Dermatology residency preparation curriculum: a model for initiating new residents into dermatology clinical care

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Abstract

Entering dermatology residency is an immersive experience requiring new specialty-specific skills. There is no standard Accreditation Council for Graduate Medical Education (ACGME) protocol for orienting new dermatology residents. We aimed to design, develop, and evaluate a curriculum for incoming first-year dermatology residents focusing on practical introduction to dermatologic clinical care emphasizing ACGME dermatology milestones. A concentrated 8-hour residency preparation course for first-year dermatology residents was designed and developed by faculty. The course encompassed clinical competencies, procedural techniques, and professionalism and collegiality principles. Teaching methods included lectures, video demonstrations, simulated patient experiences, and one-on-one practical instruction. Surveys were distributed before, immediately after, and 6-months following the course from 2016-2018 to assess participants' skill-based confidence level and perceived usefulness of the course. A total of 24 first-year dermatology residents participated in the residency preparation course over 3 years from 2016-2018. Residents' confidence levels in performing dermatology-specific skills immediately increased following the course and continued to increase 6 months into training. The majority of first-year residents "agreed" or "strongly agreed" that the course was helpful for improving clinical competence. Our residency preparation course increased first-year residents' confidence and perceived competence in performing clinical skills related to ACGME dermatology milestones.

Keywords: ACGME, education, orientation, residency preparation, simulation training

Introduction

Upon entering dermatology residency a new set of specialty-specific skills are quickly required. Most medical schools neither have dedicated preclinical courses in dermatology nor require clinical dermatology rotations [1]. A survey of residents in specialties including dermatology concluded that many do not feel prepared for residency [2].There is no standard Accreditation Council for Graduate Medical Education (ACGME) protocol for orienting new dermatology residents. Although individual dermatology residency programs may have their own curriculum for orienting residents, there is no published standard residency orientation curriculum specific to dermatology.

At many institutions, surgical residency programs such as general surgery, plastic surgery, neurosurgery, and otolaryngology have established residency preparation curricula [3-6].Some are multi-institutional and required prior to starting clinical practice [7]. Medical schools have also developed surgical courses that are effective in improving students' confidence level in performing relevant skills [8-11], although it is unknown if providing these curricula translates to competency in residency [10].

To provide first-year dermatology residents with a practical introduction to dermatologic clinical care emphasizing ACGME dermatology milestones, we

Table 1. *Correspondence between course stations and Accreditation Council for Graduate Medical Education (ACGME) dermatology milestones.*

Course station		ACGME Dermatology Milestone (pertinent component)
1	Total body skin examination	PC1. History, examination, and presentation (exam) PROF1. Practices medicine ethically (treats all patients with respect and dignity) PROF3. Patient care is the first priority (demonstrates empathy and compassion)
2	Routine clinic-based procedures	PC2. Diagnostic tests (KOH, mineral oil, selecting appropriate lab tests) PC6. Surgical treatment (informed consent, antisepsis, anesthesia) MK3. Dermatologic surgery (concepts of protocol-driven procedural safety, wound healing)
3	Lesion description	PC1. History, examination, and presentation (presentation)
4	Medical documentation	SBP1. Adapts easily and works effectively in various health care delivery settings and systems (electronic health record) PROF1. Practices medicine ethically (truthful documentation, patient confidentiality) ICS5. Medical documentation (accuracy, consistency, timeliness)
5	Professionalism and collegiality	SBP3. Improves health care delivery by identifying system errors and implementing potential systems solutions; Advocates for quality patient care and optimal patient care systems (understands potential for systems errors; open and safe discussion of errors; advocates for optimal patient care) PROF1. Practices medicine ethically (places patient needs above self-interest) PROF3. Patient care is the first priority (empathy and compassion, anticipating and meeting needs of patients) ICS1. Communication and rapport with patients and families (effective communication, maintaining composure)

ACGME milestones (https://www.acgme.org/Portals/0/PDFs/Milestones/DermatologyMilestones.pdf).
PC, patient care; MK, medical knowledge; ICS, interpersonal and communication skills; PROF, professionalism; SBP, systems-based practice.

designed, developed, and evaluated a concentrated 8-hour curriculum that encompassed clinical competencies, procedural techniques, and professionalism and collegiality principles. We expected that such a preparation course, teaching discrete skills pertinent to dermatology residency, would increase participants' confidence and competence in patient care at the beginning of residency.

