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Better Service by Doing Less: Introducing De-implementation Research in HIV

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Abstract

The course of HIV research has led to a multitude of interventions to prevent and treat HIV. With the arrival of more effective interventions comes the need to end, or de-implement, less effective interventions.

Purpose of review—To describe the state of de-implementation research in HIV and provide a rationale for expanded research in this area.

Recent findings—Existing studies have identified a set of HIV-specific interventions appropriate for de-implementing and described the persistence of interventions that should be ended. However, to our knowledge, strategies to successfully promote appropriate de-implementation of HIV-specific interventions have not been examined.

Summary—De-implementing interventions that are no longer needed is an opportunity to improve the quality and effectiveness of HIV services. Opportunities to expand this field of research abound.

Keywords

HIV; De-implementation; De-adoption; Medical Overuse; Public Health

Introduction

We are now embarking on our fifth decade of HIV research in the United States (1). Long-term investment in science to prevent and treat HIV has led to the development of numerous interventions and services. The implementation of these services has subsequently led to reduced HIV incidence and improved quality of life for people living with HIV and AIDS.

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For instance, antiretroviral therapies (ARTs) to treat HIV have changed remarkably since approximately 1990, when ARTs were first introduced. People living with HIV were required to take a handful of drugs according to a complicated regimen with numerous, harmful side effects, leading to missed doses and poor adherence (2). With the introduction of single-pill regimens with minimal side effects roughly a decade later, people began to take just one pill a day, improving adherence and health outcomes (3). Because of this drastic improvement in treatment, the life expectancy for someone living with HIV has increased drastically from a few years in 1990 to decades. Currently, an individual living with HIV, who is able to maintain adequate treatment, is more likely to die from a disease not related to their HIV(3). ARTs are just one type of intervention in a multitude of interventions at the disposal of practitioners to prevent HIV, treat HIV and co-occurring conditions, and address factors that drive the HIV epidemic (4, 5).

With continued improvement in intervention and scientific investigation comes a need to either end current interventions or treatment guidelines. De-implementation research is an emerging line of research within the field of dissemination and implementation science that investigates the persistence of interventions that should be ended and identifies strategies to support appropriate discontinuation of interventions. The goal of the current article is threefold: 1. To conceptualize intervention de-implementation and provide a rationale for this line of inquiry in HIV implementation research; 2. To summarize the current state of research on de-implementation focusing on HIV services and intervention; and 3. To identify opportunities for improving effectiveness and efficiency in HIV service delivery through de-implementation research.

What is de-implementation, what are we de-implementing, and why should we de-implement?

De-implementation is the act of ending an intervention, program, practice, or policy that should be discontinued or used less frequently (6, 7). Early generation ARTs were naturally de-implemented, as they were replaced with better medications. However, investigators have begun to demonstrate that this process of de-implementing an intervention, often does not occur without strategic support to promote appropriate behavior change by organizations (8). This need for support is why we prefer the term de-implementation over similar terms, like de-adoption, discontinuation, overuse, or abandonment (9). Similar to the implementation of new interventions, which often requires planning and effort, ending interventions also often requires effort (6,10).

Interventions that should be de-implemented fall within one of three categories (6). The first category is interventions that are either *ineffective or harmful* to provide. For instance, in Canada because of HIV non-disclosure criminalization policies, HIV+ individuals can be charged with aggravated sexual assault if they did not disclose their status, and it is determined that they placed another individual at significant risk of contracting HIV. Incorrect interpretations of what constitutes “significant risk” has caused harm and stigmatized HIV+ individuals without any clear benefit, as most transmission occurs when people are unaware of their status (11).

The second category is interventions that are *inefficient or not cost effective* to provide. The Centers for Disease Control and Prevention has promoted interventions to reduce risk of HIV transmission since approximately 2000. As new interventions, like PrEP, were developed, a number of the earliest interventions promoted were ultimately deemed to be either relatively ineffective or too burdensome to provide (12). In a clinical example, emerging evidence has begun to show that clinical appointments for HIV treatment and care as well as medication dispensing can be spaced further apart – from approximately three months to six months – for stable patients, thus reducing the number of total visits that an HIV+ individual needs to have. The benefits include reduced clinical burden, better patient retention in care, and lower costs to the patient with no difference in clinical outcomes—making more frequent visits an inefficient intervention (13, 14).

