Brief Intervention for Problem Drug Use in Safety-Net Primary Care Settings
A Randomized Clinical Trial

Peter Roy-Byrne, MD; Kristin Bumgardner, BS; Antoinette Krupski, PhD; Chris Dunn, PhD; Richard Ries, MD; Dennis Donovan, PhD; Imaa I. West, MPH; Charles Maynard, PhD; David C. Atkins, PhD; Meredith C. Graves, PhD; Jutta M. Joesch, PhD; Gary A. Zarkin, PhD

IMPORTANCE Although brief intervention is effective for reducing problem alcohol use, few data exist on its effectiveness for reducing problem drug use, a common issue in disadvantaged populations seeking care in safety-net medical settings (hospitals and community health clinics serving low-income patients with limited or no insurance).

OBJECTIVE To determine whether brief intervention improves drug use outcomes compared with enhanced care as usual.

DESIGN, SETTING, AND PARTICIPANTS A randomized clinical trial with blinded assessments at baseline and at 3, 6, 9, and 12 months conducted in 7 safety-net primary care clinics in Washington State. Of 1621 eligible patients reporting any problem drug use in the past 90 days, 868 consented and were randomized between April 2009 and September 2012. Follow-up participation was more than 87% at all points.

INTERVENTIONS Participants received a single brief intervention using motivational interviewing, a handout and list of substance abuse resources, and an attempted 10-minute telephone booster within 2 weeks (n = 435) or enhanced care as usual, which included a handout and list of substance abuse resources (n = 433).

MAIN OUTCOMES AND MEASURES The primary outcomes were self-reported days of problem drug use in the past 30 days and Addiction Severity Index-Lite (ASI) Drug Use composite score. Secondary outcomes were admission to substance abuse treatment; ASI composite scores for medical, psychiatric, social, and legal domains; emergency department and inpatient hospital admissions, arrests, mortality, and human immunodeficiency virus risk behavior.

RESULTS Mean days used of the most common problem drug at baseline were 14.40 (SD, 11.29) (brief intervention) and 13.25 (SD, 10.69) (enhanced care as usual); at 3 months postintervention, means were 11.87 (SD, 12.13) (brief intervention) and 9.84 (SD, 10.64) (enhanced care as usual) and not significantly different (difference in differences, \( \beta = 0.89 \) (95% CI, –0.49 to 2.26)). Mean ASI Drug Use composite score at baseline was 0.11 (SD, 0.10) (brief intervention) and 0.11 (SD, 0.10) (enhanced care as usual) and at 3 months was 0.10 (SD, 0.09) (brief intervention) and 0.09 (SD, 0.09) (enhanced care as usual) and not significantly different (difference in differences, \( \beta = 0.008 \) (95% CI, –0.006 to 0.021)). During the 12 months following intervention, no significant treatment differences were found for either variable. No significant differences were found for secondary outcomes.

CONCLUSIONS AND RELEVANCE A one-time brief intervention with attempted telephone booster had no effect on drug use in patients seen in safety-net primary care settings. This finding suggests a need for caution in promoting widespread adoption of this intervention for drug use in primary care.

TRIAL REGISTRATION clinicaltrials.gov Identifier: NCT00877331


Copyright 2014 American Medical Association. All rights reserved.
Based on the established efficacy of brief (1-2 sessions) interventions for hazardous alcohol use in patients seen in medical settings,1,2 national dissemination programs of screening, brief intervention, and referral to treatment (SBIRT) for “alcohol and drugs” have been implemented on a widespread scale.3,4 This rapid adoption of brief intervention for drugs other than alcohol has outstripped its meager evidence base. Of the 3 randomized clinical trials of brief intervention for drug abuse in non-treatment-seeking individuals,5-8 only 2 were positive,7,8 and only 1 found an effect among US patients.8

Ambulatory primary care is an important setting to test the effectiveness of brief intervention because of the large volume of patients seen in that setting.9 The majority of patients with problem drug use in this setting are not accessing substance abuse treatment.4,10 Adding brief substance abuse interventions onsite in primary care is also consistent with newly emerging “integrated care” models.11 Recent studies show that a disproportionate number of individuals with drug abuse or dependence are from lower socioeconomic strata12 and primarily receive care in public sector hospitals and community health clinics (ie, safety-net medical settings that serve low-income patients with limited or no insurance). Although the cost of untreated drug abuse in this system is substantial (eg, mortality, crime, lost productivity, increased medical care),13 there is limited information on these public health–relevant outcomes for brief intervention.14,15 Policy makers need such data to create traction to drive policy changes required to improve substance abuse treatment.

The purpose of this study was to determine whether a brief intervention using motivational interviewing would reduce problem drug use in safety-net primary care patients and increase admission to specialist substance abuse treatment. We also sought to estimate the effects of the brief intervention on several public health outcomes directly related to problem drug use.

