American Psychological Association

Technology, Mind & Society
2021 Conference Proceedings

© 2021 The Author(s)
ISBN:

http://dx.doi.org/10.1037/xxxxxxx

Artificial Intelligence-Enhanced Screening, Brief Intervention & Referral to Treatment (SBIRT)

Using the Brief Negotiation Interview (BNI) Across Diverse Populations

Michael V. Pantalon[1,2], Maxim Topaz[3], and Marianne S. Pantalon[1]
[1]Center for Progressive Recovery, LLC
[2]Yale University School of Medicine, Department of Emergency Medicine
[3]Columbia University School of Nursing

Screening, brief intervention and referral to treatment (SBIRT) is an evidence-based approach to the treatment of a wide variety of medical conditions (e.g., alcohol, tobacco, cannabis and opioid use, treatment engagement and adherence, asthma control, elder abuse disclosure, and exercise, among many others). While SBIRT is efficacious, it is not widely adopted or implemented. Some of the reasons for this are lack of training, time, expert providers, and funding. Thus, there is a critical need to develop effective, standardized, acceptable and time- and cost-efficient ways of implementing SBIRT, such as technology-enabled solutions, including those that do not rely on human interventionists. This symposium will present a series of papers that will each describe the current and ongoing development of such technology enabled SBIRT, focusing specifically on the Brief Negotiation Interview (BNI), one of the most robustly efficacious approaches to SBIRT. Each of the papers will also describe their efforts at incorporating artificial intelligence (e.g., machine learning, natural language processing) into this work, which spans such diverse populations as individuals with high-risk drinking, uncontrolled asthma, elder abuse, and opioid use disorder, as well as medical trainees who are using a web-based application to learn to implement the BNI with their patients. Special attention will be paid by each presenter to the potential ethical issues posed by AI.

Keywords: Artificial intelligence, screening, brief intervention, and referral to intervention (SBIRT), brief negotiation interview, chatbot, alcohol, opioids, elder abuse, asthma

Incorporating Artificial Intelligence into a Web-based, Self-Directed Brief Intervention Training Program for Medical Professionals Treating Alcohol Use Disorders

Michael V. Pantalon (Yale School of Medicine), Maxim Topaz (Columbia School of Nursing), Fuad Abujarad (Yale School of Medicine), Shara Martel (Yale School of Medicine), and Gail D'Onofrio (Yale School of Medicine).

High-risk alcohol use is one of the foremost preventable public health problems. Screening, brief intervention and referral to treatment (SBIRT) approaches are effective at reducing high-risk alcohol use, especially those using the brief negotiation interview (BNI). However, BIs are not yet commonplace in clinical practice, largely due to lack of sufficient medical training. BI training in traditional, in-person, expert-led workshops is time and labor intensive, and its widespread adoption has not been achieved. Thus, we developed a web-based, self-directed BNI training program, using a virtual preceptor, "Coach Vicky" (CV), and employing dialogue-based interactions and highly individualized feedback. CV has been shown to be promising in two pilot studies. However, in order to continue advancing the effectiveness, efficiency and real-world applicability of CV, the program needs to incorporate newer and more automated technological improvements, such as those based on artificial intelligence (AI). Specifically, AI will aid in the identification of the types of training modules that are difficult for trainees to apprehend and master. Such insights can be used to refine the training application for the specific needs of each trainee. Second, an intelligent assistant could continue evaluating the provider's skill and provide feedback during actual provider-patient interactions. The recorded dialogue from these interactions would then be analyzed by AI, and certain content and wording insights would be identified. These insights could help providers improve their interview skills in real time and refine their deployment of the BNI so as to best guide patients towards positive behavior change.

Developing a technology-enabled Brief Negotiation Interview for Asthma Control among Black Adults

Maureen George (Columbia School of Nursing), Michael V. Pantalon (Yale School of Medicine), Allison A. Norful (Columbia School of Nursing), and Maxim Topaz (Columbia School of Nursing)

Most asthma-related hospitalizations and deaths could be prevented with appropriate adherence to inhaled corticosteroids (ICS), the cornerstone of treatment for uncontrolled asthma. Compared to Whites, Non-Hispanic Black adults have lower adherence and greater asthma-related deaths. To address this, we adapted the Brief Negotiation Interview (BNI), a brief intervention that has been shown to successfully motivate patients with other chronic medical problems. The result was a tablet-based, drop-down menu program called, the BRief Evaluation of Asthma THerapy (BREATHE), which guides providers through this motivational process in 10 minutes. Our prior work demonstrated the efficacy, feasibility and acceptability of BREATHE. That said, in order to further ensure that BREATHE is broadly implemented in an effective, efficient and standardized manner, our work also includes the ongoing software development of the program, so that there may soon be a patient-administered option for settings where providers do not have the time, expertise or funds to use the live provider-patient version. Specifically, machine learning technology will be applied to actively "listen" to the BNI conversation between providers and patients while using BREATHE. Such active listening can be used to automatically monitor the degree to which the provider is adhering to the program's guidance compared to transcriptions of audiorecordings of providers who previously used BREATHE and compared to expert ratings of implementation. Machine learning algorithms will also be developed to extract insights about care outcomes (e.g., adherence to asthma control treatments) and the quality of BNI interviews (e.g., high quality vs low quality BNI).

