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A Core Curriculum for Dermatology Nurse Practitioners: Using Delphi Technique

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As the landscape of healthcare and the dermatology workforce have changed, dermatology nurse practitioners (NPs) have become an integral part of dermatologic care. According to the American Academy of Dermatology's (AAD) 2007 practice profile survey, more than 36% of dermatology practices would employ, or intended to hire, at least one NP or physician's assistant (PA) by 2010 (Resneck & Kimball, (2008). The rising use of NPs and PAs has augmented the dermatology workforce and has been shown to improve patient access to dermatology care (Godsell, 2005; Tsang & Resneck, 2006).

The current schema for the education and clinical preparation of dermatology NPs has been directed by the diverse opinions of dermatologists, health care practice patterns, and self-identified learning needs of NPs. Most dermatology NPs acquire their specialized knowledge and skills through on-the job training with dermatologists, educational conferences, and limited opportunities for clinical residency experiences (Resneck & Kimball, 2008). This has made it difficult to define the core body of knowledge and standardize the educational preparation that provides the foundation for competent dermatology NP practice.

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Dermatology NPs are master's or doctoral educated advanced practice nurses, certified and licensed in one of the population-focused practice areas (Adult-Gerontological, Family, Neonatal, Pediatrics, Women's Health, and Psychiatric-Mental Health)(APRN Joint Dialogue Group, 2008). Once board certified in a core area, NPs can pursue additional knowledge and expertise in a subspecialty area like dermatology, emergency, cardiac, and oncology.. According to the Consensus Model for Advanced Practice Registered Nursing Regulation: Licensure, Accreditation, Certification & Education (2008), each specialty's professional nursing organization is responsible for defining their educational preparation, derived knowledge base unique to that specialty, and establishment of educational criteria for specialty preparation.

The NP Society (NPS) of the Dermatology Nurses' Association (DNA) is currently the only national nursing organization dedicated solely to NPs practicing in dermatology. The NPS established the specialty's Scope of Practice and Standards of Care in 2006 (NP Society of DNA, 2006). Recognizing the importance of establishing minimum knowledge competencies for dermatology NPs, the NPS worked with the Dermatology Certification Nursing Board and conducted a role delineation study which identified the primary knowledge areas for dermatology NP practice (Dermatology Nurses' Association, 2008). In 2008, the first Dermatology Certified Nurse Practitioners (DCNP) exam was offered and remains the only formal recognition of dermatology NP knowledge competency. While the NPS firmly supports DCNP certification, it recognizes that obtaining advanced dermatology knowledge and skills can be challenging for NPs given the variability and limited number of educational opportunities in general dermatology.

The aims of this comparative descriptive study were twofold. The first purpose was to attain a consensus of opinion on important elements for a general dermatology NP core curriculum, as determined by dermatology NPs and board-certified dermatologists. The second purpose was to examine differences between the groups' opinions regarding the importance of curricular items. Data from this study may be used by NP leaders to define and standardize a core curriculum that guides national and international dermatology NP education and practice.

Methods

Study Design

Using a modified Delphi technique, this study gathered data from dermatology NPs and dermatologists about important content for a dermatology NP core curriculum. The goal of Delphi technique is to obtain the most reliable consensus of opinion among a group of experts through use of iterative questionnaires and controlled feedback (Dalkey & Helmer, 1963). Delphi is not a type of research, but a methodology utilized in quantitative or qualitative research on topics where little is known about the phenomenon and the goal is to gather a consensus of opinion. Use of the Delphi technique allows researchers to gather data from experts without the negative influences or interpersonal conflicts that may arise from group or committee meetings (Goodman, 1987). Experts contribute their opinions, both independently and in consideration of the group's opinion, through anonymous feedback.

The Delphi questionnaire for this study was designed using curricular content items derived from: the NPS Scope and Standards of Practice; DCNP Exam objectives and blueprint of the content areas; current literature from medical and nursing dermatology textbooks, medical and nursing journals; and curriculum from established medical and NP dermatology programs. Ninety-one content items were organized into knowledge, skills, and role categories. A pilot study was conducted using five dermatology NPs from the DNA leadership and five board-certified dermatologists (each with greater than five years of

dermatology experience) from academia, seeking feedback on clarity and format of the questionnaire, as well as individual content items. Based on the pilot study, revisions were made to the questionnaire which included the addition and deletion of items, grouping/order, and clarification of terms. Approval for the study was obtained from the Institutional Review Board at Case Western Reserve University (#20090608), Cleveland, OH.

Sample

Experts for the study were recruited using snowball sampling of dermatology NPs with membership in the DNA. Round 1 study packets were mailed in August 2009, to 508 dermatology NPs and included: a cover letter detailing the study, consent form, demographic questionnaire, self-addressed stamped envelope, and Round 1 Delphi questionnaire. A second and identical study packet was included for NPs to give to their collaborating dermatologists. Demographic questionnaires were tailored for NPs and dermatologists, because questions regarding type of education and certification were necessarily different. This sampling method was utilized to solicit opinion from only dermatologists who had experience working with NPs in practice.

Dermatology NPs and dermatologists participating in the study had to work a minimum of 20 hours a week in clinical dermatology. Collaborating physicians had to be board-certified in dermatology and engaged in collaborative practice with at least one NP at the time of the study. Respondents who practiced in aesthetics or cosmetic dermatology more than 50% of the time were excluded, as the focus of this study was on general and surgical dermatology practice. General dermatology practice, as defined by Resneck and Kimball (2008, p. 213) are dermatologists who spend more than 50% of their patient care providing medical dermatology.

