Open Forum Infectious Diseases

REVIEW ARTICLE

Interventions for Integrating Behavioral Health Services Into HIV Clinical Care: A Narrative Review

Hilary Goldhammer,[1,©] Linda G. Marc,[1,2] Nicole S. Chavis,[3] Demetrios Psihopaidas,[3] Massah Massaquoi,[1] Sean Cahill,[1,4,5] Hannah Bryant,[6] Beth Bourdeau,[7] Kenneth H. Mayer,[1,2,8] Stacy M. Cohen,[3] and Alex S. Keuroghlian[1,9]

[1]The Fenway Institute, Fenway Health, Boston, Massachusetts, USA, [2]Harvard T. H. Chan School of Public Health, Boston, Massachusetts, USA, [3]HIV/AIDS Bureau, Health Resources and Services Administration, Rockville, Maryland, USA, [4]Boston University School of Public Health, Boston, Massachusetts, USA, [5]Bouve College of Health Sciences, Northeastern University, Boston, Massachusetts, USA, [6]AIDS United, Washington, District of Columbia, USA, [7]Center for AIDS Prevention Studies, Division of Prevention Science, University of California, San Francisco, San Francisco, California, USA, [8]Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts, USA, and [9]Department of Psychiatry, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts, USA

The integration of behavioral health services within human immunodeficiency virus (HIV) care settings holds promise for improving substance use, mental health, and HIV-related health outcomes for people with HIV. As part of an initiative funded by the Health Resources and Services Administration's HIV/AIDS Bureau, we conducted a narrative review of interventions focused on behavioral health integration (BHI) in HIV care in the United States (US). Our literature search yielded 19 intervention studies published between 2010 and 2021. We categorized the interventions under 6 approaches: collaborative care; screening, brief intervention, and referral to treatment (SBIRT); patient-reported outcomes (PROs); onsite psychological consultation; integration of addiction specialists; and integration of buprenorphine/naloxone (BUP/NX) treatment. All intervention approaches appeared feasible to implement in diverse HIV care settings and most showed improvements in behavioral health outcomes; however, measurement of HIV outcomes was limited. Future research studies of BHI interventions should evaluate HIV outcomes and assess facilitators and barriers to intervention uptake.

Keywords. addiction medicine; behavioral medicine; delivery of healthcare; HIV; integrated; mental health.

People with HIV experience a high prevalence of depression and anxiety, substance use disorders, and posttraumatic stress disorder [1–4], yet few receive sufficient treatment [5, 6]. Not only do untreated and poorly managed mental health and substance use disorders (hereby referred to as behavioral health problems) detrimentally affect quality of life, they also lower a person's capacity to engage and stay in HIV care, adhere to antiretroviral therapy (ART), and achieve durable viral suppression [7–10]. Effective treatment for behavioral health problems, however, can significantly increase achievement of viral suppression, making it an important tool for preventing HIV transmission and ending the HIV epidemic [11–13].

HIV has become a chronic infectious disease, allowing its treatment and management to occur in both primary and specialty care settings [14]. This shift presents an opportunity to integrate behavioral health services into standard HIV medical care. Among patients receiving treatment for other chronic diseases, such as diabetes, integrating behavioral health services with primary care, also referred to as behavioral health integration (BHI), has been shown to improve behavioral health outcomes and, in a more limited number of studies, physical health outcomes [15–17]. Similarly, people with HIV may experience improvements in both behavioral health and HIV-related outcomes from BHI programs [18, 19]. Process-related benefits of BHI include improved workflow, reduced wait times, and streamlined communication among providers [20].

For this review, we surveyed and synthesized the literature on BHI interventions to describe the range of approaches being applied, the feasibility of adapting approaches in different HIV care settings, and the interventions' effects on behavioral health and HIV outcomes. Although we used a systematic approach to select articles for this review, we chose to conduct a narrative review of the articles in order to highlight themes and trends across BHI research in HIV care settings. We found that the literature was not robust enough to conduct a systematic review that could answer a specific research question or lead to a recommendation of best practices. In addition, due to the diversity of healthcare systems across the globe, we focused the review on US interventions only. HIV and behavioral health services in the US tend to occur in separate locations without any formal

Received 26 March 2022; editorial decision 18 July 2022; accepted 25 July 2022; published online 26 July 2022

Correspondence: Alex S. Keuroghlian, MD, The Fenway Institute, Fenway Health, 1340 Boylston St, Boston, MA 02215, USA (akeuroghlian@partners.org).

Open Forum Infectious Diseases®

https://doi.org/10.1093/ofid/ofac365

relationship to each other, creating barriers to navigating and accessing care [21]. Achieving BHI in the US is thus desirable [20, 22]. Although healthcare systems differ among nations, many of the lessons from the US can be applied to support BHI in HIV care globally [23].

Definitions for BHI vary considerably. For this review, we defined BHI as an organization-wide system that addresses 1 or more behavioral health problems through the collaboration of co-located behavioral health and HIV care providers, or through the routine delivery of a behavioral health intervention by a HIV primary care team. By limiting the definition to systems-level integration, we aimed to better understand the feasibility of broader BHI approaches in "real-world" clinical care contexts. Such findings tell us more about the kinds of interventions that may be ready for replication and scale-up, a critical goal for helping to end the HIV epidemic.

This work is part of the Ryan White HIV/AIDS Program Part F Special Projects of National Significance Program entitled Using Evidence-Informed Interventions to Improve Health Outcomes Among People Living With HIV (E2i), a 4-year initiative (2017–2021) funded by the Health Resources and Services Administration's HIV/AIDS Bureau of the US Department of Health and Human Services. This initiative supported the translation of effective interventions into HIV service organizations to eliminate HIV health disparities for priority populations, including people with behavioral health problems. The E2i initiative identified 3 BHI interventions, piloted their implementation, and is disseminating findings and multimedia toolkits to promote rapid replication of the interventions in HIV service organizations nationally [24–26].