Promoting self-disclosure of elder abuse with a web-based screening, brief intervention and referral to treatment (SBIRT) approach in the emergency department

Fuad Abujarad (Yale School of Medicine), Chelsea Edwards (Yale School of Medicine), Esther Choo (Oregon Health & Science University), Michael V. Pantalon (Yale School of Medicine), Karen Jubanyik (Yale School of Medicine), Thomas Gill (Yale School of Medicine), Maxim Topaz (Columbia School of Nursing), and Gail D'Onofrio (Yale School of Medicine).

Elder abuse is a national problem where only 1 in 24 cases become known to the authorities. Extant approaches to screening for this problem are of unknown efficacy and infrequently used. The reasons are lack of expertise and time. Thus, there is a critical need for effective, feasible, and efficient solutions to increase the identification of elder abuse. We developed a web-based digital health tool based on SBIRT and delivered on tablets to motivate older adults to self-disclose abuse. In order for the tool to be widely adopted and implemented, we will need to continually improve its ability to approximate a human-to-human interaction and its efficiency. In this paper, we will describe our planned software development efforts toward this end, which will incorporate a series of improvements utilizing artificial intelligence (e.g., natural language processing and machine learning) to allow users to enter their own, personal reasons for disclosure via free text entries. Those free text responses would then be categorized, and, depending on the categorization, tailored reflections would be deployed via a machine learning algorithm using a database of responses. Additionally, we plan to utilize AI to recognize and elicit signs of specific types of abuse. Conversational AI agents can interact with elderly people and ask them to describe their situation or any complaints. AI systems can analyze these responses and identify whether there are concerns about physical, financial, or emotional abuse, which could then be further discussed with a clinician or a social worker.

An Artificial Intelligence-Powered Brief Intervention Chatbot to Motivate Buprenorphine Engagement among Justice Involved Individuals with Opioid Use Disorder

Marianne S. Pantalon (Center for Progressive Recovery), Maxim Topaz (Columbia School of Nursing), Thomas Wheeler (Center for Progressive Recovery), Caitlin Malicki (Yale School of Medicine), Gail D'Onofrio (Yale School of Medicine), and Michael V. Pantalon (Center for Progressive Recovery & Yale School of Medicine)

There is an urgent need to improve opioid use disorder (OUD) treatment among justice involved individuals, the most at-risk population to die from an overdose. These individuals need to receive life-saving treatment, such as buprenorphine (bup), faster, better, and with less stigma. Since our brief intervention, the Brief Negotiation Interview (BNI), is a proven method to motivate engagement in bup treatment, we aim to develop an artificial intelligence (AI) chatbot around the four BNI steps (i.e., Acknowledge Autonomy, Enhance Motivation, Provide/Elicit Feedback & Negotiate a Plan) to motivate bup initiation. A chatbot is innovative and positively "disruptive" because it bypasses the probation officer and treatment provider "gate-keepers". In this paper, we describe the high-level aspects of developing an AI-powered BNI chatbot, including the product's overall architecture (i.e., web/mobile application, application program interface server, BNI chatbot, and administrator portal), as well as our use of machine learning and natural language processing with the transcriptions of over 300 encounters (including thousands of utterances) with emergency department patients with OUD. Specifically, we identified the best performing machine learning algorithm (Support Vector Machines) that was able to accurately classify human responses (overall F-score =0.8, indicative of high classification performance) to BNI questions. The resultant algorithm forms the heart of the BNI chatbot and will not only elicit motivational reasons to initiate bup from the chatbot user but it will also offer motivational reflections and reminders of those reasons.

This article was published [to be completed by publisher].

This research was supported in part by:

Substance Abuse & Mental Health Services Administration, H79TI081127-01
National Institute of Nursing Research, R21NR016507

National Institute on Aging, 1R01AG060084-01
National Institute on Drug Abuse, 1R43DA051287-01A1

The Session Chairs have the following conflict of interest to disclose: Drs. Michael and Marianne Pantalon are co-owners of the Center for Progressive Recovery, LLC, a small business with a financial stake in the commercialization of products based on artificial intelligence.

Correspondence concerning this article should be addressed to Michael V. Pantalon, Ph.D. Yale School of Medicine, Department of Emergency Medicine, 464 Congress Avenue, Suite 260, New Haven, CT 06517 USA. Email: michael.pantalon@yale.edu