Methods

Design

A 2-group randomized clinical trial was conducted to examine the effects of a 1-time brief intervention using motivational interviewing with attempted telephone booster compared with enhanced care as usual. A hybrid efficacy-effectiveness design was chosen to enhance external validity by using a brief intervention protocol similar to that used in the Substance Abuse and Mental Health Services Administration–funded Washington State SBIRT study16 and having the intervention delivered by social workers already working with patients in these clinics.17 The study was approved by an institutional review board and an independent data and safety monitoring board. Further details about study design and rationale have been described.18

Participants

Participants were recruited between April 2009 and September 2012 from the waiting rooms of 7 safety-net (public hospital-associated) primary care clinics in King County, Washington. Inclusion criteria were age 18 years or older; self-reported use of an illegal drug or nonprescribed medication (ie, problem drug use) at least once in the 90 days before screening19; English-speaking and able to read and understand screening and consent forms (sixth-grade literacy); currently receiving and planning to continue receiving care in the clinic; and having telephone or e-mail access to facilitate scheduling follow-up assessments. Exclusion criteria were attendance in formal substance abuse treatment in the past month (excluding self-help groups such as Narcotics Anonymous); high risk of imminent suicide; life-threatening medical illness; severe cognitive impairment; or active psychosis. All participants provided written informed consent and received compensation in gift cards for completion of study assessments ($25 at baseline and 3 months, $30 at 6 months, $35 at 9 months, $40 at 12 months, and $10 for urine samples at each follow-up).

Randomization

After a brief baseline assessment, participants were randomized in a 1:1 ratio (Figure) to brief intervention or enhanced care as usual using permuted blocks stratified by clinic and by 3 factors known to affect outcome: drug use severity20 (Drug Abuse Screening Test [DAST-10] score ≥3 [range, 0-10; 10 indicates greatest severity]), the DAST-10 instrument and interpretation guide are available in the eAppendix in the Supplement), comorbid mental illness21 (Addiction Severity Index-Lite [ASI] Psychiatric Status composite score >0.38 [range, 0-1; 1 indicates greatest problem severity]), and readiness to change22 (goal of abstinence on Thoughts about Abstinence assessment). Varying-sized blocks were generated prior to enrollment, and allocation was concealed in sequentially numbered opaque envelopes opened by the research assistant at randomization.23

Intervention

To maximize the possibility of an effect while maintaining real-world feasibility, brief interventionists were recruited from social workers in participating clinics (n = 11).24 The interventionists agreed to adhere to the study protocol, including ongoing training and supervision, and to provide written informed consent (because data on their fidelity to the motivational interviewing model would be used for the study). Additional master’s- and bachelor’s-level interventionists not working in the clinics (n = 6) were later added to help meet recruitment goals. All interventionists were trained by 1 of the original trainers for the Substance Abuse and Mental Health Services Administration’s national SBIRT initiative3 using a group workshop followed by individual feedback on audi-taped role-plays with up to 5 standardized patients over the course of 5 weeks.25 All interventionists met basic motivational interviewing proficiency training goals on at least 1 practice role-play.26

Participants randomized to the intervention condition were to receive a single, approximately 30-minute brief intervention. The clinical tasks of the intervention protocol were to give participants feedback about their drug use screening (DAST-10) results, explore the pros and cons of drug use, increase par-
participant confidence in being able to change, and discuss options for change. When appropriate, interventionists used an illustrated handout depicting the participant’s DAST-10 score and its associated problem severity (low, intermediate, substantial/severe) to aid the discussion (the DAST-10 feedback handout is available in the eAppendix in the Supplement) and provided a list of substance abuse treatment resources. A motivational interviewing approach was used to perform these tasks, with the hope that understanding and exploring ambivalence about change among vulnerable, underserved participants while eliciting their own arguments for change might empower them and bridge cultural differences. Also, as opposed to a “one size fits all” intervention, this tailored approach allowed flexibility as to which or how many drugs to target, as well as in how to guide the participant (eg, specialty treatment, abstinence, harm reduction). The same interventionist attempted a follow-up telephone booster session within 2 weeks of the intervention. Interventions were audio recorded and scored by trained coders using the Motivational Interviewing Treatment Integrity (MITI) coding system.27 Monthly group supervision and ongoing e-mailed feedback from the trainer (25% of recorded brief interventions) were used to maintain intervention fidelity. To maximize external validity, MITI scoring feedback was not given to interventionists for training role-plays or for real-patient supervision.

Enhanced Care as Usual
Participants in the enhanced care as usual group received the same illustrated handout depicting their DAST-10 drug problem severity score and list of substance abuse treatment resources. These were provided with only a quick introduction by the research assistant to minimize intervention elements in the control condition and resembled the “notification and referral” strategy that might be implemented in high-quality usual care.

Assessment Measures
The assessment battery, administered by trained research assistants, was brief to minimize any unintended intervention effects2728 and to maximize the chance of completing study procedures around a primary care visit. The baseline interview assessed demographics, including self-reported race and ethnicity; substance abuse severity (DAST-10);25 drug use in the previous month, comorbid medical and mental illness, and social and legal outcomes related to drug use (ASI);29 goal for changing drug use (Thoughts about Abstinence assessment);23 and the HIV Risk-taking Behavior Scale.30 Urine samples for drug screens were also collected to track point prevalence of actual drug use. All measures except the demographics and DAST-10 were repeated at 3-, 6-, 9-, and 12-month follow-up assessments conducted by research assistants blinded to randomization assignment. The last 12-month assessment was completed on September 20, 2013.