Measurement

The questionnaires for Round 1 instructed respondents to score the importance of 91 curricular items for their inclusion into a dermatology NP core curriculum. A Likert scale was provided to measure the level of importance for each item (Essential =4, Very Important =3, Somewhat Important =2, and Not Important =1). Mean scores for each group's responses (not individual scores) were recorded beside the individual curricular item on the Round 2 questionnaire mailed September 2009. Dermatology NPs and dermatologists were only given their respective groups' scores. Respondents were then asked to rescore each curricular item using the same Likert scale as used in Round 1, and reminded that they could score each item with the same or different value in light of the groups' mean scores.

Statistical Analysis

Demographics—Item analysis and descriptive statistics were performed on data received from dermatology NPs and dermatologists who completed both Rounds of Delphi. *Pearson chi-squared* was used to examine significant differences between groups ($p < 0.05$), which included gender, type of specialty practice, teaching experience in university-based program, authorship in peer-reviewed publication, and type of practice setting. The *Satterthwaite two-sample t-test* was used to compare group means for self-reported age, years of practice, and hours of weekly clinical practice. A $p < 0.05$ was considered statistically significant.

Relative order of importance—The initial analysis of scored importance by each group used the measures of central tendency to rank the relative order of importance, using the mode as the primary sort and mean as the secondary method. However, this analysis did not characterize in sufficient detail significant differences or a level of consensus by each group. Therefore, two additional methods of analysis were performed to examine groups' consensus for the study and comparison of scored importance between the groups.

Consensus—There has been no accepted standard definition or statistical analysis for consensus in Delphi technique (Hasson, Keeney, McKenna, 2000; Hsu & Sandford, 2007;). The assumption was made that items, where the most frequent category was scored either as a mode of 4 (essential) or 3 (very important), would most likely represent important content for inclusion into the core curriculum. Likewise, items that were most frequently scored with a mode of 2 (somewhat important) or 1 (not important), would most likely represent content for exclusion from the core curriculum.

The threshold for consensus in the study was arbitrarily defined by the authors as 70% or greater agreement among experts. When the combined mode scores of 3 (very important) and 4 (essential) reached 70% or more of the group's response, consensus indicated inclusion into the core curriculum. If combined modes scores of 3 and 4 were less than 30%, then the item reached consensus for exclusion from the core curriculum. When an item's combined mode scores of 3 and 4 were 30% or greater, but less than 70%, then the importance of the item was deemed as indeterminate importance.

Analysis between groups—A *Pearson* chi-squared analysis was performed comparing each item's distribution of scores by the NP group to the distribution of scores by the dermatologist group. A *Pearson* chi-squared $p < 0.05$ indicated significant disagreement and $p \geq 0.05$ indicated agreement between the groups.

Individual responses between rounds—Experts participated in two Delphi rounds, where the same curricular items were presented to the same individuals. In Delphi technique, researchers expect (even encourage) that study participants may modify their responses based on their opportunity to view peer feedback from a previous round in the study. The stability of individual scores from Round 1 were compared to those in Round 2 and analyzed using *Bowker's* test for symmetry, where $p < 0.05$ was considered a statistically significant difference.

Results

Demographics

The initial response rate for Round 1 Delphi was 122 of 508 (24%) surveys mailed to dermatology NPs and 62 (12%) collaborating dermatologists. Of the responses, 106 dermatology NPs and 52 dermatologists met the study criteria and were mailed Round 2 Delphi questionnaires. The second Round, and overall study response rate, yielded a total sample of 105 experts, comprised of 77 (15%) dermatology NPs and 28 (6%) dermatologists. Table 1 shows demographic data from the questionnaires, with a generally even geographic distribution among the groups.

Most dermatology NPs reported a Master's degree or higher (94%) with initial certification as Family Practice (65%) or Adult/Gerontologic NP (27%) (Table 1). While 68% of dermatologists practiced with one NP, 25% reported collaboration with two NPs, and 7% with three NPs (not shown). The average age of dermatology NPs and dermatologists (*mean* 48.2 years vs 50.7 years, $p = 0.19$), and hours of weekly clinical practice (*mean* 34.9 vs 34.3 hours, $p = 0.65$) were similar. Group characteristics differed, however, in that the majority of NPs were female (95%) with an average of 7.4 years experience, compared to more than half of dermatologists who were male (57%) with an average of 18.4 years of dermatology experience ($p < 0.05$).

The vast majority of dermatology NPs reported their practice focused mostly on general dermatology (92%), with fewer in pediatrics (4%), surgical (1.5%), and research/academic (1.5%). Dermatologists in the study reported practice in general dermatology (81%),

surgical (15%), and research/academic practice (4%). Groups' practice settings and scholarly activities were also different. Sixty-nine percent of dermatology NPs and 81.5% of dermatologists worked in private practice, compared to university-based (8% vs 18.5%, respectively). None of the dermatologists reported working in hospital-based or clinic setting, compared to dermatology NPs (4% and 19%, respectively). Several respondents reported work in multiple practice settings and could not be classified into one area. Dermatologists were more engaged in teaching at universities or residency programs (46%) and reported authorship in peer-reviewed journals or texts (64%), compared to NPs (22% and 25%, respectively, $p = < 0.05$).