Methods

Our target audience was all first-year dermatology residents (N=24) entering the Department of Dermatology, Michigan Medicine, Ann Arbor, MI, from 2016-2018. The goals of our curriculum were to increase residents' confidence and competence within the following topics deemed essential for delivery of dermatologic care: total body skin examination (TBSE); routine clinic-based procedures; lesion description; medical documentation; and professionalism and collegiality. Each corresponded to at least one ACGME Dermatology Milestone (**Table 1**). Teaching methods included lectures, video demonstrations, simulated patient experiences, one-on-one practical instruction, and round table discussions. The 8-hour course was distributed over two days during the first 1-2 weeks of residency and four to five faculty volunteers rotated responsibility for leading each segment.

Total body skin examination (TBSE)

Total body skin examination is comprised of the mechanical skills required to thoroughly examine the entire integument, as well as interpretation and assessment of any findings. We focused on the mechanics of the exam and the importance of developing meticulous TBSE habits early to establish a lifelong skill. Prior to the course, residents watched a video demonstration based on educational material available through the American Academy of Dermatology (AAD), produced by faculty members and utilizing a standardized patient. During the course, key points were reviewed and residents practiced TBSE on each other using a teaching game.

Residents were divided into groups of two along with a faculty supervisor and alternated between the patient and the examiner role. Privately, the "patient" applied several small round stickers to various assigned body locations (over clothes). The "examiner" then conducted a systematic TBSE, noting the location of the stickers. At the conclusion of the game, residents were able to provide feedback and reflect on the experience of undergoing a TBSE. Faculty provided practical tips, feedback, and commentary throughout the exercise. Patients' reactions to TBSE, including anxiety, self-consciousness, and insecurity were discussed and the importance of maintaining patient dignity and respect was highlighted.

Routine clinic-based procedures

Residents rotated through simulation stations in groups of 2-3 to gain exposure and confidence in routine procedures. For each procedure, relevant scientific principles, benefits and risks, and informed consent were discussed and residents received verbal and written instructions, as well as immediate feedback, on techniques.

Biopsy: A dermatology surgeon discussed informed consent, local anesthesia, biopsy tray set up, techniques of shave and punch biopsies, suture material, and suturing techniques (simple interrupted and figure of 8). Simulated skin products were then used for practice.

Cryotherapy: Relative sensitivity of various skin cells to cryotherapy was discussed. Techniques of cryotherapy application, including open spray canister and cotton-tip applicator, were highlighted. Residents practiced both techniques on fruit such as apples and oranges.

Electrodesiccation and curettage (EDC): Indications and cure rates for EDC were discussed. Drawbacks were reviewed including scarring, risk of recurrence, and lack of pathologic evaluation of margin control. Residents practiced the technique on oranges or potatoes.

Potassium hydroxide (KOH) and mineral oil preparation ("scrapings"): Residents practiced collection of skin scrapings, safe transportation of specimens, application of KOH or mineral oil, and microscopic analysis.

Intralesional triamcinolone injection: Faculty members modeled the mechanics of drawing up a mixture of triamcinolone with and without lidocaine and discussed injection technique. Residents practiced filling syringes with specific goal concentrations through appropriate dilution of imitation stock solutions (normal saline).

Lesion description

Mastering the description of lesions and rashes is essential to identification and communication within dermatology. Residents were introduced to morphological and color terms and practiced describing primary lesions and secondary changes. Photographs of classic dermatologic conditions were shown, residents provided descriptions, and immediate feedback from the faculty facilitator was given.

Medical documentation and presentation

Accurate and thorough medical documentation is essential to provide a record of clinical care, communicate with caregivers, and support appropriate billing. Electronic health records add a layer of complexity to medical care and require hasty adaptation by incoming residents to provide adequate care. At our institution, all incoming residents undergo standard, nonspecific hospital-based electronic health record (Epic) training prior to our dermatology-specific course. For our session, essential dermatology-specific components of documentation were emphasized. Faculty reviewed how to document and present clearly with focus on a patient's presenting concern, relevant portions of the physical exam findings, diagnosis, and plan. The importance of noting percentage of total body surface area involvement for rashes and total cumulative dose for medications, such as isotretinoin and methotrexate, was emphasized. A question-and-answer session followed.

Professionalism and collegiality

Professionalism and collegiality promote delivery of safe patient care in an optimal workplace setting. A roundtable discussion was held in which residents were asked to reflect on individuals who modeled professionalism in their previous work environments and to share relevant anecdotes with the group.

