Published in final edited form as:

Drug Alcohol Depend. 2015 October 1; 155: 236–242. doi:10.1016/j.drugalcdep.2015.07.014.

The Remote Brief Intervention and Referral to Treatment Model: Development, Functionality, Acceptability, and Feasibility

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Abstract

Background—Screening, brief intervention, and referral to treatment (SBIRT) is effective for reducing risky alcohol use across a variety of medical settings. However, most programs have been unsustainable because of cost and time demands. Telehealth may alleviate on-site clinician burden. This exploratory study examines the feasibility of a new Remote Brief Intervention and Referral to Treatment (R-BIRT) model.

Methods—Eligible emergency department (ED) patients were enrolled into one of five models. (1) Warm Handoff: clinician-facilitated phone call during ED visit. (2) Patient Direct: patient-initiated call during visit. (3) Electronic Referral: patient contacted by R-BIRT personnel post visit. (4) Patient Choice: choice of models 1–3. (5) Modified Patient Choice: choice of models 1–2, Electronic Referral offered if 1–2 were declined. Once connected, a health coach offered

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All authors have approved the final article.

Conflict of Interest

Edwin D. Boudreaux, PhD - is an employee of the University of Massachusetts Medical Center and receives consulting income and licensing revenue from Polaris Health Directions.

Tina Harralson, PhD - is an employee of Polaris Health Directions. Polaris Health Directions, Inc, intends to market RBIRT for financial gain. An intellectual property and licensing agreement exists between the University of Massachusetts Medical School and Polaris Health Directions.

Brianna Haskins, MS - Conflict of interest: none.

Edward Bernstein, MD Conflict of interest: none.

Role of Funding Source

Nothing Declared

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assessment, counseling, and referral to treatment. Follow up assessments were conducted at 1 and 3 months. Primary outcomes measured were acceptance, satisfaction, and completion rates.

Results—Of 125 eligible patients, 50 were enrolled, for an acceptance rate of 40%. Feedback and satisfaction ratings were generally positive. Completion rates were 58% overall, with patients enrolled into a model wherein the consultation occurred *during* the ED visit, as opposed to *after* the visit, much more likely to complete a consultation, 90% vs. 10%, χ^2 (4, N=50) = 34.8, $p < 0.001$.

Conclusions—The R-BIRT offers a feasible alternative to in-person alcohol SBIRT and should be studied further. The public health impact of having accessible, sustainable, evidence-based SBIRT for substance use across a range of medical settings could be considerable.

Keywords

technology; substance abuse; referrals; screening; brief motivational intervention; telehealth

1. INTRODUCTION

Screening for risky alcohol use in medical settings, providing brief interventions for those who drink above low risk drinking limits, and referring those at risk for an alcohol use disorder to specialized treatment (SBIRT) has proven effective for reducing risky alcohol use and alcohol-related consequences (Babor et al., 2007; Bernstein et al., 1997; Kaner et al., 2009; Vasilaki et al., 2006). As a result, the United States Preventive Services Task Force (2012), Substance Abuse and Mental Health Services Administration (SAMHSA, 2006), Centers for Disease Control (CDC; Hungerford and Pollock, 2002, 2003), American College of Surgeons (2007), American College of Emergency Physicians (2005), Emergency Nurses Association (2009), National Institute on Alcohol Abuse and Alcoholism (NIAAA, 2007), and Joint Commission (2014) have strongly recommended alcohol SBIRT in primary care, emergency departments (EDs), trauma centers, and inpatient units. Despite decades of research and advocacy, most SBIRT programs are supported by external grants and are discontinued after funding ends. Most medical settings still do not routinely provide alcohol SBIRT (Babor et al., 2007; Cunningham et al., 2010), and most clinicians do not perform evidence-based SBIRT because of numerous barriers (Bernstein, E. et al., 2005; Modesto-Lowe and Boornazian, 2000). A team oriented model that uses an on-site, dedicated interventionist addresses many of these barriers but is complex and costly to maintain (Babor et al., 2007; Bernstein et al., 2005, 2007; Boudreaux, 2010; Cunningham et al., 2010).

