4.1. Medications save lives, show strong efficacy; so, what's the problem?

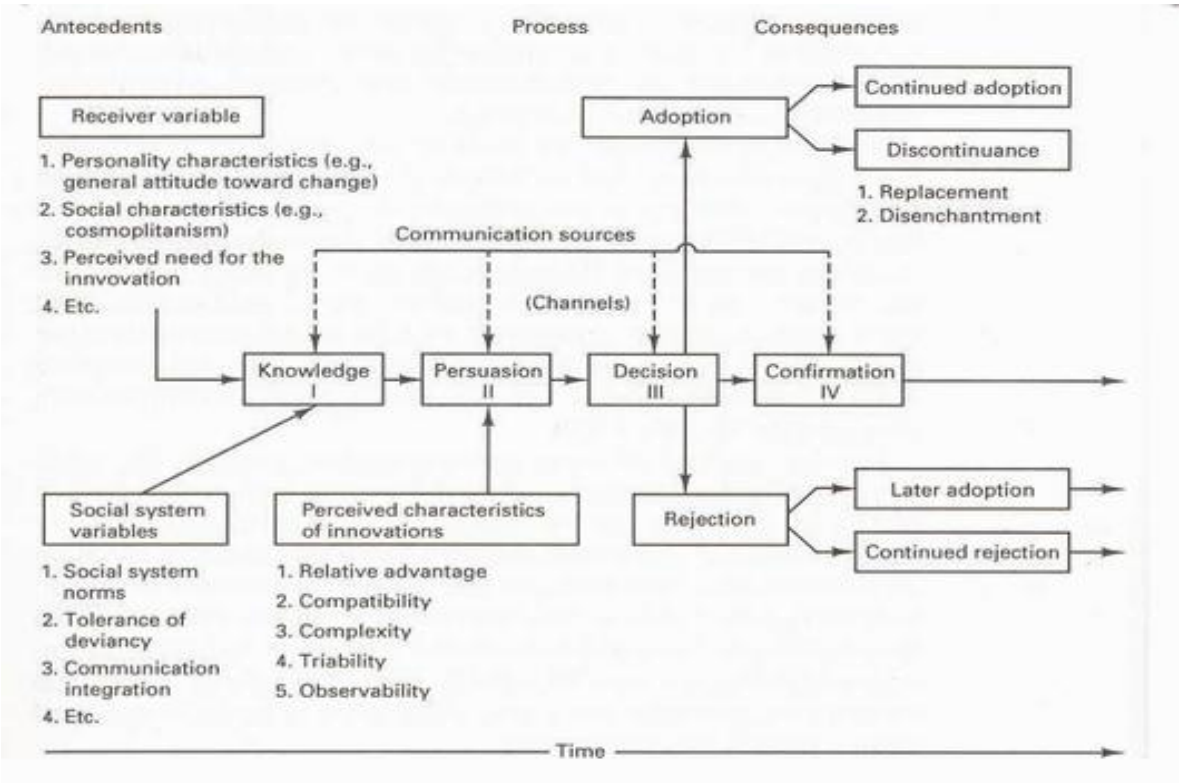
There is notable inertia, skepticism, and even active opposition to the use of medications in the treatment of opioid use disorder. Such opposition can be observed in social media, heard in communities of recovery and peer-led recovery support organizations (e.g., Narcotics Anonymous), and witnessed among clinicians in addiction clinics treating opioid addiction, as well as at the highest levels of federal and state governments. Admittedly, there is a confusing irony – even seeming absurdity - in the fact that excessive availability and accessibility of potent and seductive prescription opioids sparked an opioid overdose and addiction crisis, and yet the solution is increased availability and accessibility to yet more prescription opioids (e.g., buprenorphine/methadone). This paradox, however, is explainable and can be understood once one understands the pharmacodynamics and pharmacokinetics of how these medications work to alleviate craving and compulsive illicit opioid use (i.e., much like nicotine patches and gum work to reduce cravings for tobacco use and increase smoking cessation rates). Without such understanding of the mechanisms or knowledge of the efficacy data, and taken more at face value, it can be easier to understand why former Secretary of the U.S. Department of Health and Human Services, Tom Price, might publicly remark: "…If we simply substitute methadone or other opioid type medication for the opioid addiction, then we haven't moved the dial much*".*