Table 2. *Resident experience with dermatology-specific skills prior to residency preparation course shown as number (percentage) out of 24 total responders.*

Number of repetitions	TBSE, N (%)	Biopsy set-up, N (%)	Cryotherapy, N (%)	Scraping, N (%)	EDC, N (%)	Intralesional triamcinolone, N (%)
0-5	11 (45.8%)	13 (54.2%)	6 (25%)	15 (62.5%)	20 (83.3%)	19 (79.2%)
6-10	4 (16.7%)	5 (20.8%)	7 (29.2%)	6 (25%)	4 (16.7%)	3 (12.5%)
11-20	5 (20.8%)	2 (8.3%)	5 (20.8%)	3 (12.5%)	0 (0%)	0 (0%)
21-50	4 (16.7%)	4 (16.7%)	6 (25%)	0 (0%)	0 (0%)	2 (8.3%)
51+	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

TBSE, total body skin examination, EDC, electrodessication and curettage.

Surveys

Pre-course, immediately post-course, and 6-month post-course questionnaires (unvalidated survey created by authors) were designed and distributed to all participants to assess number of examinations or procedures performed and confidence level. Confidence levels ranged from 1 ("not confident") to 5 ("completely confident"). Perceived benefit of the course was assessed by asking the participant to what degree they agreed the course improved their clinical performance of each skill. Questionnaires were anonymous and unique, unidentifiable codes were used to link pre-course, immediately post-course, and 6-month post-course questionnaires. Data was not collected for documentation, presentation, and professionalism in 2018. The study was deemed exempt by the University of Michigan Institutional Review Board.

Statistical methods

Questionnaire responses were summarized as frequencies for categorical variables and descriptive statistics (mean (standard deviation (SD))) with standard deviation for numerical variables. Frequencies at pre-, immediately post-, and 6-month post-course were compared using the chi-squared or Fisher Exact test. Means at pre-, immediately post-, and 6-month post-course were compared using unbalanced analysis of variance (ANOVA). Significance was defined as $P<0.05$. Statistical analyses were performed using SAS version 9.4 (Cary, NC).

Results

A total of 24 first-year dermatology residents participated in the intensive residency preparation course (8 residents per class from 2016-2018). The response rates for the pre-course, immediately post-course, and 6-month post-course surveys were 100% (24/24), 91.7% (22/24), and 87.5% (21/24), respectively. **Table 2** illustrates residents' pre-course experience in performing dermatology-specific skills. The majority of residents had minimal experience (<10 repetitions) in performing skills such as TBSE, biopsy tray set up, cryotherapy, electrodessication and curettage (EDC), and intralesional injection.

Table 3 and **Figure 1** show mean confidence levels (on a scale of 1-5, with 1 "not confident" and 5 "completely confident") at pre-course, immediately post-course, and 6 months post-course for each of the 10 skills covered. Residents showed significant increases in confidence levels from pre-course to immediately post-course for all skills covered ($P<0.001$) except for professionalism. Prior to the course, mean confidence levels for TBSE, various procedural skills, lesion description, documentation, and presentation ranged from as low as 1.6 [0.8] for EDC to as high as 3.0 [1.2] for cryotherapy. Confidence levels increased post-course for all of these skills, with the most dramatic improvements in TBSE (2.3 [1.2] to 4.0 [0.7]) and procedural skills, especially EDC (1.6 [0.8] to 3.5 [0.8]) and intralesional injection (1.7 [0.7] to 3.5 [0.8]). By 6 months post-course, mean confidence levels rose to 4 or greater

Table 3. *Confidence level by skill at pre-course, immediately post-course, and 6 months post-course with 1 representing "not confident" and 5 representing "completely confident."*