Primary Outcomes
The primary outcome, prespecified on ClinicalTrials.gov, was self-reported days of drug use during the past 30 days. The ASI measures drug use for individual drugs but does not include an omnibus category for number of days with any drug use. As a proxy for this, present analyses focused on the most frequently used drug at baseline for each individual. This was supplemented with the ASI Drug Use composite score (range, 0-1; 1 indicates greatest severity), an integrated measure of frequency of use and associated problems for all drugs used. For both primary outcomes, measurement of drug use excluded use of alcohol and prescription drugs when used as prescribed.

Secondary Outcomes
Medical, psychiatric, social, and legal subscales of the ASI were used to assess functional correlates of drug use. The assessments were supplemented with Washington State administrative data, which included chemical dependency treatment records, inpatient hospitalizations, state patrol arrest records, and death records. Emergency department and outpatient visits were also tracked using electronic medical record data from the safety-net medical center where the study took place.

Analysis
Acute treatment differences in primary outcomes (days used during last 30 days and drug use composite) focused on pre-intervention to 3 months postintervention and used a difference in differences analysis strategy.31 Long-term treatment differences during 12 months postintervention were analyzed using generalized estimating equations (GEEs).22 Because days of use was highly bimodal, the original count variable was divided into 4 categories of days of use (0, 1-10, 11-20, 21-30) and analyzed using an ordinal GEE,33 whereas the drug use composite score was analyzed with a gaussian GEE. For both outcomes, alternative distributions (eg, negative binomial, log-normal) were examined, but all substantive conclusions were identical to those reported. Covariates included baseline value of the outcome, indicator variables for the clinics where recruitment occurred, and baseline values of the stratification variables used in randomization. Administrative data were analyzed via logistic regression, and ASI scores for medical, psychiatric, social, and legal domains were analyzed via linear regression. Prespecified treatment effect modification of primary outcomes was examined for baseline stratification variables of drug use severity, comorbid psychiatric illness, and motivation to change drug use. As a post hoc exploratory analysis, treatment effect modification of select secondary outcomes was also examined.

All analyses were intention-to-treat, with all available data from participants analyzed by randomization group. There were few missing data overall (87% of planned assessments completed), and GEE analyses made use of all available data. Significance was based on 2-sided P values <.05. A priori power analyses concluded that a trial with an initial sample of 1000 with 25% attrition (ie, 375 participants per group) yielded 80% power to detect small treatment differences in drug use (defined by 2.5% reduction in drug use frequency). All analyses were conducted using either SPSS version 19.0 (IBM Corp), Stata version 13 (StataCorp), or R version 3.0.2.
Brief Intervention for Problem Drug Use

Results

Sample Selection, Attrition, and Description

Of 1621 eligible participants, 868 (54%) were randomized (Figure 1). Follow-up rates were greater than 87% at all 4 points (3, 6, 9, and 12 months) and were similar in both groups. Participants without follow-ups (n = 45) were not significantly different from participants with follow-ups (n = 823) on baseline measures or by randomization group. Assessments averaged 25 minutes, and the majority of assessments were conducted in person (91%).

At baseline, the sample composition was similar in both groups: middle aged, mostly men (70%), nonwhite (55%), single (81%), and not working (91%); approximately 30% were homeless at least 1 night in the past 90 days (Table 1). In the year prior to enrollment, participants had substantial medical comorbidity (mean, >6 medical conditions), with notable percentages of hospitalization (25%) and emergency department use (49%); 10% had received chemical dependency treatment (Table 2). Drug use was similar between groups (mean, 13.82 [SD, 11.00] days of the most frequently used drug) and was highly heterogeneous, with different types and patterns of use evident according to the severity of drug use measured by validated DAST-10 score categories (Table 1 and Table 2 in the Supplement). Many participants also used alcohol, but because we had no data on quantity of alcohol consumed per drinking day, determining degree of hazardous alcohol use was not possible. Supplementing self-reported drug use with positive urine screen results only slightly increased the proportion of individuals classified as using particular drugs (eTable 1 and eTable 2 in the Supplement). Many participants also used alcohol, but because we had no data on quantity of alcohol consumed per drinking day, determining degree of hazardous alcohol use was not possible. Supplementing self-reported drug use with positive urine screen results only slightly increased the proportion of individuals classified as using particular drugs (eTable 1 and eTable 2 in the Supplement). A majority of participants (56%) had some comorbid mental illness, and a minority (37%) had the goal to try to abstain from drugs. These 2 stratification variables were also significantly associated with problem drug use severity such that the most severe group was most likely to have a goal of abstinence and also to have more mental illness.

Intervention Participation and Fidelity

Of the 435 participants randomized to the intervention, 423 (97%) received a brief intervention and 203 (47%) received a booster call. Most participants (90%) received the brief intervention on the same day as the baseline assessment, but for logistical reasons, the remaining 10% had to return to the clinic for the intervention a median of 4 days after assessment. The brief intervention averaged 27 minutes, and 86% of interventions were recorded. Mean interventionist scores for all audio-recorded brief interventions met basic proficiency cutoffs for 4 of 5 MITI summary scores, suggesting adequate but not expert proficiency. Over the course of the next year, a small number of participants in both conditions (brief intervention: n = 26; enhanced care as usual: n = 34) received brief interventions outside the study via regular clinical services.

