

Texting atopic dermatitis patients to optimize learning and eczema area and severity index scores: A pilot randomized control trial

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Abstract

Background/Objectives: Atopic dermatitis is a common, chronic, debilitating disease. Poor adherence to treatment is the most important preventable contributor to adverse outcomes. Thus, improving adherence can improve patient outcomes. Text message reminders with embedded condition-specific information have been shown to improve pediatric immunization adherence but have not been assessed in atopic dermatitis. The objective was to assess the effect of daily text messages on Eczema Area Severity Index scores and caregiver knowledge of atopic dermatitis.

Methods: In this pilot randomized controlled trial, caregivers of children with atopic dermatitis enrolled during their initial appointment with a pediatric dermatologist and randomized 1:1 to standard care or daily text messages with patient education material and treatment reminders. Participants completed a multiple-choice atopic dermatitis knowledge quiz at initial and follow-up visits, and Eczema Area Severity Index scores were assessed.

Results: Forty-two patients enrolled, and 30 completed the study: 16 standard care group, 14 text message group. There was no significant difference in Eczema Area Severity Index score between the standard care and text message groups at follow-up, with mean decreases in Eczema Area Severity Index score of 53% and 58%, respectively. Mean score on follow-up atopic dermatitis knowledge quiz was significantly higher in the text message group (84% correct) than in the standard care group (75% correct) ($P = .04$).

Conclusion: This pilot study did not demonstrate a difference in Eczema Area Severity Index scores with text message reminders. The significantly higher follow-up atopic dermatitis quiz score in the text message group indicates that participants read and retained information from text messages. Limitations include small sample size and short duration of follow-up.

KEYWORDS

atopic dermatitis, eczema, health care delivery, text messages

1 | INTRODUCTION

Atopic dermatitis (AD) is the most common chronic childhood dermatologic disorder in the United States, and optimal management requires long-term adherence to multimodal therapies.¹ Nonadherence is one of the main contributors to poor outcomes.^{2,3} Average adherence rates of 40% for 5-day treatments and 32% for 8-week treatments have been reported.^{4,5} Inability to adhere to time-consuming or complicated protocols is the main modifiable factor that contributes to poor outcomes in AD.² Interventions that have been found to increase adherence include use of written eczema action plans (EAP), educational workshops, and shorter time to follow-up.⁶⁻⁸

The use of educational and reminder text messages (TMs) has improved adherence in preventative health maintenance, such as completing immunizations, and in a variety of chronic diseases, including psoriasis.⁹⁻¹¹ There are no published studies on the use of TMs for the purpose of education and treatment reminders in caregivers of young children with AD. We aimed to test whether using TMs to convey disease-specific information and treatment reminders could increase Eczema Area and Severity Index (EASI) scores and AD-specific knowledge of patients with AD and their families.

2 | METHODS

This pilot randomized controlled trial recruited children and their caregivers (parent or legally authorized guardian) seen by a pediatric dermatologist in inpatient or ambulatory settings in New York City from June 2016 to June 2017. The Columbia University Medical Center Institutional Review Board approved the study protocol. New patients younger than 7 with a clinical diagnosis of AD, AD severity that necessitated anticipated follow-up within 8 weeks, a caregiver with fluency in written and spoken English, and a mobile phone capable of receiving TMs were included.

The primary outcome measure was EASI score as assessed by a board-certified pediatric dermatologist at initial and follow-up visits (theoretical range 0.0-72.0).¹² The secondary outcome measure was score (% correct) on a 16-question multiple-choice AD knowledge quiz. The enrolled caregiver took the quiz after the child's first dermatologic assessment and a second time during or near the date of their follow-up visit. The same questions were asked in the initial and follow-up quiz, and participants were advised that they would take a second quiz. They were not informed that the questions were identical, and they were not provided with the answers before the repeat assessment. The follow-up survey also asked about feedback about and satisfaction with the study. The quiz and survey questions were administered on-line.

After the initial quiz, patients were allocated 1:1 to a standard care or TM intervention arm. The unit of randomization was the patient. Allocation was via opaque, sealed, sequentially numbered envelopes ordered using random-block permutation. The study coordinator and participating pediatric dermatologists were blinded to

randomization order. Allocation was revealed to the participant and study coordinator, but the pediatric dermatologist evaluating the patient was not informed of allocation.

3 | INTERVENTION

TMs were sent every morning from an encrypted mobile phone for 42 days or until follow-up appointment, whichever occurred sooner. Appendix 1 contains a representative sample of the educational TMs. Upon completion of the study, all participants were provided with a printed copy of the informational TMs and offered a review of the AD knowledge quiz questions.

The target sample size of 50 patients was based on detecting a difference in EASI score of 4.0 points with 80% power. An intention-to-treat analysis was used. Unpaired *t*-tests were used to compare differences in mean EASI scores and AD knowledge quiz scores.