Analysis of Items

Relative order of importance—Using mode and mean scores, items were placed in a descending order of relative importance (Table 2). Dermatology NPs scored 75 items (82%) with a mode score 3 (very important or essential), as compared to dermatologists who identified 69 items (76%) with mode 3. Both groups' identified *skin exam* as the most important curricular item and agreed on the same 15 of the 20 highest ranked items (Table 2, upper shaded items in bold). Among these 15 items were important knowledge areas of pre- and malignant neoplasms, dermatology emergencies, drug eruptions, bacterial infections, sun screens, pharmacology of retinoids and *glucocorticoids*. The highest scored skill items were *skin exam*, *lesion evaluation*, *cryotherapy*, *shave* and *punch biopsy*, *post-operative complications*, and *hyfrecation/electrocoagulation*. *Patient education* was the highest scored role item for both groups.

The lowest scored items in relative order of importance showed similar group agreement, as dermatology NPs and dermatologists agreed on 18 of 20 items ranked lowest in the survey (Table 2, lower shaded items in bold). The majority of the low scored curricula were role items such as, writing for publication, melanoma/tumor board, dermatology residency and medical student education, education of non-dermatology providers, grand rounds, research, clinical trials and *outreach programs*. Other low scored curricular elements were knowledge of *photoimmunology*, and advanced surgical skills of *flaps & grafts*, *nail biopsy* and *complex suture/repair*. Cosmetics procedures were the lowest scored items and included laser therapy, chemical peels, cosmetic injectables, sclerotherapy, and *liposuction*.

Consensus—Analysis of group consensus identified curricular items with high levels of group agreement of importance for inclusion (70% of the groups' scores were modes of 3 and 4), exclusion (<30% of the groups' scores were modes of 3 and 4), or indeterminate (<70% but 30% of scores were modes of 3 and 4) for a core curriculum. Results showed that dermatology NPs reached consensus for the inclusion of 71 items and exclusion of three items, compared to dermatologists with 58 and 13 items, respectively (Tables 3a-c). A comparison of consensus items between the dermatology NPs and dermatologists demonstrated mutual agreement on the inclusion of 31 knowledge items (Table 3a), 23 skills and three role items (Table 3b) for a core curriculum. Groups also agreed on consensus for the exclusion of three curricular items (Table 3c), and were indeterminate on six items (Table 4).

Another group of curricula (25 items) was identified in which only one of the groups achieved consensus on an item (70% groups' scores were modes of 3 or 4 or <30% group's scoring modes of 3 or 4) compared to the other group which did not reach the 70% threshold (Table 5). NPs reached consensus for inclusion of 14 items (70% group's scores were modes of 3 or 4), while the majority (>50%) of dermatologists scored those items as very important or essential but did not reach consensus for inclusion (Table 5, shaded items in left column). In contrast, the dermatologist group reached consensus for the exclusion of

10 items (<30% of group's scores) and inclusion of one item. There were noted group differences where dermatology NPs did not reach consensus for exclusion on the same items excluded by dermatologists, and conversely scored four of the items (*nail biopsy*, *complex repair/suture*, *research*, and *dermatology resident education*) as very important or essential curricula.

Summary of significant differences between groups—The distribution of groups' scores differed on 14 curricular items which are summarized in Table 6. On five items (diagnostics in dermatology, pathophysiology, percutaneous absorption, application of destructive agents, and *pharmacology of hormonal drugs*) the Pearson *chi-squared* analysis identified significant differences ($p < 0.05$), yet both groups agreed on mode scores for the items as very important or essential. Consensus (>70% scored items as 3 or 4) was also achieved by both groups, except in the case of *percutaneous absorption* (Table 6, % consensus). Despite statistical differences, these findings fundamentally indicate agreement for item inclusion for a core curriculum based on ranking. Likewise, there were role and skill items (research, complex repair/suture, residency education, grand rounds, melanoma/tumor board, flaps & grafts, and *writing for publication*) that were statistically different; however, both groups showed agreement by scoring the items with a mode of 1 or 2, indicating the items were not of high importance to either group.

There are two items in Table 6 (shaded items) that show actual disagreement, both statistically and with ranked importance using group mode scores that separate the items from essential/very important (mode 4 or 3) and somewhat/not important (mode 2 or 1). For the skill of *nail biopsy*, although the NP mode was 3, consensus for inclusion was not achieved (63%), compared to dermatologists' mode score of 2 and which reached consensus for exclusion (>70% mode scores of 1 or 2). For knowledge of *dapsone & sulfapyridine*, dermatology NPs reached consensus (82%) with a mode of 3 for inclusion; however, dermatologists scored it with a mode of 2 and did not reach consensus (57%) for inclusion or exclusion. Thus, only two of the 14 items which achieved statistically significant differences in the distribution of mode scores between NPs and dermatologists also realized differences in consensus and ranked importance for inclusion or exclusion.

Individual Responses—There were no significant differences in the distribution of dermatologists' scores between Delphi rounds (Bowker's $p < 0.05$). Dermatology NPs demonstrated a significantly lower score on one item, *nail biopsy* (Bowker's $p = 0.03$), in Round 2, despite a stable mode of 3 in both rounds.