SEARCH STRATEGY AND SELECTION CRITERIA

We searched PubMed and PsycINFO databases for peer-reviewed articles published between 1 January 2010 and 31 December 2021, using combinations of the following terms in the title or abstract fields: "HIV," "intervention," "integrated care," "mental health," "depression," "substance," "SBIRT," "collaborative care," "behavioral health," "opioid," and "drug use." Eligible studies met all of the following criteria: (1) sample consisted of 100% people with HIV or results were stratified by HIV status; (2) setting provided HIV medical care; (3) intervention addressed 1 or more behavioral health problems through an organization-wide system change; (4) study presented quantitative data on 1 or more of the following: (a) HIV care outcomes (engagement and retention in care, medication adherence, and viral suppression), (b) mental health or substance use disorder outcomes (excluding tobacco use), or (c) process outcomes related to implementation; and (5) study was conducted in the US.

BHI APPROACHES

Our search yielded 19 BHI studies that we grouped under 6 approaches: (1) collaborative care; (2) SBIRT; (3) PROs; (4) onsite psychological consultation; (5) integration of addiction specialists; and (6) integration of BUP/NX treatment. Table 1 displays intervention descriptions, sample demographics, settings, and primary implementation, behavioral health, and HIV outcomes.

Collaborative Care

Collaborative care is an integrated approach for treating depression and other common mental health disorders in primary care that has been studied in a diversity of populations [48–50]. A typical collaborative care team consists of a behavioral healthcare manager who delivers psychoeducation and measures improvement in symptoms, a primary care provider who prescribes psychotropic medications, and a consulting psychiatrist who advises the team via meetings, a patient registry, and electronic health records (EHRs) [50].

Our search found 5 studies of collaborative care for people with HIV and co-occurring depression [27–32]. The studies took place in a range of settings, including academic medical centers [31], a large urban HIV primary care clinic, a tertiary hospital infectious disease (ID) clinic with a co-located psychiatric consultation service [27], and via telehealth at Veterans Health Administration (VHA) clinics. To adapt collaborative care for people with HIV, the implementers used a variety of strategies. For example, the intervention by Pence et al added motivational interviewing sessions focused on improving adherence to ART [31] and developed a treatment algorithm with antidepressant medications that do not interact with HIV medications [31, 51]. The Lavakumar et al [29] and Gunzler et al [28] intervention added a mandatory training for providers on trauma and its relationship to depression and care engagement. Recognizing that bipolar disorder also disproportionately affects people with HIV [52], the implementers also adapted the intervention by assessing and treating patients with moderate to severe depression for bipolar disorder, as reported in Kruzer et al [30].

Pyne et al developed a telehealth collaborative care program with a web-based decision support system for 3 geographically dispersed VHA clinics [32, 53]. To address the high prevalence of comorbid substance use disorders among people with HIV, the behavioral healthcare manager also conducted SBIRT for alcohol and drug use with each patient [54]. Additionally, this intervention added a pharmacist to the care team to help select antidepressants less likely to cause interactions with HIV medications [32].

All studies except the Coleman et al [27] intervention reported achieving full implementation and integration of collaborative care. Ancillary studies also reported patient and provider

Table 1. Interventions That Integrate Behavioral Health Services Into HIV Care Settings in the United States, 2010–2021

Authors, Year	Description	Study Design, Sample, and Setting	HIV-Related Outcomes[a]	Clinical Behavioral Health Outcomes[a]	Process Outcomes
Collaborative care					
Coleman et al, 2012 [27]	HIV physicians referred patients with suspected depression to co-located psychiatric consultation team; HIV and psychiatric teams shared EHR notes and conducted monthly case reviews	• Pre/post • n = 124 with depression • 84% male; mean age 43 y • Hospital-based ID clinic	Patients showed improvements in viral load and CD4 count	Patients showed reductions in depression severity	Not measured
Gunzler et al, 2020 [28]; Lavakumar et al, 2020 [29]	Annual depression screening; measurement-based, stepped care; weekly case consultation between behavioral healthcare manager and psychiatrist	• Pre/post • n = 416 with depression • 72% male; 48% Black, 42% White; age not reported • HIV primary care clinic in academic medical center	Not measured	Patients showed improvements in depression symptoms	Not measured
Kruzer et al, 2020 [30] (substudy of Gunzler et al, 2020 [28])	Patients with moderate to severe depression assessed for bipolar disorder; care manager recommended medications; complex patients referred to psychiatric consultation	• Pilot, retrospective review • n = 24 with bipolar disorder • 75% male; 50% White, 37.5% Black; mean age 44.5 y	Not measured	Not measured	Collaborative care was associated with linkage to psychiatric care and increases in detecting bipolar disorder and initiating treatment
Pence et al, 2015 [31]	Annual depression screening; measurement-based care; web-based patient registry; group supervision and quality monitoring by psychiatric consultant; 3 MI sessions on ART adherence	• RCT • n = 149 intervention, n = 155 usual care • 75% male; 56% Black; mean age 43 y • 4 ID clinics in academic medical centers	No group differences were found in ART adherence, retention, viral load, CD4 count, or HIV-related symptoms	The intervention was associated with lower depression severity and suicidal ideation, and higher depression remission at 6 mo but not 12 mo	Not measured
Pyne et al, 2011 [32]	Centralized care team (depression care manager, psychiatrist, and pharmacist) collaborated remotely with local HIV providers via EHR notes; telehealth-delivered measurement-based, stepped care; SBIRT for alcohol use	• RCT • n = 123 intervention, n = 126 usual care • 97% male; 63% Black; mean age 50 y • 3 VHA HIV clinics	The intervention was associated with lower HIV symptom severity at 12 mo; no group differences were found in ART adherence	The intervention was associated with depression treatment response and remission at 6 mo but not 12 mo	Collaborative care did not increase total workload for primary care or mental health providers
Screening, brief intervention, and referral to treatment					
Dawson-Rose et al, 2017 [33]	Self-administered, web-based assessment for alcohol and drug use linked with the EHR, followed by brief, interactive, motivational intervention tailored to severity of use; moderate-risk patients received links to resources, high-risk patients referred to onsite social worker with dedicated hours	• RCT • n = 96 web-based SBIRT, n = 112 clinician-delivered SBIRT • 67% male; 40% Black; mean age 45 y • HIV primary care clinic	Not measured	No group differences were found; patients in both groups combined who had moderate- to high-risk substance use showed reductions in use at 6 mo; patients with lower-risk substance use showed increases in use at 6 mo	In web-based SBIRT, 41% of enrolled patients completed SBI; 0 of 24 patients who received referrals met with social worker. In clinician-delivered SBIRT, 85% of enrolled patients completed SBI; 4 of 71 referred patients met with social worker
Graham et al, 2016 [34]	SBIRT for alcohol and drug use delivered to all patients during routine medical care by a dedicated bilingual educator trained in MI	• Descriptive study • n = 241 • 75% male; 71% White, 24% Hispanic • HIV safety-net clinic	Not measured	The percentage of patients reporting alcohol and drug use remained stable over 6 y, except methamphetamine, which trended upward (statistical significance not measured)	Penetration of SBIRT increased over time; 90% of patients were screened and 91% of positive screens received a BI in year 6

