clearly benign should undergo biopsy. In our series, it was not possible to resolve difficult cases in the absence of local dermatologists but it can also act as a means of educating primary health care professionals regarding the management of common skin conditions. \[1\]

Thus, the main advantage of telemedicine is that it can play an important role in reducing wait times and accommodating persons without local dermatologists but it can also act as a means of educating primary health care professionals (PHCPs) regarding the management of common skin conditions. \[3\]

In summary, we found that CMs present a diagnostic challenge. The use of dermoscopy, particularly the 2-step algorithm and pattern analysis, may help to identify these uncommon tumors as benign. Nonetheless, physicians should remain cognizant that melanomas and other cutaneous malignant neoplasms can present with SK-like features or directly in association with SKs. To maintain a high sensitivity for melanoma detection, all skin lesions that cannot be classified as benign. Nonpolarized dermoscopic image

Visualized with nonpolarized dermoscopy. C. A polarized dermoscopic image shows more conspicuous comedolike openings, milialike cysts, and blue color.

Drafting of the manuscript: Chung, Marchetti.

Critical revision of the manuscript for important intellectual content: All authors.

Administrative, technical, or material support: Marghoob, Marchetti.

Study supervision: Marchetti.

Conflict of Interest Disclosures: None reported.


Adherence to Teledermatology Recommendations by Primary Health Care Professionals: Strategies for Improving Follow-up on Teledermatology Recommendations

Dermatology is well suited to telemedicine because diagnosis and management greatly depend on the visual presentation of a disease. Studies have shown little difference between teledermatology and conventional face-to-face (FTF) care in clinical outcomes.\[1\] By using communication technologies, dermatologists can improve access to specialty care in a cost-effective manner.\[2\] Not only can teledermatology play an important role in reducing wait times and accommodating persons without local dermatologists but it can also act as a means of educating primary health care professionals (PHCPs) regarding the management of common skin conditions.\[3\]

The Dermatology Division in the Atlanta Veterans Affairs Medical Center started its teledermatology service on July 5, 2012, and receives referrals from 10 community-based outpatient centers. Before the launch of teledermatology, a dermatology training course (DTC) was conducted, funded as a “miniresidency” by the Office of Specialty Care Transforma-
tion, for PHCPs in community-based outpatient centers. To prepare PHCPs to care for common dermatologic conditions, the DTC provided 2 days of hands-on training and lectures regarding melanoma and nonmelanoma skin cancer, acne, dermatitis, and psoriasis, all with corresponding case reports. We were interested in determining the effectiveness of teledermatology in terms of how often referring PHCPs followed teledermatology recommendations, exploring the effect of the DTC on adherence to the recommendations, and assessing the efficiency of teledermatology in terms of the number of visits saved and the average turnaround time.

**Methods** | The Emory University Institutional Review Board approved the study. We conducted a retrospective medical record review of the Veterans Affairs computerized patient record system of all veterans who had received and completed teledermatology services from September 1, 2012, through April 30, 2013. Notes written by PHCPs and nurses were reviewed, as well as pharmacy lists, to determine whether recommendations given by the teledermatologist were implemented. Three possible recommendations included prescribing medications, reassuring patients, and conducting FTF appointments (including biopsies). Turnaround times were also recorded.

**Results** | Of 1001 teledermatology referrals, 997 had recommendations, of which 241 (24.5%) came from PHCPs who participated in the DTC (Table). Medication was recommended most commonly (467 [46.8%]) and reassurance least commonly (174 [17.5%]). Primary health care professionals followed 80% of all recommendations; FTF appointments were the recommendations that were most commonly followed (98% of the time). A total of 40.8% of recommendations for reassuring patients and 24.6% of recommendations for prescribing medications were not implemented.

We found that participants in the DTC were not more likely to follow recommendations. However, the average turnaround time for the 1001 teledermatology consultations was 1 business day and 668 (66.8%) patients did not need a FTF appointment.