The third category is interventions that are no longer needed because the health issue has dissipated (6, 10). Instances, like an acute outbreak, require rapid scale up of intervention that subsequently can be scaled back once the outbreak is under control. Acute HIV outbreaks do occasionally happen, as in the example of the HIV outbreak among injection drug users in Southern Indiana in 2015 (15). This outbreak prompted scaling up of testing services, contact tracing, substance abuse counseling, increased clinical services, and case management. Ideally, once an outbreak is quelled, it would be justifiable to scale back services to only those needed to prevent another outbreak and support those affected by the previous outbreak.

We also draw a distinction between de-implementation, which focuses on ending interventions that should be ended, and abandonment, where interventions that should have been continued are simply abandoned. Brownson and colleagues provide an excellent review of other conceptual domains describing when interventions are used in a less than optimal manner— including overuse, underuse, de-implementation, and abandonment (16). From these criteria, we derive the fundamental arguments for why interventions should be de-implemented - either they cause poor health outcomes, lead to undue cost for individuals who receive them, or they are not a good use of tax-payer dollars (6,7,17). In an era where funding for HIV prevention and treatment is finite, de-implementing interventions that are ineffective, inefficient, or not needed, is an opportunity to move resources toward better HIV intervention, thus providing higher quality HIV services.

De-implementation research in health

De-implementation research has been borne out of the intersection of several major areas of research. There is growing recognition within the U.S. of excess healthcare spending without additional health benefits. Estimates suggest that approximately 150–225 billion dollars in the United States are spent on unneeded medical interventions (18), and approximately 30% of medical interventions are unnecessary (19). This indicates that practitioners do not always naturally stop using unnecessary interventions. In response, a number of efforts to identify interventions that should be discontinued and understand the extent to which they persist in practice are underway. The Choosing Wisely campaign represents a substantial effort to identify medical interventions that should be discontinued in numerous medical specialties (20, 21). Furthermore, passive efforts to promote de-

implementation, like awareness campaigns among the public, have not proven successful (8). This suggests that more active and targeted behavior change approaches, like feedback and monitoring for clinicians, or structural approaches, like changing payment structures, are needed to help encourage appropriate de-implementation (8). Subsequently, research on approaches that lead to appropriate de-implementation is burgeoning in several fields where de-implementation is a pressing issue, like antimicrobial stewardship to reduce inappropriate antibiotic use or reducing opioid prescribing (22–24).

The state of de-implementation research in HIV

An initial step in de-implementation research is identifying interventions that should be ended or used less often. For clinical treatment of HIV, the Choosing Wisely campaign has identified a list of practices meeting these criteria, primarily focusing on unnecessary CD4 and viral load testing (25). In public health, the Centers for Disease Control and Prevention has identified a number of prevention interventions that are considered inefficient to provide (5). Other collections also enumerate interventions of relevance to HIV prevention and treatment and indicate the quality of scientific evidence supporting the intervention, including the Community Health Guide (26), developed by the U.S. Department of Health and Human Services (HHS), and the Evidence-Based Practices Resource Center, developed by the Substance Abuse and Mental Health Services Administrations (SAMHSA) (27). Finally, the Center for HIV Law and Policy identifies a number of harmful HIV-related policies at the state and federal levels (28). However, these lists are by no means comprehensive.

A second step is determining the extent to which interventions appropriate for discontinuing remain in use. Our work has demonstrated that several years after evidence on their relative inefficiency became available public health HIV prevention interventions that should be discontinued persist in practice approximately 50% of the time (29). Once a target intervention is identified for de-implementation, a major aspect of de-implementation research is understanding the factors that contribute to de-implementation. Factors at multiple levels, including patient, provider, organizational, and socio-political levels, can make de-implementation or persistence more likely (30). Although de-implementation can be relatively straight forward, for instance a practitioner simply stops prescribing one therapy in favor of a better alternative, de-implementation of complex or policy-level interventions heavily embedded in the system may require effort and action from multiple actors to dismantle and ultimately end. (31) Our work within public health settings has demonstrated that practitioners are reticent to stop using interventions. This is especially true if they feel the intervention has continued benefit, if the community they serve wants the intervention, or if there is not a similar intervention that provides a similar benefit (10, 32, 33). For these reasons, our work has demonstrated that many organizations have been reluctant to discontinue many of the behavioral interventions promoted by the CDC between 2000 and 2010, which are perceived as being more relevant to minority communities and more engaging than biomedical interventions (32, 33). We suggest that de-implementing these heavily embedded interventions will require engagement with practitioners, consensus building about the appropriateness of the intervention, and alternatives that were perceived as acceptable replacements.