Limitations

Limitations of the study may include potential bias as only nurse practitioners, with registered membership in the DNA and current collaborative practice with board-certified dermatologists, were solicited for self reported work characteristics and opinion. Study findings may not be representative of dermatology NPs working with non-dermatology physicians or dermatologists who are not board-certified. Similarly, results from the study may not be generalized to PAs as the study purpose and design were predicated on the educational preparation and subspecialty practice of NPs. It does not, therefore, allow for differences in education, clinical preparation, licensure, and regulatory guidelines. Finally, the study purpose was to identify core knowledge, skills, and roles for the educational preparation necessary to develop the minimal competencies as a dermatology NP. The study design did not allow respondents to differentiate curricular importance based upon varied levels of competency. Therefore, low-scored curricular items from the study may indicate low importance or content that is not appropriate for development of minimal competence for entry level practice in general dermatology.

Discussion

Nurse practitioners are advanced practice nurses who must complete a masters program with a specialty in one of the well-defined population focus areas, before they can specialize in dermatology. Traditionally, the acquisition of additional dermatology, subspecialty knowledge and clinical skills has been subjective, variable, and not clearly defined. This study identifies important content for a dermatology NP core curriculum, as reported by a sample of dermatology NPs and dermatologists who spend the majority of their time providing general dermatologic care (92% and 81%, respectively). This is consistent with the workforce characteristics from the AAD's 2007 practice profile survey that reported 79% of nonphysician clinicians spent the majority of their time in general dermatology (Kimball & Resneck, 2008); and, the 2006 DNA survey that reported 89% of NPs spent more than 50% of their time providing general dermatologic care (VanCott & Kimball, 2009). By using three methods of analysis, study findings showed a surprisingly high level of agreement between the groups on the scored importance for curricula.

Ranked curricula using mode scores demonstrated that NPs and dermatologists agreed on the majority of items (66%) for inclusion into a core curriculum with an emphasis on the importance of medical dermatology knowledge and skills. Dermatology NPs and dermatologists agreed on 15 of the top 20 most important curricular items including skin exam, lesion evaluation, recognition of pre- & malignant neoplasms, cryotherapy, shave and punch biopsies, hyfrecation/electrocoagulation, bacterial infections, pharmacology (sun screens, drug eruptions, glucocorticoids, and retinoids), dermatology emergencies, and *post-operative complications*. Equally as important, groups also agreed on 18 of the 20 lowest ranked curricula, concentrated mostly on advanced surgical skills, cosmetic skills and scholarly NP roles.

Nurse practitioners' valuation of the importance of dermatology science was evident by their consensus for the inclusion of seven curricular items focused on dermatology science (dermatopathology- normal histology, reaction patterns and melanocytic lesions; percutaneous absorption; genodermatoses; pharmacology of cytotoxic agents; and, *pharmacology of dapsone & sulfapyridine*). While the majority of dermatologists (50-68%) believed that these science items were essential or very important, they did not reach consensus for inclusion into the core curriculum. Although these differences may seem modest, a similar scoring pattern was noted in the distribution of five other dermatology science items (pathophysiology, diagnostics in dermatology, percutaneous absorption, pharmacology of hormonal drugs, and dapsone & sulfapyridine) in which NPs' scored importance was significantly higher, compared to dermatologists' scores ($p < 0.05$). This highlights groups' differences regarding the importance of dermatology sciences in curricula which may influence (or limit) the level of competency in dermatology NP practice.

The authors would not propose that either dermatology NPs or dermatologists believe that knowledge of basic sciences, in dermatology, are not important for a core curriculum. While NPs may desire more advanced dermatology science for the development of competencies, some dermatologists may believe that NPs do not need it for their role in dermatology or, may not have basic science background to fully integrate this knowledge. Thus, this study may have identified an important curricular gap that may be addressed by integrating additional basic or advanced dermatology science into NP education. However, additional basic science education with a concentration on dermatology should be tailored differently for dermatology NPs, as compared to dermatology medical residents, who bring different basic science backgrounds into their clinical training.

This Delphi study also examined the importance of scholarly roles for dermatology NPs. Despite significant differences in scores, both groups ranked dermatology resident education, grand rounds, melanoma/tumor board, and *writing for publication*, as only somewhat or not important for curricula. Low scores for these items were consistent with the practice demographics reported by NPs in the study, including teaching (22%), authorship (25%), employment in university based practice (8%), or research/academia (1%). NPs are educated in scholarly writing, education, research, and health care policy during their Masters' or Doctoral preparation. Hence, the low scored importance for scholarly role items by NPs may indicate they do not believe it is necessary to incorporate them into specialty curricula, or moreover, that education, research, and writing is not a priority in their current dermatology practice.

Data from this study emphasize the perceived importance of general dermatology knowledge and skills, in contrast to the low scored importance of advanced surgical procedures. Although both groups scored advanced surgical skills much lower than knowledge items, NPs scored *complex repair/suture, flaps and grafts, and nail biopsy* significantly higher than collaborating dermatologists. It is especially notable, given that NPs in the study reported their practice was in general dermatology (92%), pediatrics (4%), surgical (1%), and research/academia (1%), compared to dermatologists (81%, 1%, 15%, 4%, respectively). Do dermatology NPs practicing in general dermatology desire more knowledge about complex surgical dermatology skills, so they can better understand the procedures, indications, complications, risks, and appropriate referral of their patients? Or, do they wish to develop competencies in some of these dermatologic procedures?

