

**\*\*REVISION\*\***

**Effective use of topical corticosteroids by primary care providers:  
There's an app for that!**

**Pennsylvania Academy of Dermatology**

*Officers*

Christine E. Cabell, MD, President

Glen H. Crawford, MD, Vice President

Lorraine Larsen Rosamilia, MD, Secretary

Rosalie Elenitsas, MD, Treasurer

Justin J. Vujevich, MD, Immediate Past President

Maurice A. Thew, MD, 2nd Immediate Past President

Michael T. Gette, MD, 3rd Immediate Past President

*Administrative Staff*

Jennifer Keeler, Executive Director

Kelley Richwine, Assistant Executive

**Proposal Authors**

*Penn State Milton S Hershey Medical Center*

Joslyn Kirby, MD, MEd, MS

Jeffrey J Miller, MD, MBA

*Geisinger Health Center*

Christine Cabell, MD

There is an opportunity and an obligation to educate and inform primary care providers' (PCPs') use of topical corticosteroid (TCS), namely, choices of potency and volume. This proposal aims to develop and disseminate a point-of-care app with recommendations for TCS ingredient and volume, with recommendations based on evidence-based guidelines, site, treatment duration and body surface area.

**\*\*REVISIONS** are bracketed by asterisks and are found in the following sections: Goals and Objectives, Project Design – Aim 2 and Aim 3, Participants, Project/Budget Timeline, Budget, and Reference**\*\***

Goals and Objectives:

There is a demonstrated issue with access to necessary dermatologic care, and we can improve care by assisting primary care providers (PCPs) to effectively and appropriately treat dermatologic conditions. \*\*This improves access to care of skin conditions by leveraging the combined efforts of PCPs and dermatologists. Skin conditions can be more effectually treated by PCPs by facilitating treatment recommendations to ensure stronger steroids are used (when appropriate) and patients are prescribed a sufficient amount. The app will be a tool recommend to dermatologists' referral base, so PCPs can manage maintenance therapy of patients and reduce unnecessary return appointments to dermatologists. This would allow dermatologists to have more availability for patients with greater need.\*\* With your support, we will collaborate with Pennsylvania providers, across disciplines and multiple institutions, to develop and disseminate a new app for PCPs, focused on improving prescribing decisions, specifically the effectiveness, safety, and cost-efficiency of prescribing topical corticosteroid therapy (TCS).

The literature has shown that patients with dermatologic conditions may not receive appropriate management by PCPs. Dermatologic conditions are common, affecting 20-36% of patients in PCP offices; however PCPs report diagnostic and management uncertainty.<sup>1,2</sup> PCPs have been shown to prescribe either inappropriately high-potency TCS or, conversely, inappropriately low-potency TCS.<sup>3</sup> In addition, we recently showed that drug costs may be higher if multiple small tubes are dispensed over the treatment course.<sup>4</sup> Thus, there are opportunities to reduce cost by prescribing larger units, when indicated; however PCPs may not have the knowledge to effectively and cost-efficiently prescribe TCS. Teaching this information is not sufficient, since most (71%) medical schools provided nine or fewer hours of instruction in the first two years.<sup>5</sup> Importantly, mobile devices and apps provide significantly increased access to point-of-care tools and, with use by providers, demonstrate better clinical decision-making and improved patient outcomes.<sup>6,7</sup> Thus, our goal is to develop a point-of-care decision support app to educate PCPs while facilitating evidence-based care and lower health care costs.

The goal of this proposal is to develop and disseminate an evidence-based point-of-care app to support clinically effective and cost-effective topical corticosteroid prescribing. This goal will be achieved through three Aims: Aim 1. Perform a systematic review and quality assessment of clinical practice guidelines for topical corticosteroid use.

Aim 2. Develop an innovative, freely-available, evidence-based (from Aim 1), app to support point-of-care topical corticosteroid prescribing.

Aim 3. Disseminate the app, with a toolkit, to stakeholder organizations and investigate effects of implementation.

## Project Design, Methods and Evaluation

Timeline: 2 years

Aim 1. Systematic review and quality assessment of guidelines – 6 months

Aim 2. Develop an innovative, freely-available app – 4-6 months

Aim 3. Disseminate app and investigate effects – 9 months

Goals of the project:

Aim 1. Perform a systematic review and quality assessment of clinical practice guidelines for topical corticosteroid use.

Aim 2. Develop an innovative, freely-available, evidence-based app to support point-of-care topical corticosteroid prescribing.