Such comments and attitudes might partially explain the lack of uptake of medications nationally. The latest National Survey of Substance Abuse Treatment Services [4] indicate adoption and provision of medications to address opioid use disorder remains surprisingly low, especially given the accumulation of high-quality research demonstrating benefit. The proportion of opioid treatment programs (OTPs) providing only methadone and buprenorphine treatment decreased slightly from 41 percent of all facilities with OTPs in 2007 to 39 percent in 2017. Between 2011 and 2017, the proportion of facilities with OTPs that offer methadone, buprenorphine, and injectable naltrexone increased from 10 percent to 23 percent. The proportion of facilities (either OTP or non-OTP) providing any buprenorphine services increased from 14 percent of all facilities in 2007 to 29 percent of all facilities in 2017. The percentage of all facilities providing any extended-release injectable naltrexone treatment increased from 8 percent in 2011 to 24 percent in 2017.

Given the potential of these medications to substantially reduce overdose death and enhance abstinence rates and functioning and quality of life, why is it that treatment programs have not adopted and implemented such treatments across the board? Obviously, these medication treatments are not self-implementing, despite their scientific support.

Even in the world's largest national health care system – U.S. Veterans Health Care – consisting of 130 hospitals and about 1,000 outpatient clinics, where opioid use disorder medications are mandated to be provided to veterans, latest estimates (fiscal year 2017) indicate only 41% of veterans with a current opioid use disorder diagnosis received any kind of FDA-approved medication for that opioid use disorder (up slightly from 38% in 2016) [33]. Thus, in a national health care system, with a standardized set of common procedures, including a national electronic health record, and a mandate to provide opioid use

Figure 1. Conceptual Model of Diffusion of Innovations



disorder medications, almost two-thirds of patients did not receive it. Furthermore, while many VA programs increased in the number of patients receiving medications between 2016 and 2017, many showed decreases, and there was large year to year variations in the proportion of patients receiving opioid use disorder medications within the same programs [33]. This suggests implementation barriers may be dynamic, and may stem from barriers related to patients, providers, or programs.

4.2. A Framework for Understanding and Explaining Non-Adoption of Medications - Diffusion of Innovation Theory

Given that buprenorphine and extended release naltrexone medications for opioid use disorder, in particular, are relatively new interventions in the treatment of opioid addiction, a potentially helpful conceptual framework for understanding this lack of uptake is Diffusion of Innovation theory [5, 6], which posits several factors that may promote or inhibit the diffusion of innovations. Students of innovation diffusion and dissemination research know that getting a new idea adopted, and then maintained, even when it has obvious advantages, is very difficult.

Diffusion is a special type of communication in which the message is about a new idea. The newness raises questions of uncertainty and risk among potential adopters. Because of this uncertainty, according to this framework adoption of an innovation goes through a predictable process: knowledge-persuasion-decision-confirmation (center of Figure 1). Each stage of this process is influenced by other factors that increase or decrease initial receptivity to, or desire for, the innovation and its adoption as well as its maintenance. These factors include characteristics related to the potential adopter of the innovation (i.e., in this case the characteristics of patients, addiction treatment systems, and providers, such as their attitudes toward medications; see “Receiver” and “Social system” variables in Figure 1), as

well as to the innovation itself (e.g., the medications' compatibility with existing practices; how complex or simple they are to adopt; and their relative advantage; see "Perceived Characteristics of Innovations" in Figure 1).

