Choice, Transparency, Coordination, and Quality Among Direct-to-Consumer Telemedicine Websites and Apps Treating Skin Disease

Jack S. Resneck Jr, MD; Michael Abrouk; Meredith Steuer, MMS; Andrew Tam; Adam Yen; Ivy Lee, MD; Carrie L. Kovarik, MD; Karen E. Edison, MD

**IMPORTANCE** Evidence supports use of teleconsultation for improving patient access to dermatology. However, little is known about the quality of rapidly expanding direct-to-consumer (DTC) telemedicine websites and smartphone apps diagnosing and treating skin disease.

**OBJECTIVE** To assess the performance of DTC teledermatology services.

**DESIGN AND PARTICIPANTS** Simulated patients submitted a series of structured dermatologic cases with photographs, including neoplastic, inflammatory, and infectious conditions, using regional and national DTC telemedicine websites and smartphone apps offering services to California residents.

**MAIN OUTCOMES AND MEASURES** Choice of clinician, transparency of credentials, clinician location, demographic and medical data requested, diagnoses given, treatments recommended or prescribed, adverse effects discussed, care coordination.

**RESULTS** We received responses for 62 clinical encounters from 16 DTC telemedicine websites from February 4 to March 11, 2016. None asked for identification or raised concerns about pseudonym use or falsified photographs. During most encounters (42 [68%]), patients were assigned a clinician without any choice. Only 16 (26%) disclosed information about clinician licensure, and some used internationally based physicians without California licenses. Few collected the name of an existing primary care physician (14 [23%]) or offered to send records (6 [10%]). A diagnosis or likely diagnosis was proffered in 48 encounters (77%). Prescription medications were ordered in 31 of 48 diagnosed cases (65%), and relevant adverse effects or pregnancy risks were disclosed in a minority (10 of 31 [32%] and 6 of 14 [43%], respectively). Websites made several correct diagnoses in clinical scenarios where photographs alone were adequate, but when basic additional history elements (eg, fever, hypertrichosis, oligomenorrhea) were important, they regularly failed to ask simple relevant questions and diagnostic performance was poor. Major diagnoses were repeatedly missed, including secondary syphilis, eczema herpeticum, gram-negative folliculitis, and polycystic ovarian syndrome. Regardless of the diagnoses given, treatments prescribed were sometimes at odds with existing guidelines.

**CONCLUSIONS AND RELEVANCE** Telemedicine has potential to expand access to high-value health care. Our findings, however, raise concerns about the quality of skin disease diagnosis and treatment provided by many DTC telemedicine websites. Ongoing expansion of health plan coverage of these services may be premature. Until improvements are made, patients risk using health care services that lack transparency, choice, thoroughness, diagnostic and therapeutic quality, and care coordination. We offer several suggestions to improve the quality of DTC telemedicine websites and apps and avoid further growth of fragmented, low-quality care.
Dermatology was an early adopter of telemedicine technologies, and a substantial evidence base has demonstrated diagnostic concordance, improved cost, and similar outcomes to in-person care for certain clinical scenarios. These positive findings are primarily from store-and-forward (asynchronous) teleconsultation models, where a referring clinician sends a patient’s history and images to a dermatologist for recommendations.

Direct-to-consumer (DTC) teledermatology, while less studied, is expanding rapidly. Direct-to-consumer telemedicine companies have raised substantial investor capital and marketed themselves heavily to consumers, employers, and health plans. Many additional DTC telemedicine websites with a narrower focus on dermatology have also emerged. While most initially relied on fees paid by individual patients who sought convenience or inexpensive care, large DTC services are increasingly contracting with major health plans to provide telecare to millions of enrollees. Meanwhile, many of these payers still exclude asynchronous telemedicine services provided by a patient’s existing health care team.

While the number of DTC telemedicine website visits in 2015 reached 1.25 million, relatively little is known about the quality of these services. A recent study assessing DTC telemedicine consultations for primary care conditions revealed a lack of appropriate diagnostic testing and poor antibiotic stewardship. Reviews of teledermatology services showed failures to collect key medical history and raised concerns about use of international physicians and advertising prominently featuring easily obtained prescriptions.