This failure in sustainability of alcohol SBIRT has occurred despite data suggesting it results in net healthcare cost savings (Estee et al., 2010; Fleming et al., 2002; Gentilello et al., 2005; Zarkin et al., 2003). For example, one study has shown that for every dollar invested in SBIRT, \$4.30 in medical costs were saved (Fleming et al., 2002). Unfortunately, the savings accrue to insurance companies, not to the organizations that bear the cost of providing SBIRT. Fortunately, because healthcare financing reform as a result of the Affordable Care Act now offers incentives for quality, healthcare organizations will directly reap the benefits of averted costs (SAMHSA/HRSA, 2012).

The telehealth model has potential to be more cost effective than the on-site interventionist. Telehealth is defined as “the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration” (Health Resources and Services Administration Rural Health, n.d.). Telehealth has revolutionized how, when, and where healthcare is provided. It has been applied to a range of clinical issues, from real time neurological and psychiatric evaluations performed via video conferencing in EDs (Boyle et al., 2009) to national tobacco Quitlines (Bonniot and Schroeder, 2010). Telehealth has several advantages, including (1) provision of specialty care to populations with limited access; (2) improved care efficiency and cost-effectiveness; and (3) enhanced quality control through uniform training, competency standards, and quality assurance protocols.

Although commercial telehealth delivered alcohol SBIRT services do not currently exist, one study of brief telephone counseling provided after an ED visit has been published (Mello et al., 2008). The intervention did not decrease alcohol consumption but significantly decreased impaired driving in the six months after the ED visit when compared to usual care. This study supported the feasibility of telehealth for alcohol SBIRT delivered after the ED visit and encouraged development of improved models. This paper describes initial development, functionality, acceptability, and, overall feasibility of a new telehealth SBIRT delivery model that was field-tested by a small sample of ED patients.

2. MATERIALS AND METHODS

2.1. Overview

The University of Massachusetts Medical School (UMass) and Polaris Health Directions partnered to design and evaluate the Remote Brief Intervention and Referral to Treatment (R-BIRT) consultation service. It incorporates practices promoted by SAMHSA’s National Registry for Evidence-based Programs and Practice (SAMHSA, n.d.a); however, rather than using on-site interventionists it uses remote interventionists (see Figure 1). First, patients are identified by treating clinicians as drinking above low risk drinking limits (NIAAA, n.d.) or as exhibiting clinical symptoms suggestive of an Alcohol Use Disorder (American Psychiatric Association, 2013). Second, the clinician describes the R-BIRT consultation to the patient and connects willing patients to an R-BIRT interventionist, called a health coach to reduce stigma, by telephone or two-way video during the healthcare visit. If the clinician is too busy to provide a “warm handoff,” the patient can make the call during the visit using a toll-free number. Third, the R-BIRT health coach performs an assessment, brief motivational counseling, and, if needed, referral to specialized treatment. Specially designed software enables a semi-structured computer assisted interview. In addition to standardized screeners, the software provides an interactive motivational toolkit and a referral generator that helps identify a best treatment provider based on patient characteristics, like ZIP code, insurance, and alcohol abuse severity (Boudreaux et al., 2009). Fourth, once the consultation is complete, the software generates summary reports, one for the referring clinician (Healthcare Provider Report) and one for the patient (Patient Feedback Report). The reports are transmitted by fax or secure email to the clinician and can be accessed by the patient through a secure web-portal hosted by Polaris. The R-BIRT improves upon the post-visit

telehealth model (Mello et al., 2008) by: (1) targeting all patients with risky drinking or symptoms of an Alcohol Use Disorder rather than focusing only on those presenting with injury; (2) applying the intervention *during* the visit when motivation and opportunity are greatest; and (3) using a computer assisted interview to promote fidelity. While the R-BIRT is designed to accommodate any medical setting, there is a strong evidence base for alcohol SBIRT in the ED (Academic ED SBIRT Research Collaborative, 2007a, 2007b; D’Onofrio et al., 2012; Woolard et al., 2013) so it was tested in an ED where risky alcohol use is common.