Main Outcomes

Figure 2 depicts days of drug use during the last 30 days and drug use composite scores over time in the 2 groups. The treatment means in each plot are virtually identical, change over time is minimal, and there is no evidence of an intervention effect. Mean days used of the most common problem drug at baseline were 14.40 (SD, 11.29) (brief intervention) and 13.25 (SD, 10.69) (enhanced care as usual) and at 3 months postintervention were 11.97 (SD, 12.13) (brief intervention) and 9.84 (SD, 10.64) (enhanced care as usual). Mean ASI Drug Use composite score at baseline was 0.11 (SD, 0.10) (brief intervention) and 0.11 (SD, 0.10) (enhanced care as usual) and at 3 months was 0.10 (SD, 0.09) (brief intervention) and 0.09 (SD, 0.09) (enhanced care as usual). Acute treatment differences based on difference in differences revealed no significant differences in either days of drug use (β = 0.89 [95% CI, −0.49 to 2.26]) or ASI Drug Use composite (β = 0.008 [95% CI, −0.006 to 0.021]). Generalized estimating equation analyses confirmed that there were no significant treatment differences during 12 months postintervention in either days of drug use (odds ratio, 1.20 [95% CI, 0.96 to 1.50]) or the ASI Drug Use composite (β = 0.005 [95% CI, −0.005 to 0.016]).

Table 2 reports the secondary outcome variables, including ASI scores for medical, psychiatric, employment, social, and legal domains, proportion of individuals who accepted a referral to chemical dependency treatment and had an initial treatment contact, and relevant public health outcomes (eg, medical care use, arrests, deaths). There were no significant intervention effects on any secondary outcomes, including admission to chemical dependency treatment.

Effect modification of primary drug use outcomes by baseline drug use severity, psychiatric comorbidity, and motivation to change revealed no significant moderation effects (eTable 4 and eTable 5 in the Supplement). However, in exploratory effect modification analyses of secondary outcomes, drug use severity significantly moderated intervention effects on both admission to treatment and emergency department use. Participants with high drug problem severity receiving the intervention were more likely to enter specialist drug treatment and more likely to reduce their use of the emergency department (Table 3 and eTable 6 in the Supplement).

Discussion

In the overall sample, participants who received a brief intervention using proficiency-level motivational interviewing showed no benefit across multiple domains, including drug use frequency, admissions to drug treatment, and all other secondary measures, including those of high public health relevance. Both groups showed modest and similar reductions in drug use frequency over the first 3 months with no subsequent change, possibly suggesting a regression to the mean in both groups. Although our negative findings are consistent with prior studies in treatment-seeking patients in the United States, they also may be a product of our participant characteristics as well as the ways in which the intervention was conducted and the outcomes were evaluated.
Figure 1. Participant Flow in the Trial of a Brief Intervention for Problem Drug Use

39,062 Patients approached for screening

28,725 Excluded
  15,560 Excluded at approach (did not meet inclusion criteria or met exclusion criteria)\textsuperscript{a}
  9,992 Declined to participate
  3,213 Other (eg, left during approach)

10,337 Screened

8,716 Excluded
  5,840 Excluded at screening (did not meet inclusion criteria or met exclusion criteria)\textsuperscript{b}
  1,760 Other (eg, left during screening)

1,621 Eligible

868 Randomized

435 Randomized to receive brief intervention plus booster call
  423 Received brief intervention as randomized
  203 Received booster call as randomized

433 Randomized to receive enhanced care as usual (control)
  433 Received enhanced care as usual as randomized

378 Completed 9-mo follow-up assessment
  35 Could not be reached
  3 Deaths
  2 Incarcerated
  13 Refused
  3 Other

380 Completed 6-mo follow-up assessment
  30 Could not be reached
  6 Cumulative deaths
  5 Incarcerated
  17 Refused
  4 Other

380 Completed 3-mo follow-up assessment
  35 Could not be reached
  3 Deaths
  2 Incarcerated
  13 Refused
  3 Other

387 Completed 6-mo follow-up assessment
  28 Could not be reached
  3 Deaths
  6 Incarcerated
  6 Refused

387 Completed 3-mo follow-up assessment
  28 Could not be reached
  3 Deaths
  6 Incarcerated
  6 Refused

385 Completed 12-mo follow-up assessment
  22 Could not be reached
  10 Cumulative deaths
  3 Incarcerated
  1 Physically/mentally unable
  22 Refused
  2 Other

392 Completed 12-mo follow-up assessment
  12 Could not be reached
  7 Cumulative deaths
  12 Incarcerated
  1 Physically/mentally unable
  9 Refused

435 Included in primary analysis
  426 Provided consent to access administrative data

433 Included in primary analysis
  422 Provided consent to access administrative data

80,337
520 Declined to participate
154 Other (eg, left during consent process)

947 Provided consent

868 Randomized

* Inclusion criteria were age 18 years or older; self-reported use of an illegal drug or nonprescribed medication (ie, problem drug use) at least once in the 90 days before screening\textsuperscript{c}; English-speaking and able to read and understand screening and consent forms (sixth-grade literacy); currently receiving and planning to continue care in the clinic; and having telephone or e-mail access to facilitate scheduling follow-up assessments. Exclusion criteria were attendance in formal substance abuse treatment in the past month (excluding self-help groups such as Narcotics Anonymous); high risk of imminent suicide; life-threatening medical illness; severe cognitive impairment; or active psychosis. Data for reasons of exclusion are not available.