National physician groups, many of which support expanded telemedicine, have questioned whether these companies are giving patients choice, disclosing clinician credentials, collecting adequate medical history, following evidence-based guidelines, coordinating care with existing treating physicians, and establishing protocols for local referrals. We assessed the performance of DTC telemedicine websites and apps by submitting a series of structured dermatologic consultations.

Methods

We performed a series of internet searches seeking DTC telemedicine websites and smartphone apps accepting patient-originated visits for skin conditions. For inclusion, websites had to offer services to California residents and mention skin disease among treated conditions. Websites were excluded if they required live-interactive video, a specific enrolled employer, or communication from a referring clinician. We also excluded websites with just 1 clinician, only serving a clinic’s existing patients, or primarily offering custom medication compounding.

Six simulated structured dermatologic cases were constructed, each including patient demographics, history of present illness (HPI), review of systems (ROS), and 3 photographs of skin eruptions or lesions. The photographs were mostly obtained from publicly available online image search engines, which any patient wanting to obtain prescriptions from a DTC telemedicine website could access, copy, and submit. To simulate the information that real patients present during both in-person and virtual interactions with clinicians, each universally submitted HPI (what a patient might think is relevant) was supplemented with additional HPI and ROS data that each patient would offer if asked or if there was any place in the submission process to include it. The highlights of each case are summarized in Table 1.

Study personnel accessed each website and app between February 4 and March 11, 2016, posing as patients (all cases were separately submitted to each website, except that acne-only websites received just 2 cases). Study personnel claimed to be uninsured and paid fees using Visa gift debit cards in the names of the simulated patients. No study personnel provided any false government-issued identification cards or numbers. When given a choice of clinician, we selected with the following priority: dermatologist > primary care physician > other physician > nurse practitioner > physician assistant. The initial HPI was submitted in its entirety if there was any opportunity to enter it, and was supplemented with the additional history if opportunities were given to enter an ROS or if relevant additional questions were asked. At least 1 of the photographs was submitted if there was any way to do so, and additional photographs were also uploaded if the website specified that 2 or 3 photographs were preferable.

We recorded data from each encounter related to fees paid, response times, choice of clinician, transparency of credentials, clinician location, demographic and medical data requested, diagnoses given, treatments prescribed, adverse effects discussed, referrals made, and medical records made available. When provided with a clinician name and location but not credentials, we used searches of state licensure databases, national board certification databases, and other websites to attempt to establish licensure and board certification status. No prescriptions were ever procured by study personnel.

The institutional review board of the University of California, San Francisco, reviewed and approved the study protocol.

Key Points

Question Are rapidly expanding direct-to-consumer (DTC) telemedicine websites and apps providing high-quality diagnosis and treatment for skin diseases?

Findings Sixty-two simulated encounters to 16 DTC telemedicine websites resulted in care that often lacked patient choice of clinician, transparency of clinician credentials, or care coordination. Many incorrect diagnoses were proffered without reasonable attempts to ask basic medical history follow-up questions, treatment recommendations sometimes contradicted evidence-based guidelines, and prescriptions frequently lacked disclosure of possible adverse effects and pregnancy risks.

Meaning Telemedicine has potential to expand access, but these findings raise doubts about the quality of skin disease diagnosis and treatment currently being provided by DTC telemedicine websites and apps.
Table 1. Structured Clinical Case Descriptions of 6 Simulated Patients