4 | RESULTS

Of 42 patients, 30 completed the study; Figure 1 shows participant flow and follow-up. Two eligible patients declined to participate. One patient did not complete the initial survey before randomization. All eligible caregivers had a mobile phone. Five patients in the standard care and six in the TM group were lost to follow-up. No caregivers in the TM group indicated that they wanted to stop receiving messages, including those who did not return for follow-up.

Table 1 shows demographic information, mean initial and follow-up EASI scores, mean initial and follow-up AD knowledge quiz scores, and mean time to follow-up, with relevant *P*-values for the standard care and TM intervention groups. Overall, the EASI score improved in both groups, with a mean 6.1-point (53%) decrease in the standard care group and 9.1-point (58%) decrease in the TM intervention group (Figure 2). The difference in EASI score between study arms was not statistically significant in the initial or follow-up evaluation. AD knowledge quiz scores (secondary outcome measure) were significantly higher at follow-up in the TM group (84.6%) than in the standard care group (74.8%) (*P* = .04).

Participant feedback regarding study participation was collected during follow-up. When asked about their experience participating in the study, five (32%) members of the standard care group were very satisfied, nine (56%) were satisfied, one (6%) was neither satisfied nor unsatisfied, and one (6%) was unsatisfied. In the TM group, seven (50%) were very satisfied, and seven (50%) were satisfied with the study overall. Participants in the TM group answered additional feedback questions (Table 2).

5 | DISCUSSION

This study generated clinically relevant information to support the use of TMs to improve care of children with AD and their caregivers.

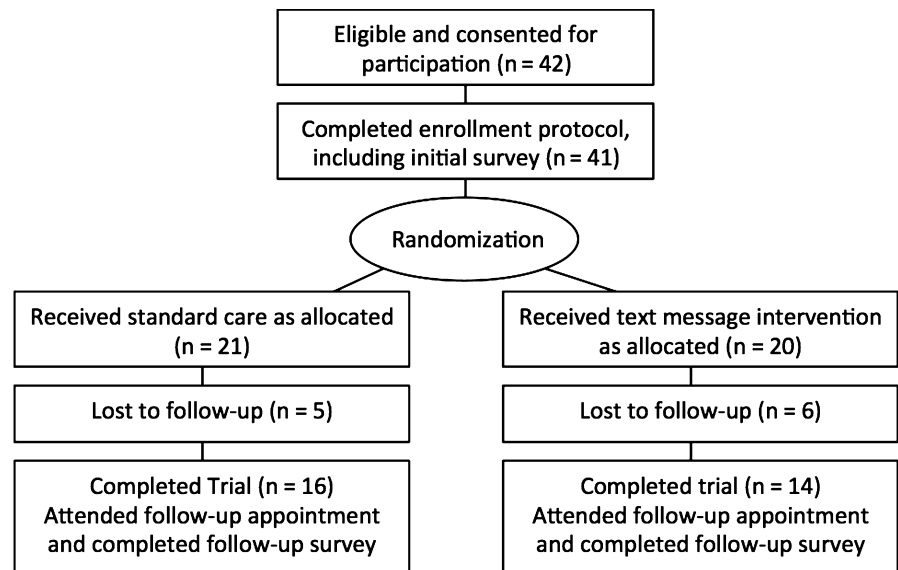


FIGURE 1 Participant flow and follow-up

TABLE 1 Initial and follow-up results for standard care and text message intervention groups

	Standard care group, n = 16	Text message group, n = 14	P-value
Age, years, average (range)	1.4 (0.3-3.8)	0.9 (0.3-2.2)	.18
Female, n (%)	12 (75%)	5 (36%)	-
Initial EASI score, mean (95% CI)	11.6 (8.6-14.5)	15.6 (9.7-21.4)	.22
Follow-up EASI score, mean (95% CI)	5.5 (3.1-7.9)	6.5 (2.7-10.2)	.65
Initial AD quiz score, %, mean (95% CI)	72.8 (67.2-78.3)	73.9 (66.1-81.6)	.82
Follow-up AD quiz score, %, mean (95% CI)	74.8 (68.9-80.6)	84.6 (77.8-91.3)	.04
Time to follow-up, days, mean (95% CI)	43 (35-51)	38 (25-50)	.48

AD, atopic dermatitis; CI, confidence interval; EASI, Eczema Area and Severity Index.

Although the intervention group did not have significantly lower EASI scores at the first follow-up visit than the control group, participants who received TMs scored significantly higher on an AD knowledge quiz. Furthermore, 70% reported that TMs helped them complete “a few” or “many more” days of treatment, and 100% liked receiving TMs for “learning new information.” These results validate the use of TMs as an acceptable method of communicating disease-specific information. Longer-term follow-up may be necessary to manifest differences in EASI scores and other AD-related outcomes, such as hospitalizations and infections.