R-BIRT development and feasibility testing occurred in two phases: (1) drafting an intervention protocol and training materials, and creating the enabling software; and (2) usability testing and refinement through an open field test of ED patients. Each phase is described below.

2.2. Phase 1: R-BIRT Design and Creation

The team guiding the R-BIRT design has considerable experience with traditional (Academic ED SBIRT Research Collaborative, 2007a, 2007b; Bernstein et al., 2009) and computerized SBIRT models (Boudreaux et al., 2009, 2011, 2012). The team reviewed the literature on telehealth and SBIRT and conducted interviews with variety end-users, including physicians (n=5), nurses (n=3), crisis hotline counselors and administrators (n=4), ED patients with alcohol use above low risk drinking limits or other evidence of an Alcohol Use Disorder (n=8), and experts in behavioral telehealth (n=4). The framework approach (Miller and Crabtree, 1999) was employed to index and organize interview data. Five core design principles were distilled:

1. The R-BIRT should assess both alcohol *and* illicit drug use, independently and as comorbid. Despite the conflicting evidence around the efficacy of universal screening and brief interventions for illicit drug use (Saitz et al., 2014; Bogenschutz et al., 2014), there is a practical need for clinicians to avoid medical errors that may result from not asking about substance use, including the interaction between alcohol and prescription opioid and benzodiazepine use.
 2. A range of severity should be accommodated regardless of presenting complaint.
 3. The enabling software should act as a semi-structured computer assisted interview for the health coach to facilitate fidelity to best practices while remaining flexible to develop rapport.
 4. A telephone and toll free number should be used because it is the current universally available technology; however, it should be able to accommodate two-way video to ensure long term scalability.
 5. The implementation models should be flexible and tailored to the needs of the site.
- Three primary model variations were identified and are described in Table 1.

Enabling software, an intervention manual, and training materials were created (see Table 2). Project ASSERT, among the nation’s oldest and most respected SBIRT programs (Bernstein et al., 1997; SAMHSA, n.d.b), was used as the guiding model. Project ASSERT

has received a 3.4 out of 4 rating for research quality and 4 out of 4 for dissemination from SAMSHA's National Registry for Evidence-based Programs and Practice (n.d.a).

Training materials for the health coaches consisted of interactive didactics on SBIRT, the science of addiction and co-occurring disorders, treatment modalities, the culture of medicine, and challenges of working in the ED setting. Content also included a review of screening instruments, brief motivational interviewing core principles of Autonomy, Collaboration, and Elicitation (ACE), and core communication skills of Open-ended questions, Affirmations, Reflections, and Summaries (OARS; Miller and Rollnick, 2012). Video recorded examples and live demonstration of the intervention were used. Health coaches were trained using simulated patients and mock telephone calls. All materials and software were refined in response to feedback, then tested internally until the team was confident the software and coaches were ready to "go live."

2.3. Phase 2: Field Test and Refine the R-BIRT Service and Software

Because the R-BIRT service was built using core design principles derived from end users (see section 2.2.), both alcohol *and* illicit drug users (total n = 50) were enrolled: risky alcohol use alone (n=20), illicit drug use alone (n=18), co-occurring (n=12). Ten participants were enrolled sequentially into each of the first three models (see Table 1). In all models, an overview of the R-BIRT service was first described to the individual. In the Warm Handoff model, a treating ED clinician contacted the R-BIRT service, provided basic patient information and the reason for the referral, and handed the phone to the patient, who completed the consultation during the visit. In the Patient Direct model, the patient called the toll-free number during the visit using a hospital telephone. In the Electronic Referral model, the patient provided contact information that was transmitted to the R-BIRT service, which then tried to contact the individual within 48 hours of the ED visit.