This highlights a unique temporal quality of de-implementation, which is the process involved in ending interventions is often closely connected with what is potentially being implemented next. Wang and colleagues (2018) parse the de-implementation process into four potential scenarios (34). 1) An intervention may be de-implemented in conjunction with uptake of a replacement intervention that targets a similar outcome. For instance, newer ARTs designed to treat the same problem but with fewer side effects. 2) Intervention de-implementation may occur in conjunction with uptake of an intervention with the same overall intent, but the mechanism of change is different from the de-implemented intervention. For instance, many early interventions promoted by the CDC were designed to reduce risk behaviors associated with HIV transmission and prevent HIV have been de-implemented in favor of pre-exposure prophylaxis (PrEP), a medication also designed to prevent HIV. 3) Interventions may be used with less frequency but not eliminated entirely, as with reducing CD4 testing or reduced clinical visits for HIV+ individuals. 4) Finally, an intervention may need to be ended entirely with no replacement, as with many damaging policy interventions targeting individuals with HIV. Some of these de-implementation processes may be easier than others, like replacing an older intervention with a newer one that is similar but more effective, as this requires little meaningful change for providers or recipients. However, other processes may be more difficult, like replacement with an intervention that has a different acting mechanism. For instance, the emergence of PrEP and movement away from behavioral interventions represents a substantial redirection in how HIV prevention efforts take place and has been contentious among frontline providers and researchers alike (35, 36).

Ultimately, the goal of de-implementation research is to establish strategies that encourage appropriate de-implementation. A review of recent strategies by Colla and colleagues (2017) identifies approaches demonstrating the most and least promise within healthcare settings (8). Clinical decision support tools that help providers make treatment decisions at the point of care, performance feedback systems, and clinician education have demonstrated the most promising evidence thus far; However, the evidence supporting a number of other strategies is either limited or mixed, for instance, insurer restrictions or patient education. Although appropriately ending an intervention is the primary outcome, early evidence within HIV implementation research demonstrates that de-implementation can also have secondary outcomes for other interventions, organizations, and the communities that have been the recipients of the intervention, as well as the implementation of future interventions. If the de-implementation process is handled poorly or ended abruptly, the secondary outcomes, like relationships with the target community may be damaged, creating problems for implementation and success of new interventions (6, 37).

Additional considerations in de-implementation research

There are a number of issues worth highlighting related to de-implementation research and encouraging intervention discontinuation.

The nature of evidence—Scientific evidence is a minimum condition for identifying an intervention for de-implementation. However, scientific evidence alone is often insufficient to determine whether an intervention is appropriate for de-implementing, especially within

public health settings where the success of an intervention is based on local epidemiology (a second type of evidence), practitioner experience with and preference for an intervention (a third type of evidence), and local evaluative data (a fourth type of evidence) (38). To make matters more complicated, good evidence of efficacy can become less applicable over time. Technology and social platforms like Grindr have dramatically changed the opportunity for sexual encounters and by extension potential exposure to HIV. Sexual and gender expression has also changed rapidly, particularly among younger generations. As such, many interventions and the evidence behind them are simply no longer applicable in the current HIV epidemic. Furthermore, social factors beyond the evidence can lead an intervention to fall out of favor and be abandoned without sufficient scientific evidence. See Johns and colleagues (2016) for an excellent review of the myriad of factors that led to an HIV counseling and testing intervention, RESPECT, being considered appropriate for de-implementation (39). In short, when identifying interventions for de-implementation, the evidence supporting appropriate de-implementation is critical.

An equity lens—Disparity in who is affected by HIV is growing within the U.S. (40). As such, it is increasingly important to conduct de-implementation research with specific attention to how interventions or their removal may differentially impact the range of communities at risk for HIV. Furthermore, there is a growing body of evidence in healthcare overuse research suggesting that disadvantaged individuals (e.g., minority or low socioeconomic status) are more likely to receive certain types of unnecessary treatments than their more advantaged counterparts. In cases where more advantaged groups are receiving unnecessary care, a disproportional cost burden falls to disadvantaged individuals within the same insurance pools (41). The national HIV prevention shift from HIV behavioral interventions toward PrEP has been debated, in part, because many earlier behavioral interventions were tailored to specific groups (e.g., men who have sex with men, black and Hispanic women, or youth) while the early roll out of PrEP did not give similar attention. Many researchers continue to be concerned PrEP makes HIV prevention overly clinically-oriented and limits personal engagement and trust building with communities at increased risk and in need of more support services – a fundamental need if convincing communities to participate in services and reduce disparities (42), although efforts are under way to address these issues (43).