The purpose of this study was to assess the importance of curricular content for the minimum level of NP practice competency. The researchers did not, however, explore education based on levels on varied levels of practice competency. In a recent study, Lee, Nehal, Dusza, Hale, & Levine (2011) examined the expectations of third-year dermatology residents, regarding their educational experience in procedural dermatology during their residency. The authors noted the Accreditation Council for Graduate Medical Education and Residency Review Committee categories of training, and asked residents to indicate their "level" of training expectation as either: *knowledge* through lecture and observation; *experience* in the technique; or *competence* as the primary surgeon. This approach assessed educational preparation based on varied levels of competency expected from the learner. Future studies examining dermatology NP education, dermatologic procedures, or curricular items from the study with significantly different group scores, may consider a competency-based assessment approach instead of a scored level of importance.

As new dermatology NP residencies, fellowships, and continuing education programs develop, the need to define and standardize dermatology NP education will become paramount. The acquisition of these knowledge, skills, and role items, however, does not confer competency. The elements of a core curriculum help learners to develop clinical competency. It is essential that the profession of nursing, like medicine, define and document clinical competency which demonstrates the expected minimum level of professional performance. The evaluation of clinical competency is a complex, dynamic, and lifelong process, where no single tool or method can guarantee competency (ANA, 2010).

Conclusion

The NP Society of the Dermatology Nurses' Association established the Scope and Standards of Practice for dermatology NPs in 2006. Later, the Dermatology Certification Nursing Board, in collaboration with the Center for Nursing Education and Testing (C-

NET), established the Dermatology Nurse Practitioner Certification (DCNP) examination to validate dermatology NP knowledge competency. However, there has been no well-defined or standardized core curriculum to date. The onus is on dermatology NP leaders to establish a standardized core curriculum for the educational preparation of dermatology NPs.

Curriculum development should not be arbitrary, but rather, carefully planned, implemented, and evaluated. Data from this study provide a consensus of opinion and a majority of agreement from both practicing dermatology NPs and board-certified dermatologists, regarding the most important elements for educational preparation. In A Bridge to Quality, the Institute of Medicine (IOM) provided recommendations for the reform of health professional education to enhance quality patient care (IOM, 2003). In the recommendations for improved health education, the IOM emphasized the value of interdisciplinary education which should be reflected in collaborative practice. A well-defined and standardized core curriculum, based on a consensus of opinion, can guide both formal and informal NP education and practice, and promote dialogue between NPs and dermatologists to ensure quality dermatologic care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1**Demographics**

	NPs <i>n</i> = 77	Dermatologists <i>n</i> = 28	<i>p</i> Value
Region, no. (%)			
West	15 (19)	7 (25)	
Midwest	19 (25)	9 (32)	
Northwest	18 (23)	5 (18)	
South	25 (33)	7 (25)	
Age, mean (<i>SD</i>), yr	48.2 (10.0)	50.7 (8.0)	0.19 ¹
Gender			<0.0001 ²
Male, no. (%)	4 (5)	16 (57)	
Female, no. (%)	73 (95)	12 (43)	
Yrs. of practice (<i>SD</i>)	7.4 (4.5)	18.4 (9.2)	<0.0001 ¹
Clinical hrs/wk (<i>SD</i>)	34.9 (6.0)	34.4 (6.8)	0.65 ¹
Teaching at Univ/College (%)	17 (22.1)	13 (46.4)	0.012 ²
Authored, no. (%)	19 (24.7)	18 (64.3)	0.0002 ²
Academic Degree, no. (%)	Doctorate 6 (8)	M.D. 27 (96)	
	Masters 66 (86)	D.O. 1 (4)	
	Bachelor's 4 (5)		
	Associate 1 (1)		
Certification/ Add'l degree, no. (%)	FNP 49 (65.3)	Doctorate 2 (7.1)	
	ANP/GNP 20 (26.7)	Master's 1 (3.6)	
	PNP 2 (2.7)	Other 1 (3.6)	
	WHNP 2 (2.7)	None 24 (85.7)	
	ACNP 1 (1.3)		
	Other 1 (1.3)		
Practice Setting, no. (%)			0.030 ²
	Private 51 (68.9)	Private 22 (81.5)	
	University 6 (8.1)	University 5 (18.5)	
	Hospital 3 (4.1)	Hospital 0	
	Clinic 14 (18.9)	Clinic 0	
Specialty Practice, no. (%)			0.045 ²
	General 66 (91.7)	General 21 (80.8)	
	Pediatrics 3 (4.2)	Pediatrics 0	
	Surgical 1 (1.4)	Surgical 4 (15.4)	
	Research/Academic 1 (1.4)	Research/Academic 1 (3.9)	
	Other 1 (1.4)	Other 0	