<table>
<thead>
<tr>
<th>Patient Age, y/Sex/Occupation and Diagnosis</th>
<th>Initial HPI Given</th>
<th>Additional History Offered if Asked or Submitted if Opportunity to Enter in ROS</th>
</tr>
</thead>
<tbody>
<tr>
<td>28/F/Freelance writer with acne in setting of undiagnosed PCOS</td>
<td>I’ve had acne since my teen years but now I’m 28 and I’m getting tired of it. I tried a bunch of prescription creams and ointments (like clindamycin and Retin-A) that didn’t work, and an antibiotic pill (I’m not sure which kind) I took for a few months a couple of years ago made it halfway better. What can I do to get clearer skin?</td>
<td>Irregular periods ranging from 4 to 10 weeks apart, sometimes skips a month. I have more hair growth on my face than my friends; I get electrolysis on my chin and jawline. I use condoms, no current or prior OCPs, no prior pregnancies. My mom has diabetes.</td>
</tr>
<tr>
<td>25/M/Waiter with annular secondary syphilis plaques</td>
<td>I have a bad new rash. I saw my regular doctor and she said it is psoriasis, but the cream she gave me (desonide) isn’t helping much. It all started about 3 weeks ago when it broke out on my back, chest, arms, legs, and feet. It doesn’t really itch that much, but it look terrible. It’s even all in my scalp, and the desonide cream just makes a mess of my hair.</td>
<td>No prior similar rashes. Mostly protected sex with 1 male partner, but occasional unprotected sex with others. No oral lesions. I get herpes sores on my penis every few months, last was 2 months ago, none now. A couple of weeks ago, I had a headache and felt feverish for a couple of days, but it is better now. Last HIV test 6 months ago, negative result. No arthralgias, no nail changes. Current medications: Desonide cream.</td>
</tr>
<tr>
<td>20/M/College student with gram-negative folliculitis due to acne antibiotics</td>
<td>I’ve had acne since I was 12. Two years ago, my dermatologist started me on pills (doxycycline) and it was awesome. It was so much better for a long time. I’m still on the pills, but my acne has been getting bad again on my lips and chin with some new pus bumps for 2 months. Why isn’t it working anymore? What else can I use?</td>
<td>Right before this breakout, I ran out of doxycycline for 2 weeks, but I restarted the pills 6 weeks ago, and they aren’t helping anymore. No truncal acne. No other symptoms. No medication adverse effects except sunburn from the doxycycline last year. No new topical or cosmetics being put on face. Similar to prior acne? No, this breakout is totally different.</td>
</tr>
<tr>
<td>35/M/Barista with both a nodular melanoma and a seborrheic keratosis</td>
<td>There are 2 moles that I wanted you to check. Do I need to get them taken off? One is on my right cheek, the other is in the middle of my back. I think they both showed up about 5 years ago, but I’m not sure. They both seem to have grown some this year, but they don’t hurt or itch or anything.</td>
<td>Growth? Not sure, maybe they are 25% bigger Change? I’m not sure, wasn’t really looking at them much before. One seems round, the other kind of oval. Painful? No. Itchy? No. Bleeding? No. Lots of other moles? I have 20 or so total. Previous skin biopsies? No, I’ve never seen a dermatologist. Anybody in the family with skin cancer? No Sun exposure history? I guess I got a few sunburns when I was a teenager on vacation, I’m not sure how many. Indoor tanning history? Nope, I never did that. Current medications? Cymbalta.</td>
</tr>
<tr>
<td>19/F/Student and waiter with eczema herpetica</td>
<td>I’ve had eczema since I was a little kid. It’s been pretty bad at times. But it was getting better over the last year or 2. My creams had been working pretty well. Over the past 10 days, my skin on my face and neck got way more itchy and irritated and my rash got worse. Do I need a stronger cream? Should I start on Atarax pills again?</td>
<td>Blisters? Maybe, my skin is oozing a lot. History of cold sores? I don’t think so. History of genital lesions? No. Fever or other symptoms: I felt a little warm lately, but haven’t taken my temperature, and don’t have a thermometer around. No other symptoms. Do the new bumps hurt? They do sting. Eye lesions or soreness? No. Has your eczema been on your face or neck in the past? I’ve had it just about everywhere. Ever had any immune system problems? No. Positive personal history of asthma. My mom and sister both had eczema. Current medications: Desonide face, triamcinolone exterminities.</td>
</tr>
<tr>
<td>60/M/Retired high school coach with stasis dermatitis</td>
<td>These red splotches on my legs have been there a couple of months, and this week they turned brighter red and got all irritated. My wife thinks it has started to get bigger. Is this an infection? Do I need antibiotics?</td>
<td>Does it itch? Yeah, at night. Is it warm/hot? Seems like it. Yeah, it does feel a little warm. How fast is it spreading? I don’t know, it took a few days to get bigger. Fever, sweats, chills? No. Any other rashes? No. Any surgical procedures? None other than my appendix removal. Leg swelling? I always have a little bit, but this is making it worse. Any medicine tried? I tried some Gold Bond cream for the last 3 days, but I don’t know if it did anything. Current medications? Biowax, hydrochlorothiazide, Zocor.</td>
</tr>
</tbody>
</table>

Abbreviations: HIV, human immunodeficiency virus; HPI, history of present illness; OCP, oral contraceptive pill; PCOS, polycystic ovarian syndrome; ROS, review of systems.

