Categorising implementation determinants and strategies within the US HIV implementation literature: a systematic review protocol

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ABSTRACT

Introduction Despite decreased rates of new infections, HIV/AIDS continues to impact certain US populations. In order to achieve the goals laid out in the Ending the HIV Epidemic (EHE) in the US initiative, implementation science is needed to expand the sustained use of effective prevention and treatment interventions, particularly among priority populations at risk for and living with HIV/AIDS. Over 200 HIV-related implementation studies have been funded by the US National Institutes of Health. Therefore, a comprehensive review of the literature identifying implementation determinants (barriers and facilitators) and categorising implementation strategies across the continuum of HIV prevention and care in the USA is appropriate and needed to enhance current knowledge and help achieve the goals laid out in the EHE national strategic plan.

Methods and analysis This systematic review protocol follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Between November 2020 and January 2022, a broad database search strategy of Ovid MEDLINE, PsycINFO and Web of Science was conducted to capture implementation-related studies along the HIV prevention and care continuum. Articles were eligible for inclusion if they were: conducted in the USA, published after the year 2000, written in English, related to HIV/AIDS, focused on outcomes related to dissemination and implementation (ie, did not test/evaluate/explore implementation determinants or strategies) and were behavioural studies (ie, not basic science). We plan to conduct three systematic reviews to identify and categorise determinants and strategies associated with three HIV focus areas: pre-exposure prophylaxis, testing/diagnosing and linkage to care, and treatment. Determinants will be coded according to an adapted Consolidated Framework for Implementation Research framework to capture implementation determinants and strategies within the implementation protocol.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Thorough literature search of major electronic databases and reporting as per Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.
⇒ Frameworks and guidelines used are in accordance with broader implementation science field.
⇒ The Consolidated Framework for Implementation Research framework is intended to capture provider-level implementation determinants and does not capture recipient-level determinants, which we adapted to capture.
⇒ Existing implementation strategy frameworks are not fully capable of capturing key information for categorising implementation strategies.
⇒ The search strategy is limited to published articles, potentially biasing findings to those appearing in peer-reviewed academic journals and indexed in the databases searched.

INTRODUCTION

More than 700,000 people in the USA have died from HIV/AIDS since it was first recognised in 1981.1 Currently, over 1 million people in the USA are living with HIV, with over 34,000 new HIV diagnoses in 2019.2 Although the rate of new HIV diagnoses has decreased since its peak in the mid-1980s, the rate of decline has plateaued and become increasingly concentrated among minority populations, such as black/African American and Hispanic/Latino persons, men who have sex with men, transgender individuals and people who inject drugs.3 Although there is no cure or vaccine for HIV, prevention tools, such as pre-exposure prophylaxis (PrEP), routine testing and linkage to care programmes and prompt, sustained treatment options for viral suppression markedly reduce new infections, mortality and morbidity. Despite effective prevention and
treatment innovations across the continuum of care, as well as guidelines provided by the Centers for Disease Control and Prevention (CDC). Discrepancies exist in implementation, limiting the progress towards ending the HIV epidemic (EHE) in the USA. For example, only around 25% of the 1.2 million people who are indicated for PrEP treatment are receiving it and rates are even lower in many key populations. To achieve the goals laid out in the EHE initiative—which include increasing PrEP coverage to 50%, reducing new HIV infections by 75%, linking 95% of HIV infected persons to care within 1 month of diagnosis and increasing viral suppression among diagnosed people to 95%—it is imperative to use implementation science to generate knowledge, guide practice and expand the sustained use of effective prevention and treatment interventions particularly among priority populations.

Contextual factors that influence implementation success are referred to as implementation determinants, often called barriers and facilitators. Multiple studies have examined barriers to HIV prevention and care at the provider and patient levels. Classifying determinants using a comprehensive implementation framework, such as the Consolidated Framework for Implementation Research (CFIR), is potentially useful to establish generalisable knowledge about common or critical determinants using a standard nomenclature. Although identifying determinants is an important first step, developing effective strategies to precisely address barriers and leverage facilitators is what implementation scientists hope will lead to improved implementation outcomes on such metrics as reach, adoption, fidelity and sustained delivery of HIV preventive and care practices. Implementation strategies are the methods or techniques used to enhance the implementation of clinical programs. Examples drawing from the widely used Expert Recommendations for Implementing Change (ERIC) taxonomy include changing infrastructure to make testing easier or using evaluative and iterative techniques (eg, audit and feedback).