**Discussion** | The experience of the teledermatology service in the Atlanta Veterans Affairs Medical Center has been paradigm-changing for the veterans, with fast turnaround times and decreased need for FTF appointments. However, our study demonstrates that the success of a teledermatology program relies heavily on the effective participation of PHCPs. While the recommendations for an FTF appointment were followed most often, this was owing to the direct scheduling of follow-up appointments at the Atlanta Veterans Affairs Medical Center instead of waiting for the PHCP to review the recommendations in the consultation notes. Thus, the 98% adherence was not in compliance at all. More telling was the lack of adherence to medication and reassurance recommendations. Training did not increase the adherence rate because there was no increased likelihood that PHCPs who participated in the DTC would follow the recommendations. More likely, other factors, such as the attitude of the PHCP and lack of resources, were involved. Our results reinforce previous studies’ conclusions that emphasized the importance of an infrastructure for teledermatology, including communication and tracking protocols, support staff, and well-defined roles for team members.4,5 Our group is exploring protocol changes in which the dermatology department prescribes the medication, a nurse

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. (%) Patients (N = 1001)*</th>
<th>Followed Up (n = 799)</th>
<th>Not Followed Up (n = 202)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation</td>
<td>997 (34.2)</td>
<td>797 (79.9)</td>
<td>202 (20.3)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FTF and/or biopsy appointment</td>
<td>341 (46.8)</td>
<td>333 (97.7)</td>
<td>8 (2.3)</td>
<td>.101</td>
</tr>
<tr>
<td>Medication</td>
<td>174 (17.5)</td>
<td>103 (59.2)</td>
<td>71 (40.8)</td>
<td>.35</td>
</tr>
<tr>
<td>Reassurance</td>
<td>983</td>
<td>789 (80.3)</td>
<td>194 (19.7)</td>
<td>.35</td>
</tr>
<tr>
<td>Yes</td>
<td>241 (24.5)</td>
<td>199 (82.6)</td>
<td>42 (17.4)</td>
<td>.35</td>
</tr>
<tr>
<td>No</td>
<td>742 (75.6)</td>
<td>590 (79.5)</td>
<td>152 (20.5)</td>
<td>.35</td>
</tr>
</tbody>
</table>

**Diagnosis**

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. (%)</th>
<th>Followed Up (n = 799)</th>
<th>Not Followed Up (n = 202)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermatology category</td>
<td>965</td>
<td>776 (80.4)</td>
<td>189 (19.6)</td>
<td>.009</td>
</tr>
<tr>
<td>Eruption or lesion</td>
<td>302 (31.3)</td>
<td>258 (85.1)</td>
<td>44 (14.6)</td>
<td>.20</td>
</tr>
<tr>
<td>Lesion</td>
<td>653 (67.7)</td>
<td>525 (80.4)</td>
<td>143 (21.9)</td>
<td>.20</td>
</tr>
<tr>
<td>Eruption category</td>
<td>338</td>
<td>284 (84.0)</td>
<td>54 (16.0)</td>
<td>.009</td>
</tr>
<tr>
<td>Infectious</td>
<td>80 (23.7)</td>
<td>66 (82.5)</td>
<td>14 (17.5)</td>
<td>.88</td>
</tr>
<tr>
<td>Inflammatory</td>
<td>222 (65.7)</td>
<td>187 (84.2)</td>
<td>35 (15.8)</td>
<td>.88</td>
</tr>
<tr>
<td>Other</td>
<td>36 (10.7)</td>
<td>31 (86.1)</td>
<td>5 (13.9)</td>
<td>.88</td>
</tr>
<tr>
<td>Lesion category</td>
<td>608</td>
<td>477 (78.5)</td>
<td>131 (21.5)</td>
<td>.005</td>
</tr>
<tr>
<td>Benign</td>
<td>373 (61.3)</td>
<td>277 (74.3)</td>
<td>96 (25.7)</td>
<td>.005</td>
</tr>
<tr>
<td>Malignant</td>
<td>190 (31.3)</td>
<td>162 (85.3)</td>
<td>28 (14.7)</td>
<td>.005</td>
</tr>
<tr>
<td>Both</td>
<td>45 (7.4)</td>
<td>38 (84.4)</td>
<td>7 (15.6)</td>
<td>.005</td>
</tr>
</tbody>
</table>

Abbreviations: DTC, dermatology training course; FTF, face-to-face.