Results

Sixteen DTC telemedicine websites and apps met inclusion criteria and responded to at least 1 case (Box 1). A few others met inclusion criteria but failed to respond to requests or had portal error messages that prevented successful case submission (Figure).

There were 62 clinical cases with a successful submission and response. Nonresponders were the result of scope limita-
Box 1. Direct-to-Consumer Telemedicine Website and App Respondents

<table>
<thead>
<tr>
<th>Dermatology only</th>
<th>General medical websites</th>
</tr>
</thead>
<tbody>
<tr>
<td>• DermatologistOnCall</td>
<td>• Amwell</td>
</tr>
<tr>
<td>• DermLink</td>
<td>• First Opinion (phone app only)</td>
</tr>
<tr>
<td>• Direct Dermatology</td>
<td>• HealthTap Prime</td>
</tr>
<tr>
<td>• First Derm</td>
<td>• MD Live</td>
</tr>
<tr>
<td>• SkyMD</td>
<td>• MeMD</td>
</tr>
<tr>
<td>• Spruce (phone app only)</td>
<td>• Teladoc</td>
</tr>
<tr>
<td>• Virtual Acne (acne only)</td>
<td>• Virtuwell</td>
</tr>
<tr>
<td>• YoDerm (acne only)</td>
<td></td>
</tr>
</tbody>
</table>

The clinician’s geographic practice location was disclosed in 38 encounters (61%). We were able to determine the location for 57 encounters, 35 of which were in California (11 within 100 miles of the patient). The remaining locations included India (6), Minnesota (4), Colorado (3), Illinois (2), Washington, DC (2), Vermont (2), Sweden (2), and New York (1).

The price per consultation varied—most charged a fixed cost per visit ($35-$95), while others charged monthly memberships ($9 per 2 weeks to $49 monthly). Response times were rapid (0-8 days), with 87% of encounters receiving replies on the same or following day.

Websites allowed patients to select a clinician on 20 of 62 encounters (32%), while the remaining 42 (68%) assigned a clinician without any patient choice. We were able to determine the practice type of the clinician in all but 5 encounters (57 of 62 encounters). Physician backgrounds included dermatology (27), internal medicine (5), emergency medicine (3), family medicine (3), obstetrics/gynecology (1), cardiology (1), pain management (1), and physical medicine/rehabilitation (1). The nonphysician backgrounds included family nurse practitioners (3), physician assistants from dermatology settings (3), and a nurse practitioner in emergency medicine. The rest were primary care physicians in India (6) and dermatologists in Sweden (2).

The 8 internationally based physicians who were not California-licensed and provided responses worked for First Opinion or First Derm, both of which are headquartered in California. First Derm claims their physicians are “board-certified dermatologists,” but we were unable to find evidence that they were either licensed in California or were ABMS certified. These websites post a variety of disclaimers that they do “not provide health care services,” and do “not create a physician-patient relationship,” but we found that they did make diagnoses and offer specific treatment recommendations (without sending prescriptions to pharmacies).

The demographic and clinical data collected by the websites are summarized in Table 2. In very few of the encounters did the clinician ask the name of an existing primary care physician (23%) or dermatologist (2%), and only 6 of 62 (10%) ultimately offered to send records to a current member of the
A diagnosis or likely diagnosis was proffered in 48 (77%) of encounters, with the remainder of patients being referred to a local physician for diagnosis. Patients referred for diagnosis were given suggested name(s) of practicing local clinicians in only 2 of 14 instances. No patients were sent to a laboratory for studies. A differential diagnosis was listed in 8 of 48 cases with diagnoses (17%), and 2 of 14 cases without diagnoses (14%).

Among 48 encounters with diagnoses, 31 (65%) were given prescription medications, and 9 (19%) were told to seek a local physician for treatment (3 gave suggested names). The remainder were reassured, treated with over-the-counter medications, or had prescriptions recommended but not provided. When prescriptions were provided, the clinician disclosed relevant adverse effects or risks in 10 of 31 encounters (32%). Among 14 encounters where a female patient was prescribed a pregnancy class C or higher drug, pregnancy risks were disclosed in 6 (43%).