Aim 3. Disseminate the app, with a toolkit, to stakeholder organizations and investigate effects of implementation.

## Project Design

Aim 1. Perform a systematic review and quality assessment of clinical practice guidelines for topical corticosteroid use.

Clinical practice guidelines (CPG) can guide clinicians by succinctly reviewing the literature and proposing evidence-based management recommendations.<sup>8</sup> The quality of CPG can vary for many reasons including the adequacy of the literature search, types of studies incorporated, and bias of the authors.<sup>9,10</sup> To develop the best-available evidence basis for Aim 2, we will assess the quality of CPG about TCS use. We will use the AGREE II tool, developed to evaluate the validity, feasibility and sources of bias in CPG.<sup>11</sup> The AGREE and AGREE II tools have been validated and widely applied, including for CPG of dermatologic conditions<sup>12,13</sup> We used it to assess CPG for actinic keratosis and this work was accepted for publication.

A medical librarian will perform a systematic search of the medical literature for TCS guidelines. The search will include Medline/PubMed and international guideline sources, including National Institute for Health and

Clinical Excellence, Guidelines International Network, the TRIP Database, the American Academy Dermatology web site and others.

The inclusion criteria will be established a priori and preliminarily include (1) an explicit statement identifying the document as a management guideline, (2) written by multiple authors including at least one dermatologist, and (3) recommendations concerning the use of TCS on the skin of adults, children or infants. Two reviewers will independently examine the retrieved titles and abstracts to assess the articles for inclusion. Eligible articles will be retrieved and the same reviewers will independently review the full-text for inclusion.

Two reviewers will independently score the CPGs yielding domain scores. Spearman's Rho will be used to determine interrater reliability.<sup>14</sup> A descriptive statistical analysis of the scores will be performed and include the mean and standard deviation. A p-value of <.05 will be considered significant. All analyses will be performed using SAS 9.3 (SAS, Cary, NC).

Aim 2. Develop an innovative, freely-available, evidence-based app to support point-of-care topical corticosteroid prescribing.

Clinicians continue to struggle to estimate how much topical medication they should prescribe for a given dermatological condition. PCPs are likely unaware of methods to estimate volumes of creams needed and in a busy clinic don't have the time to look this up.<sup>15</sup> We will develop an app based on the best available evidence (from Aim 1), the input of our PAD membership, and PCP stakeholders. This app will be freely available.

Research has shown that use of the app by stakeholders is tied to completion of tasks with the app.<sup>16</sup> Therefore, app development will use a mixed methods approach that incorporates the stakeholders, namely PCPs and dermatologists, and cycles of app use to ensure the app works for the audience it is meant for. Multiple plan-act-observe-reflect cycles will be performed; a participatory research method involves the participants in research and design using an iterative process.<sup>17,18</sup> During development, PCP residents and faculty from Penn State and Geisinger and the surrounding private practice providers will utilize the tool and contribute their opinions to improve the quality and acceptability of the tool.<sup>19,20</sup> PAD members will also utilize the app during development to ensure validity of the recommendations. PCPs' and dermatologists' user

experience will be collected using anonymous surveys about the app's strengths, weaknesses, and opportunities to improve. Surveys will be distributed via REDCap; a secure, web-based application that provides secure data capture and management for research studies, which is made available through the Penn State Center for Translational Science Institute. The app will rely on evidence from Aim 1; treatment volume will be based on the fingertip unit; unit sizes available from multiple manufacturers. The "Fingertip Unit" (FTU) is a framework for judging the appropriate volume of topical medication needed; one FTU is one line of topical cream, from distal interphalangeal joint to fingertip, which provides 0.5 grams of medication and covers 1% body surface area.<sup>21</sup>

The following is a description of the user flow that is to be created:

1. User launches app and title screen appears
2. \*\*Screen with photos to prompt the user to ensure this is a steroid responsive skin. User will see a row of eczema and psoriasis images contrasted with a row of conditions not "responsive to steroids" [impetigo, tinea]. The user will touch the row indicating their choice.
  - a. If [Not sure or not steroid responsive] is selected, the app directs the provider to consider performing a potassium hydroxide mount, culture or to talk to their local dermatologist].
  - b. If [yes, steroid responsive] is selected then they go to #3 below.\*\*
3. User selects "adult" or "child" patient type
4. User selects body area
5. User selects treatment (cream type) and desired treatment duration
6. App recommends potency, coverage amount needed for the body area and tube size to use in prescription and patient instructions
7. User exits app