¹ Satterthwaite two-sample t-test *p* < 0.05² Pearson chi-squared *p* < 0.05

Table 2

Round 2 Relative Order of Importance of Curricula by Groups

Dermatology NPs ¹	Mode	Mean	SD	Dermatologists ²	Mode	Mean	SD
Skin exam³⁴⁵	4	3.96	0.19	Skin exam³⁴⁵	4	4.00	0.00
Pre- & malignant neopl	4	3.95	0.22	Cryotherapy	4	3.96	0.19
Lesion evaluation	4	3.95	0.22	Lesion evaluation	4	3.89	0.42
Cryotherapy	4	3.94	0.25	Patient education	4	3.89	0.31
Punch biopsies	4	3.90	0.31	Pharm-sun screens	4	3.86	0.45
Shave biopsy	4	3.90	0.31	Pre- & malignant neo	4	3.86	0.36
Derm emergencies	4	3.84	0.37	Shave biopsy	4	3.82	0.48
Pharm-sun screens	4	3.83	0.41	Punch biopsies	4	3.82	0.48
Diagnostics in derm	4	3.79	0.41	Post-op complications	4	3.82	0.39
Pathophysiology	4	3.78	0.48	ID-bacterial	4	3.75	0.44
Patient education	4	3.75	0.49	ID-viral	4	3.75	0.44
Hyfrecation/electrocoag	4	3.74	0.52	Pharm-antihistamines	4	3.71	0.60
Simple repair/suture	4	3.74	0.52	Pharm-retinoids	4	3.71	0.53
Pharm-glucocorticoids	4	3.74	0.50	Derm emergencies	4	3.71	0.46
ID-bacterial	4	3.73	0.50	Hyfrecation/electrocoag	4	3.68	0.61
Pharm-drug eruptions	4	3.72	0.51	Pharm-glucocorticoids	4	3.68	0.48
Pharm-drug interactions	4	3.71	0.53	Pharm-safety in preg	4	3.68	0.48
Pharm-retinoids	4	3.71	0.48	Health prom/dis. prev.	4	3.68	0.48
Surgical & PO hemostasis	4	3.71	0.48	Dermopath-report interpret	4	3.64	0.62
Post-op complications	4	3.69	0.47	Pharm-drug eruptions	4	3.64	0.49
ID-viral	4	3.68	0.55	Surgical/PO hemostasis	4	3.61	0.63
Pharm-anti-inflammatory	4	3.68	0.50	Simple repair/suture	4	3.54	0.64
Pharm-antihistamines	4	3.62	0.56	Pharm-anti-inflammatory	4	3.54	0.58
Health prom/disease prev.	4	3.61	0.54	Pharm-infectious disease	4	3.54	0.51
Dermopath-report interpret.	4	3.58	0.59	Pharm-drug interaction	4	3.52	0.64
Anesthetics	4	3.58	0.68	Plants, stings, bites	4	3.50	0.58
Incision & drainage	4	3.58	0.62	Diagnostics in derm	4	3.46	0.74
KOH	4	3.57	0.73	KOH	4	3.46	0.64

Dermatology NPs ¹		Mode	Mean	SD	Dermatologists ²		Mode	Mean	SD
Pharm-safety in pregnancy	4	4	3.57	0.64	Excisional biopsies	4	4	3.43	0.84
Curettage epidermal lesion	4	4	3.57	0.64	Anesthetics	4	4	3.41	0.80
Appl. of destructive agent	4	4	3.57	0.62	Wound healing	4	4	3.29	0.76
Excisional biopsies	4	4	3.55	0.72	Pathophysiology	4	4	3.29	0.76
Pharm-perc. absorption	4	4	3.49	0.58	Skin tag removal	4	4	3.25	0.97
Pharm- infectious disease	4	4	3.49	0.64	Milia extraction	4	4	3.25	0.89
Wound healing	4	4	3.43	0.62	Curettage epiderm lesion	4	4	3.25	0.80
Dermopath-melanocytic	4	4	3.42	0.71	Mineral oil prep	4	4	3.18	0.86
Elliptical excision	4	4	3.38	0.78	Appl. of destructive agent	4	4	3.14	0.89
Pharm-biologics	4	4	3.35	0.68	Dermopath-melanocytic ⁵	4	4	3.00	0.90
Mineral oil prep	4	4	3.32	0.85	Incision & drainage	3	3	3.39	0.63
Dermopath-norm histology	4	4	3.32	0.80	Surg. Anatomy	3	3	3.29	0.71
Layered repair/suture	4	4	3.27	0.82	ID-mycology	3	3	3.29	0.71
Hair pull	4	4	3.20	0.77	Immunology/allergy	3	3	3.29	0.66
Woods lamp	4	4	3.18	0.85	Wound & ulcer mgmt	3	3	3.29	0.66
Cyst removal	4	4	3.17	0.80	Psychosocial assess	3	3	3.25	0.70
Skin tag removal	4	4	3.12	0.86	Pharm-biologics	3	3	3.25	0.65
Milia extraction ⁵	4	4	3.04	0.95	ID-mycobacterial infect.	3	3	3.25	0.59
Plants, stings, bites	3	3	3.42	0.57	Staff education	3	3	3.21	0.64
Wound & ulcer mgmt	3	3	3.31	0.63	Elliptical excision	3	3	3.18	0.82
ID-mycobacterial infection	3	3	3.29	0.65	Pharm-cytotoxic agents	3	3	3.16	0.67
Pharm-hormonal drugs	3	3	3.27	0.62	Pharm-coal tar/psoralens	3	3	3.07	0.77
Education/mentoring NPs	3	3	3.25	0.76	Pharm-hormonal drugs	3	3	3.07	0.81
Pharm-cytokine inhibit	3	3	3.22	0.62	ID- parasitic	3	3	3.07	0.60
ID- Parasitic	3	3	3.21	0.62	Photo-basic principle	3	3	3.04	0.74
Surg. Anatomy	3	3	3.21	0.73	Cultural diversity	3	3	3.04	0.69
Staff education	3	3	3.21	0.64	Dermoscopy	3	3	2.96	0.88
ID- mycology	3	3	3.21	0.72	Phototoxicity & allergy	3	3	2.96	0.58
Psychosocial assess	3	3	3.18	0.72	Woods lamp	3	3	2.93	0.77