Ten additional participants were enrolled into a fourth condition called Patient Choice. For this condition, the three primary models were described to the participant and he/she chose a preferred model. All 10 (100%) chose the Electronic Referral. The Electronic Referral had a very low rate of consultation completion because of difficulty reaching these patients. An additional 10 participants were enrolled into a fifth condition called the Modified Patient Choice. In this condition, the first two models (Warm Handoff and Patient Direct) were presented, and Electronic Referral was offered if the individual declined the first two. None chose Warm Handoff, 7 (70%) chose Patient Direct, and 3 (30%) chose Electronic Referral. Procedures for the field test are described below.

2.3.1. Procedures—Patients presenting for treatment in the UMass ED were screened for eligibility by research assistants (RAs) using a combination of medical record review, discussion with treating clinicians, and patient interview. Enrollment occurred weekdays, 9AM to 7PM. All eligible patients who agreed to participate signed written informed consent. Semi-structured interviews and satisfaction ratings were obtained from the treating ED clinician and the participant. All problems were documented by the RA, reviewed weekly by the study team, and protocols and software were modified as needed. Each

participant was called at 1 and 3 months after the ED visit to assess treatment initiation and substance use. The study adheres to the ethical principles of the World Medical Association.

2.3.2. Setting and participants—The study was set in an urban, academic ED in central Massachusetts with approximately 75,000 visits/year. Adult patients drinking more than the NIAAA low risk drinking limits, defined as consuming >14 drinks/week and/or >4 drinks/occasion for men <65 years old, and >7 drinks/week and/or >3 drinks/occasion for all women and men ≥ 65 years old, or who used any illicit drugs in the past 12 months were eligible. Exclusion criteria included severe illness or distress (e.g., intubation, vomiting, pain), cognitive insufficiency (e.g., dementia, psychosis, altered consciousness), incarceration, and language barriers.

2.3.3. Measures

2.3.3.1. Demographics: Age, sex, race (white, non-white), ethnicity (Hispanic, non-Hispanic), and insurance type (private, Medicare, Medicaid, other, none) were documented for all approached patients.

2.3.3.2. R-BIRT: See Table 2 for a list of the measures included in the enabling software.

2.3.3.3. Satisfaction assessments: Satisfaction assessments, completed by patients and ED clinicians, consisted of semi-structured interviews which assessed impressions of the R-BIRT service, and recommendations for improvement. This included five-point quantitative ratings (1 = Very Poor, 2 = Poor, 3 = Fair/Average, 4 = Good, 5 = Excellent) across a variety of domains. Patients rated satisfaction with the health coach, the usefulness of the service, overall satisfaction, and likelihood of recommending the service to others. ED clinicians rated overall satisfaction and likelihood of using the service.

2.3.3.4. Process log: The research assistant completed a process log for each participant, documenting problems with executing critical tasks, the solutions applied, and the outcome. The following potential barriers were pre-identified during early end-user interviews and were tracked for each participant: delay ≥ five minutes before the ED provider called the R-BIRT service (for Warm Handoff Model only), difficulty reaching the health coach once the call was initiated, consultation interruptions, inaccuracies in the R-BIRT reports, and R-BIRT software crash or unavailability.

2.3.3.5. Fidelity: Fidelity to the intervention protocols was assessed by examining completion of the required elements: screening for both alcohol and illicit drug use, identifying a target behavior, completing an assessment of the behavior, using at least one motivational tool (see Table 2), and providing referrals.

2.3.3.6. Follow-up assessment: An independent RA not affiliated with the recruitment site and blind to baseline assessment results contacted all participants at 1 and 3 months post-visit. Each participant was asked if he/she had contacted any substance treatment providers, completed an initial evaluation, or attended any self-help groups. Also, the RA assessed self-reported alcohol and drug use. Participants were remunerated with a \$20 gift card per completed assessment, for a total of \$40 if both were completed.