Table 1. Continued

Authors, Year	Description	Study Design, Sample, and Setting	HIV-Related Outcomes[a]	Clinical Behavioral Health Outcomes[a]	Process Outcomes
McCaul et al, 2021 [35]	Alcohol use screening during routine care; patients with positive screens invited to complete on a tablet two 20-minute BI sessions delivered by an avatar; sessions tailored to drinking severity; included HIV-specific content	• Nonrandomized implementation study • n = 537 invited, n = 279 not invited • 82% male; 47% Black, 43% White; median age 45 y • 2 HIV clinics	No pre/post changes and no group differences were found for viral suppression	Patient engagement in at least 1 BI session was associated with reduction in drinks per week	42% of invited patients enrolled; of these, 78% participated in at least 1 session; 44% completed both sessions
Satre et al, 2019 [36]	Alcohol use screening followed by either (1) physician-delivered advice and referral to in-house addiction services; (2) SBIRT plus a psychologist-led 45-minute MI session and two 20-minute telephone sessions; or (3) SBIRT plus personalized EF by psychologist, with referral to online resources or addiction treatment; MI and EF also included ART adherence information	• RCT • n = 209 SBIRT, n = 201 SBIRT + MI, n = 204 SBIRT + EF • 97% male; 63% White; mean age 49 y • HIV primary care clinic	No group differences were found in ART adherence or viral suppression	No group differences were found in unhealthy alcohol use or alcohol-related problems; patients in all 3 groups showed declines in unhealthy alcohol use and alcohol-related problems at 12 mo	Not measured
Williams et al, 2017 [37]	Primary care providers received EHR alerts to screen annually for unhealthy alcohol use and give advice to reduce or abstain from drinking within 14 d of a positive screen	• Retrospective cohort study • n = 1618 received BI, n = 483 no BI received • 98% male; 56% Black, 36% White, 10% Hispanic; 74% aged 45–64 y • VHA outpatient clinics	Not measured	No group differences were found in resolution of unhealthy alcohol use	77% of patients with an initial positive screen received a BI
Patient-reported outcomes					
Crane et al, 2017 [38]	Prior to routine HIV care visit, patients completed touch-screen mental health and substance use assessments (PROs); providers automatically received PRO results; providers created action plans with patients	• Pre/post • n = 722 • 85% male; 60% White, 21% Black, 12% Hispanic; mean age 43 y • HIV clinic in academic medical center	Not measured	Not measured	Providers were significantly more likely to document depression, at-risk alcohol use, and at-risk substance use, and to document action on depression and ART adherence
Jabour et al, 2021 [39]	Patients with positive PROs were asked to prioritize an issue prior to visit; providers automatically received PRO results along with recommendations tailored to priority issue; providers created action plans with patients	• Quasi-experimental pilot study • n = 32 intervention, n = 38 historic control • 61.4% male; 82.9% Black; mean age 52 y • HIV clinic in academic medical center	Not measured	Not measured	The intervention was associated with patients raising a behavioral health issue with their provider and with having a documented action plan
Schumacher et al, 2013 [40]	Patients with positive PROs for depression referred to onsite mental health services, eg, psychiatric assessment, psychotherapy, and pharmacotherapy	• Pre/post • n = 152 • 79% male; 52% Black or "other" race • HIV clinic in academic medical center	Not measured	An increase in the number of depression treatment visits was associated with a decrease in depression severity	100% of patients with depression received a referral; 46% of those patients received depression treatment
Onsite psychological consultation					