In the case of polycystic ovarian syndrome (PCOS) with inflammatory acne, the 28-year-old patient was not asked relevant questions about her hypertrichosis or irregular menses by a single website (1 website inquired about menses only to check pregnancy status before prescribing). Every clinician diagnosed acne, including 1 who did not ask for photographs, and none raised the issue of hirsutism, androgen excess, or PCOS. Two of 12 websites responding to this case recommended in-person follow-up for treatment, and 1 recommended use of only mild soaps, moisturizers, and cool showers. The patient received prescriptions for oral antibiotics (from 8 websites), topical retinoids (6), and topical antibiotics (5). None of the clinicians discussed hormonal treatment options.

In the case of secondary syphilis with unusual plaques, the patient was not asked about his recent fever (even when he proactively reported it on ROS), and no clinician seemed concerned that his diffuse eruption began so acutely only 3 weeks previously without a history of prior skin eruptions (uncommon in patients with large-plaque psoriasis). Seven of the 8 clinicians diagnosed psoriasis, including 1 who did not ask for photographs. One clinician (an emergency physician) made no diagnosis and referred the patient to see a local dermatologist, and another (a Sweden-based physician) who diagnosed psoriasis suggested that the patient see a local dermatologist for treatment. This patient received prescriptions for class I or II topical steroids in 5 encounters and was told to use moisturizers and take lukewarm baths in another.

In the case of gram-negative folliculitis, 1 clinician (a board-certified dermatologist) referred the patient to a local dermatologist for a culture, and another (an India-based physician) sent him to his primary care physician for diagnosis. The remaining 10 clinicians all diagnosed acne, seemingly unconcerned by the sudden appearance of pustules around the mouth after lengthy doxycycline use (a common presentation of gram-negative folliculitis caused by Proteus, Klebsiella, or Serratia). This patient was prescribed trimethoprim-sulfamethoxazole (by 2 clinicians), minocycline (by 3), continued doxycycline (by 1), topical antibiotics (by 3), and topical retinoids (by 2). One clinician suggested only topical retinol, and another recommended reducing his sugar intake and applying moisturizer.

In the case of 1 nodular melanoma and 1 seborrhoeic keratosis, 11 of 14 clinicians referred the patient for an in-person examination of at least 1 of his lesions. The others (2 dermatologists and a physician assistant) reassured him that both lesions were benign.

The young woman with eczema herpeticum blisters (a potentially life-threatening infection caused by herpes simplex virus erupting in eczema) was diagnosed as having an ordinary eczema flare or contact allergies in 7 of 9 encounters, but 2 clinicians (1 dermatologist, 1 unidentified) raised concerns

---

**Table 2. Percentage of Encounters Requiring Specific Demographic or Clinical Information**

<table>
<thead>
<tr>
<th>Type of Data Collected</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic data</strong></td>
<td></td>
</tr>
<tr>
<td>Patient name</td>
<td>57 (92)</td>
</tr>
<tr>
<td>Street address</td>
<td>33 (53)</td>
</tr>
<tr>
<td>City/state</td>
<td>56 (90)</td>
</tr>
<tr>
<td>Phone No.</td>
<td>44 (71)</td>
</tr>
<tr>
<td>Age or date of birth</td>
<td>62 (100)</td>
</tr>
<tr>
<td>Social security No.</td>
<td>0</td>
</tr>
<tr>
<td>Driver’s license No.</td>
<td>6 (10)</td>
</tr>
<tr>
<td>Name of existing PCP</td>
<td>14 (23)</td>
</tr>
<tr>
<td>Address of existing PCP</td>
<td>3 (5)</td>
</tr>
<tr>
<td>Fax of existing PCP</td>
<td>7 (11)</td>
</tr>
<tr>
<td>Name of existing dermatologist</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Address of existing dermatologist</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Fax No. of existing dermatologist</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Local pharmacy</td>
<td>48 (77)</td>
</tr>
<tr>
<td>Insurance status</td>
<td>25 (40)</td>
</tr>
<tr>
<td><strong>Clinical data</strong></td>
<td></td>
</tr>
<tr>
<td>History of present illness</td>
<td>62 (100)</td>
</tr>
<tr>
<td>Review of systems</td>
<td>21 (34)</td>
</tr>
<tr>
<td>Medical history</td>
<td>41 (66)</td>
</tr>
<tr>
<td>Surgical history</td>
<td>12 (19)</td>
</tr>
<tr>
<td>Skin cancer history</td>
<td>7 (11)</td>
</tr>
<tr>
<td>Family history</td>
<td>20 (32)</td>
</tr>
<tr>
<td>Current medication list</td>
<td>46 (74)</td>
</tr>
<tr>
<td>Allergies</td>
<td>46 (74)</td>
</tr>
<tr>
<td>Pregnancy status*</td>
<td>11 (52)*</td>
</tr>
<tr>
<td>Lactation status*</td>
<td>11 (52)*</td>
</tr>
</tbody>
</table>