A holistic view of HIV and sexual health services—As noted above, interventions are embedded in systems and have multiple consequences. In particular, support for HIV prevention and treatment services in the U.S. provides tangential support for other types of health and social services that HIV service organizations commonly provide like substance abuse services, housing support, and mental health services. When HIV interventions are ended, our work and the work of others has demonstrated consequences for the staff and organizations that implemented them and the communities that have received them, some of which are poor like reduced overall capacity to provide services in general (10, 33, 42). Furthermore, many interventions designed to address HIV also impact other health problems. For instance, behavioral interventions designed to reduce risk behaviors, while not as successful at preventing HIV, continue to be effective in preventing other, more common types of sexually transmitted infections (43). We recommend caution and research to

understand the interconnectedness of HIV interventions with other types of interventions to avoid inadvertently hurting health outcomes in other ways by de-implementing HIV services. Ultimately, we should be working towards the physical and mental well-being of our communities and patients in all aspects of their lives.

Opportunities for research to de-implement HIV services

Based on the current state of de-implementation research in HIV, we encourage researchers, especially those interested in the implementation of evidence-based HIV interventions and HIV services research, to consider de-implementation research in the following areas:

- Identifying interventions appropriate for de-implementation – Determining which interventions should be ended is a first step to promoting more effective and efficient services. Some lists are available for identifying HIV-related interventions that should be discontinued, but these lists are fragmented, focusing on specific areas of HIV, and are not comprehensive. A more systematic and rigorous effort to identify interventions with clear evidence indicating they are appropriate for de-implementation would be invaluable.
- Describing the depth and breadth of persistence – Although our work provides early evidence that many interventions that should be ended actually persist in public health settings (26), more work is needed to understand which interventions are persisting among a variety of providers in a variety of settings in both HIV prevention and treatment services.
- Factors and strategies contributing to successful de-implementation– Robust frameworks are available to conceptualize the myriad of factors that contribute to de-implementation or persistence of interventions (6, 7, 31). However, there is very little empirical data identifying which factors are more likely to promote appropriate de-implementation. Understanding factors more or less likely to promote de-implementation will help inform the development of active strategies that foster appropriate de-implementation. Furthermore, strategies identified as effective in other areas of de-implementation research (8), may be applicable in HIV service settings and serve as a promising starting point.
- Understanding outcomes - Research to help outline an ideal de-implementation process and ensure positive outcomes in terms of more efficient use of resources, increased uptake of more effective interventions, and improved outcomes for HIV-affected communities will be fundamental for establishing the improved value of HIV prevention and treatment services.

To support this potential research trajectory, funders have begun to express interest in supporting projects with a de-implementation focus (44), and the number of related research projects has increased in recent years (45). However, HIV interventions have received little attention and opportunities to conduct innovative de-implementation research related to HIV services abound.

Conclusions

Ongoing research will continue to yield more effective and efficient interventions to address the HIV epidemic and, by extension, create a need to end interventions that no longer hold value for the community. De-implementation research, which focuses on appropriately ending interventions, has failed to receive much attention in HIV services and implementation research despite gaining substantial traction among other health issues. However, HIV de-implementation research is critical to addressing the current phase of the HIV epidemic and optimizing HIV services so communities benefit from the most effective, efficient, and contextually appropriate interventions.

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Table 1.
Examples of interventions appropriate for de-implementation and their corresponding de-implementation process.

Intervention(s)	De-implementation criteria	De-implementation process	Description
Early generation ARTs	Inefficient or not cost effective	Replaced with similar mechanism	A complicated regimen of anti-retroviral therapies with numerous, harmful side effects, leading to missed doses and poor adherence (2).
HIV non-disclosure criminalization policy	Ineffective or harmful	Ended with no replacement	Policy in Canada that allows HIV+ individuals to be charged with sexual assault if they did not disclose their status, and it is determined that they placed another individual at significant risk of contracting (11).
Early behavioral interventions for HIV prevention	Inefficient or not cost effective	Replaced with different mechanism	Interventions from the Diffusion of Effective Behavioral Intervention project that were supported by the CDC from 2000–2010, but in light of new evidence on cost and efficacy were deemed inefficient and no longer recommended by the CDC starting in 2011 (5, 29, 32, 33).
Frequent clinical visits for HIV treatment	Inefficient or not cost effective	Used with less frequency	Clinical appointments for HIV treatment, care, and medication every 3 months (13, 14).
Frequent CD4 testing	Inefficient or not cost effective	Used with less frequency	CD4 testing and monitoring for patients with stable viral suppression. CD4 tests in conjunction with every viral load test (25).