Table 1. Continued

Authors, Year	Description	Study Design, Sample, and Setting	HIV-Related Outcomes[a]	Clinical Behavioral Health Outcomes[a]	Process Outcomes
Bottonari and Stepleman, 2010 [41]	At each visit, patients asked if wanted onsite psychological consult; consults included screening, addressed presenting concern, and provided psychoeducation, follow-up plans, and referral for onsite specialized behavioral healthcare	• Retrospective study • n = 963 • 62% male; 75% "racial minority"; 49% aged 25–44 y • ID clinic in academic medical center	Not measured	Not measured	26% of patients received a behavioral health consult over 1 y; 43% of those patients received specialized psychiatric care; receiving care was associated with being White
Integration of addiction specialists					
Proeschold-Bell et al, 2010 [42]	Co-located addiction specialist at all sites; 1 site fully integrated the addiction specialist into the primary care team; all sites provided individual and group therapy, assertive patient outreach, and ART adherence counseling	• Pre/post • n = 286 • 62% male; 80% Black, 14% White; mean age 43 y • 2 ID clinics in academic medical centers and 1 community health center	Not measured	Patients showed reductions in drug use severity and alcohol use severity at 12 mo; there were no differences in substance use outcomes among sites	Not measured
Walley et al, 2015 [43]	Patients with SUD offered addiction treatment during weekly half-day clinics by a team of physician, nurse, and addiction counselor; treatment included primary care, counseling, medication-assisted treatment, case management, wrap-around services, and referral to additional SUD treatment	• Pre/post • n = 154 • 61% male; 37% Hispanic, 29% Black, 27% White; mean age 45 y • HIV primary care clinic	Not measured	Patient substance use dependence decreased at 6 mo; BUP/NX treatment was associated with this decrease	66% of patients engaged in addiction treatment, primarily BUP/NX
Integration of BUP/NX treatment					
Altice et al, 2011 [44]; Fiellin et al, 2011 [45]	Ten demonstration sites integrated BUP/NX prescription and monitoring into HIV medical care as part of a national initiative; sites also offered addiction counseling and case management	• Pre/postintervention with comparison groups • n = 303 for opioid outcomes, n = 295 for HIV outcomes • 68% male; 51% Black; mean age 45 y • Health centers, ID clinics, and 1 ID research center (10 sites)	Initiation of BUP/NX was associated with ART prescription and improvement in CD4 counts; longer retention on BUP/NX was associated with higher viral suppression among patients not on ART at baseline	Among retained BUP/NX patients, past-month opioid use decreased for each quarter in treatment	Integration was feasible and acceptable to patients and providers in 9 of 10 demonstration sites
Lucas et al, 2010 [46] (substudy of Altice et al, 2011 [44])	Patients received BUP/NX treatment from a waivered physician, and counseling from a licensed practical nurse who also managed the program	• RCT • n = 46 patients who received office-based BUP/NX, n = 47 patients referred to external treatment • 72% male; 98% Black; median age 45 y HIV clinic	Patient receipt of BUP/NX was associated with retention in HIV care at 12 mo; no group differences were found in ART prescription, viral load, or CD4 count	Patient receipt of BUP/NX was associated with more frequent abstinence from opioids and cocaine	Office-based BUP/NX was associated with uptake of opioid agonist therapy compared to referral to external treatment

Table 1. Continued

Authors, Year	Description	Study Design, Sample, and Setting	HIV-Related Outcomes[a]	Clinical Behavioral Health Outcomes[a]	Process Outcomes
Tetrault et al, 2012 [47] (substudy of Altice et al, 2011 [44])	Patients received integrated, office-based BUP/NX with either: standard PM with biweekly 15-min, manual-guided, medically focused counseling; or PM plus weekly 45-min enhanced medical management of nurse-led, manual-guided counseling on drug use and ART adherence	• RCT • n = 25 PM, n = 22 PM + EMM • 83% male; 57% White; mean age 47 y • HIV primary care clinic	Both groups showed an increase in viral suppression at 12 wk; no group differences were found in ART adherence or viral suppression	Both groups showed increases in opioid abstinence at 12 wk; no group differences were found in opioid use outcomes	It was feasible to add additional counseling to office-based BUP/NX

Abbreviations: ART, antiretroviral treatment; BI, brief intervention; BUP/NX, buprenorphine/naloxone; EF, emailed feedback; EHR, electronic health record; HIV, human immunodeficiency virus; ID, infectious diseases; MI, motivational interviewing; PM, physician management; PROs, patient-reported outcomes; RCT, randomized controlled trial; SBI, screening and brief intervention; SBIRT, screening, brief intervention, and referral to treatment; SUD, substance use disorder; VHA, Veterans Health Administration.

[a]Statistically significant outcomes.

acceptability and satisfaction [55–57], and the telehealth intervention was found to be cost effective [58]. Due to reported resource constraints of the Coleman et al intervention, patients were referred directly to the psychiatric consultation service, rather than working with a behavioral healthcare manager, and some patients had their treatment managed by the psychiatric team, rather than the ID team [27]. Barriers encountered during implementation by the other interventions included not having enough staff to meet demand, low health literacy among patients, and difficulty maintaining phone contact with patients [29, 31, 59]. Lavakumar et al also reported lower response to treatment among patients with substance use disorders and psychiatric comorbidities [29].

Screening, Brief Intervention, and Referral to Treatment

Like collaborative care, SBIRT is an evidence-based approach developed for general primary care populations that has since been studied in a diversity of populations and settings [60, 61]. The SBIRT approach involves screening for substance use risk, providing a brief intervention to raise awareness of substance use patterns and set goals to decrease use, and referral for specialized addiction care as needed [62, 63]. SBIRT providers in the US often use a motivational interviewing approach during the brief intervention [64].

We found 5 studies of SBIRT interventions in HIV care settings [33–37]. The studies took place in a small, semirural Ryan White HIV/AIDS Program clinic [34], large urban hospital-based clinics [33], HIV primary care centers [35, 36], and the national network of VHA outpatient clinics [37]. To adapt SBIRT for people with HIV, McCaul et al [35] and Satre et al [36] incorporated information on the effects of substance use on HIV-related health outcomes. The Satre et al study also tested the addition of motivational interviewing and emailed feedback to the brief intervention. Dawson-Rose et al [33] and McCaul et al [35] developed computer-based interventions to improve fidelity to the original intervention and minimize HIV clinician burden. The other studies did not discuss modifications of SBIRT for people with HIV [34, 37].

With regard to feasibility, the interventions delivered directly by providers had very high participation and completion rates, whereas the computer-based interventions had much lower rates [33, 35]. The difference may relate to process flow. In the computer-based interventions, staff asked patients if they wanted to participate, and participants needed to add time to their visit. In contrast, provider-delivered SBIRT seamlessly integrated the intervention into the visit. Additionally, the Williams et al study prompted providers via EHR alerts to deliver the intervention [37]. McCaul et al argued, however, that the computer-based intervention still reached the people who needed the intervention most, thus demonstrating usefulness and acceptability [35, 65].

Only 1 study measured patient follow-through on referrals to treatment; they found very low appointment adherence despite having an onsite addiction specialist with dedicated hours for referrals [33]. This finding is consistent with the literature. People with HIV do not readily access substance use treatment due to stigma, lack of childcare, and untreated psychiatric disorders [6]. SBIRT programs may need to add incentives, warm handoffs, transportation, childcare, and other support services to encourage access to treatment.