* Denominator includes only the 21 encounters with a female patient.

Abbreviation: PCP, primary care physician.
about infection and referred her to be seen in person (though they did not suggest any timeline or individuals she could see). She was prescribed oral prednisone (2), topical steroids (2), and antihistamines (1). Of the remaining 2 websites that diagnosed eczema, one recommended that topical steroids be prescribed in person, and the other recommended a vegan diet and suggested follow-up with an allergist. The 2 clinicians recommending prednisone, which can worsen eczema herpeticum when given without antiviral drugs, and which clinical guidelines recommend avoiding even for uninfected atopic dermatitis, were a doctor of osteopathic internal medicine and a family nurse practitioner.

The patient with stasis dermatitis was properly diagnosed by all 7 websites where his case was successfully submitted. He was prescribed topical clobetasol (3) or hydrocortisone (2). One website suggested clobetasol but did not provide a prescription, and 1 website suggested he see a local physician for a cardiac workup.

Discussion

When implemented appropriately, DTC telemedicine websites can improve access to quality care for patients facing geographic, mobility, or financial constraints. While a large body of evidence supports the use of teleconsultation for skin disease between a referring clinician and dermatologist, our study raises significant concerns about the rapidly expanding use of direct-to-consumer telemedicine.

The DTC telemedicine websites we consulted, many with a large and growing national footprint, provided care that often lacked patient choice of clinician, transparency of clinician credentials, or care coordination with existing health care teams. Many diagnoses were proffered without reasonable attempts to ask basic medical history follow-up questions, treatment recommendations sometimes contradicted evidence-based guidelines, and prescriptions frequently lacked basic disclosure of adverse effects, risks, or pregnancy warnings. When referrals to in-person care were made, they rarely included suggested clinician names. No DTC telemedicine websites attempted to confirm the identity of patients or raised doubts about the authenticity of photographs.

Patient choice of their treating physician is part of our medical code of ethics, and we were surprised that these websites with multiple clinicians on staff assigned a clinician without patient choice in most encounters. Transparency about licensing and credentials is inherent in patient choice and informed consent, and most services failed to provide licensure or board certification information during encounters. Despite claims that they were not providing health care services, we believe that 2 DTC telemedicine websites headquartered in California but using foreign clinicians were engaged in the practice of medicine without a state license, as they clearly provided diagnoses and treatment recommendations.

Our findings also suggest that treatment provided by these websites is likely to exacerbate care fragmentation, since only 23% asked for the names of existing primary care physicians, and only 10% offered to provide medical records to existing clinicians. In an era when traditional health care delivery is working to “minimize silos” (ie, individuals, groups, organizations, or systems that operate in isolation, lacking adequate communication with other groups) and improve inadequate care coordination, it makes little sense to design new care delivery channels without including an ability for patients’ longitudinal care teams to know about new diagnoses made and treatments initiated. When DTC telemedicine websites determined that in-person care was necessary, they only suggested where patients might go in a small minority of cases. None offered to actually facilitate a referral to a local physician (except in 1 instance where the clinician self-referred), even when some of the clinical scenarios involved urgent medical conditions in which ensuring follow-up was vital. This lack of care coordination may be related to the substantial geographic distance of many of the clinicians from our simulated patients and their possible lack of knowledge of the local health care system.

Many patients were prescribed oral or topical medications, and only one-third were told about relevant risks or adverse effects. Fewer than half of pregnancy category C or higher prescriptions given to women of childbearing age included any discussion of pregnancy risks or avoidance.

