Original Article

Developing a Virtual Teach-To-Goal™ Inhaler Technique Learning Module: A Mixed Methods Approach

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What is already known about this topic? Self-management education has been shown to improve patient care and health outcomes; however, patients often need repeated educational sessions for long-term retention of learned skills. In addition, clinicians often lack the resources to provide training.

What does this article add to our knowledge? We describe the development of an interactive, adaptive learning module that can be used for repeated educational sessions in multiple settings, allowing for a tailored training session to learn effective inhaler technique skills.

How does this study impact current management guidelines? This study provides important insights into using patient feedback to improve a novel technology-based intervention and obtaining pragmatic information on access and willingness to use the module.

BACKGROUND: Most hospitalized patients with asthma or chronic obstructive pulmonary disease misuse respiratory inhalers. An in-person educational strategy, teach-to-goal (TTG), improves inpatients' inhaler technique.
OBJECTIVE: To develop an effective, portable education intervention that remains accessible to hospitalized patients postdischarge for reinforcement of proper inhaler technique.
METHODS: A mixed methods approach at an urban academic hospital was used to iteratively develop, modify, and test a virtual teach-to-goal™ (V-TTG™) educational intervention using patient end-user feedback. A survey examined access and willingness to use technology for self-management education. Focus groups evaluated patients' feedback on access, functionality, and quality of V-TTG™.
RESULTS: Forty-eight participants completed the survey, with most reporting having Internet access; 77% used the Internet at home and 82% used the Internet at least once every few weeks. More than 80% reported that they were somewhat or very likely to use V-TTG™ to gain skills to improve their health. Most participants reported smartphone access (73%); half owned laptop computers (52%). Participants with asthma versus chronic obstructive pulmonary disease were more likely to own a smartphone, have a data plan, and have daily Internet use ($P < .05$). Nine focus groups (n = 25) identified themes for each domain: access—platform and delivery, Internet access, and technological literacy; functionality—usefulness, content, and teaching strategy; and quality—clarity, ease of use, length, and likability.
CONCLUSIONS: V-TTG™ is a promising educational tool for improving patients' inhaler technique, iteratively developed and refined with patient input. Patients in our urban, academic hospital overwhelmingly reported access to platforms and willingness to use V-TTG™ for health education. © 2017 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2017;■:■-■)

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In the United States, asthma and chronic obstructive pulmonary disease (COPD) affect almost 30 million adults.[1,2] Medications delivered by inhalers provide the mainstay of

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Abbreviations used
COPD- Chronic obstructive pulmonary disease
REDCap- Research Electronic Data Capture
TTG- Teach-to-goal
UCM- University of Chicago Medicine
V-TTG™- Virtual teach-to-goal™

treatment in controlling and preventing symptoms for both diseases.[3-8] However, respiratory inhaler misuse is exceedingly common,[9,10] with 86% of observed inpatients with asthma or COPD displaying incorrect technique.[3,11] Improper inhaler use, especially certain critical errors such as inspiratory effort, leads to ineffective medication delivery and correlates closely with suboptimal symptom control, lower quality of life, and increased emergency room visits and hospitalizations.[12,13] This ineffective inhaler technique is often not considered before escalating treatment; therefore, doses of medications or even additional medications may be unnecessarily added to patients' regimens.[10] The economic cost of wasted medications alone is estimated to be $5 billion to $7 billion annually, and the burden on the health care system due to uncontrolled chronic symptoms is tremendous.[12,14-18] Proper inhaler technique education is therefore crucial for effective self-management of asthma and COPD.[13,19]

Our previous work has shown that teach-to-goal (TTG), an in-person educational method of cycles of demonstration and assessment,[11,20] is effective for teaching inhaler technique to hospitalized patients with asthma or COPD.[11,21,22] However, we have also shown that the improved inhaler technique initially obtained through TTG wanes within 30 days postdischarge.[21] Because providing in-person inhaler teaching postdischarge is often impractical, but reinforced teaching is necessary, a need exists for an effective, portable education strategy that remains accessible to patients both in-hospital and postdischarge.