Patient-Reported Outcomes

Patient-reported outcomes (PROs) represent a system of universal screening wherein patients complete assessments, often via touch-screen computers or tablets, and results are immediately reported to the provider through a printout or EHR notes. Unlike SBIRT, which focuses solely on the patient's substance use, PROs capture a range of measures appropriate for a

specific population, such as substance use, mental health, and quality of life. PROs tailored for people with HIV typically consist of a battery of assessments for depression, anxiety, alcohol use, drug use, ART adherence, and other clinical domains relevant to HIV [66]. Concurrent assessment of mental health and substance use among people with HIV is logical, given the high prevalence of comorbidities [6]. Every 4–6 months, patients complete PROs measures while waiting for routine HIV care. After automatically receiving the assessment scores, providers are expected to take action through discussions, referrals, or prescriptions [38–40].

We found 3 studies reporting on PROs implementation. All studies took place in academic medical center HIV clinics [38–40]. PROs became well-integrated into clinical workflows, had high patient engagement, and were associated with improvements in documented actions to address patient behavioral health problems. The pilot study by Jabour et al adapted PROs by adding recommendations to the provider's assessment report to support clinical decision-making [39]. This study also asked patients with >1 positive assessment score to prioritize an issue in order to increase self-efficacy and engagement in treatment. Compared to historic controls, the intervention was associated with patients raising a behavioral health issue with their provider and having a documented action plan.

Onsite Psychological Consultation

Onsite psychological consultation-liaison service involves having a co-located behavioral health provider in a primary care or specialty setting who provides services by request immediately following a routine appointment [41]. We found 1 study that used this approach [41]. The setting was an ID clinic in a mostly rural area. All patients received a list of issues that the consultation service could address. To destigmatize the service, the list included items such as "family concerns" in addition to mental health concerns. Services were discussion of primary concern, assessment, and referral. About a quarter of patients accessed the service, and nearly half of those patients followed through on referrals, suggesting feasibility and acceptability of the intervention. There were no statistically significant differences by patient race in access to the consultation service; White patients, however, were far more likely to access referrals than Black and Hispanic/Latinx patients, indicating a need for additional interventions to address this disparity.

Integration of Addiction Specialists

Integration of addiction counselors into HIV care settings aims to increase engagement in substance use disorder treatment among people with HIV [42, 43]. We found 2 studies that applied this approach in 4 different settings, including ID clinics [42], an HIV primary care clinic [43], and a community health center [42]. Degree of integration ranged from co-location of the specialists to fully integrated care teams. In addition to addiction counseling, the Proescheld-Bell et al intervention incorporated ART adherence education and other HIV-related topics into counseling [42], and Walley et al provided comprehensive "wrap-around services" and medication-assisted treatment [43, 67]. With regard to process outcomes, Walley et al found high engagement in addiction services, particularly BUP/NX treatment, and Proescheld-Bell et al found that different levels of integration were not associated with reductions in substance use severity.

Integration of BUP/NX Treatment

Integration of BUP/NX treatment in HIV care settings enables institutions to address the interconnected epidemics of HIV and opioid use disorder (OUD). Initiation of BUP/NX not only improves OUD outcomes but also increases the probability of achieving viral suppression [12]. We found 2 evaluations of a multisite initiative and 2 substudies of that initiative examining integration of office-based BUP/NX treatment programs into HIV medical care [44–47]. The composition and roles of treatment teams varied across demonstration sites, but the overall model consisted of BUP/NX prescribers supported by a nonphysician manager who coordinated services and provided counseling, monitoring, and in some instances, case management. All but 1 of the 10 sites demonstrated the feasibility of integrating BUP/NX into a diversity of HIV care settings [44, 68]. In a randomized controlled trial (RCT) substudy, Tetrault et al compared enhanced nurse-led counseling on ART adherence and drug use with a shorter physician counseling session and found no significant differences between groups in either HIV or OUD outcomes [47]. This finding suggests that more intensive counseling is feasible but may not be necessary for positive BUP/NX-related outcomes.

CLINICAL OUTCOMES

As this was a narrative review, we did not assess the methodological quality of the studies. Instead, we looked for trends across interventions with regard to clinical behavioral health and HIV-related outcomes. Despite the wide variety of intervention approaches and study designs, a few themes emerged. First, of the 15 studies that reported clinical behavioral health outcomes, all but 1 found statistically significant improvements over time. The studies with comparison groups, however, displayed more nuance. For example, among the 2 SBIRT studies with usual care comparison groups [35, 37] only 1 observed a statistically significant improvement in unhealthy alcohol use among the intervention group [35]. The lack of effect in the latter study may have been due to providers not receiving SBIRT training [69]. Among the collaborative care studies with control groups, the intervention groups had statistically significant improvements in depression at 6 months, but not at 12 months, suggesting a drop-off in effect [31, 32]. Among the nonalcohol

drug use studies, opioid use [43, 45, 47] and cocaine use [46] were specifically reported to have significant reductions among patients. In particular, BUP/NX interventions had large and statistically significant effects on reducing opioid use among patients who initiated and remained in treatment [45–47].

Only 8 studies (42%) reported HIV-related health outcomes [27, 31, 32, 35, 36, 44, 46, 47]. All BUP/NX studies reported at least 1 statistically significant improvement on an HIV outcome, such as retention in HIV care, initiation of ART, CD4 lymphocyte counts, or viral suppression [44, 46, 47].

While the observational collaborative care study found significant improvements in viral load and CD4 lymphocyte counts over time, the 2 RCT studies did not find statistically significant between-group differences for self-reported HIV medication adherence [31, 32], retention, or viral suppression [31]. The 2 SBIRT studies that measured HIV care-related outcomes were also not associated with viral suppression, despite incorporating information or counseling on ART adherence and other HIV-related factors [35, 36].

IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

The studies found in our literature search used a diversity of integrated approaches to identify and address mental health disorders, substance use disorders, or both. Based on implementation outcomes among the studies, achieving BHI with these approaches appears feasible in a variety of HIV care settings. Furthermore, because several interventions target different outcomes, organizations could conceivably implement >1 of these approaches.

Several gaps in the research remain. First, none of the studies directly addressed methamphetamine addiction, which is nearly as prevalent as OUD among people with HIV and has large adverse effects on HIV-related health outcomes [70]. Second, most interventions separated mental health from substance use screening and intervention. Given the frequency of comorbid psychiatric and substance use disorders among people with HIV, more research on PROs is warranted, as are novel approaches that integrate screening and treatment for all behavioral health problems [6].