---

\textsuperscript{a} Inclusion criteria were age 18 years or older; self-reported use of an illegal drug or nonprescribed medication (ie, problem drug use) at least once in the 90 days before screening; English-speaking and able to read and understand screening and consent forms (sixth-grade literacy); currently receiving and planning to continue care in the clinic; and having telephone or e-mail access to facilitate scheduling follow-up assessments. Exclusion criteria were attendance in formal substance abuse treatment in the past month (excluding self-help groups such as Narcotics Anonymous); high risk of imminent suicide; life-threatening medical illness; severe cognitive impairment; or active psychosis. Data for reasons of exclusion are not available.
### Table 1. Baseline Characteristics of Randomized Participants (N=868)*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Participants, No. (%)</th>
<th>Overall (N = 868)</th>
<th>Brief Intervention (n = 435)</th>
<th>Enhanced Care as Usual (n = 433)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, mean (SD), y</td>
<td>47.76 (10.89)</td>
<td>47.50 (11.29)</td>
<td>48.03 (10.48)</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>264 (30)</td>
<td>127 (29)</td>
<td>137 (32)</td>
<td></td>
</tr>
<tr>
<td>Race**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>386 (45)</td>
<td>190 (44)</td>
<td>196 (45)</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>320 (37)</td>
<td>157 (36)</td>
<td>163 (38)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>150 (18)</td>
<td>82 (19)</td>
<td>68 (16)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>72 (9)</td>
<td>33 (9)</td>
<td>39 (10)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/living with partner</td>
<td>161 (19)</td>
<td>80 (18)</td>
<td>81 (19)</td>
<td></td>
</tr>
<tr>
<td>Divorced/separated/widowed</td>
<td>348 (40)</td>
<td>167 (39)</td>
<td>181 (42)</td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>357 (41)</td>
<td>188 (43)</td>
<td>169 (39)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some high school or less</td>
<td>166 (19)</td>
<td>91 (21)</td>
<td>75 (17)</td>
<td></td>
</tr>
<tr>
<td>High school graduate</td>
<td>254 (29)</td>
<td>125 (29)</td>
<td>129 (30)</td>
<td></td>
</tr>
<tr>
<td>Beyond high school</td>
<td>447 (52)</td>
<td>218 (50)</td>
<td>229 (53)</td>
<td></td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working</td>
<td>78 (9)</td>
<td>33 (8)</td>
<td>45 (10)</td>
<td></td>
</tr>
<tr>
<td>Unemployed/retired/in school/homemaker/other</td>
<td>238 (27)</td>
<td>120 (28)</td>
<td>118 (27)</td>
<td></td>
</tr>
<tr>
<td>Disabled and unable to work</td>
<td>551 (64)</td>
<td>282 (65)</td>
<td>269 (62)</td>
<td></td>
</tr>
<tr>
<td>Homeless in shelter or on street ≥1 night in past 90 d</td>
<td>263 (30)</td>
<td>130 (30)</td>
<td>133 (31)</td>
<td></td>
</tr>
<tr>
<td><strong>Medical/psychiatric</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDPS medical conditions, mean (SD)*</td>
<td>6.12 (3.56)</td>
<td>6.20 (3.54)</td>
<td>6.04 (3.58)</td>
<td></td>
</tr>
<tr>
<td>ASI Psychiatric Status composite score &gt;0.3821,d</td>
<td>470 (54)</td>
<td>232 (53)</td>
<td>238 (55)</td>
<td></td>
</tr>
<tr>
<td>≥1 Mental illness ICD-9 diagnosis code*</td>
<td>478 (56)</td>
<td>248 (58)</td>
<td>230 (55)</td>
<td></td>
</tr>
<tr>
<td><strong>Substance use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASI days most frequently used drug, mean (SD)*</td>
<td>13.82 (11.00)</td>
<td>14.40 (11.29)</td>
<td>13.25 (10.69)</td>
<td></td>
</tr>
<tr>
<td>ASI Drug Use composite score, mean (SD)✓,e</td>
<td>0.11 (0.10)</td>
<td>0.11 (0.10)</td>
<td>0.11 (0.10)</td>
<td></td>
</tr>
<tr>
<td>ASI drug use, any in past 30 d*e</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marijuana</td>
<td>656 (76)</td>
<td>333 (77)</td>
<td>323 (75)</td>
<td></td>
</tr>
<tr>
<td>Stimulants f</td>
<td>362 (42)</td>
<td>184 (42)</td>
<td>178 (41)</td>
<td></td>
</tr>
<tr>
<td>Cocaine</td>
<td>325 (37)</td>
<td>161 (37)</td>
<td>164 (38)</td>
<td></td>
</tr>
<tr>
<td>Amphetamines</td>
<td>63 (7)</td>
<td>36 (8)</td>
<td>27 (6)</td>
<td></td>
</tr>
<tr>
<td>Opiates</td>
<td>228 (26)</td>
<td>105 (24)</td>
<td>123 (28)</td>
<td></td>
</tr>
<tr>
<td>Heroin</td>
<td>59 (7)</td>
<td>30 (7)</td>
<td>29 (7)</td>
<td></td>
</tr>
<tr>
<td>Methadone and other opiates/analogesics nonprescribed</td>
<td>208 (24)</td>
<td>96 (22)</td>
<td>112 (26)</td>
<td></td>
</tr>
<tr>
<td>Sedatives/hypnotics/tranquilizers</td>
<td>72 (8)</td>
<td>29 (7)</td>
<td>43 (10)</td>
<td></td>
</tr>
<tr>
<td>Other drugs (e,g)</td>
<td>51 (6)</td>
<td>23 (5)</td>
<td>28 (6)</td>
<td></td>
</tr>
<tr>
<td>2 or more drugs used in past 30 d f</td>
<td>389 (45)</td>
<td>188 (43)</td>
<td>201 (46)</td>
<td></td>
</tr>
<tr>
<td>Intravenous drug use in past 30 d</td>
<td>72 (8)</td>
<td>39 (9)</td>
<td>33 (8)</td>
<td></td>
</tr>
<tr>
<td>DAST-10 drug use severity*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (score 1-2)</td>
<td>278 (32)</td>
<td>141 (32)</td>
<td>137 (32)</td>
<td></td>
</tr>
<tr>
<td>Intermediate (score 3-5)</td>
<td>328 (38)</td>
<td>169 (39)</td>
<td>159 (37)</td>
<td></td>
</tr>
<tr>
<td>Substantial/severe (score ≥6)</td>
<td>262 (30)</td>
<td>125 (29)</td>
<td>137 (32)</td>
<td></td>
</tr>
<tr>
<td>Goal of total abstinence from drugs (e,g)</td>
<td>323 (37)</td>
<td>158 (36)</td>
<td>165 (38)</td>
<td></td>
</tr>
<tr>
<td>ASI Alcohol Use composite score, mean (SD)✓</td>
<td>0.15 (0.20)</td>
<td>0.14 (0.20)</td>
<td>0.16 (0.20)</td>
<td></td>
</tr>
<tr>
<td>ASI alcohol use, any in past 30 d</td>
<td>598 (69)</td>
<td>276 (63)</td>
<td>322 (74)</td>
<td></td>
</tr>
<tr>
<td>Nicotine use, any in past 30 d</td>
<td>620 (72)</td>
<td>318 (73)</td>
<td>302 (70)</td>
<td></td>
</tr>
</tbody>
</table>