Selecting and testing implementation strategies for specified, multilevel determinants can aid in achieving EHE goals. However, this is not currently being done; a recent review that sought to identify the extent to which implementation science was incorporated into HIV-related prevention and treatment interventions found that, among 39 included articles, none incorporated an implementation framework. This may limit the ability to link findings to the larger implementation science literature on strategies that can overcome barriers and build on facilitators, and indicates that researchers may not be considering the ultimate wide-scale implementation of their innovative approaches. Furthermore, an important part of the EHE initiative is to find and scale up strategies that achieve equity and address the social and structural determinants of health.

A recent mapping review of over 200 HIV-related implementation research studies funded by the US National Institutes of Health (NIH) found that around half were ‘implementation preparation’, studies, defined as studies in preparation for a formal prospective evaluation or test of implementation strategies. These studies most often focused on understanding determinants and developing and piloting implementation strategies without formal testing. The other half met NIH’s definition of ‘implementation research’, which consisted of a formal evaluation or test of the impact of implementation strategies on implementation or health outcomes. Given this near even split, a comprehensive review of the literature regarding implementation determinants and strategies across the continuum of HIV prevention and care in the USA is appropriate and needed to enhance current knowledge and achieve the goals laid out in the EHE plan. Therefore, our aim is to conduct three separate systematic reviews drawn from a broad database search to synthesise the extant HIV implementation literature and categorise (A) the multilevel determinants according to the updated CFIR 2.0 and (B) the implementation strategies that have been evaluated to effect implementation outcomes in line with established guidelines.

Before we began, we registered our initial protocol focused on all HIV interventions on PROSPERO. As part of a larger initiative of multiple systematic reviews, one PrEP-focused determinants only paper has been published following this protocol. While conducting that review and embarking on the next ones for PrEP strategies and HIV testing and linkage determinants and strategies, we were able to further refine the specific coding methods for both determinants and strategies. We present our protocol refinements here to (A) update our approach and (B) help other researchers who may embark on similar studies in the future, the details of which might otherwise get lost in results papers.

**METHODS AND ANALYSIS**

**Retrieval strategies**

Between November 2020 and January 2022, a broad database search strategy (online supplemental file 1) was conducted to capture implementation-related studies along the HIV prevention and care continuum. The protocol for this search is registered with the International Prospective Register of Systematic Reviews (PROSPERO ID: CRD42021233899). A clinical informaticist (author CGG) searched Ovid MEDLINE [1946—19 January 2021], PsycINFO (EBSCOhost) and Web of Science (Clarivate Analytics) [2007—2021] for peer-reviewed articles published in English. A total of 20,265 unique records were identified through a database search. From this broad search, we plan to conduct three separate systematic reviews. These reviews will identify both determinants and strategies associated with three HIV focus areas: (A) PrEP, (B) HIV testing/diagnosing and linkage to care, and (C) HIV treatment. Each review will be conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.
Screening and eligibility criteria

To identify articles, we will use a multiphase screening process. First, semiautomated computerised study exclusion procedures using text mining and natural language processing will exclude records that (A) were not conducted in the USA, (B) were conducted prior to the year 2000, (C) were not written in English, (D) were not related to HIV/AIDS, (E) were not focused on outcomes related to dissemination and implementation (ie, did not test/evaluate/explore implementation determinants or strategies) and (F) were not behavioural studies (ie, were basic science focused related to studying efficacy or effectiveness of particular HIV tests rather than focused on implementation or behaviour change). To complete this, a dictionary with sets of specific keywords for each of the inclusion/exclusion criteria will be created. A final set of keywords unique to the HIV prevention, testing/linkage and treatment study will be used to further pare down the database. Text mining procedures will be applied to extract counts and quantitatively characterise each record in the dataset. Based on extracted information about title and abstract, heuristic rules and machine learning will be trained as machine classifiers for each of the four criteria above (eg, domestic, HIV related, implementation outcomes, behavioural). For instance, records containing any exclusionary terms and zero inclusionary terms will be removed. This semiautomated process will be tested against human coders for reliability until reliability estimates reach >90% sensitivity and specificity. We will use a stratified sampling procedure to randomly select records and test each of the four machine classifiers.

