Development of a Smartphone "App" for Tinnitus Management
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Objectives. This study is based on the premise that outcomes of hearing health care (HHC) can be improved if patients receive "real time" intervention that addresses their tinnitus problems within minutes or hours of occurrence through use of smartphone "apps" that conduct an ecological momentary assessment (EMA) and provide rehabilitation advice and suggestions based on the user's responses. The study will address the following **specific aim**: (1) Develop a smartphone app for improving outcomes with intervention for clinically significant tinnitus (Tinnitus Coach); **Plan.** We recently completed a pilot study to evaluate the feasibility of using EMA with two groups of individuals: hearing aid users and individuals with bothersome tinnitus. A pocket-sized electronic device was used to perform multiple daily self-report assessments to capture data describing the participants' auditory-based problems in real time. Participants in our pilot study used a Palm personal digital assistant (PDA) to respond to questions four times a day for 2 weeks. Participants were compliant (77% response rate for hearing aid group and 90% for tinnitus group) and their data provided a high-resolution assessment of within- and between-day auditory problems. We will build upon our pilot study by refining the tinnitus EMA protocol and adding a rehabilitation component. A software application ("app") will be developed to deliver the EMA protocol via smartphones. The app would be programmed to assess auditory difficulties. Additional algorithms will be developed that enable delivery of immediate feedback and advice to participants either through an alert schedule or through patient-driven on-demand assessments. After each assessment, the app would provide immediate on-screen suggestions for how to address any tinnitus difficulties reported. The app to be developed is referred to as "Tinnitus Coach." It is hypothesized that use of this app will improve outcomes of HHC for tinnitus patients.

Methods. The study will be conducted in two phases. In **Phase 1 Developmental Study** (months 0-12) the EMA and rehabilitation protocols will be developed and the smartphone appwill be designed and programmed. No subject testing will be done for this phase. During Phase 2 Refinement focus groups will be conducted with individuals bothered by their tinnitus to get their feedback to the app. Note: an IRQ for full IRB approval will be submitted prior to any human subject testing. Based on the Phase 2 findings, the app will be fine-tuned, software problems will be resolved, and an appropriate alert protocol will be determined.

Findings to Date. none

Relevance to VA's Mission. Tinnitus is the most common of all the service-connected disabilities for military Veterans. By the end of Fiscal Year 2012, a total of 971,990 Veterans were service connected for tinnitus. Completion of this study will result in novel methodology for assessing and managing patients' tinnitus problems in real time. This new approach has the potential to improve outcomes of tinnitus intervention for Veterans.