Additionally, few interventions measured HIV-related outcomes, and those that did found mostly null results. To understand the impact of BHI on the HIV epidemic, more studies should aim to measure retention in care, medication adherence, and viral suppression. Follow-up for >1 year may also be needed to better detect the effects of BHI interventions on HIV outcomes. It is also possible that addressing behavioral health outcomes may not always be sufficient for improving HIV outcomes [71]. People with HIV contend with multiple structural and enacted stigmas that create inequities in employment, income, housing, and education, and in turn adversely affect HIV outcomes [72]. Although BHI has the potential to reduce several barriers to care rooted in societal inequities, social factors that produce health disparities are not easily remedied. Given the substantial upfront resources needed to implement BHI, organizations may desire more evidence on both behavioral health and HIV outcomes prior to investing in BHI [18, 20, 73].

Finally, future BHI research could benefit from more implementation science research to uncover the mechanisms that produce desired outcomes, or lack thereof. By evaluating process outcomes along with clinical outcomes, implementation science research could help reveal specific facilitators and barriers to the uptake of evidence-based and evidence-informed interventions into "real-world" HIV care settings. The previously described E2i initiative is applying an implementation science framework to support the identification, implementation, evaluation, and adaptation of BHI interventions in HIV service organizations. The findings and lessons learned from this initiative have been incorporated into implementation toolkits to promote the scale-up of effective BHI interventions within the full range of HIV care organizations [24].

Notes

Acknowledgments. The authors thank Victoria L. Wilcox, PhD, for support with the literature search.

Author contributions. H. G. conducted the literature search and wrote the original draft. L. G. M., N. S. C., D. P., S. C., B. B., K. H. M., S. M. C., and A. S. K. guided the manuscript development, and M. M. and H. B. contributed to the analysis of interventions. All authors reviewed the manuscript, provided comments, and helped to edit the manuscript. N. S. C., D. P., and S. M. C. provided regulatory guidance. H. G., A. S. K., N. S. C., and D. P. finalized the manuscript based on comments from all authors and other reviewer feedback.

Disclaimer. The views expressed in this publication are solely the opinions of the authors and do not necessarily reflect the official policies of the US Department of Health and Human Services or the Health Resources and Services Administration, nor does mention of the department or agency names imply endorsement by the US government.

Financial support. This work was supported by the US Department of Health and Human Services, Health Resources and Services Administration (U69HA31067 to A. S. K.).

Potential conflicts of interest. The authors: No reported conflicts of interest.

All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

References

1. Nanni MG, Caruso R, Mitchell AJ, Meggiolaro E, Grassi L. Depression in HIV infected patients: a review. Curr Psychiatry Rep **2015**; 17:530.
2. O'Cleirigh C, Magidson JF, Skeer MR, Mayer KH, Safren SA. Prevalence of psychiatric and substance abuse symptomatology among HIV-infected gay and bisexual men in HIV primary care. Psychosomatics **2015**; 56:470–8.
3. LeGrand S, Reif S, Sullivan K, Murray K, Barlow ML, Whetten K. A review of recent literature on trauma among individuals living with HIV. Curr HIV/AIDS Rep **2015**; 12:397–405.
4. Hartzler B, Dombrowski JC, Crane HM, et al. Prevalence and predictors of substance use disorders among HIV care enrollees in the United States. AIDS Behav **2017**; 21:1138–48.