* Missing values are not included in this table.  
** Assessed by self-report using National Institutes of Health reporting categories for federally funded clinical research.  
✓ Administrative data available for 848 participants in the 1-year preintervention period.  
*ASI composite scores range from 0 to 1, with 1 indicating greatest problem severity.  
* Excludes use of alcohol or nicotine.  
† ASI drug use groups reported are not mutually exclusive.  
‡ "Other drugs" can include all other abused medications (eg, antihistamines, antidepressants) or drugs of abuse (eg, hallucinogens, inhalants) not included in the existing categories.  
§ From the Thoughts about Abstinence measure, which is used to assess one’s goal for changing drug use (no goal, controlled use, occasional use, temporary abstinence, total abstinence slip is possible, total abstinence never use again). The reported “Goal of total abstinence from drugs” includes "Total abstinence, never use again" and "Total abstinence, slip is possible.”

Abbreviations: ASI, Addiction Severity Index; BI, brief intervention; CD, chemical dependency; CDPS, Chronic Illness and Disability Payment System; DAST-10, Drug Abuse Screening Test 10-item; ICD-9, International Classification of Diseases, Ninth Revision.
Table 2. Select Secondary Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Baseline</th>
<th>1 Year*</th>
<th>Regression Coefficient or Adjusted OR (95% CI)**</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Brief Intervention (n = 426)</td>
<td>Enhanced Care as Usual (n = 422)</td>
<td>Brief Intervention (n = 426)</td>
<td>Enhanced Care as Usual (n = 422)</td>
</tr>
<tr>
<td>ASI composite scores, mean (SD)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical</td>
<td>0.65 (0.32)</td>
<td>0.66 (0.35)</td>
<td>0.54 (0.35)</td>
<td>0.56 (0.36)</td>
</tr>
<tr>
<td>Psychiatric</td>
<td>0.37 (0.24)</td>
<td>0.39 (0.24)</td>
<td>0.31 (0.26)</td>
<td>0.32 (0.26)</td>
</tr>
<tr>
<td>Employment</td>
<td>0.79 (0.23)</td>
<td>0.79 (0.23)</td>
<td>0.78 (0.24)</td>
<td>0.78 (0.24)</td>
</tr>
<tr>
<td>Family/social</td>
<td>0.17 (0.22)</td>
<td>0.17 (0.22)</td>
<td>0.11 (0.18)</td>
<td>0.13 (0.20)</td>
</tr>
<tr>
<td>Legal</td>
<td>0.06 (0.12)</td>
<td>0.07 (0.15)</td>
<td>0.04 (0.10)</td>
<td>0.04 (0.12)</td>
</tr>
<tr>
<td>Public health-relevant measures, No. (%) with any</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington State chemical dependency treatment admissions</td>
<td>37 (9)</td>
<td>53 (13)</td>
<td>60 (14)</td>
<td>57 (14)</td>
</tr>
<tr>
<td>Washington State inpatient hospitalizations</td>
<td>113 (27)</td>
<td>108 (26)</td>
<td>106 (25)</td>
<td>98 (23)</td>
</tr>
<tr>
<td>Safety-net hospital emergency department visits</td>
<td>215 (50)</td>
<td>213 (50)</td>
<td>204 (48)</td>
<td>198 (47)</td>
</tr>
<tr>
<td>Safety-net outpatient visits</td>
<td>381 (89)</td>
<td>380 (90)</td>
<td>402 (94)</td>
<td>399 (95)</td>
</tr>
<tr>
<td>Felony or gross misdemeanor arrests</td>
<td>36 (8)</td>
<td>43 (10)</td>
<td>41 (10)</td>
<td>37 (9)</td>
</tr>
<tr>
<td>HIV Risk-taking Behavior Scale risk factor ≥1</td>
<td>237 (55)</td>
<td>225 (53)</td>
<td>195 (51)</td>
<td>198 (51)</td>
</tr>
<tr>
<td>Death</td>
<td>NA</td>
<td>NA</td>
<td>10 (2)</td>
<td>7 (2)</td>
</tr>
</tbody>
</table>