One dominant pattern emerged when examining the diagnostic accuracy of these websites with our clinical scenarios. For the 2 cases in which photographs alone were adequate to easily make a correct diagnosis (stasis dermatitis and melonoma), most of the DTC telemedicine websites performed well. However, when further engaging the patient for basic history elements was a necessary part of the interaction, diagnostic performance was poor.

None of the clinicians asked the 28-year-old woman with inflammatory acne about her irregular menses or hirsutism, so none raised concerns about PCOS or androgen excess or initiated appropriate treatment. The young man with highly infectious secondary syphilis was not asked about his recent fevers, attention was not paid to the unusually sudden onset he described, and all but 1 of the websites accepted the diagnosis of psoriasis the patient himself offered. This not only left him at substantial risk from untreated syphilis, but was a public health failure given the urgent need for contact tracing and risks of ongoing transmission. The patient with gram-negative folliculitis was not given a chance to say that the rampant new pustules around his mouth were unlike the acne he had before. The patient with eczema herpeticum faces the risk of disseminated infection and even death (especially when given systemic steroids without antiviral drugs) because most of the DTC telemedicine clinicians did not ask about the stinging vesicles shown in her photographs.

Our study has a significant limitation: we are unable to assess whether clinicians seeing these patients in traditional in-person encounters would have performed better on diagnostic accuracy. However, the additional medical history necessary to make the diagnoses (eg, fevers, irregular menses) are the types of information that, in our experience, typically emerge in the give-and-take of obtaining a history in the office setting. This give-and-take could certainly be replicated in a store-and-forward telemedicine environment, especially if the clinician...
takes time to engage the patient, but the DTC telemedicine websites we queried typically offered diagnoses and prescriptions immediately after a form-driven submission, without sending meaningful, appropriate follow-up questions to our simulated patients. In addition, diagnostic inaccuracy is only 1 of many concerning outcomes we reported.

Another limitation of our study is that the design forced us to exclude any DTC telemedicine websites or apps that required live interactive video. However, only 3 DTC telemedicine websites from our initial search had to be excluded for requiring video. We also excluded platforms serving only a clinic’s existing patients, which may be expected to offer more coordinated care.

Finally, we cannot fully guarantee the photographs acquired from the internet are of patients with biopsy or laboratory proof of the listed diseases. However, the fact that most DTC telemedicine websites failed to consider a diagnosis of eczema herpeticum in a young woman with eczema and new oozing, stinging blisters seems far more important than whether we have evidence of a positive Herpes culture from this woman with a classic presentation in her photographs.

Conclusions

Telemedicine has potential to expand access, and the medical literature is filled with examples of telehealth systems providing quality care. Our findings, however, raise doubts about the quality of skin disease diagnosis and treatment being provided by a variety of DTC telemedicine websites and apps. The substantial investment of health plans in providing enrollees with insurance-covered access to these DTC telemedicine websites, as well as rapidly expanding availability for patients willing to pay out of pocket over the internet, may be premature. The problem may be exacerbated by several health plans’ willingness to pay large national DTC telemedicine providers while excluding asynchronous telemedicine provided by a patient’s existing specialists.

We believe that DTC telemedicine can be used effectively, but it is best performed by physicians and team members who are part of practices or regional systems in which patients already receive care. This allows telemedicine clinicians to view a patient’s existing medical records, communicate with existing health care team members, provide in-person follow-up when needed, and be accountable for the care they deliver. A regional clinician network can provide a safety net for patients when errors in diagnosis and treatment occur.

ARTICLE INFORMATION

Accepted for Publication: April 23, 2016.
Published Online: May 15, 2016.

Author Contributions: Dr Resneck had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: Resneck, Abrouk, Lee, Kovarik, Edison.
Acquisition, analysis, or interpretation of data: Resneck, Abrouk, Steuer, Tam, Yen.
Drafting of the manuscript: Resneck, Abrouk.
Critical revision of the manuscript for important intellectual content: All authors.
Obtained funding: Resneck.
Administrative, technical, or material support: Abrouk, Lee.
Study supervision: Abrouk, Lee, Kovarik.