Text messages are inexpensive, accessible, and a potentially useful tool to assist patients in incorporating AD treatments into their daily routine. Misconceptions about AD and recommended medications can affect adherence outcomes,^{2,13} so providing patients with reliable facts through TMs may help reinforce treatment rationale,

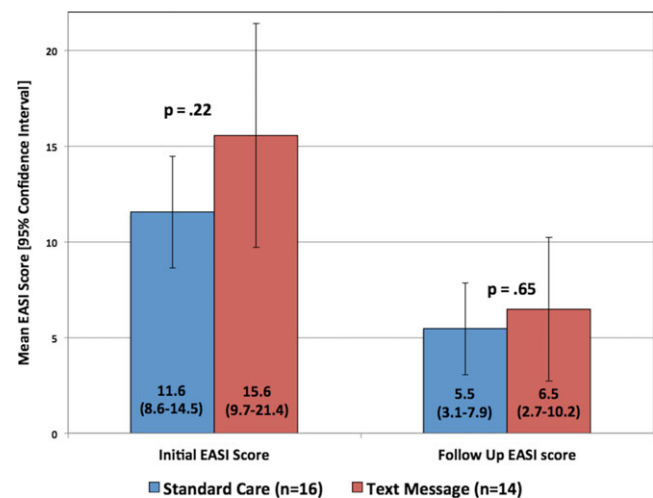


FIGURE 2 Mean initial and follow-up Eczema Area and Severity Index (EASI) scores. Bars represent 95% confidence intervals. Mean decrease in EASI score from baseline was 53% in the standard care arm and 58% in the text message arm

improve AD specific knowledge, and augment the physician-patient relationship.

A similar number of patients were lost to follow-up in both groups, suggesting that TMs do not affect attendance. Patients who were lost to follow-up did not communicate their reasons for nonattendance, but lost wages, cost of transportation, and finding child-care for other siblings can all contribute to the expense of attending appointments.^{3,14} Factors that influenced the time between the initial and follow-up visits included disease severity and caregiver availability. Thus, there was a range in the number of days between visits.

There are several limitations to this study. The small number of participants limited our ability to test the hypothesis with the calculated power. The AD knowledge quiz was not designed to

TABLE 2 Responses from text message recipients regarding study experience (N = 14)

Question and response choices	n (%)
How do you feel that text message reminders affected the number of days you were able to complete your personalized daily treatment plan?	
Text message reminders did not help me complete more days of treatment	4 (29)
Text message reminders helped me complete a few more days of treatment	6 (43)
Text message reminders helped me complete many more days of treatment	4 (29)
How did you feel about the number of text messages you received during this study?	
There were too many	2 (14)
There were the right amount	12 (86)
There were too few	0
Did you ever refer back to, or re-read, older text messages from TADPOLES for information?	
Yes, very often	2 (14)
Yes, a few times	6 (43)
No, never	6 (43)
What did you like about receiving text messages? Check all that apply	
I did not like anything about receiving text messages	0
Learning new information	14 (100)
Being reminded about treatments	7 (50)
Easier than talking on the phone	5 (36)
Easy to read	11 (79)
Felt supported knowing there were daily messages	6 (43)
Felt less alone in caring for my child's atopic dermatitis	6 (43)
What did you dislike about receiving text messages? Check all that apply	
Nothing; I did not dislike anything about receiving text messages	9 (64)
There were too many messages	1 (7)
The did not have new information	3 (21)
They were delivered at inconvenient times	1 (7)
They were not helpful	0

distinguish between knowledge acquisition and recall because the same questions were presented at the initial and follow-up visits. Using a single follow-up EASI score as the primary outcome data point is not truly reflective of the chronicity and episodic flares of AD. Longer-term follow-up would be a goal of future studies to understand the potential effect of TM intervention on disease severity and caregiver knowledge acquisition.

6 | CONCLUSION

Although the TM intervention did not result in a decrease in EASI scores at the first follow-up visit, this pilot study validated the use

of TMs as a tool for AD-specific patient education. More data over time and a larger sample size might provide insight into the potential long-term effect of TM on AD knowledge. Participants in the TM group reported favorable feedback regarding receipt of daily TM with AD information, which is encouraging for future studies that wish to use TMs.

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APPENDIX 1

Sample of Informational and treatment reminder text messages

Day of delivery	Text message
1	Atopic dermatitis (AD) is also called eczema or atopic eczema. It's very common and affects 10%-20% of all children. Remember your Eczema Action Plan (EAP)!
2	Some things that can worsen AD are dry skin, allergies, stress, infection, sweat, cigarette smoke, hot baths, and chemicals. Remember your EAP!
10	Skin is a barrier that keeps germs out and water in. AD weakens the skin barrier, but moisturizing helps protect it. Remember your EAP!
17	Nighttime itching often disrupts sleep. Daily moisturizing, soft cotton pajamas, and cool temperatures to reduce sweating can help. Remember your EAP!
24	AD is very itchy because skin irritation triggers special nerves in your skin. Moisturizing and gentle cleansing reduces irritation. Remember your EAP!