With increasing Internet access among the American public,[23] using a virtual teach-to-goal™ (V-TTG™) education module for inhaler training may be a viable and efficient alternative.[24] Previous studies have shown technology-based interventions to be effective at improving self-management for other chronic conditions.[25-31] However, access and willingness to use technology for home-based self-management education among inpatients with asthma or COPD is unknown, particularly among an underserved patient population. Furthermore, the use of adaptive learning technology for self-management education for this topic and population has not been widely studied. Therefore, when developing the V-TTG™ learning module it was necessary to iteratively modify and test each module component, which included demonstration and narration videos, predemonstration and postdemonstration self-assessment questions, and overall video module design and delivery, to ensure that we optimized V-TTG™ for patient use.

The overall goal was to develop V-TTG™ into an effective and acceptable interactive learning module that would be easily accessed postdischarge on patients' home devices. After developing the inhaler technique demonstration videos produced by Click To Play Media (Berkeley, Calif), we partnered with Smart Sparrow (Sydney, NSW, Australia) for its adaptive learning technology platform. Our aim was to optimize the V-TTG™ through mixed methods, including surveys and focus groups, to offer 2 different perspectives across 3 key domains of the module design and delivery: access, functionality, and quality. Using mixed methods, we aimed to (1) understand patient access to technology, including which platforms would be both favorable and available to our patient population using quantitative survey data, and (2) obtain in-depth feedback on the usability and quality of the module assessment questions and the overall learning module itself using qualitative patient focus group data.

METHODS

Design and setting

We conducted a prospective mixed methods study[32] at the University of Chicago Medicine (UCM), an urban, predominantly underserved adult patient population. Iterative testing of V-TTG™ and its components was completed with surveys on patients' use and ownership of technology and with patient focus groups, collecting quantitative and qualitative data, respectively. This use of mixed methods was selected for the insight it could offer into 2 different aspects of V-TTG™: (1) the proportion of inpatients who have used specific devices or have accessed the Internet and (2) the subjective experience of interacting with and learning from the module.[32] The former could be best examined using quantitative methods, whereas the latter by qualitative.

Participants

Technology survey. Survey participants were recruited from the general medicine service from January to September 2014. Patients who provided written informed consent to take part in the Hospitalist Project, an ongoing study on cost and quality of care,[33] and who met inclusion criteria for the technology survey study were approached during the same hospitalization by trained research assistants. For this report, we only used survey data from inpatients with a diagnosis of asthma and/or COPD. Patients with asthma only were included in the asthma cohort, whereas patients with COPD or COPD and asthma were included in the COPD cohort. Additional inclusion criteria included being older than 18 years and English-speaking. Exclusion criteria included inability to provide consent. All participation was voluntary. The study was approved by the UCM Institutional Review Board (IRB16-0763).

Focus groups. Participants were recruited from the UCM Department of Internal Medicine and Asthma and COPD Center between December 2013 and April 2014. Inclusion criteria included being older than 18 years and English-speaking, physician diagnosis of asthma or COPD, and prescribed use of a metered dose inhaler. Exclusion criteria included current hospitalization and inability to provide consent. Potential participants were contacted using a phone script and, if interested, were mailed or emailed a letter regarding their participation. All participation was voluntary and written informed consent was obtained. This study was approved by the University of Chicago Institutional Review Board (IRB13-1139).

Data collection

Technology survey. The survey was developed to obtain a comprehensive understanding of our patient population's use, ownership, and access to technology, and their willingness to use technology for health-related information. Survey items were benchmarked against similar items from the existing literature including the national Pew survey[34] and questions from a local research study,[35] in addition to V-TTG™–specific questions for more detailed information on patients' willingness and ability to use V-TTG™.