The app, to be programmed by JPL Creative, a design firm, will be written using standard web technology (HTML5, JavaScript and CSS), and use a third party product (such as PhoneGap) to "wrap" the code so it behave like a native app for iOS and Android. The app is then made available at each store (iTunes, Google Play). This approach will decrease cost and time compared to building and performing maintenance on two native apps (1-iOS, 1-Android). JPL's proposal includes app development, development of "user stories" describing how the app will be used, app name and branding, transfer of app content, code and assets, app updates, embedded Google Analytics and usage reporting needs, exploration and assistance with deployment process to the marketplaces (iTunes, Google Play),

facilitation of any legal or IT needs by development partners including Penn State Hershey, PAD and American Academy of Dermatology. The business proposal from JPL is available upon request.

Aim 3. Disseminate the app, with a toolkit, to stakeholder organizations and investigate effects of implementation.

**\*\*Dissemination:** Research has shown that spread of app utilization can be encouraged by several interventions<sup>22,23</sup> and we plan to utilize a two-phased, multi-pronged strategy to support dissemination of the app. JPL, also a marketing firm, can both develop and implement the dissemination strategy. The first phase is to (1) involve and learn more about the target users (PCPs) so the dissemination campaign can be tailored and (2) create the campaign elements. JPL can also implement the strategy; however, if funds are not available the PAD and AAD could commit time and resources to enact the dissemination plan.

The multi-faceted dissemination strategy includes:

- Optimize use of Social media: early users can encourage app promotion through social media by building positive reviews of the app

- Promote through Online Presence: a webpage will be developed as a foundation for information about the app, blogs, and generate interest about it; search engine optimization opportunities will be pursued to funnel potential users; develop and post a short You-tube video to advertise the app's capabilities

- Basis on Best-available Evidence (Aim 1);

- Stakeholder Involvement: Involvement of PCP-users is important as recommendations by others facilitates app dissemination through social networks.<sup>16</sup>

- Build a Coalition of Credible Campaign Sponsors -based on existing partnerships at the state and national level, JPL and our PAD lead administrator, Jennifer Keeler, will utilize connections with the Pennsylvania Medical Society and other State societies. At the national level, we work with AAD administrative staff to leverage partnerships between the AAD and national medical organizations, such as the American College of Physicians;

- Interactive Education Utilizing the App – during discussions with partnering medical organizations, members of this team will volunteer to run interactive educational sessions during large meetings;

-Develop and disseminate a 60-90-second teaser video to be shown on session screens and meeting monitors throughout state and national meetings

-Develop a Toolkit – this will contain documents that describe the app and its evidence basis, purpose/goal, tips for use, and limitations.

These features can support changes in behavior or knowledge by 10-68% of providers.<sup>22</sup> \*\*

Investigate app impact: We will investigate changes associated with the app at the level of the provider and patient. (1) We will survey providers to investigate their perceptions about how app use influenced their TCS prescribing comfort, knowledge and abilities. (2) We will investigate changes in provider knowledge by partnering with faculty and resident providers from the Penn State departments of Family medicine, Internal medicine, and Pediatrics. Providers will be given a pre-test and post-test before and after app use. The items on the test will be developed from evidence base formed in Aim 1. The pre-test will be administered in-person during a meeting in which the app is introduced and the toolkit discussed. The post-test will be administered through an internet-based application approximately 6 weeks later. Responses to both questionnaires will be confidential. Upon completion of the second survey, subjects will receive a \$10 gift card. A convenience sample will be used and we have budgeted for 150 participants. We will examine the magnitude of the pre-to post-test group mean difference by calculating Cohen's d. A series of Mann Whitney U tests will also be performed to examine pre/post change on individual items pertaining to choice of potency and choice of unit size. One-way ANOVAs will be used to examine differences due to year of training or years in practice. All analyses will be performed in SAS version 9.3. A two-sided p-value <0.05 will be considered statistically significant. In addition, we will collect data from the analytics embedded in the app. From this, we will investigate the features most frequently used and user interactions with the app.

### Participants

Participants (names of state society staff /members/ organizations responsible for this project)

Aim 1. Perform a systematic review and quality assessment of clinical practice guidelines for topical corticosteroid use.