Conflict of Interest Disclosures: Dr Resneck serves on the Board of Trustees of the American Medical Association. Drs Resneck, Lee, Kovarik, and Edison serve on the Telemedicine Task Force of the American Academy of Dermatology Association. Dr Lee serves as a physician performing consultations for Direct Dermatology but did not participate in any of the telemedicine consultations encompassed in this study. No other disclosures are reported.

Funding/Support: The American Academy of Dermatology Association provided funding for the debit cards used in the study.

Based on our findings, we believe that DTC telemedicine services should, at a minimum, adopt several standard practices (Box 2). We hope that studies such as ours will help DTC telemedicine companies and participating clinicians improve their services so that patients seeking these newer channels of care delivery can receive transparent, ethically provided, coordinated, high-quality care. In the meantime, we also hope that policymakers, regulators, and payers will find ways to identify and encourage telemedicine services that abide by these principles, while discouraging the growth of DTC telemedicine websites and apps that provide fragmented, low-quality care.

Box 2. Authors’ Recommended Practices for Direct-to-Consumer Telemedicine Websites

- Disclose the licensure, credentials, and location of their clinicians, making sure that all are licensed in the states where patients are located, and give patients some choice of which clinician will provide their care.
- Obtain proof of identity of patients seeking care, and establish an initial relationship with live interactive video before beginning a store-and-forward relationship (when a patient’s existing health care team is uninvolved).
- Collect relevant medical history, including at least a history of present illness, review of systems, medication list, and drug allergies. In many instances, appropriate past medical records should be available to the consulting clinician.
- Recognize that the accurate diagnosis of disease often requires an interactive history, and train participating clinicians to ask appropriate follow-up questions to complete a patient’s relevant medical history.
- Seek the use of laboratory studies in clinical scenarios when an in-person physician would have relied on those studies.
- Provide diagnoses and treatments consistent with existing evidence-based guidelines.
- Engage in meaningful informed consent, including discussion of risks, potential adverse effects, pregnancy concerns, and a clear follow-up plan when prescribing medications.
- Collect information about a patient’s existing health care team and provide medical records to relevant team members—unless a patient opts out.
- Have relationships with local physicians in all areas where they treat patients, so that patients are not sent to emergency departments or left on their own when they need urgent in-person follow-up or experience medication adverse effects.
- Create quality assurance programs that regularly monitor clinical performance, patient outcomes, follow-up, and care coordination.
Role of the Funder/Sponsor: The American Academy of Dermatology Association had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Disclaimer: The views expressed in this article are those of the authors and do not necessarily represent the views of the American Medical Association or the American Academy of Dermatology Association (Dr Resneck is a trustee of the American Medical Association).

REFERENCES


Editor's Note

California (and 47 other states) requires that physicians engaging in telemedicine are licensed in the state in which the patient is located and follow the medical practice act regulations of that state. At the time this research was performed by Resneck and colleagues, multistate reform offered by the Federation of State Medical Boards (FSMB) was not in effect in California. The FSMB has created an Interstate Medical Licensure Compact that has already been enacted by 12 state legislatures, and is under consideration in many others. For states that join, the Compact will offer a voluntary expedited pathway for eligible physicians without existing medical board disciplinary histories to obtain licenses to practice in multiple states without having to resubmit extensive eligibility and credentialing paperwork. Each state will retain its role in regulating the practice of medicine and protecting patient welfare, and the Compact enhances the ability of states to share disciplinary information. Implementation is still under way, and this new option for licensure is not yet in effect.

Conflict of Interest Disclosures: None reported.


Need for State Licensure

June K. Robinson, MD

California (and 47 other states) requires that physicians engaging in telemedicine are licensed in the state in which the patient is located and follow the medical practice act regulations of that state. At the time this research was performed by Resneck and colleagues, multistate reform offered by the Federation of State Medical Boards (FSMB) was not in effect in California. The FSMB has created an Interstate Medical Licensure Compact that has already been enacted by 12 state legislatures, and is under consideration in many others. For states that join, the Compact will offer a voluntary expedited pathway for eligible physicians without existing medical board disciplinary histories to obtain licenses to practice in multiple states without having to resubmit extensive eligibility and credentialing paperwork. Each state will retain its role in regulating the practice of medicine and protecting patient welfare, and the Compact enhances the ability of states to share disciplinary information. Implementation is still under way, and this new option for licensure is not yet in effect.