Dermatology NPs ¹		Mode	Mean	SD	Dermatologists ²		Mode	Mean	SD
Pharm-cytotoxic agents		3	3.16	0.67	Phototherapy		3	2.93	0.72
Phototoxicity & allergy		3	3.16	0.59	Phototherapy & agent		3	2.93	0.66
Photo-basic principle		3	3.14	0.70	Dermopath-norm histology		3	2.89	0.96
Dermoscopy		3	3.12	0.83	Ed/mentoring NPs		3	2.89	0.83
Immunology/allergy		3	3.12	0.56	Pharm-cytokine inhibit		3	2.89	0.79
Pharm-dapsone & sulfapy		3	3.08	0.66	Hair pull		3	2.89	0.69
Dermopath-reaction pattern		3	3.06	0.78	Pharm-cytotoxic agents		3	2.89	0.75
Cultural diversity		3	3.04	0.73	Pharm-percutan. absorp		3	2.86	0.76
Health care policy		3	3.03	0.77	Cyst removal		3	2.82	0.82
Pharm-coal tar, psoralens		3	3.01	0.75	ID-trepponematoses		3	2.82	0.67
Patch testing		3	2.97	0.78	ID-Rickettsial		3	2.75	0.75
Phototherapy		3	2.96	0.75	Health care policy		3	2.61	0.79
Genodermatoses		3	2.94	0.75	Patch testing		2	2.71	0.94
Phototherapy & agent		3	2.93	0.72	Dermopath-reaction patterns		2	2.79	0.92
ID-Rickettsial ⁶		3	2.83	0.79	Pharm-dapsone&sulfapyr ⁶		2	2.75	0.84
ID-trepponematoses		3	2.82	0.80	Genodermatoses		2	2.61	0.79
Photoimmunology ⁵		3	2.78	0.64	Photoimmunology ⁵		2	2.50	0.75
Nail biopsy		3	2.75	0.83	Outreach programs		2	2.50	0.96
Research		2	2.78	0.79	Laser therapy		2	2.39	0.74
Complex repair/suture		2	2.74	0.88	Clinical trials		2	2.29	0.85
Ed. non-derm providers		2	2.69	0.78	Ed. non-derm providers		2	2.29	0.66
Derm. residency ed.		2	2.62	0.95	Research		2	2.14	0.80
Outreach programs		2	2.62	0.81	Nail biopsy		2	2.11	0.96
Clinical trials		2	2.61	0.78	Chemical peels		2	2.04	0.92
Grand rounds		2	2.55	0.85	Cosmetic injectables		2	2.04	0.69
Laser therapy		2	2.53	0.80	Medical student ed.		2	1.96	0.74
Melanoma/tumor board		2	2.51	0.92	Grand rounds		2	1.93	0.81
Medical student Ed.		2	2.47	0.91	Derm. residency ed.		2	1.86	0.71
Writing for publication		2	2.28	0.74	Melanoma/tumor board		2	1.79	0.74

Dermatology NPs ¹	Mode	Mean	SD	Dermatologists ²	Mode	Mean	SD
Flaps & grafts	2	2.21	0.92	Complex repair/suture	1	1.96	1.00
Chemical peels	2	2.19	0.99	Sclerotherapy	1	1.71	0.90
Cosmetic injectables	2	2.08	0.89	Writing for publication	1	1.57	0.63
Sclerotherapy	2	1.81	0.83	Flaps & grafts	1	1.61	0.83
Liposuction	1	1.52	0.79	Liposuction	1	1.43	0.74

¹ NPs scored 75 items with a mode 3

² Dermatologists scored 69 items with a mode 3

³ Bolded items denote significant differences between groups, *Pearson chi-squared* $p < 0.05$

⁴ Shaded areas indicate top 20 ranked items based on mode and means scores

⁵ Heavy horizontal lines separate mode categories

⁶ Shaded areas indicate lowest 20 ranked items based on mode and means scores

Table 3a

Knowledge items for which consensus for *inclusion*¹ was achieved by both groups

Item		% of providers scoring item as Essential or Very Important	
		Dermatology NPs Inclusion	Dermatologists Inclusion
KNOWLEDGE	Pathophysiology²	97.4	82.1
	Surgical anatomy	81.8	85.7
	Pre- & malignant neoplasms	100.0	100.0
	Immunology/allergy	89.6	89.3
	Photo-basic principles	81.8	75.0
	Phototoxicity & allergy	89.5	82.1
	Phototherapy & agent	73.7	75.0
	Dermpath-report interpretation.	94.8	92.9
	Pharm-drug interactions	96.1	92.6
	Pharm-drug eruptions	97.4	100.0
	Pharm-glucocorticoids	97.4	100.0
	Pharm-anti-inflammatory	98.7	96.4
	Pharm-biologics	88.3	89.3
	Pharm-cytokine inhibitors	89.5	71.4
	Pharm-infect. disease agents	92.2	100.0
	Pharm-antihistamines	96.1	92.9
	Pharm-coal tar, psoralens	77.9	75.0
	Pharm-retinoids	98.7	96.4
	Pharm-sun screens	98.7	96.4
	Pharm-hormonal drugs²	90.9	71.4
	Pharm-safety in pregnancy	92.2	100.0
	Psychosocial assessment	81.8	85.7
	Dermatologic emergencies	100.0	100.0
	Plants, stings, bites	96.1	96.4
	Diagnostics in dermatology²	100.0	85.7
	Wound healing	93.5	82.1
	Infectious disease (ID)-bacterial	97.4	100.0
	ID-viral	96.1	100.0
	ID-mycobacterial	89.5	92.9
	ID-parasitic	85.3	85.7
	ID-mycology	82.9	85.7