- PAD & Penn State: Joslyn Kirby (PAD Committees), Jeffrey Miller (PAD past-president)

- PAD & Geisinger: Christine Cabell, MD (PAD president)
- Aim 2. Develop an innovative, freely-available, evidence-based app to support point-of-care topical corticosteroid prescribing.
- PAD: Members to pilot the app and recommend revisions
  - AAD staff: Investigate best options for app hosting (web, Play store)
- Aim 3. Disseminate the app, with a toolkit, to stakeholder organizations and investigate effects of implementation.
- PAD physicians at Penn State and Geisinger: Engage primary care departments for participants in pre/post-test study
  - PAD staff: Facilitate dissemination of app to stakeholder medical societies, such as Pennsylvania Medical Society
  - AAD staff: Facilitate dissemination of app to stakeholder medical societies, such as American Academy of Family Practice, American College of Physicians, and American Academy of Pediatrics

Consultants/experts needed to accomplish this project

Aim 1. Systematic review and quality assessment of guidelines

- Master Librarian with expertise in systematic review and Interlibrary loan resources
- Project manager: coordination of data, reviewers, and basic data analysis

Aim 2. Develop an innovative, freely-available app

- JPL Creative, a marketing and digital development consulting firm with a record of excellent service for the Pennsylvania Medical Societies as well as national and international companies: app development
- Project manager: Management of data collected from stakeholders during development

\*\*Aim 3. Disseminate app and investigate effects

- JPL Creative, a marketing and digital development consulting firm with a record of excellent service for the Pennsylvania Medical Societies as well as national and international companies: Dissemination strategy and plan development +/- implementation (depending on budget amount approved)\*\*
- Project manager: Develop toolkit to facilitate app dissemination, manage
- Data analyst: Collect and analyze data from surveys, pre/post-tests, and app usage

Delivered Product:

Aim 1. Systematic review and quality assessment of guidelines



- Service or Products: Submission of findings for presentation at state and national meetings, Submission of findings for publication in medical literature
  - Stakeholder Recipient(s): PAD, AAD, medical literature/community
- Aim 2. Develop an innovative, freely-available app
- Service or Products: Point-of-care decision support app for TCS, Submission of findings for publication in medical literature
  - Stakeholder Recipient(s): PAD and other Pennsylvania medical societies, AAD and other national medical societies
- Aim 3. Disseminate app and investigate effects
- Service or Products: Toolkit with information on app development and app use, Results from pre-/post-test, Results from app analytics (usage data), Submission of findings for publication in medical literature
  - Stakeholder Recipient(s): Professional medical societies for PCPs (ACP, AAFP, AAP), PAD, AAD

#### Outcome Measures:

Aim 1. Systematic review and quality assessment of guidelines

- Review of evidence completed and graded
- Results submitted as publication

Aim 2. Develop an innovative, freely-available app

Users feel the app is:

- Easy-to-use app, generalizable to providers prescribing TCS.
- Moves the search for evidence-based recommendations into the patient room for quicker, more direct application.
- Encourages learning through repeated use.
- Facilitates closure of practice gaps in knowledge and ability to effectively, safely, and cost-efficiently prescribe TCS.

Aim 3. Disseminate app and investigate effects

- Results from questionnaire on provider-reported comfort prescribing TCS using app.
- Results from pre/post-test comparison of knowledge of TCS prescribing before and after app use.
- Results from data taken from app analytics, or embedded data capture, describing utilization of app by users.

### **Project Timeline/Budget Timeline**

Aim 1. Systematic review and quality assessment of guidelines

Deliverables to be provided: Results submitted as meeting abstract and/or publication

Aim 2. Develop an innovative, freely-available app

Materials needed: Survey software – provided by PAD member-investigators

Deliverables to be provided: An innovative and functional app

Aim 3. Disseminate app and investigate effects

\*\*Hire: Continue collaboration with JPL Creative, to facilitate app dissemination,

Deliverables to be provided: Engage PAD and AAD staff to develop marketing campaign, toolkit documents to facilitate implementation,

Results submitted as meeting abstract and/or publication.