Applying this theoretical model more concretely to the addiction treatment and recovery support services system to help explain barriers to adoption, it may be that some of the reasons for lack of adoption of medications for opioid use disorder pertain to either the characteristics of the adopter or the innovation (medications), or both. In terms of the characteristics of the adopter (patients, the addiction treatment system, health care prescribers) there are some possibilities that lead to attitudes of non-adoption. These may include 1. Cultural norms pertaining to historical precedents of iatrogenic medical harms in the name of help and related suspicion of medications; and, 2. a "Lack of Perceived need" for the medication innovation in treatment due to a lack of awareness regarding their own effectiveness and outcomes, and the testimony of people in recovery from opioid addiction that never used medications.

Additionally, there may be barriers related to the nature of the innovation itself (i.e., medications). These might include uncertainty regarding "compatibility" and "relative advantage", due to the potentially confusing irony of using opioids to treat opioid use disorder (especially long-term use)., and whether these medications produce a true observable, relative advantage, for the benefit of the patient (vs. society; e.g., agonists as "liquid handcuffs" and social control vs facilitating personal recovery), and in real-world clinical settings with greater patient complexity than those treated in clinical trials (i.e., efficacy vs effectiveness differences). Efficacy data obtained under ideal clinical conditions with selected patients to maximize internal validity, may not translate well into clinical effectiveness when implemented in frontline settings among patients with more complex comorbidities, especially if the effect size in clinical trials is small (e.g., [34]). Also, there may be a perceived lack of "relative advantage" due to beliefs about perpetuating "addiction/dependence" on agonists, their misuse/diversion, lack of emphasis on enhancing functioning and quality of life, and not being perceived as comprising "real recovery". Each of these are elaborated on below, beginning first with barriers to adoption related to the receiver, followed by those related to the innovation itself (medication).

4.3. Receiver Characteristic Barriers to Adoption

4.3.1. Cultural norms pertaining to historical precedents of iatrogenic medical harms in the name of help and related suspicion of medications

Suspicion and mistrust of medical approaches to treating addiction among individuals affected by it has a long history [35]. A long list of ill-gotten medicines and "cures" have existed since colonial times in the U.S. including convulsive therapies, water cures, and medical procedures such as convulsive therapies and even prefrontal lobotomies [35, 36]. Various "medications" were procured to cure addiction including most famously "double-chloride of gold" injections under the auspices of the Keeley Institute (comprised of strychnine, alcohol, opium and myriad other elements) in the 19th century and overprescribing of minor and major tranquilizers among alcohol addicted individuals during the 20th century [35]. Together with the stigmatization, separation, and ostracization, of the care of addiction patients away from main stream medicine, these may have fostered a cultural mistrust among patients, their families, and those providers that cared for them that persist within an enclosed social system of addiction treatment. Perhaps these historical antecedents have resulted in slow adoption of treatment

innovations, especially given that once again a medical entity (prescribed opioid medications) that initially sparked the current epidemic, and that still play a strong role in its perpetuation [7], are now deemed to be the cure.

4.3.2. "Lack of perceived need" for medication innovations due to a lack of awareness of programs' own effectiveness and outcomes for opioid use disorder patients, and the testimony of many in recovery from opioid addiction that never used medications.

With some rare exceptions, most programs have no idea of their own clinical effectiveness. Some report very high "success rates", but these tend to be ill-defined, non-verifiable, or highly methodologically flawed and biased. Although there is increasing pressure to collect and report outcomes in healthcare [37], meaningful, systematic, measurement of clinical responsiveness to care is poor. This means that most providers and programs, while assuming they are performing well, cannot adequately confirm it, either to themselves or others in any verifiable way and to any agreed-upon standard[38]. Coupled with well-known cognitive confirmation biases and selective attention and memorization of only positive outcome cases, this can lead to a lack of perceived need on behalf of providers and programs to adopt a new innovation, such as medications for opioid use disorder, because they already think they are highly effective. This problem is not unique to addiction treatment, but pervasive across medical care [38]. In addition, there are many observable examples within the recovery community and in treatment and recovery support services settings of individuals who have overcome an opioid addiction without the use of medications that serve to reinforce this notion of "lack of perceived need". Also, recent national data show that a majority of people in recovery from an opioid problem have never used medications [39] possibly because a large number of these are older and achieved recovery at a time before buprenorphine or extended release naltrexone was available and thus recovered through non-medication pathways [38]. Importantly, just because a majority of those in recovery from opioid use disorder have not used medications, it does not necessarily follow that medications are only for a minority. This is because those completing such surveys are the select survivors of opioid use disorder and such samples cannot speak to relative effectiveness of any types of interventions. In sum, perceptions of already doing well, and cognitive confirmation biases may lead providers and programs to not perceive any need for adoption.