Abbreviations: ASI, Addiction Severity Index–Lite; ED, emergency department; HIV, human immunodeficiency virus; NA, not applicable; OR, odds ratio.

* Data available for 848 participants unless otherwise indicated.

** With the exception of death, the preintervention value of the outcome was used as a covariate in the model. For example, in assessing the association between randomization and hospitalization within 1 year after intervention, the proportion hospitalized in the 1 year before intervention was used as a covariate.

Results measured at 12-month assessment for ASI composite scores and during the 1-year postintervention period for public health-relevant measures.

Regression coefficients by linear regression. A positive coefficient indicates the intervention was associated with a higher score.

Adjusted ORs by logistic regression. Values greater than 1 indicate the intervention was associated with higher odds of the outcome.

Figure 2. Changes in Problem Drug Use Over Time

The Addiction Severity Index–Lite (ASI) Drug Use composite score accounts for frequency of use and associated problems for all drugs used, excluding alcohol and medications taken as prescribed (range, 0-1; 1 indicates greatest severity).
Table 3. Potential Effect Modification: Estimates for Select Secondary Outcomes by Baseline Drug Use Severitya

<table>
<thead>
<tr>
<th>Potential Effect Modifier/Level</th>
<th>Chemical Dependency Treatment (Estimated Likelihood of ≥1 Admission)</th>
<th>Emergency Department</th>
<th>Admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Brief Intervention (n = 426)</td>
<td>Enhanced Care as Usual (n = 422)</td>
<td>P Value</td>
</tr>
<tr>
<td>Low (DAST-10 score 1-2)</td>
<td>0.04</td>
<td>0.09</td>
<td>.14</td>
</tr>
<tr>
<td>No. experiencing event/sample size or mean (SD)</td>
<td>4/137</td>
<td>9/135</td>
<td>53/137</td>
</tr>
<tr>
<td>Intermediate (DAST-10 score 3-5)</td>
<td>0.13</td>
<td>0.13</td>
<td>0.78</td>
</tr>
<tr>
<td>No. experiencing event/sample size or mean (SD)</td>
<td>20/167</td>
<td>19/156</td>
<td>81/167</td>
</tr>
<tr>
<td>Substantial/severe (DAST-10 score ≥6)</td>
<td>0.26</td>
<td>0.16</td>
<td>0.84</td>
</tr>
<tr>
<td>No. experiencing event/sample size or mean (SD)</td>
<td>36/122</td>
<td>29/131</td>
<td>70/122</td>
</tr>
</tbody>
</table>

Abbreviations: ASI, Addiction Severity Index–Lite; DAST-10, Drug Abuse Screening Test 10-item.

a Outcome estimates apply to 1-year postintervention period, conditional on baseline drug use severity and at mean values of pretreatment level of outcomes, baseline ASI Psychiatric composite score, and abstinence goal on the Thoughts about Abstinence assessment at baseline.

b Treatment differences for emergency department costs were also examined and contained a number of extreme outliers. Nonparametric rank statistics stratified by levels of DAST-10 scores revealed no significant treatment differences.

c Unadjusted results measured over 1-year postintervention period for number of participants experiencing 1 or more chemical dependency treatment admissions, number of participants experiencing 1 or more emergency department admissions, and mean number of emergency department admissions among those with 1 or more admissions.

First and most important, drug use in the sample was very heterogeneous, spanning casual marijuana use to severe opioid and stimulant abuse. Although the DAST-10 score, which measures severity and is strongly related to type of drug used, did not moderate intervention effects on frequency of drug use, it did moderate both treatment uptake and emergency department use in exploratory analyses of secondary outcomes. Participants in the brief intervention group with the most severe drug use problems, with a greater pattern of stimulant and opiate abuse, were more likely to pursue specialty treatment and had reduced use of the emergency department relative to those in the enhanced care as usual group. This is consistent with the 1 positive study of brief intervention for cocaine and opiate users by Bernstein et al,7 although no effects were found on treatment uptake. In contrast, no benefit of the intervention was found for those in the lowest severity of drug use problems, predominantly marijuana users. Although legalization of marijuana use in Washington State did not occur until well after enrollment, the legalization climate may have served to normalize marijuana use, often not associated with work or personal problems, and reduce motivation for change for this substance. Second, the sample was severely socioeconomically disadvantaged. However, studies of alcohol brief intervention have not indicated that disadvantage/poverty moderates brief intervention effect,36 and the study by Bernstein et al drew participants from homeless and low-income clinics. Third, the sample had a high rate of comorbid mental illness, which is known to be associated with poorer substance use outcomes.37 These last 2 aspects of our population (poverty and mental illness), along with the fact that patients in this study received compensation, may limit the generalizability of our results.

