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An Internet-Based Survey and Improvement of Acne Treatment Outcomes

A number of topical agents are effective for the treatment of mild to moderate acne, but patients often do not use their medications as prescribed.¹⁻³ Medication use increases around the time of office visits,⁴ but frequent office visits may not be a practical way to increase compliance. Because adolescents use the Internet regularly, we tested whether a weekly Internet-based communication could improve teenagers' adherence to topical acne therapy.

Methods. This investigator-blinded, randomized, prospective study was approved by the Wake Forest University Health Sciences institutional review board, Winston-Salem, North Carolina. Twenty male and female participants, aged 13 to 18 years, with mild to moderate acne, were prescribed topical benzoyl peroxide, 5% gel, daily for 12 weeks. They were randomized 1:1 to a control group or to an Internet-based survey group; participants in the Internet survey group were sent a weekly e-mail containing a link to a survey assessing their acne severity and treatment. In the survey, the following questions were asked (with potential answer choices):

1. How many days did you apply the drug this week (1-7 times)?
2. How easy was it to use the study drug as prescribed (Very easy; OK; Inconvenient; Very difficult)?
3. Did using the medication interfere with your daily routine (Yes; No)? If Yes, how much (Just another thing to do; Completely interrupted my day)?
4. How useful was the medication in treating your acne (Acne is clear; No change; Acne much worse)?
5. How severe is your acne now (Clear; Mild; Moderate; Severe)?
6. Have you had any side effects (Yes; No)? If yes, what side effect did you experience?

If participants in the Internet survey group completed at least 5 surveys during a 6-week period, they received a \$5 gift card to Amazon.com. In addition, each completed survey provided the participant an additional chance to win an iPod Nano at the study conclusion. Adherence was monitored objectively with electronic monitors that recorded the date and time when the medication containers were opened (medication event monitoring system caps).⁵ Adherence was rated as a percentage of days the medication container was opened; adherence could be greater than 100% if the container was opened more than once per day. Participants were not informed of the monitoring until the last study visit. Their acne severity was also evaluated via Acne Global Assessment as well as by inflammatory and noninflammatory lesion counts at baseline, week 6, and week 12 (end of study).

Results. Of the 20 enrolled participants, 8 from the control group and 7 from the Internet survey group completed the 12-week study (**Figure 1**). Overall adherence ranged from 58% to 132% for the Internet survey group, and from 4% to 80% for the control group. Median adherence was 74% in the Internet group and 32% in the control group ($P < .01$). In the control group, mean adherence dropped rapidly ($P = .02$), but there was no statistically significant change in adherence over time for the Internet survey group ($P = .10$) (**Figure 2**). Within the Internet survey group, there was no significant difference between patient-reported adherence via the Internet survey and adherence measured via medication event monitoring system caps ($P = .11$).

Baseline severity was similar between the 2 groups. While the Internet survey group demonstrated a greater mean percentage reduction of noninflammatory and total lesion counts (44% vs 11% and 36% vs 13%, respectively), this difference was not statistically significant

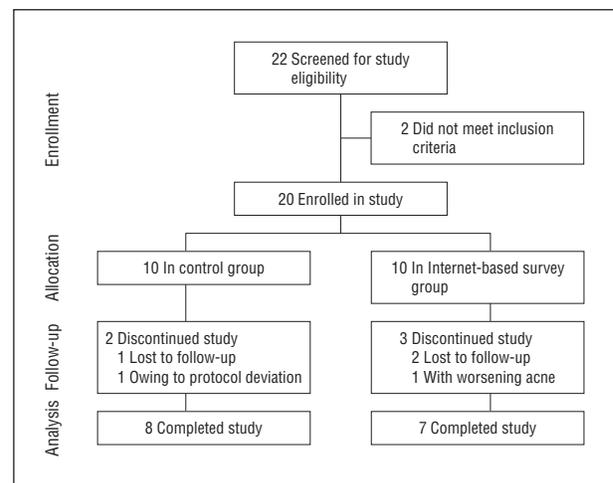


Figure 1. CONSORT flowchart.

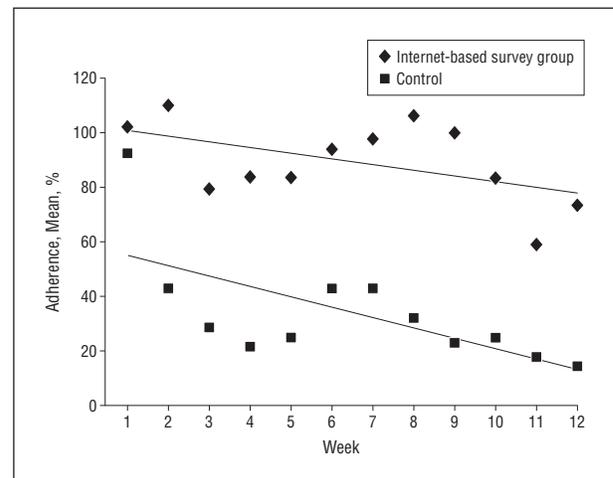


Figure 2. Mean adherence over time. Mean adherence was measured using electronic monitors (medication event monitoring system caps). Adherence was rated as a percentage of days the medication container was opened; adherence could be greater than 100% if the container was opened more than once per day. The group randomized to the Internet-based survey had better adherence to treatment over time. With the exception of week 1, the difference in adherence was statistically significant at all time points (Kruskal-Wallis; $P < .05$).

($P = .49$ and $.56$, respectively). However, this study was not powered to detect such differences.

Comment. As demonstrated in this pilot study, an automated Internet-based system of communication may be a cost-effective, practical, and easily implemented means to improve adherence. Adolescents are savvy users of the Internet and other newer technologies and may respond well to such interaction. Since other forms of electronic “reminders” have not been very effective at increasing adherence in teens with acne, it is likely that our Internet-based survey functions differently from a simple reminder. We believe the survey component of the intervention may have acted like a physician office visit, with increased adherence observed with this “virtual office visit” driven by the same factors that drive “white-coat compliance.”^{4,5} An increased understanding of what factors are crucial for medication adherence and how they can be further harnessed will likely provide means for enhancing our patients’ treatment outcomes.

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COMMENTS AND OPINIONS

Successful Long-term Use of Intravenous Immunoglobulin to Treat Livedoid Vasculopathy Associated With Plasminogen Activator Inhibitor-1 Promoter Homozygosity

We previously reported the case of a 33-year-old woman who was diagnosed as having livedoid vasculopathy (LV) associated with plasminogen activator inhibitor-1 (PAI-1) promoter homozygosity (4G/4G).¹ In patients with homozygosity for the 4G allele, high levels of PAI-1 may be associated with increased risk of venous thromboembolism, coronary disease, and poor outcome of stroke.¹ This patient was successfully treated with infusions of tissue plasminogen activator (tPA) (10 mg/d for 2 weeks) after failed treatments with anti-inflammatory and antiplatelet therapies.

Despite an excellent therapeutic response to tPA infusion, the remissions were short lived (approximately 3 months’ duration), resulting in numerous hospital ad-