* Denominator was based on number of recommendations.
explains difficult-to-use medications and assesses the outcomes, and a standardized letter enables PHCPs to more effectively communicate with patients. We hope that such maneuvers will further enable teledermatology to be an efficient health care model.

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Study concept and design: Martin.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Martin.

Critical revision of the manuscript for important intellectual content: All authors.


Administrative, technical, or material support: S. C. Chen.

Study supervision: S. C. Chen.

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Effect of Calcium Channel Blockade on Vismodegib-Induced Muscle Cramps

Aberrant hedgehog (HH) pathway signaling is the pivotal molecular abnormality in all basal cell carcinomas whether occurring sporadically or as part of the rare autosomal dominant disease basal cell nevus (Gorlin) syndrome (OMIM 109400). Vismodegib (Erivedge, GDC-0449), an oral HH pathway inhibitor, is approved by the Food and Drug Administration for the treatment of locally advanced and metastatic basal cell carcinomas.

One of the major adverse effects of vismodegib is severe muscle cramps. Currently, there is no treatment for this adverse effect, often resulting in drug therapy discontinuation. Teperino et al suggested that vismodegib acts not only to antagonize canonical HH signaling but also to agonize noncanonical HH signaling, causing cell membrane calcium channel activation and inducing muscle cramps. These investigators proposed that calcium channel blockers might abrogate this adverse event. Our objective was to evaluate the course of muscle cramps in our cohort of vismodegib-treated patients and to investigate whether the calcium channel blocker amlopidine besylate would alter the self-reported severity and frequency of these cramps.

Methods | This was an ancillary study of 43 patients enrolled in 2 clinical trials testing vismodegib, 150 mg/d, for basal cell carcinoma prevention. We treated 9 patients with basal cell nevus syndrome with amlopidine, 10 mg/d, for 8 weeks based on their willingness to take a daily medication for cramps. We queried them using telephone-administered questionnaires at 4 weeks, baseline, and 2, 4, and 8 weeks after amlopidine therapy initiation about cramp frequency, severity (scale of 0 [none] to 10 [severe]), and duration (minutes); frequency of night awakenings due to muscle cramps; and common adverse effects associated with amlopidine. We excluded 34 patients from amlopidine treatment who had completed the study (n = 3), were not currently using vismodegib (n = 11), were expected to stop taking vismodegib within the ensuing 4 weeks (n = 7), were already using amlopidine at baseline (n = 2), were unwilling to take amlopidine or had contraindications to its use (n = 9), or were unavailable to complete baseline questionnaires (n = 2). This study was approved by the Children’s Hospital Oakland Research Institute Institutional Review Board. Oral informed consent was received from all patients.

Our primary end point was the percentage change in muscle cramp frequency from baseline to week 8 of amlopidine treatment. Our secondary outcomes were changes in muscle cramp severity, cramp duration, and frequency of night awakenings.

Results | We included 8 amlopidine-treated patients in the analysis; one patient was excluded because of incomplete questionnaires after baseline. Study participants included 5 men and 3 women with a mean (SD) age of 54 (11) years who were treated with a mean (SD) of 14 (11) months of vismodegib at baseline.

During a period of 8 weeks, the percentage change in cramp frequency was significantly reduced by –5.81% per week (95% CI, –10.15% to –1.48%; P = .009) with amlopidine treatment (Table and Figure). There was no significant change in muscle cramp severity (P = .48), cramp duration (P = .85), or frequency of night awakenings (P = .47) over time (Figure).

As a comparison, we followed up 9 patients who did not take amlopidine but who were taking vismodegib and answered regular telephone questionnaires about muscle...