4.4. Characteristics of the Innovation Itself as Barriers to Adoption

Diffusion of innovation theory posits that innovations are more or less likely to be adopted based on several factors related to the innovation: compatibility, complexity, relative advantage, observability, and trialability.

Some of the reasons for non-adoption of effective medications, for example, might include perceived "(in)compatibility". Given the so called, "abstinence-based" history of the vast majority of the addiction treatment system, medications and the practitioners that are able to prescribe and monitor the effects of such medications, have not been present, and thus are considered inconsistent with current culture and mainstream practice norms. The novelty of a "medical" addition as a part, let alone the mainstay, of treatment for opioid use disorder, may make it challenging to incorporate.

Related to this is the theory's notion of "complexity". Because many, if not most, programs, do not have a physician on staff, incorporating medications involves adding complexity and cost to the program's expenses. This barrier may be especially applicable to most of the non-opioid-specific treatment

programs, where opioid use disorder patients - while gradually increasing as a proportion of the overall treatment census - remain a minority (e.g., compared to alcohol, cocaine/methamphetamine, cannabis).

In addition, as noted above, due to reasons of lack of perceived need, the "relative advantage" of adopting medications may be perceived as low or non-existent. They may even be perceived as harmful due to negative anecdotal reverberations echoing throughout a fairly insular social system of abstinence-based treatment. Some commonly heard negative critiques include the notion that opioid use disorder medications are more in the interests of others/society than the patient - that opioid agonists represent "liquid handcuffs", place people "in the parking lot" of life, and thus are a strategy for social control and not a means for facilitating meaningful personal recovery with enhanced functioning and quality of life. Also, that use of these medications is merely perpetuating the problem, "substituting one addiction for another". In addition, because of the reality of at least some misuse and diversion of such medications [40], they may be seen as exacerbating, rather than solving, the problem.

There may also be a different interpretation of the same research results that support the efficacy of medications by those in the abstinence camp. In a large multi-center study examining the effectiveness of buprenorphine/naloxone compared to extended release naltrexone [9], for example, across a six month follow-up, 43% of those randomized to buprenorphine were categorized as not having relapsed (where relapse was defined as 4 consecutive weeks of use or 7 consecutive days), and had, on average, 10 opioid-free weeks out of 24 during the assessment period. While this represents a clear advantage compared to placebo, individuals with an abstinence-based treatment orientation may not view a 57% relapse rate on buprenorphine under well-resourced, high-quality treatment implementation conditions, as especially positive.

Taken together, this cluster of negative observations and beliefs, may increase perceptions of relative "disadvantage" rather than relative "advantage", in relation to adopting medications.

The degree to which an innovation can be tested out – "trialability"- is also an important factor in diffusion theory relating to the likelihood of adoption. This is the rationale behind free samples across many commodities, including pharmaceuticals. Being able to "try it out" leads to a personalized experience, which, especially when free and when resulting in a positive outcome, can lead to adoption at little risk. A prominent notable example of trialability has been occurring at the Hazelden Betty Ford Foundation - considered by many as the originator, and high-quality exemplar, of "abstinence-based" treatment for all substance use disorders, including opioid use disorder. Recognizing that opioid use disorder patients were not doing well with purely abstinence-based approaches and were at increased risk of overdose death - and while facing immense internal and external opposition across the treatment field to *not* adopt medications for opioid use disorder - Hazelden Betty Ford nevertheless adopted and measured the effects of implementing buprenorphine/naloxone and extended release naltrexone in their opioid use disorder patient population and have subsequently observed significant clinical outcome improvements.