Skill	Pre-course			Immediate post-course			6-month post-course			P
	Mean [SD]	Range	N§	Mean [SD]	Range	N§	Mean [SD]	Range	N§	
TBSE	2.3 [1.2]	1-5	24	4.0 [0.7]	3-5	22	4.8 [0.4]	4-5	20	<0.0001*
Biopsy set up	2.2 [1.1]	1-5	24	4.1 [0.7]	3-5	22	4.4 [0.7]	3-5	21	<0.0001#
Cryotherapy	3.0 [1.2]	1-5	24	4.2 [0.7]	3-5	22	4.8 [0.4]	4-5	20	<0.0001#
EDC	1.6 [0.8]	1-4	24	3.5 [0.8]	2-5	22	4.5 [0.5]	4-5	21	<0.0001*
Scraping	2.3 [1.0]	1-5	24	3.8 [0.8]	2-5	22	4.0 [0.8]	3-5	21	<0.0001#
IL triamcinolone	1.7 [0.7]	1-3	24	3.5 [0.8]	2-5	22	4.4 [0.7]	3-5	21	<0.0001*
Lesion description	2.2 [1.0]	1-5	24	3.4 [0.7]	2-4	22	4.3 [0.5]	4-5	20	<0.0001*
Documentation	2.4 [1.1]	1-4	16	3.3 [0.8]	2-4	16	4.7 [0.5]	4-5	14	<0.0001*
Presentation	2.8 [0.9]	1-4	16	3.5 [0.5]	3-4	16	4.6 [0.6]	3-4	15	<0.0001*
Professionalism	4.4 [0.9]	2-5	16	4.8 [0.6]	3-5	16	4.9 [0.3]	4-5	15	0.01014

*statistically significant differences across all three time frames.
#statistically significant differences between pre- and immediately post-course and pre- and 6-month post-course, but not immediately post- and 6-month post-course.
§Data was not collected for documentation, presentation, and professionalism in 2018.
SD, standard deviation; TBSE, total body skin examination, EDC, electrodessication and curettage; IL, intralesional.

across all skills. Confidence levels in TBSE, EDC, intralesional injection, lesion description, documentation, and presentation continued to show statistically significant increases from immediately post-course to 6 months post-course. Most residents were confident in their professionalism at baseline with a mean confidence level of 4.4 [0.9] and there was no significant increase in confidence level immediately post-course (4.8 [0.6]) or 6 months post-course (4.9 [0.3]), (P=0.1014). Overall, the majority of first-year residents "agreed or strongly agreed" that the residency preparation course was helpful for improving clinical competence in the skills taught (**Table 4**).

With regard to cost and feasibility, materials needed for hands-on experiences were obtained from the clinic. Other materials used for simulation exercises, such as fruit and potatoes, were obtained from local grocery stores or cafeterias.

Discussion

Given that dermatology-specific training is not routinely emphasized in medical school and internship, an introductory curriculum focusing on dermatologic clinical care is essential to an incoming dermatology resident. Although individual dermatology residency programs may have their orientation curriculum, there have been no studies to date evaluating the effectiveness of a standardized residency orientation curriculum. Our

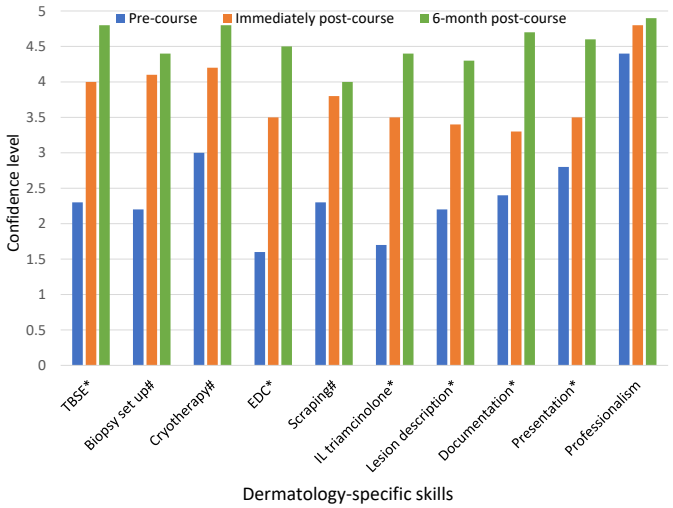

Figure 1. *Confidence levels at pre-course, immediately post-course, and 6 months post-course with 1 representing "not confident" and 5 representing "completely confident.*

EDC, electrodessication and curettage; IL, intralesional; TBSE, total body skin examination.
*statistically significant differences across all three time frames, P<0.05.
#statistically significant differences between pre- and immediately post-course and pre- and 6 months post-course, but not between immediately post- and 6 months post-course.