## References

1. Federman DG, Concato J, Kirsner RS. Comparison of dermatologic diagnoses by primary care practitioners and dermatologists. A review of the literature. *Archives of family medicine*. Mar-Apr 1999;8(2):170-172.
2. Moreno G, Tran H, Chia AL, Lim A, Shumack S. Prospective study to assess general practitioners' dermatological diagnostic skills in a referral setting. *The Australasian journal of dermatology*. May 2007;48(2):77-82.
3. Balkrishnan R, Cook JM, Shaffer MP, Saltzberg FB, Feldman SR, Fleischer AB, Jr. Analysis of factors associated with prescription of a potentially inappropriate combination dermatological medication among US outpatient physicians. *Pharmacoepidemiology and drug safety*. Mar 2004;13(3):133-138.
4. Skojec A, Foulke G, Kirby JS. Variation in the Cost of Generic Topical Corticosteroids. *JAMA dermatology*. Aug 19 2015.
5. McCleskey PE, Gilson RT, DeVillez RL. Medical Student Core Curriculum in Dermatology Survey. *Journal of the American Academy of Dermatology*. 2009;61(1):30-35.e34.

6. Aungst TD. Medical applications for pharmacists using mobile devices. *The Annals of pharmacotherapy*. Jul-Aug 2013;47(7-8):1088-1095.
7. Ventola CL. Mobile devices and apps for health care professionals: uses and benefits. *P & T : a peer-reviewed journal for formulary management*. May 2014;39(5):356-364.
8. IOM (Institute of Medicine). *Clinical Practice Guidelines We Can Trust*. 2011; [https://http://www.iom.edu/~media/Files/ReportFiles/2011/Clinical-Practice-Guidelines-We-Can-Trust/Clinical Practice Guidelines 2011 Insert.pdf](https://http://www.iom.edu/~media/Files/ReportFiles/2011/Clinical-Practice-Guidelines-We-Can-Trust/ClinicalPracticeGuidelines2011Insert.pdf). Accessed March 11, 2015.
9. Alonso-Coello P, Irfan A, Sola I, et al. The quality of clinical practice guidelines over the last two decades: a systematic review of guideline appraisal studies. *Qual Saf Health Care*. Dec 2010;19(6):e58.
10. Detsky AS. Sources of bias for authors of clinical practice guidelines. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne*. 2006;175(9):1033-1035.
11. Brouwers M KM, Browman GP, Burgers JS, Cluzeau F, Feder G, Fervers B, Graham ID, Grimshaw J, Hanna S, Littlejohns P, Makarski J, Zitzelsberger L for the AGREE Next Steps Consortium. AGREE II: Advancing guideline development, reporting and evaluation in healthcare *Can Med Assoc J*. 2010;182:E839-842.
12. de Haas ER, de Vijlder HC, van Reesema WS, van Everdingen JJ, Neumann HA. Quality of clinical practice guidelines in dermatological oncology. *J Eur Acad Dermatol Venereol*. Oct 2007;21(9):1193-1198.
13. Sanclemente G, Acosta JL, Tamayo ME, Bonfill X, Alonso-Coello P. Clinical practice guidelines for treatment of acne vulgaris: a critical appraisal using the AGREE II instrument. *Arch Dermatol Res*. Aug 8 2014;306(3):269-277.
14. Pagano M, Gauvreau K, eds. *Principles of Biostatistics*. 2nd ed. Belmont CA: Brooks/Cole; 2000.
15. Bewley A. Expert consensus: time for a change in the way we advise our patients to use topical corticosteroids. *The British journal of dermatology*. May 2008;158(5):917-920.
16. Briz-Ponce L, Garcia-Penalvo FJ. An Empirical Assessment of a Technology Acceptance Model for Apps in Medical Education. *Journal of medical systems*. Nov 2015;39(11):176.
17. Anderson T, Shattuck J. Design-based Research: A Decade of Progress in Educational Research? *Educational Researcher*. 2013;41(1):16-25.

18. Cobb P, Confrey, J., diSessa, A., Lehrer, R., Schauble, L. . Design experiments in educational research. *Educational Researcher*. 2003;32(1):9-13.
19. Waterman H, Tillen D, Dickson R, de Koning K. Action research: a systematic review and guidance for assessment. *Health Technology Assessment*. 2001;5(23).
20. Whyte WF. *Participatory Action Research*. London: Sage; 1991.
21. Long CC, Finlay AY. The finger-tip unit--a new practical measure. *Clinical and experimental dermatology*. Nov 1991;16(6):444-447.
22. Prior M, Guerin M, Grimmer-Somers K. The effectiveness of clinical guideline implementation strategies--a synthesis of systematic review findings. *Journal of evaluation in clinical practice*. Oct 2008;14(5):888-897.
23. Yuan CT NI, Stern AF, Brush JE, Jr., Krumholz HM, Bradley EH. *Blueprint for the Dissemination of Evidence-Based Practices in Health Care*. Washington DC: The Commonwealth Fund;2010.