2.3.4. Data Analysis—The primary quantitative outcomes reflecting acceptability and feasibility consisted of: Acceptance Rates, defined as the proportion of eligible patients who accepted the offer to engage with the R-BIRT; Satisfaction Rates, represented by patient and clinician satisfaction ratings; and Completion Rate, defined as the proportion of those who accepted the offer to engage with the R-BIRT who successfully completed a consultation. The secondary outcomes were: Fidelity Rate, defined as the proportion of those who initiated a brief intervention that had all required components of the assessment and intervention completed; and Problem Rates, defined as the proportion of those who agreed to participate who encountered a barrier listed in the process log. Exploratory outcomes were: substance treatment initiation and substance use. Descriptive statistics, including proportions, means, standard deviations, medians, and interquartile ranges (IQR), were calculated for all variables. SPSS 22 (IBM, Armonk, NY) was used for all analyses.

3. RESULTS

3.1. Acceptance

Of the 125 patients identified as having risky alcohol or drug use, 50 were enrolled, for an overall Acceptance Rate of 40%. Descriptive statistics for the enrolled sample can be found in Table 3. Among those eligible, acceptance was not associated with age, sex, race, amount of alcohol consumption, or comorbidity between risky alcohol use and drug use at greater than chance rates (all p-values > 0.05). Those who accepted were more likely to be insured with Medicaid than those who declined (62% vs. 33%, respectively), χ^2 (4, N=125) = 13.6, p=0.009.

3.2. Satisfaction

Figure 2 summarizes the satisfaction ratings of 27 participants who completed an R-BIRT consultation and provided ratings. The qualitative feedback was strongly positive. The most important critiques aligned with the problems noted below in Section 3.5. Of the 21 clinician ratings obtained, 18 (86%) rated their overall satisfaction as “Good/Excellent” and 19 (90%) rated their likelihood of using the service as “Good/Excellent.”

3.3. Completion

Of the 50 participants enrolled, 29 (58%) completed a consultation with the health coach. As Table 4 summarizes, patients enrolled into a model wherein the consultation was completed *during* the ED visit (Warm Handoff, Patient Direct, Modified Patient Choice) were much more likely to complete a consultation compared to those enrolled in a model wherein the consultation occurred *after* the ED visit, 90% vs. 10%, respectively, χ^2 (4, N=50) = 34.8, p<0.001. Of the 29 consultations completed, 27 were enrolled in a model during the visit and two were reached by phone later.

3.4. Fidelity

Among the 29 consultations completed, the health coach completed all required elements for 27 (93%). Deviations were typically minor (e.g., skipped item in the assessment).

3.5. Problems

Of the 27 participants enrolled into a model during the ED visit, 100% were able to complete the consultation during the visit. However, among the 10 in the Warm Handoff model, 2 (20%) experienced a delay in getting the ED clinician to call the R-BIRT service ≥ 5 minutes. Seven (26% of the 27 enrolled in a model during the ED visit) had difficulty reaching the R-BIRT health coach once the call was initiated (i.e., they were placed on hold); 7 (26%) had their consultation interrupted by medical care or a family member; and 4 (15%) had one or more inaccuracies on their reports (e.g., all drugs endorsed were not listed). The programming logic that was creating the report inaccuracies was corrected early during the field test, and none of the final 15 reported inaccuracies. No calls resulted in delayed medical care or discharge. There were no software crashes or unavailability.

3.6. Clinical Outcomes

Of the 32 participants drinking above the NIAAA low risk limits at baseline, 24 (75%) were reached at three months: 11 (46%) no longer drank above the low risk limits, 7 (29%) had made contact with an alcohol treatment provider, and 5 (21%) had attended at least one self-help meeting. Of the 29 participants who reported using at least one illicit drug at baseline, 21 (72%) were reached at three months: 11 (52%) reported using no drugs in the past 30 days, 4 (19%) had made contact with a drug abuse treatment provider, and 3 (14%) had attended at least one self-help meeting.