¹ 70% of group scored item as *Essential* or *Very Important*

² **Bolded** items denote significant differences between groups, *Pearson chi-squared* $p < 0.05$

Table 3bSkills and Role items for which consensus for *inclusion*¹ was achieved by both groups

	Item	% of providers scoring item as Essential or Very Important	
		Dermatology NPs	Dermatologists
SKILLS	Skin exam	100.0	100.0
	Lesion evaluation	100.0	96.4
	KOH	90.9	92.9
	Mineral oil prep	80.5	78.6
	Hair pull	78.9	71.5
	Dermoscopy	76.6	75.0
	Anesthetics	92.1	81.5
	Surgical & PO hemostasis	98.7	92.9
	Incision & drainage	93.4	92.9
	Cryotherapy	100.0	100.0
	Wound & ulcer management	90.9	89.3
	Hyfrecation/electrocoagulation	96.1	92.9
	Milia extraction	72.7	78.6
	Skin tag removal	74.0	71.4
	Curettage of epidermis	92.2	78.6
	Shave biopsy	100.0	96.4
	Punch biopsies	100.0	96.4
	Excisional biopsies	89.6	85.7
	Elliptical excision	84.4	82.1
	Simple repair/suture	96.1	92.9
	Post-op complications	100.0	100.0
	Application of destructive agents²	93.5	75.0
	Phototherapy	75.3	71.4
ROLE	Cultural diversity	77.9	78.6
	Patient education	97.4	100.0
	Promotion/Disease prevention	97.4	100.0

¹ 70% of group scored item as *Essential* or *Very Important*² **Bolded** items denote significant differences between groups, *Pearson chi-squared* $p < 0.05$

Table 3c

Items reaching consensus for *exclusion*^I by both groups

	Item	% of providers scoring item as Essential or Very Important	
		Dermatology NPs	Dermatologists
SKILL	Cosmetic injectables	24.7	25.0
	Sclerotherapy	13.0	14.3
	Liposuction	10.4	14.3

^I <30% of group scored item as *Essential* or *Very Important*

Table 4

Indeterminate^I items not reaching consensus for inclusion or exclusion by either group

Item	Dermatology NPs Inclusion	Dermatologists Inclusion
Photoimmunology	68.4	50.0
ID-Rickettsial	64.5	64.3
Laser therapy	49.4	39.3
Education of non-derm providers	54.5	32.1
Outreach programs	51.9	46.4
Clinical trials	48.1	32.1

^I > 30% but <70% of group scored item as *Essential* or *Very Important*

Table 5Items for which consensus¹ was achieved by only one group

	Item	% of providers scoring item as Essential or Very Important ¹	
		Dermatology NP	Dermatologists
Knowledge	Dermpath-normal histology	84.4	64.3
	Dermpath-reaction patterns	75.3	53.6
	Dermpath-melanocytic	89.6	67.9
	Percutaneous absorption²	96.1	64.3
	Pharm-cytotoxic agents	84.4	66.7
	Dapsone & sulfapyridine²	81.8	57.1
	Genodermatoses	76.6	50.0
	ID-treponematoses	36.8	75.0
Skills	Nail biopsy²	63.3	28.6
	Complex repair/suture²	55.5	25.0
	Flaps & grafts²	33.8	14.3
	Chemical Peels	31.2	28.6
	Cyst removal	77.9	64.3
	Patch testing	71.4	53.6
	Woods lamp	79.2	67.9
	Layered repair/suture	79.2	64.3
Roles	Health care policy	75.0	57.1
	Staff education	88.3	67.9
	Education/mentoring NPs	85.7	67.9
	Research²	58.4	25.0
	Medical student education.	44.2	25.0
	Derm. residency education²	50.6	17.9
	Writing for publication²	31.6	7.1
	Grand rounds²	46.8	21.4
	Melanoma/tumor board²	46.1	17.8

¹ Shaded items: consensus 70% of the group scored item as *Essential* or *Very Important* indicates inclusion, and <30% of the group scored items as *Essential* or *Very Important* indicates exclusion.

² **Bolded** items denote significant differences between groups Pearson *chi squared* $p < 0.05$

Table 6

Summary of items with statistically significant differences between groups¹

ITEM ²	Dermatology NPs		Dermatologists		p value
	Mode	%consensus ³	Mode	%consensus ³	
Diagnostics in dermatology	4	100	4	86	0.002
Pathophysiology	4	97	4	82	0.001
Pharm- percutaneous absorption	4	96	3	64	0.000
Application of destructive agents	4	94	4	75	0.034
Pharm-hormonal drugs	3	91	3	71	0.031
Pharm- dapsona & sulfapyridine	3	82	2	57	0.038
Nail biopsy	3	63	2	29	0.003
Research	2	58	2	25	0.001
Complex repair/suture	2	56	1	25	0.000
Dermatology residency education	2	51	2	18	0.003
Grand rounds	2	47	2	21	0.007
Melanoma/tumor board	2	46	2	18	0.003
Flaps & grafts	2	34	1	14	0.011
Writing for publication	2	32	1	7	0.000

⁴Shaded items indicate items with statistically significant differences, consensus levels *and* ranking by mode scores.

¹ Pearson *chi-squared* $p < 0.05$

² Sorted by NP Mode and Mean Scores

³ 70% of group scored item as *Essential* or *Very Important*