A primary care Web-based Intervention Modeling Experiment replicated behavior changes seen in earlier paper-based experiment

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Abstract

Objectives: Intervention Modeling Experiments (IMEs) are a way of developing and testing behavior change interventions before a trial. We aimed to test this methodology in a Web-based IME that replicated the trial component of an earlier, paper-based IME.

Study Design and Setting: Three-arm, Web-based randomized evaluation of two interventions (persuasive communication and action plan) and a "no intervention" comparator. The interventions were designed to reduce the number of antibiotic prescriptions in the management of uncomplicated upper respiratory tract infection. General practitioners (GPs) were invited to complete an online questionnaire and eight clinical scenarios where an antibiotic might be considered.

Results: One hundred twenty-nine GPs completed the questionnaire. GPs receiving the persuasive communication did not prescribe an antibiotic in 0.70 more scenarios (95% confidence interval [CI] = 0.17−1.24) than those in the control arm. For the action plan, GPs did not prescribe an antibiotic in 0.63 (95% CI = 0.11−1.15) more scenarios than those in the control arm. Unlike the earlier IME, behavioral intention was unaffected by the interventions; this may be due to a smaller sample size than intended.

Conclusions: A Web-based IME largely replicated the findings of an earlier paper-based study, providing some grounds for confidence in the IME methodology. © 2016 Elsevier Inc. All rights reserved.

Keywords: Intervention Modeling Experiments; Behavior change; Randomized controlled trials; Intervention development; Prescribing; Primary care

1. Background

Without help, the uptake of research results into clinical practice happens slowly, if it happens at all [1]. The field of implementation science (or knowledge translation as it is generally called in North America) has been established to, among other things, develop and evaluate interventions to support professional behavior change that translates research evidence into practice. Examples include audit and feedback [2] and educational outreach [3]. However, the literature provides less information to guide the choice, or to optimize the components, of these

What is new?

Key findings
- A Web-based Intervention Modeling Experiment (IME) replicated the findings of an earlier paper-based IME on general practitioners' simulated antibiotic-prescribing behavior. The Web-based IME did not replicate findings linked to behavioral intention.

- Intervention effects were consistent across different modes of intervention delivery.

What this adds to what was known?
- Replication studies are relatively rare. Using different modes of delivery, general practitioners from different parts of the United Kingdom and done 7 years after the original study, this replication experiment demonstrated that the IME methodology can produce consistent results.

What is the implication and what should change now?
- The IME methodology may potentially be considered as a way of developing theory-based behavior change interventions before evaluation in a full-scale trial.

interventions for use in different contexts [4,5]. Interventions can be effective (e.g., reminder systems, audit), but the evidence is conflicting and the reason for this is largely unknown [2]. The UK Medical Research Council framework for developing and evaluating complex interventions proposes more and better theoretical and exploratory work before a full-scale trial as a means of improving intervention development [6].

Intervention Modeling Experiments (IMEs) are one way of doing this exploratory work [7] with some of the present study's authors (D.B., M.P.E., J.J.F., and N.B.P.) involved in their development. In an IME, key elements of the intervention are delivered, using a randomized design, in a manner that approximates the real world but where the measured outcome is generally an interim outcome, a proxy for the behavior of interest. Although we thought the methodology promising, there had been no replication study, which we considered essential if other investigators were to have confidence in the methodology; a single success is rarely sufficiently compelling to support widespread adoption [8].

The work described here is part of a study to evaluate the IME methodology itself by replicating an earlier, paper-based IME [9–11]. Our key research interests were as follows:

1. Does the delivery mode of the IME (paper or Web) affect predictors of general practitioner (GP) behavior?

2. Do interventions developed using these predictors change behavioral intention and simulated behavior in similar ways for the paper- and Web-based IMEs?

This is important information because, for the IME methodology to be useful, it needs to be a robust and reliable method to support trialists with their intervention modeling work. The first aim was addressed in an earlier publication [12], which showed that the Web-based IME identified 8/10 of the predictors of prescribing behavior identified in the paper-based IME. This article describes work linked to the second of our aims.

A detailed description of the form and content of the two theory-based interventions has been published elsewhere [12]. This article describes a randomized evaluation of two behavior change interventions (a persuasive communication and an action plan) with a "no intervention" comparator, all of which were delivered within a Web-based IME.

2. Methods

The trial was a three-arm, Web-based trial of two behavior change interventions compared to no intervention. Participants were GPs from 12 Scottish Health Boards identified by the Scottish Primary Care Research Network (SPCRN; www.sspc.ac.uk/) using a combination of publicly available information provided by Information Services Division Scotland (http://www.isdscotland.org/isd/3793.html) and restricted information held on the NHS.net database, the latter to provide e-mail addresses. SPCRN staff sent e-mail invitations to GPs on our behalf because supporting recruitment to research studies in this way is part of their role and GPs were familiar with receiving e-mails from SPCRN (but not the research team). SPCRN staff also sent reminders but had no other role in the study. The decision to use e-mail to invite GPs was taken after a randomized evaluation of postal vs. e-mail invitations, which found e-mails to be as effective as postal invitations but quicker and cheaper to send [13].

2.1. Recruitment

Recruitment was done in two stages, reflecting the stages of an IME [8]. The first stage recruited GPs to complete an online questionnaire comprising 20 questions about antibiotic-prescribing behavior, eight clinical scenarios that required antibiotic-prescribing decisions, and four general questions about the GP's background. GPs were also offered a £20 voucher for this stage. These data were used to identify predictors of antibiotic-prescribing behavior, which replicated work from the earlier paper-based IME [10], as well as to design a new intervention [12]. The clinical content of all eight scenarios, provided by one of the authors (M.P.E.), was such that there were no clear cases for prescribing an antibiotic.

The second stage recruited from among the GPs responding to stage 1 but excluded those in the first quartile of