5. Levy ME, Monroe AK, Horberg MA, et al. Pharmacologic treatment of psychiatric disorders and time with unsuppressed HIV viral load in a clinical HIV cohort. J Acquir Immune Defic Syndr **2019**; 82:329–41.
6. Durvasula R, Miller TR. Substance abuse treatment in persons with HIV/AIDS: challenges in managing triple diagnosis. Behav Med **2014**; 40:43–52.
7. Hoare J, Sevenoaks T, Mtukushe B, Williams T, Heany S, Phillips N. Global systematic review of common mental health disorders in adults living with HIV. Curr HIV/AIDS Rep **2021**; 18:569–80.
8. Azar MM, Springer SA, Meyer JP, Altice FL. A systematic review of the impact of alcohol use disorders on HIV treatment outcomes, adherence to antiretroviral therapy and health care utilization. Drug Alcohol Depend **2010**; 112:178–93.
9. Brezing C, Ferrara M, Freudenreich O. The syndemic illness of HIV and trauma: implications for a trauma-informed model of care. Psychosomatics **2015**; 56: 107–18.
10. Shubber Z, Mills EJ, Nachega JB, et al. Patient-reported barriers to adherence to antiretroviral therapy: a systematic review and meta-analysis. PLoS Med **2016**; 13: e1002183.
11. Sin NL, DiMatteo MR. Depression treatment enhances adherence to antiretroviral therapy: a meta-analysis. Annals of Behavioral Medicine **2014**; 47:259–69.
12. Kim J, Lesko CR, Fojo AT, et al. The effect of buprenorphine on human immunodeficiency virus viral suppression. Clin Infect Dis **2021**; 73:1951–6.
13. Seeman MV. The role of mental health services in addressing HIV infection among women with serious mental illness. Psychiatr Serv **2015**; 66:966–74.
14. Mahungu TW, Rodger AJ, Johnson MA. HIV as a chronic disease. Clin Med (Lond) **2009**; 9:125–8.
15. Atlantis E, Fahey P, Foster J. Collaborative care for comorbid depression and diabetes: a systematic review and meta-analysis. BMJ Open **2014**; 4:e004706.
16. Tully PJ, Baumeister H. Collaborative care for comorbid depression and coronary heart disease: a systematic review and meta-analysis of randomised controlled trials. BMJ Open **2015**; 5:e009128.
17. Butler M, Kane RL, McAlpine D, et al. Integration of mental health/substance abuse and primary care. Evid Rep Technol Assess (Full Rep) **2008**; 173:1–362.
18. Chuah FLH, Haldane VE, Cervero-Liceras F, et al. Interventions and approaches to integrating HIV and mental health services: a systematic review. Health Policy Plan **2017**; 32(Suppl 4):iv27–47.
19. Haldane V, Cervero-Liceras F, Chuah FL, et al. Integrating HIV and substance use services: a systematic review. J Int AIDS Soc **2017**; 20:21585.
20. Ward MC, Miller BF, Marconi VC, Kaslow NJ, Farber EW. The role of behavioral health in optimizing care for complex patients in the primary care setting. J Gen Intern Med **2016**; 31:265–7.
21. Stange KC. The problem of fragmentation and the need for integrative solutions. Ann Fam Med **2009**; 7:100–3.
22. Grazier KL, Smith JE, Song J, Smiley ML. Integration of depression and primary care: barriers to adoption. J Prim Care Community Health **2014**; 5:67–73.
23. Remien RH, Stirratt MJ, Nguyen N, Robbins RN, Pala AN, Mellins CA. Mental health and HIV/AIDS: the need for an integrated response. AIDS **2019**; 33: 1411–20.
24. Marc LG, Goldhammer H, Mayer KH, et al. Rapid implementation of evidence-informed interventions to improve HIV health outcomes among priority populations: the E2i initiative. Public Health Rep **2022**; 137:617–24.
25. Bourdeau B, Shade S, Koester K, et al. Implementation science protocol: evaluating evidence-informed interventions to improve care for people with HIV seen in Ryan White HIV/AIDS program settings. AIDS Care **2021**; 33:1551–9.
26. Goldhammer H, Mayer KH, Marc LG, et al. HIV care continuum interventions for Black men who have sex with men in the USA. Lancet HIV **2021**; 8:e776–86.
27. Coleman SM, Blashill AJ, Gandhi RT, etal. Impact of integrated and measurement-based depression care: clinical experience in an HIV clinic. Psychosomatics **2012**; 53:51–7.
28. Gunzler D, Lewis S, Webel A, et al. Depressive symptom trajectories among people living with HIV in a collaborative care program. AIDS Behav **2020**; 24: 1765–75.
29. Lavakumar M, Lewis S, Webel A, et al. Correlates of depression outcomes in collaborative care for HIV. Gen Hosp Psychiatry **2020**; 66:103–11.
30. Kruzer K, Avery A, Lavakumar M. Collaborative care for bipolar disorder in people living with HIV. Gen Hosp Psychiatry **2020**; 64:117–8.
31. Pence BW, Gaynes BN, Adams JL, et al. The effect of antidepressant treatment on HIV and depression outcomes: results from a randomized trial. AIDS **2015**; 29: 1975–86.
32. Pyne JM, Fortney JC, Curran GM, et al. Effectiveness of collaborative care for depression in human immunodeficiency virus clinics. Arch Intern Med **2011**; 171: 23–31.
33. Dawson-Rose C, Draughon JE, Cuca Y, et al. Changes in specific substance involvement scores among SBIRT recipients in an HIV primary care setting. Addict Sci Clin Pract **2017**; 12:34.
34. Graham LJ, Davis AL, Cook PF, Weber M. Screening, brief intervention, and referral to treatment in a rural Ryan White Part C HIV clinic. AIDS Care **2016**; 28: 508–12.
35. McCaul ME, Hutton HE, Cropsey KL, et al. Decreased alcohol consumption in an implementation study of computerized brief intervention among HIV patients in clinical care. AIDS Behav **2021**; 25:4074–84.
36. Satre DD, Leibowitz AS, Leyden W, et al. Interventions to reduce unhealthy alcohol use among primary care patients with HIV: the Health and Motivation randomized clinical trial. J Gen Intern Med **2019**; 34:2054–61.
37. Williams EC, Lapham GT, Bobb JF, et al. Documented brief intervention not associated with resolution of unhealthy alcohol use one year later among VA patients living with HIV. J Subst Abuse Treat **2017**; 78:8–14.
38. Crane HM, Crane PK, Tufano JT, et al. HIV provider documentation and actions following patient reports of at-risk behaviors and conditions when identified by a web-based point-of-care assessment. AIDS Behav **2017**; 21:3111–21.
39. Jabour SM, Chander G, Riekert KA, et al. The Patient Reported Outcomes as a Clinical Tool (PROACT) pilot study: what can be gained by sharing computerized patient-reported mental health and substance use symptoms with providers in HIV care? AIDS Behav **2021**; 25:2963–72.
40. Schumacher JE, McCullumsmith C, Mugavero MJ, et al. Routine depression screening in an HIV clinic cohort identifies patients with complex psychiatric comorbidities who show significant response to treatment. AIDS Behav **2013**; 17: 2781–91.
41. Bottonari KA, Stepleman LM. Improving access to mental health services via a clinic-wide mental health intervention in a southeastern US infectious disease clinic. AIDS Care **2010**; 22:133–6.
42. Proeschold-Bell RJ, Heine A, Pence BW, McAdam K, Quinlivan EB. A cross-site, comparative effectiveness study of an integrated HIV and substance use treatment program. AIDS Patient Care STDS **2010**; 24:651–8.
43. Walley AY, Palmisano J, Sorensen-Alawad A, et al. Engagement and substance dependence in a primary care-based addiction treatment program for people infected with HIV and people at high-risk for HIV Infection. J Subst Abuse Treat **2015**; 59:59–66.
44. Altice FL, Bruce RD, Lucas GM, et al. HIV treatment outcomes among HIV-infected, opioid-dependent patients receiving buprenorphine/naloxone treatment within HIV clinical care settings: results from a multisite study. J Acquir Immune Defic Syndr **2011**; 56(Suppl 1):S22–32.
45. Fiellin DA, Weiss L, Botsko M, et al. Drug treatment outcomes among HIV-infected opioid-dependent patients receiving buprenorphine/naloxone. J Acquir Immune Defic Syndr **2011**; 56(Suppl 1):S33–38.
46. Lucas GM, Chaudhry A, Hsu J, et al. Clinic-based treatment of opioid-dependent HIV-infected patients versus referral to an opioid treatment program: a randomized trial. Ann Intern Med **2010**; 152:704–11.
47. Tetrault JM, Moore BA, Barry DT, et al. Brief versus extended counseling along with buprenorphine/naloxone for HIV-infected opioid dependent patients. J Subst Abuse Treat **2012**; 43:433–9.
48. Gilbody S, Bower P, Fletcher J, Richards D, Sutton AJ. Collaborative care for depression: a cumulative meta-analysis and review of longer-term outcomes. Arch Intern Med **2006**; 166:2314–21.
49. Thota AB, Sipe TA, Byard GJ, et al. Collaborative care to improve the management of depressive disorders: a community guide systematic review and meta-analysis. Am J Prev Med **2012**; 42:525–38.
50. Unutzer J, Katon W, Callahan CM, et al. Collaborative care management of late-life depression in the primary care setting: a randomized controlled trial. JAMA **2002**; 288:2836–45.
51. Adams JL, Gaynes BN, McGuinness T, Modi R, Willig J, Pence BW. Treating depression within the HIV "medical home": a guided algorithm for antidepressant management by HIV clinicians. AIDS Patient Care STDS **2012**; 26:647–54.
52. Jallow A, Ljunggren G, Wandell P, Wahlstrom L, Carlsson AC. HIV-infection and psychiatric illnesses—a double edged sword that threatens the vision of a contained epidemic: the greater Stockholm HIV cohort study. J Infect **2017**; 74:22–8.
53. Fortney JC, Pyne JM, Steven CA, et al. A web-based clinical decision support system for depression care management. Am J Manag Care **2010**; 16:849–54.
54. Curran GM, Pyne J, Fortney JC, et al. Development and implementation of collaborative care for depression in HIV clinics. AIDS Care **2011**; 23:1626–36.
55. Drummond KL, Painter JT, Curran GM, et al. HIV patient and provider feedback on a telehealth collaborative care for depression intervention. AIDS Care **2017**; 29:290–8.
56. Deen TL, Fortney JC, Pyne JM. Relationship between satisfaction, patient-centered care, adherence and outcomes among patients in a collaborative care trial for depression. Adm Policy Ment Health **2011**; 38:345–55.
57. Fuller SM, Koester KA, Erguera XA, et al. The collaborative care model for HIV and depression: patient perspectives and experiences from a safety-net clinic in the United States. SAGE Open Med **2019**; 7:2050312119842249.