Other factors may have influenced the effectiveness of the brief intervention. First, the majority of participants had a single brief intervention contact, with only 47% receiving a follow-up booster call. Although more frequent contact may increase efficacy,3 studies have failed to show this.38 Second, the participant’s primary care physician did not deliver the intervention, nor did a research-confirmed expert. Although the current use of a physician-extender to deliver the intervention is consistent with extant integrated care models and has been shown effective in other contexts,39 the physician might have more influence with a patient.35

Third, despite efforts to simplify the assessment battery, all participants received up to 5 assessments, in which information about drug use was discussed, as well as DAST-10 feedback. It is possible that this may have inadvertently served to produce an intervention effect in the comparison group.40 Fourth, measuring frequency but not quantity of drug use is a limited measure of outcome. Similarly, our measure of alcohol use did not include quantity consumed, limiting our ability to use alcohol as either a predictor or outcome variable. Currently there is no gold standard for quantifying problem drug use. Researchers measuring problem drug use outcomes must find a way to measure quantity, as well as frequency, of use. It is possible that our exploratory finding of reduced emergency department utilization could reflect changes in quantity but not frequency of drug use, although the finding may also be spurious.
Despite these limitations, further research to identify subgroups responsive to this intervention, as well as the role of more intensive interventions, appears to be warranted. For example, targeting intervention efforts toward individuals with severe drug abuse, many of whom use stimulants and opiates and may be at higher risk of overdose and other harmful consequences, might increase the uptake of specialty treatment and reduce emergency department utilization.

ARTICLE INFORMATION

Author Contributions: Dr Roy-Byrne had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Roy-Byrne, Bumgardner, Krupski, Dunn, Ries, Donovan, Atkins.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Roy-Byrne, Bumgardner, Dunn, Ries, Atkins.

Critical revision of the manuscript for important intellectual content: Roy-Byrne, Bumgardner, Krupski, Ries, Donovan, West, Maynard, Atkins, Graves, Joesch, Zarkin.

Statistical analysis: West, Maynard, Atkins, Graves, Joesch, Zarkin.

Obtained funding: Roy-Byrne, Bumgardner, Krupski, Dunn, Ries, Donovan, Joesch, Zarkin.

Administrative, technical, or material support: Roy-Byrne, Bumgardner, Krupski.

Study supervision: Roy-Byrne, Bumgardner, Dunn, Ries.

Conflict of Interest Disclosures: All authors have completed and submitted the ICMEU Form for Disclosure of Potential Conflicts of Interest. Dr Roy-Byrne reported receiving financial support as the editor in chief of Depression and Anxiety, Journal Watch Psychiatry, and UpToDate Psychiatry and receiving stock options for consultation to Valant Medical Solutions (behavioral health electronic medical record company), outside the submitted work. Dr Ries reported receiving financial support from Janssen Pharmaceuticals Inc, Alkermes, and Reckitt Benckiser Pharmaceutical Inc, outside the submitted work. No other authors reported disclosures.

Funding/Support: This study was funded by National Institute on Drug Abuse grant R01 DA026014 (Dr Roy-Byrne).

Role of the Sponsor: The National Institute on Drug Abuse had no role in the design and conduct of the study; the collection, management, analysis, and interpretation of the data; the preparation, review, or approval of the manuscript; or the decision to submit the manuscript for publication.

Disclaimer: The views expressed reflect those of the authors and do not necessarily reflect the official views of the National Institute on Drug Abuse or the National Institutes of Health.

Additional Contributions: We gratefully acknowledge the participation and support of many people without whom this study could never have been completed. These include the patients and the administrative and clinical staff, including medical directors, of the primary care clinics that participated in the study; the interventionists receiving grant support who spent time to train and gain proficiency in the motivational interviewing-enhanced brief intervention and then to provide study interventions to participating clinic patients; and the expert research staff employed by the grant for study coordination, data collection resulting in more than 87% follow-up participation, and coding of intervention recordings. We also gratefully acknowledge the expert oversight of our data and safety monitoring board (Katharine A. Bradley, MD, MPH [Group Health Research Institute, Seattle, Washington]; John M. Roll, PhD [Professor and Senior Vice Chancellor, Washington State University, Spokane]; and Andrew J. Saxon, MD [Director, Center of Excellence in Substance Abuse Treatment and Education, VA Puget Sound Health Care System; Professor, Department of Psychiatry & Behavioral Sciences, University of Washington, Seattle]), and the support of the late Richard A. Denisco, MD, MPH, our program officer at the National Institute on Drug Abuse. Dr Denisco and the members of the data and safety monitoring board did not receive compensation from this grant.

REFERENCES


21. Alterman AJ, McAllan AT, Shiffman RB. Do substance abuse patients with more

Conclusions

A one-time brief intervention with attempted telephone booster call had no effect on drug use in patients seen in safety-net primary care settings. This finding suggests a need for caution in promoting widespread adoption of this intervention for drug use in primary care.