4. DISCUSSION

The integration of evidence-based alcohol SBIRT practices, enabling software, and a delivery modality that can provide high-quality consultation anywhere, anytime is highly innovative. While most medical settings are usually fraught with time demands for clinicians, patients often have downtime as they are waiting for test, clinicians, consultations, or procedures. Most settings simply lack the available interventionists. A telehealth service like the R-BIRT has strong potential to address this problem. However, the acceptability, feasibility, efficacy, and cost effectiveness must be demonstrated before implementation. This study is the first step towards this long range goal.

Results revealed important patterns in patient acceptability. Patients and clinicians who engaged with the service evaluated it positively (see Figure 2). However, only 40% of eligible patients accepted the offer to engage with the service. Consenting to a research protocol is not directly translatable to willingness to engage in a clinical service when it is offered as part of routine care; however, it is the closest measure available to begin ascertaining the acceptability of the intervention. The rate observed in this study is similar to the only other published study examining telehealth alcohol SBIRT, which reported an acceptance rate of 31% (Mello et al., 2008). There are three possible reasons that might account for low initial acceptance. First, ED patients who use substances may simply be unwilling to talk about their use with any clinician, regardless of whether the clinician is in person or on the phone. Future modifications to overcome this barrier may include non-verbal communication options, such as email or text messaging, between patient and health coach. Second, they may be willing to talk about their use but unwilling to do so on the

telephone, i.e., the method is unacceptable, not the conversation. This barrier could be alleviated by using a two-way video system to connect the patient with the health coach, instead of a telephone. Finally, they may be willing to talk about their use clinically but unwilling to participate in a research study. This can only be assessed once the services are offered clinically after sufficient evidence supports the translation to practice.

Acceptance rates are important to understand because the public health impact of any intervention is heavily influenced by the proportion of patients who accept it. Future studies are needed to answer the question of relative acceptability across different models – clinician, in-person interventionist, telehealth interventionist -- and should address barriers to initial participation. Questioning those who decline about their reason for doing so could provide insight to optimize approach and increase participation. For example, a list of known or suspected barriers to participation could be consulted when a patient declines, and relevant reasons could be recorded for each non-participant. Such consultation and documentation could help identify patterns of non-participation.

The feasibility of completing a consultation among those who accepted the offer was also important to establish. The data revealed important patterns with implications for which implementation models should move forward for additional research. All of the individuals who used a model that involved *in vivo* consultation *during* the visit completed the consultation prior to discharge. However, only 20% of those who used a model that involved a consultation *after* discharge completed a consultation. This was due primarily to difficulty reaching patients by phone *after* the visit. This suggests that *in vivo* models may be optimally positioned to ensure completion. These findings contrast with Mello and colleagues' (2008) who reported successfully contacting 70% of their sample for post-discharge telehealth SBIRT. The reasons for these differences between the two studies are difficult to discern. The samples, procedures, participant remuneration, and interventions were different between the two studies. If models relying on post-visit contact continue to be explored further, factors that influence the successful contact rate will require careful investigation.

Despite positive feedback for the R-BIRT, there were barriers to implementation. Many of the *in vivo* consultations were interrupted, requiring the patient to disconnect and call back. This is an important consideration for feasibility, suggesting the service will have to accommodate interrupted calls. In addition, observations of the process identified the following supports needed for success: **(1)** Access to a phone in all treatment areas, or a private area where patients can be temporarily moved, **(2)** Direct, toll-free access to a health coach with no answering service trees or being placed on "hold," and, **(3)** Adequate training and support for ED clinicians to (a) know how to properly screen for risky substance use; (b) understand the availability and capabilities of R-BIRT, including the range of severity handled; and (c) the best way to frame the service to promote patient acceptance.

Fostering connectivity to substance treatment and reduced substance use are important goals of the R-BIRT and should be studied further. Treatment outcomes from this initial feasibility study show promise for continued development and study of the impact on public health. The R-BIRT treatment provider contact rates ranged from 19% for illicit drug users to 29%

for risky alcohol users within three months of the ED visit. Approximately 50% of each substance class reported either abstinence or non-risky use at 3 months. Evaluating how the R-BIRT compares to treatment as usual or in-person models in terms of connecting patients to care and decreasing substance use awaits further study using randomized clinical trials.