Table 4. *Resident responses to questionnaire item, "Overall, I feel the course improved my clinical performance of ___." **

		Strongly disagree or disagree	Neutral	Agree or strongly agree	Total
TBSE	Post	0 (0%)	0 (0%)	16 (100%)	15
	6-month	0 (0%)	0 (0%)	15 (100%)	15
Biopsy set-up	Post	0 (0%)	0 (0%)	16 (100%)	16
	6-month	0 (0%)	3 (20%)	12 (80%)	15
Cryotherapy	Post	0 (0%)	2 (12.5%)	14 (87.5%)	16
	6-month	0 (0%)	1 (6.7%)	14 (93.3%)	15
EDC	Post	0 (0%)	2 (12.5%)	14 (87.5%)	16
	6-month	0 (0%)	0 (0%)	15 (100%)	15
Scraping	Post	0 (0%)	3 (18.8%)	13 (81.3%)	16
	6-month	0 (0%)	4 (26.7%)	11 (73.3%)	15
IL triamcinolone	Post	0 (0%)	2 (12.5%)	14 (87.5%)	16
	6-month	0 (0%)	2 (13.3%)	13 (86.7%)	15
Lesion description	Post	0 (0%)	0 (0%)	16 (100%)	16
	6-month	0 (0%)	2 (13.3%)	13 (86.7%)	15
Documentation	Post	0 (0%)	2 (12.5%)	14 (87.6%)	16
	6-month	0 (0%)	3 (20%)	12 (80%)	15
Presentation	Post	0 (0%)	4 (25%)	12 (75%)	16
	6-month	1 (6.7%)	3 (20%)	11 (73.3%)	15
Professionalism	Post	0 (0%)	3 (18.8%)	13 (81.3%)	16
	6-month	0 (0%)	2 (13.3%)	13 (86.7%)	15

*There were no statistically significant differences between responses at immediately post-course and 6-month post-course for all stations.
TBSE, total body skin examination, EDC, electrodessication and curettage; IL, intralesional

study confirmed that residents have minimal experience in performing dermatology-specific skills prior to starting residency. An 8-hour concentrated residency preparation course increased resident confidence in relevant skills, increased residents' perceived competence, and was well-received by residents. The cost of the course was nominal and implementation was feasible.

Studies have suggested that simulation-based medical education is more effective than instructional learning [12], although the validity and effectiveness of most simulations, including ours, have not been formally studied [13]. Except for documentation and professionalism, our curriculum was based on simulation-based training with accompanying lectures, one-on-one practical instruction, and round table discussions. We found that residents' confidence levels rose immediately following the course in all skills covered except for professionalism.

Confidence in performing many skills, including TBSE, EDC, scraping, intralesional injection, lesion description, and documentation, continued to rise 6 months into residency training as these skills were performed in the clinical setting. Confidence levels in other skills remained stable over this interval. Cryotherapy confidence was already very high immediately post-course and did not change significantly after 6 months. Confidence in biopsy set-up increased immediately following the course but remained stable, perhaps attributable to medical assistants taking on this responsibility in our typical clinic workflow. Similarly, skin scraping confidence remained stable from immediately post-course to 6 months post-course, perhaps related to inadequate opportunities to perform this skill in clinic and residents' realization that additional practice may be required to achieve mastery. Overall, these observations indicate that our curriculum is suitable for an initial introduction to dermatology-specific

skills but does not replace the experience gained during early residency training to improve and optimize these skills. Some skills may be acquired well within a targeted educational session and mastery of others requires continued educational and clinical experience.

Increased experience with patient interactions and active discussions with ongoing exposure to strong positive role models promote learning professionalism [14,15]. Incoming residents were confident in their professionalism at baseline, perhaps related to required education in professionalism in medical schools in many countries [16]. Our professionalism roundtable discussion did not further increase confidence in this area, although residents agreed or strongly agreed that the course improved their clinical performance of professionalism.

Limitations of this study include the small sample size given the single-program nature, some discrepancies in data collection over the course of the three years (documentation, presentation, and professionalism in 2018), and short overall duration. There may also be differences in teaching techniques among faculty members who administered the various course content. We only measured confidence level and did not assess actual knowledge/skills gained from the course. This curriculum could be expanded to and studied at other dermatology residency programs in the future.

Conclusion

A concentrated, practical dermatology residency preparation course addressing patient care, routine procedures, professionalism, and collegiality increased first-year dermatology residents' confidence in performing skills included in ACGME milestones and was perceived by the participants to be significantly helpful. Future considerations include standardization of simulated activities and teaching methodology between faculty members, as well as expansion of the program to reach other learners such as medical students, interns, and primary care residents.

Acknowledgements

We would like to acknowledge Jackie Giletto for her help in designing the teaching game. We would also like to acknowledge Jackie Giletto, Erin Wal, Katherine Boss and Heather Chubb for their assistance in organizing the curriculum and surveys.

Potential conflicts of interest

The authors declare no conflicts of interest.

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