58. Painter JT, Fortney JC, Gifford AL, et al. Cost-effectiveness of collaborative care for depression in HIV clinics. J Acquir Immune Defic Syndr **2015**; 70:377–85.
59. Edwards M, Quinlivan EB, Bess K, et al. Implementation of PHQ-9 depression screening for HIV-infected patients in a real-world setting. J Assoc Nurses AIDS Care **2014**; 25:243–52.
60. Aldridge A, Linford R, Bray J. Substance use outcomes of patients served by a large US implementation of screening, brief intervention and referral to treatment (SBIRT). Addiction **2017**; 112(Suppl 2):43–53.
61. Barata IA, Shandro JR, Montgomery M, et al. Effectiveness of SBIRT for alcohol use disorders in the emergency department: a systematic review. West J Emerg Med **2017**; 18:1143–52.
62. Bray JW, Del Boca FK, McRee BG, Hayashi SW, Babor TF. Screening, brief intervention and referral to treatment (SBIRT): rationale, program overview and cross-site evaluation. Addiction **2017**; 112(Suppl 2):3–11.
63. Babor TF, Del Boca F, Bray JW. Screening, brief intervention and referral to treatment: implications of SAMHSA's SBIRT initiative for substance abuse policy and practice. Addiction **2017**; 112(Suppl 2):110–17.
64. McAfee NW, Schumacher JA, Madson MB, Hurlocker-Villarosa MC, Williams DC. The status of SBIRT training in health professions education: a cross-discipline review and evaluation of SBIRT curricula and educational research [manuscript published online ahead of print 29 March 2022]. Acad Med **2022**. doi: 10.1097/ACM.0000000000004674.
65. Yang C, Crane HM, Cropsey K, et al. Implementation of computer-delivered brief alcohol intervention in HIV clinical settings: who agrees to participate? J Addict Res Ther **2016**; 7:276.
66. Kall M, Marcellin F, Harding R, Lazarus JV, Carrieri P. Patient-reported outcomes to enhance person-centred HIV care. Lancet HIV **2020**; 7:e59–68.
67. Drainoni ML, Farrell C, Sorensen-Alawad A, Palmisano JN, Chaisson C, Walley AY. Patient perspectives of an integrated program of medical care and substance use treatment. AIDS Patient Care STDS **2014**; 28:71–81.
68. Finkelstein R, Netherland J, Sylla L, et al. Policy implications of integrating buprenorphine/naloxone treatment and HIV care. J Acquir Immune Defic Syndr **2011**; 56(Suppl 1):S98–104.
69. Williams EC, Achtmeyer CE, Young JP, et al. Local implementation of alcohol screening and brief intervention at five Veterans Health Administration primary care clinics: perspectives of clinical and administrative staff. J Subst Abuse Treat **2016**; 60:27–35.
70. Garner BR, Gotham HJ, Knudsen HK, et al. The prevalence and negative impacts of substance use disorders among people with HIV in the United States: a real-time delphi survey of key stakeholders. AIDS Behav **2022**; 26:1183–96.
71. Pisu M, Cloud G, Austin S, Raper JL, Stewart KE, Schumacher JE. Substance abuse treatment in an urban HIV clinic: who enrolls and what are the benefits? AIDS Care **2010**; 22:348–54.
72. Turan B, Hatcher AM, Weiser SD, Johnson MO, Rice WS, Turan JM. Framing mechanisms linking HIV-related stigma, adherence to treatment, and health outcomes. Am J Public Health **2017**; 107:863–869.
73. Pence BW, Gaynes BN, Williams Q, et al. Assessing the effect of measurement-based care depression treatment on HIV medication adherence and health outcomes: rationale and design of the SLAM DUNC Study. Contemp Clin Trials **2012**; 33:828–38.