4.1. Limitations

Despite designing the R-BIRT to accommodate any medical setting, the study was performed in a single ED. Consequently, the results may not apply to all EDs or translate to other medical settings. Biological validation of abstinence was not included in this project because of its primary focus on development and feasibility, not efficacy. Future efficacy studies should consider using biological validation of abstinence to confirm results and strengthen impact on public health.

This was an exploratory study to test the feasibility of a new model, such as the R-BIRT, for alcohol SBIRT in the ED setting. For the purpose of testing feasibility a small sample size was used. Future studies should include a larger sample size in order to better determine the effects of treatment and their ultimate impact on public health.

4.2. Conclusions

The R-BIRT has potential to positively impact public health and should be studied further. Risky substance use is relatively common in medical settings. Inadequate detection occurs because clinicians are not sufficiently trained in validated screening practices and, those who are, are reluctant to screen because they do not have the knowledge, time, or resources to handle a positive screen. The R-BIRT addresses this latter disincentive by providing an easy solution for a positive screen that can be readily accessed during the visit. Even if R-BIRT does not successfully promote more broad-based screening, it can provide better, evidence-based interventions for those who are already identified as having problematic substance use through usual practices. The public health impact of finally having an easily accessible, sustainable, evidence-based brief intervention model for substance use could be profound, especially when one considers its applicability to a wide range of medical settings.

Acknowledgments

This study was funded by a Small Business Technology Transfer grant from the National Institutes of Health (R41AA022035)

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Highlights

- A telehealth model for brief substance use interventions was designed.
- The service provides interventions for both alcohol AND drug use.
- Several possible implementation strategies were identified by end-users.
- Strategies involving consultation during the medical encounter engaged patients.
- Strategies that called the patient after the encounter did not engage patients.

Figure 1. R-BIRT Overview

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Figure 2. Patient Satisfaction with the R-BIRT Consultation (n=27)

Note: Patient satisfaction rating for each item are depicted as percentages within each response category. Only those patients who completed a consultation during the ED visit were available to complete the satisfaction assessment (n=27).

Table 1

Models of Implementation *

Model Name and Description	Pros	Cons
Warm Handoff: The treating nurse or physician contacts R- BIRT service on behalf of the patient during the medical visit, provides the health coach basic information, such as patient name and reason for referral, and hands the phone/video to the patient.	<ul style="list-style-type: none"> Establishes clear continuity between providers Firmly establishes referring clinician support for integrated care Occurs <u>during</u> the medical visit Provides summary report to treating nurse or physician Capitalizes on teachable moment 	<ul style="list-style-type: none"> Clinicians can view having to place the call as a hassle Delays in connecting to a counselor will delay the clinician, which delays care Patients are sometimes feeling badly and not “in the mood” to talk during the medical visit May be interrupted by testing or treatment considerations
Patient Direct: The treating nurse or physician provides the telephone or video device to patient with instructions and R- BIRT telephone number, and the patient calls directly during the medical visit.	<ul style="list-style-type: none"> Occurs <u>during</u> the medical visit Provides summary report to treating nurse or physician Less hassle for nurse or physician Capitalizes on teachable moment 	<ul style="list-style-type: none"> Less continuity between treating nurse or physician and R-BIRT Patients are sometimes feeling badly and not “in the mood” to talk during the medical visit May be interrupted by testing or treatment considerations
Electronic Referral: The treating nurse or physician (or designee) sends the patient’s name and contact information electronically to R-BIRT, and a telehealth coach calls the individual the next day.	<ul style="list-style-type: none"> An easy form of facilitated referral that requires little staff time/effort May approach patient when feeling better after the medical encounter 	<ul style="list-style-type: none"> Does not occur during the medical visit, so lack of feedback to clinician Reaching the patient after they leave can be problematic (i.e., inactive phone numbers, no answer)

* All three models presume that the treating clinician has identified risky substance use or potential for a Substance Use Disorder and describes the R-BIRT service in a manner likely to engender acceptance (e.g., in a supportive, non-judgmental manner, highlighting the readily availability and strong capabilities of the service).