After computerised exclusions, a team of trained readers will screen titles and abstracts using Covidence software. Articles will be excluded along the following main criteria: (A) not HIV/AIDS focused, (B) not implementation focused, (C) not original research and (D) not US based. Articles will be excluded if they: conduct basic science research, are protocol articles, opinion, perspective or commentary pieces; studies about research recruitment; or studies solely focused on comorbidities among people with HIV. Two readers will review each record, and discrepancies will be reconciled by team members with more experience with implementation science frameworks, theories and methods. After all articles are screened, a random sample audit of 100 articles will be rescreened with a 5% threshold for misclassification. Readers will also enter the reasons for exclusions of the studies. This will serve as an additional verification, test of accuracy and improvement of the computerised methods. Additionally, these data will further improve the keyword set for subsequent reviews. The improved and tested natural language processing classifiers will be further developed to have a more flexible application depending on the need of the literature review (see the Discussion section).

Review team characteristics and training

Our review team will consist of over 15 individuals who have a mix of bachelors, masters and doctorate level training in implementation science and health research. We will use a stratified leadership model, wherein senior-level researchers (principal investigators) oversee mid-level researchers (faculty and postdocs), who oversee research assistants and coordinators. Ongoing weekly virtual meetings will be held to share concepts, processes and adjust timelines accordingly to individual and collective progress. These meetings will also provide space and opportunity to raise questions about the coding or concepts, contribute to decision making and codebook refinement, and prevent coder drift.

Extraction

Study-level and sample-level data will be extracted using Covidence. The following five broad categories of data will be extracted: (A) study-level variables: author and journal name, year published; (B) sample-level variables: setting(s), geographical location, participants, CDC priority population(s); (C) implementation study design; (D) innovation variables: type of PrEP, HIV testing and/or linkage, or treatment and (E) measurement and dependent variables: data type (ie, quantitative, qualitative, mixed/multi method), data collection method (eg, survey, extraction from the electronic health record (EHR)) and implementation outcomes. Each article will be double-coded with a consensus round conducted by senior researchers. Extraction training will involve synchronous training sessions, followed by assigned practice articles. Intercoder agreement will be conducted until reliability estimates for each pair surpass the 80% threshold and a Cohen’s kappa value of 0.60. After extraction, articles will be categorised into two non-mutually exclusive groups: (A) whether the article was classified as measuring innovation and/or implementation determinants (ie, whether the determinant targeted outcomes related to recipients or deliverers of the innovation) and (B) whether the article was classified as evaluating one or more implementation strategies.

Determinants coding

Studies classified as measuring innovation and/or implementation determinants will be qualitatively coded using MAXQDA. Following CFIR 2.0, determinants that are measured by each study will be coded into one of five domains: inner setting, outer setting, innovation characteristics, individual characteristics and process. Added to the outer setting was a code to capture structural and systemic oppression. Structural oppression was defined as ‘the totality of societal structures and policies that create and maintain inequities by unequally distributing access’. Additional codes include the valence of the determinant (ie, barrier or facilitator); the measurement method (ie, qualitative or quantitative); the type of outcome the determinant influences (ie, implementation outcomes at the provider or system level or innovation
outcomes at the recipient or patient level),\textsuperscript{15} and the HIV-related innovation the determinant effects (ie, testing, linkage to care, PrEP, treatment). Coder training will be conducted until coders are able to reliably apply codes to passages according to established reliability guidelines.\textsuperscript{27} Our full determinants codebook is presented in online supplemental file 2. Operational definitions for codes presented were adapted from CFIR 2.0.\textsuperscript{16}

Strategies coding
Studies classified as evaluating implementation strategies will be tabulated and coded in Microsoft Excel. The coding scheme was developed through an iterative refinement process and includes the following categories: (A) strategy structure, which delineates the discrete practices or components of strategies used to effect implementation outcomes; (B) the ERIC domain and construct associated with each discrete strategy,\textsuperscript{19} (C) the measured implementation outcome(s),\textsuperscript{23} (D) the study design\textsuperscript{26} and (E) the extent to which strategy specification was adequately provided.\textsuperscript{28} Additionally, we will capture whether the study had a health disparities or health equity focus. This code was informed by extant literature on measuring equity.\textsuperscript{30–32} It involved classifying the study as (A) not having a health disparities or equity focus; (B) identifying a health disparity through the study, (C) conducting an implementation trial among a CDC priority population or within a particular community or (D) the study compared the effectiveness of a strategy between a CDC priority population and a general population. Finally, we classified structural interventions according to the taxonomy developed by Sipe and colleagues.\textsuperscript{33} Our full strategies codebook with operational definitions is available as online supplemental file 3.

