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Usefulness of FaceTime to Improve Medication Adherence in Adolescents and Young Adults with Systemic Lupus Erythematosus: A Case Series

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Abstract

Poor adherence to medications is a ubiquitous problem in patients with chronic diseases such as systemic lupus erythematosus (SLE), and can be associated with higher risk of disease flare and mortality. With the increasingly accessible use of mobile technology in health care, a novel application has emerged: the use of mobile technology to improve medication adherence in patients with chronic disease. We report the use of video-conferencing via FaceTime to improve medication adherence in childhood-onset SLE patients treated with mycophenolate mofetil. All of the patients had an undetectable mycophenolic acid (MPA) level prior to remote directly observed therapy (remote DOT) with FaceTime. The primary outcome was achievement of a therapeutic MPA level after remote DOT with FaceTime, and was met in all patients. This suggests an important role for video-conferencing in the improvement of medication adherence and disease outcomes not only in SLE patients, but in young adults with other chronic diseases.

Keywords: Adolescence; Childhood lupus; FaceTime; Lupus nephritis; Medication adherence; Mycophenolate mofetil; Remote directly observed therapy

Introduction

Adherence to medication regimens is a crucial part of therapy, especially in chronic diseases such as systemic lupus erythematosus (SLE). In particular, adolescents with SLE appear to be adherent to medications only 50-60% of the time [1]. Poor adherence to medication regimens is associated with poor disease control and increased mortality [2]. With over 6.8 million mobile phone users, mobile phones are widely used by young adults, and there has been an increase in the use of mobile technology in health care [3-8]. In particular, text messaging and short message service texting has been successful in improving attendance at specialists' appointments and medication adherence [3-8]. Several studies have demonstrated improvement in visit attendance and medication adherence after the implementation of cellular text message reminders in both adults and children with SLE [9,10]. However, limitations of text messaging include difficulty in confirming the intended patients' identities, and difficulties that arise when patients change their mobile phone numbers without informing the health care providers [11-13]. FaceTime is a video-conferencing application readily available on Apple™ iPhones. This study describes the use of FaceTime as a tool for remote directly observed therapy (remote DOT) in adolescents and young adults on treatment with mycophenolate mofetil for SLE.

Methods

We report a series of 4 patients with childhood-onset SLE who are all over 16 years of age at the time of this study. Approval to conduct this study was obtained from the Institutional Review Board of Columbia University Medical Center. Informed consent was obtained from each patient prior to enrolment in this study. All patients were required to have a diagnosis of SLE (meeting at least 4 of 11 American College of Rheumatology or Systemic Lupus International Collaborative Clinics diagnostic criteria) [14,15], and to be on treatment with mycophenolate mofetil at 600 mg/m^2/dose twice daily for over 6 months, with an undetectable level of metabolites over at least two routine follow-up visits. Cellular phone numbers were obtained from patients and all patients were required to have access to a phone with FaceTime. All prescriptions were sent to patient-preferred pharmacies and confirmation of medication pick-up by the patient or parent made via telephone call to the pharmacies. A clinical nurse in our division contacted the patients to determine a schedule for them to call her with FaceTime at the times of their medication administration. After directly observed therapy for six doses, the patients had blood drawn for mycophenolic acid (MPA) levels.

Results

The mean age of the patients at the time of remote DOT with FaceTime was 19.5 years, and 50% were female. All patients were Hispanic. Three patients had class III or IV lupus nephritis with a component of class V. All patients were being treated with hydroxychloroquine in addition to mycophenolate mofetil. Three patients were on concomitant oral corticosteroids, and one on intravenous solumedrol every 4 weeks, with a mean prednisone equivalent dose of 19 mg/day. The mean systemic lupus erythematosus disease activity index (SLEDAI) score was 7 (range 4-12), and the physician global assessment (PGA) score ranged from 0.5-2.5, prior to remote DOT with FaceTime.

All patients with undetectable levels of MPA prior to directly observed therapy with FaceTime had therapeutic MPA levels after FaceTime (Table 1), with a mean MPA level of 2.9 µg/ml. The PGA

score decreased by at least 0.3 points or stayed the same in 3 patients. One patient was experiencing a lupus flare prior to remote DOT with FaceTime, with suspected poor adherence to daily oral medications. In fact, he continued to have clinically active disease though his MPA level became therapeutic after FaceTime.

	Lupus nephritis class	MPA level before FaceTime (µg/ml)	MPA level after FaceTime (µg/ml)	SLEDAI before FaceTime	SLEDAI after FaceTime	PGA before FaceTime	PGA after FaceTime
1	IV/V	<0.5	4.1	8	12	2.5	3.0
2	III/V	<0.5	4	12	10	2.5	1.5
3	III/V	<0.5	1.4	4	4	1.0	0.7
4	III	<0.5	2.0	4	4	0.5	0.5
MPA: Mycophenolic Acid; SLEDAI: Systemic Lupus Erythematosus Disease Activity Index; PGA: Physician Global Assessment							

Table 1: Patient characteristics and data on mycophenolate mofetil before and after remote directly observed therapy with FaceTime. Therapeutic trough levels of mycophenolic acid are between 1-3.5 µg/ml.

Discussion

This is, to our knowledge, the first report of using FaceTime as remote DOT to improve medication adherence in SLE. A review of the literature demonstrates video-conferencing as DOT has been tried and successful in only one other patient population: patients undergoing treatment for tuberculosis [16]. Patients treated with tuberculosis are often on multi-drug therapy, paralleling the multiple immunosuppressives often used to treat SLE. Our results demonstrate that 100% of our patients who had undetectable levels of plasma MPA prior to intervention with FaceTime improved to have therapeutic levels of this metabolite post-intervention, indicating an improvement in medication adherence. Moreover, there was a general downward trend indicating improvement in SLEDAI and PGA scores. One patient was experiencing a disease flare prior to remote DOT with FaceTime. Although his medication adherence improved as evidenced by his resultant therapeutic MPA level, he required further evaluation to escalate treatment when clinical signs of flare persisted.

In conclusion, the use of remote DOT with FaceTime improved medication adherence in 100% of our patients and resulted in therapeutic levels of plasma metabolites and a general decrease in disease activity scores. Remote DOT with FaceTime also suggests a potential role for video-conferencing technology to enforce medication adherence in chronic disease and improve disease outcomes.

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