4.5. Summary

There are formidable barriers to adoption of proven opioid use disorder medications. These medications, when evaluated against accepted rigorous scientific standards, are shown to dramatically reduce overdose deaths and enhance treatment outcomes. Despite dramatic increases in mortality rates, however, these medications are offered only in a minority of treatment programs or appear to be

used by only a minority of patients suffering from opioid use disorder. Barriers to adoption of such medications are common and can be understood within a diffusion of innovations conceptual framework as stemming both from characteristics of the adopters, as well as those of the innovation, and their interaction. At the same time, approximately only half of patients, on average, show a positive clinical response to such medications and as many as 40% of patients with opioid use disorder decline to take such medications in the first place. These findings suggest a need to potentiate or otherwise augment current medication efforts, as well as offer engaging, evidence-based, non-medication alternatives for those individuals who refuse such medications.

5. Solutions

When so many lives needlessly have been lost and so many more are currently at stake, frustration and anger can quickly arise when one feels something can be done to save those lives that is not being done. In the case of implementing medication treatment for opioid use disorder, it is easy and tempting to blame the abstinence-based addiction treatment workforce for being "ignorant", "lazy", and "uncaring". Such thoughts and vocalizations can be observed across information-exchange social media sites such as Twitter. Although "mandating" the implementation of medications is one tempting way to go, and can help, compulsory provision and implementation of such medications does not equate to universal uptake. The study in the national VA system, described earlier, demonstrates this [33]. Consequently, additional strategies are needed to increase the likelihood of adoption, implementation, and maintenance. Three strategies are offered below that may be of help in this regard: 1. Taking a program-centered orientation; 2. Remaining aware of the "one-size fits all" trap (again); and, 3. "Modernity leave" involving a reinvestment in the clinical and public infrastructure of addiction treatment.

5.1. Taking a "Program-Centered" Perspective

For decades in the addiction field it was felt that addiction patients were stubborn, psychologically defensive, and unmotivated. If patients did not respond well to treatment, it was their own fault; they were to blame. They needed to "go away and come back when they were ready". In 1991, with the publication of the book, Motivational Interviewing [41] a new paradigm was born whereby it was made clear that ambivalence about change is a core, and normal, part of the addictive behavior change process for many patients. Because of this realization, instead of blaming the patient for "not being ready", the responsibility for enhancing motivation for change was placed squarely in the lap of clinicians. This "patient-centered" approach has now become the norm. A question arises, in this regard, as to whether the old paradigm of "blaming the patient" is not occurring now, but instead of patients, it is addiction treatment programs that are being blamed "for not being ready" and for "non-compliance". Perhaps, as in motivational interviewing, a "program-centered" approach might be taken, that attempts to understand specific barriers to non-adoption of medications; to clarify and help programs' resolve any ambivalence they may have about change, and help diagnose the challenges, or reasons, for non-adoption. Such a perspective, of course, requires willingness on the part of treatment program administration and staff to engage in this potentially fruitful dialogue in the first place.

5.2. Remaining aware of the "One size fits all" trap (again)

It has long been asserted by many in the addiction treatment field that, "One size does not fit all". In other words, what may work for one patient may not work for another. This is because of the

heterogeneity, varying severity, and clinical complexity, of substance use disorders, including opioid use disorders, as well as the degree of recovery resources available at someone's disposable to bring to bear on a recovery attempt. As noted, while efficacious, medications for OUD are rejected by a substantial minority of patients and among those that *do* take the medications, only about half respond favorably. Furthermore, among those that do respond well, medication compliance beyond six months is rare [28]. While the data demonstrate overall very good clinical efficacy, as far as any intervention goes, it is important to remain conscious regarding how clinical responsiveness can be further enhanced among those that do choose to take the medications, as well as to consider clinically proven alternative treatments and supports that can help those refusing medications. Research on alternatives and adjuncts to medications for opioid use disorder are sorely lacking, but for such patients, existing alternatives should be on the menu of additional options so that patients can choose another option that could help them engage and improve their quality of life. These may take the form of long-term residential options such as recovery housing [42], and mutual-help organizations [21], which have shown to be helpful and cost-effective along with the use of other recovery supports such as Recovery Community Centers [43]. Such centers can assist in helping people get jobs and get connected to other recovery support services (e.g., Recovery Coaching) that can help sufferers build recovery capital and instill and sustain hope for the future.