Due to the complexity of coding, each article will be coded in Excel by two independent coders, and consensus will be reached for each article. If consensus cannot be reached, a third reviewer with advanced expertise will be brought in to make an executive decision. Once consensus is achieved for each article, a data manager will transfer the data to a main file.

Analyses
Summary statistics of determinants and strategies will be synthesised and presented in planned manuscripts according to the categories detailed above. Additional qualitative analyses are planned to further elucidate themes among particular priority populations and within and across implementation settings.

Patient and public involvement
In line with the EHE’s mandate for partnerships to be formed between HIV treatment and service providers and academic researchers, the output from these systematic reviews will be reviewed by 12 HIV treatment and service professionals that serve as expert implementation practice consultants to the primary sponsored award supporting this work. Aply named the Community and Implementation Practice committee (CIPC), these expert advisers represent the following sectors: consumers of HIV services, an HIV treatment and services community-based organisation, a state HIV services planning committee, state health departments, national HIV services technical assistance providers, a federal agency and the national Centre for AIDS Research community advisory board coalition (N3C). The CIPC informs the selection, packaging and dissemination of best practice implementation strategies that support evidence-based HIV prevention and treatment interventions. As expert consultants, CIPC that are eligible to receive compensation for their knowledge and time do so at the same hourly rate that investigators are paid for contributing to this sponsored research project. The CIPC has an integral role in the pathway to generalisable knowledge of EHE sponsored research funding.

Ethics and dissemination
Ethics approval is not applicable for this study since no original data will be collected. Results from these three reviews will be disseminated through peer-reviewed publication and conference presentations. Furthermore, the results will be hosted on a publicly available, interactive web-based tool on the ISCI Website: https://hivmpsci.northwestern.edu/dashboard/. As reviews are being finalised, searches will be updated to ensure that results are as include the current state of the literature.

Additionally, we will share the computationally intensive resources and tools developed in these reviews. For instance, starting with the same dataset, the four machine classifiers will require a development of standalone software. This software will have the flexibility to either update the systematic review to newer years of publication, or different inclusion/exclusion criteria. Other tools were developed that included algorithms based on heuristics and machine learning that can be adapted to answer different aspects of the literature review. The four machine classifiers will require a development of standalone software. This software will have the flexibility to either update the systematic review to newer years of publication, or different inclusion/exclusion criteria. For instance, starting with the same dataset, if the review requires a different geographical region (eg, sub-Saharan Africa) or a different stage of the HIV care cascade (eg, linkage and retention), the machine classifier related to geography or HIV cascade stage will be adjusted. The end goal is to have a standalone software that can be used by the research community.

DISCUSSION
Although the HIV implementation literature is nascent, recent reviews indicate that a synthesis of determinants and strategies is appropriate and needed to advance the goals of the EHE initiative. This series of systematic
reviews will provide researchers and practitioners with a database of determinants identified and strategies tested among which populations and in which settings along the HIV continuum. This will allow researchers to focus their efforts by knowing which determinants have been identified that can aid in the development of new and precise implementation strategies. It will also allow practitioners and quality improvement specialists to make changes to their service settings to not only improve implementation, but to emphasise reaching priority populations, reducing health disparities and addressing the social and structural determinants of health. We will achieve this by using rigorous methodology via PRISMA and reporting in accordance with established guidelines from the broader implementation science field. We are also practising open science by making our results accessible in a way that they can be used by others via the free online tool. We also plan to use this review as a foundation for identifying best practice strategies that should be supported for further dissemination. Our search was limited to published literature indexed in one of the databases searched, therefore, publication bias may be present in our findings and should be taken into consideration when interpreting the findings of the planned reviews.

Correction notice This article has been corrected since it was published.

Provenance and peer review statement has been updated.

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