Table 2**The Enabling Software Components**

Screening/Assessment	Validated screeners for alcohol (AUDIT) (Babor et al., 2001) and illicit drugs (Drug Abuse Severity Test (DAST-10) (Skinner, 1982) are included, with questions pertaining to withdrawal symptoms and previous treatment experience.
Motivational tools	Tools rooted in Brief Motivational Interviewing are used to guide brief counseling: (1) a pro/con exercise, (2) personalized feedback based on the assessment, including safe drinking limits, (3) assessment of readiness to change using readiness rulers, and (4) action planning. The tools are interactive and the results are documented in the reports. Prompts are derived from Motivational Interviewing strategies focused on reinforcing patient autonomy and choice, eliciting and reinforcing change talk, promoting change commitment and developing discrepancy between current and goal states, by utilizing open ended questioning, affirmations, reflective listening, and, summaries.
Referrals	Personally tailored referrals are generated automatically using an algorithm that matches an individual to the most appropriate treatment providers based on substances used, abuse severity, location of residence, insurance provider, and other demographics. The algorithm was developed and validated in previous studies and accesses a provider library maintained by Polaris (Boudreaux et al., 2009). The software provides a range of good-fit referral options for the health coach to discuss with individuals to allow for flexibility and patient choice, when possible. At a minimum, all individuals receive a list of inpatient and outpatient treatment facilities and self-help resources, such as the AA hotline and AA meeting finder URL, as part of their Patient Feedback Report. In addition to a printed list, those interested are able to choose one of two facilitated referral paths: (1) a faxed referral, whereupon the treatment facility receiving the fax contacts the individual within five days of the referral ("dynamic referral"), or (2) direct telephone transfer from R-BIRT to the treatment provider ("patch in").
Reports	The software generates two reports. The Healthcare Provider Report is a one- page summary of the assessment and referrals and is faxed or electronically transmitted to the referring clinician and charted on the patient's medical record. The Patient Feedback Report includes personalized patient feedback, a summary of the motivational exercises, and personally tailored referrals. It is given to the patient at discharge and can be accessed after the visit on-line through a patient portal.
Patient portal	A secure, HIPAA compliant portal allows patients to access and share their report at any time.
Technical specs	The application platform is an n-tier architecture comprised of the core enabling software application (application layer), Hibernate (object persistence layer), PostgreSQL database server application (data layer), and Jasper Reports server application (reporting layer). Data is stored on state of the art, encrypted, dual firewall protected, HIPAA compliant servers.

Table 3

Descriptive Statistics of the Sample (n=50)

Domain	Mean (SD)	N (%)
Age	42 years (14 years)	
Sex		
Male		35 (70%)
Female		15 (30%)
Race		
White		41 (82%)
Non-white		9 (18%)
Ethnicity		
Hispanic		2 (4%)
Non-Hispanic		48 (96%)
Insurance		
Private		12 (24%)
Medicare		6 (12%)
Medicaid		41 (62%)
None		1 (2%)
Substance use screening		
Risky alcohol alone		20 (40%)
Illicit drugs alone		18 (36%)
Both risky alcohol and drugs		12 (24%)
Model enrollment		
Warm handoff		10 (20%)
Patient direct		10 (20%)
Electronic referral		10 (20%)
Patient choice		10 (20%)
Modified patient choice		10 (20%)

Table 4

Model Enrollment and Intervention Completion (n=50)

Model Name	N (%) Completed Consultation *
1. Warm Handoff (n=10)	10 (100%)
2. Patient Direct (n=10)	10 (100%)
3. Electronic Referral (n=10)	0 (0%)
4. Patient Choice (n=10)	2 (20%)
5. Modified Patient Choice (n=10)	7 (70%)
Total	29 (58%)

* Percentage who completed an assessment and brief intervention with a health coach