5.3. Facilitating "Modernity Leave" for the Addiction Treatment System

Since the passing of the federal Family and Medical Leave Act in 1993, U.S. mothers have the right to up to 12 weeks of maternity leave to ensure health of the newborn baby and mother. Research indicates that each additional week of maternity leave among mothers in industrialized nations reduces infant mortality by 0.5 deaths per 1,000 live births [44, 45]. Similarly, in order to reduce mortality in the opioid use disorder treatment field, and addiction field more broadly, it may be wise to invest in addiction treatment infrastructure and facilitate what I refer to as, "modernity leave" for the nurturance of the addiction health care system.

The addiction healthcare system is often perceived as archaic, backwards, and lacking the latest technology and skills to provide high quality care. How come? The addiction treatment workforce, in general, receives very low reimbursement for long hours of intensive work with challenging populations who often have great needs. It is one of the most underfunded and under-resourced in all of healthcare. Compare the quality of the buildings, furniture, and surroundings at your local addiction clinic to the comfortable, nicely decorated and furnished surroundings that can be seen at your local cancer, diabetes, and heart disease, care centers. It won't take long to quickly see and confirm this difference in allocation of resources. This observable difference reflects a resource and reimbursement gap that is underwritten by a pervasive and enduring stigma and discrimination that surrounds substance use disorders.

Similar to maternity leave, "modernity leave", would involve, but not be limited to, adequate allocated time to keep abreast of the latest scientific developments and how to apply them in the care of patients. This would include of course immersion in the science regarding the efficacy of medications to treat opioid use disorder, but just as importantly, immersion in the reality of the limitations of such medications (i.e., that only about half respond favorably, few comply beyond six months; and a substantial number decline medications in the first place), and therefore the critical role of "abstinence-based" behavioral treatments in augmenting and supplementing medications, aiding accrual of recovery

capital over the long-term (e.g., through recovery community centers; recovery mutual-help), and their crucial role in providing alternative recovery pathways for those unwilling to take medications.

"Modernity leave" also would encompass investing in the modernization of clinical environments in which patients are treated so that they are indistinguishable from, even more dignified than, other healthcare treatment environments. Because so many with addiction have lost their dignity and sense of self-respect, creating environments that possess especially dignified surroundings can communicate implicitly a new or renewed sense of self-worth and hope. Increasing pay for addiction healthcare workers so that it is commensurate with other areas of healthcare could also invigorate and strengthen a workforce that serves so often as the scaffolding for recovery.

Finally, and perhaps most importantly, another addition to "modernity leave" for addiction treatment would be the integration of measurement-based practice infrastructure [38]. This would allow for continuous measurement of patients' response to treatment at every point of care that could be instantly scored, aggregated, summarized, related to prior scores, and graphically presented to quickly illustrate clinical response and relapse risk, and thus inform and help direct clinical care in real time. We are accustomed to measurement of "vital signs" in the care of many chronic diseases (e.g., blood pressure readings in the care of hypertension). These measurements are used as the basis for informing and directing care. Similarly, investing in the capture of "recovery vital signs" using measurement-based practice will increase patients', providers', and payors', awareness of the quality and effectiveness of the implementation of "evidence-based practices" (both medications-based and abstinence-based approaches) across the complex array of differing environments and patients, so that care can be adjusted and enhanced. Also, because standardized metrics are used, this approach has the added benefit of increasing the clinical accountability of treatment programs to allow for objectively verifiable confirmation of effectiveness preventing exaggerated and misleading reports of "success rates"[38]. Modernity leave is, thus, an umbrella term for investing in the modernization of the public health and clinical infrastructure for addiction care [46].

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