



Patient-perceived acceptability and behaviour change benefits of inhaler reminders and adherence feedback: A qualitative study



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ABSTRACT

Introduction: Little is known about patients' perceptions of electronic inhaler reminders, which have emerged in recent years as adherence promotion aids. This study explored asthma patients' attitudes toward the acceptability and utility of inhaler reminders.

Methods: Participants from a 6-month cluster randomized controlled trial who received reminders for missed doses via SmartTrack adherence monitors (Adherium Ltd) were interviewed to explore their perceptions; interviews were audio-recorded, transcribed and analysed thematically.

Results: 18 participants (50% male, mean age 39 years [range 17–68]) were interviewed. Three themes were identified. *Acceptability and Feasibility:* Interviewees found the monitor easy to use. For some, concerns about the monitor itself affected adherence, e.g. leaving it at home to avoid breakage. Positive features included that reminders played only for missed doses, and the choice of reminder tunes. *Utility and Behavioural Impact:* Interviewees described reminders as an effective “training” tool for adherence, encouraging habit-formation, behaviour change and attitude change. Reminders were considered less acceptable or useful by participants who preferred taking medication only when symptomatic or who doubted the necessity or safety of their medication. *Sustainability:* Some interviewees reported sustained behaviour change, supported by reminders, through the establishment of routine or via experiential learning that good adherence improved their asthma. Other interviewees wanted ongoing support (i.e. reminders or substitute adherence cues) after study end.

Conclusion: Patients with asthma found 6-months' use of reminders and adherence feedback acceptable and useful for improving their adherence attitudes, adherence behaviours and confidence in asthma self-management. Some patients may benefit from ongoing adherence support.

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1. Introduction

Digital technologies which promote illness management are predicted to expand in the coming years. In the adherence space, novel technologies to promote medication use have emerged, such as electronic monitors with in-built reminders [1,2]. Reminders for missed doses have been shown to improve adherence with inhalers and clinical outcomes in asthma patients in randomized controlled trials (RCT); in a pragmatic 6-month RCT in adults with moderate-

Abbreviation list: RCT, Randomized Controlled Trials.

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severe asthma, we showed that inhaler reminders for missed doses led to improved adherence (average 73% vs 46%, $p < 0.0001$) and reduced severe exacerbations [3], similar results have been observed in children after ED presentation [4].

There has been a concerted call for greater involvement of patients in the design of new technologies [5], since the ultimate success of innovations depends on their acceptability and perceived usefulness by patients [6]. While effective implementation and long-term persistence with inhaler monitors and reminders will similarly be driven by patient acceptability, there is little research about this. A few studies have explored patient attitudes to pill box adherence monitors and reminders in patients with HIV [7,8], or kidney transplants [9], but these cannot necessarily be extrapolated to inhalers or to patients with respiratory disease. Two studies exploring patient-acceptability of monitors and reminders for inhalers were restricted to a 7–30 day window of exposure to the monitor and reminders [10,11], and implemented within a research setting. These data provided little information about the feasibility of longer term use in real world settings nor about the process of patient behaviour and attitude change, nor about barriers to change in response to monitoring, reminding and adherence feedback.

The aim of this study was to explore asthma patients' attitudes toward the acceptability of electronic adherence monitoring and the usefulness of medication reminders for missed doses and adherence feedback after six months' use.

2. Methods

2.1. Recruitment of participants for the randomized controlled trial

Patients aged 14 years and older with moderate-severe asthma (prescribed twice daily ICS/LABA for ≥ 1 month prior to enrolment; no asthma exacerbation in the last month; and not currently participating in an asthma study) and sub-optimal asthma control (Asthma Control Test ≤ 19) [12]; were enrolled by their GP in a pragmatic 6-month cluster randomized controlled trial (RCT) of GP-delivered interventions for improving patients' adherence with inhaled fluticasone propionate/salmeterol xinafoate (hereafter referred to as 'preventer') therapy [3,13].

2.2. Recruitment of participants for the interview study

At the end of the RCT, a sub-sample of the participants who received an inhaler-based 'reminder and feedback' intervention (see below) were invited to take part in an interview. Participants were selected using theoretical sampling to represent a range of: gender, age, education and self-reported satisfaction with monitoring and reminders, the latter recorded by participants at RCT exit on a 100 mm long visual analog scale from 'not at all satisfied' to 'extremely satisfied'. We also aimed to include one or two patients who dropped out of the study to capture any negative views on the monitor that may have contributed to their decision to drop out. For half of the participants selected for interview, their GP had also received training to deliver an 'adherence counselling' intervention (an intervention that was found to be ineffective for improving medication use or adherence attitudes) [3,13].

2.3. Reminder and feedback intervention

Patients received twice-daily reminders for missed preventer doses from the SmartTrack (Adherium, Auckland, New Zealand) adherence monitoring device (hereafter referred to as "monitor") that we have previously validated and field tested [11]. The monitor clipped onto the patient's preventer inhaler, recorded the date/time of all actuations and uploaded the data each month to a secure

website using an internal mobile phone SIM card. Patients could customize reminder ringtones and reminder times, cancel individual reminders, or switch reminders off completely. The monitor screen displayed the time since the last dose in minutes, hours, days or weeks [11]. Each month, patients received an automated e-mail to remind them to view a graph of their daily preventer use on a website (Fig. 1); a similar email was sent to their GP. The patient also received telephone contact from the research team every two months to collect study outcomes for the RCT.

2.4. Study design

This was a qualitative study utilizing in-depth, semi-structured interviews to explore asthma patients' experiences of using an adherence monitor with reminder and feedback capability.

2.5. Interviews

Interviews of approximately 45 min duration were conducted by telephone by JMF. An interview guide (Appendix A) was used to explore patients' perceptions of barriers, facilitators, usefulness and impact of using the monitor and its reminders. Participants were assured that the content of the interview would be kept strictly confidential. After each interview, field notes were recorded of emergent themes, the situational context, and/or new topics for follow up in subsequent interviews. Interviews continued until thematic saturation occurred (i.e. when three interviews had been conducted with no new themes emerging) [14].

2.6. Analysis

Recordings were transcribed verbatim and transcripts were anonymised. We adopted the thematic approach to analysing qualitative data [15]. Interviews were analysed systematically by JMF, with the first step being familiarisation (reading and re-reading transcripts and field notes) to gain an immediate impression of data, and analytic memoing to document the researcher's reflections. Initial descriptive coding was then carried out which later progressed to pattern coding [16], and identification of themes and subthemes. The analysis was carried out iteratively as each new interview was completed. All codes and themes were continuously checked and re-checked by JMF, with regular in-depth discussion of coding and themes with co-authors HKR and LS to ensure they represented the content of the interviews. All co-authors commented on the themes prior to finalising the analysis.

2.7. Ethical considerations

The Human Research Ethics Committee (HREC) of the University of Sydney approved the interview study protocol (ref. no. 05-2009/11731). Written information was provided, and written informed consent was obtained from all participants.

3. Results

Eighteen participants (50% female; mean age 39 [range 17–68] years) were interviewed (Table 1). Of patients receiving reminders in the RCT [3], 7 were lost to follow up and 2 dropped out, one of whom agreed to be interviewed. The latter participant had not provided a score on satisfaction with monitoring at study withdrawal. The mean participant-reported satisfaction (scored 0–100) with the monitor was 82 (range 32–100). Interviews lasted an average of 47 min (range 21–90 min).

Analysis of the transcripts revealed three principal themes: 'Feasibility and Acceptability', 'Utility and Behavioural Impact of

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