Optimizing education on the inpatient dermatology consultative service

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Abstract

A consultative dermatology service plays an important role in patient care and education in the hospital setting. Optimizing education in balance with high-quality dermatology consultative services is both a challenge and an opportunity for dermatology consultation teams. There is an emergence of new information about how dermatology can best be taught in the hospital, much of which relies on principles of workplace learning as well as the science of how learning and teaching best happen in work settings. These best practices are summarized in this narrative review with integrated discussion of concepts from outpatient dermatology education and lessons learned from other inpatient teaching models. In addition, consultative dermatology curricula should utilize a blended curriculum model comprised of patient care and active learning and self-study modalities. Specific educational methods will discuss 2 strategies: (1) direct patient-care activities (ie, bedside teaching rounds) and (2) nonpatient care-activities (ie, case presentations, didactic sessions, online modules, and reading lists).

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Consultative dermatology teams play vital roles in providing optimal care for patients with cutaneous disease and facilitating dermatology education within the inpatient setting. Following the decline of United States inpatient dermatology services due to changes in health care payment systems in the early 1980s, the presence of dermatology in the hospital has recently been reestablished by the growth of inpatient dermatology consultative services and the creation of the Society for Dermatology Hospitalists (SDH).[1]

Inpatient dermatology consult services provide a critical formative educational experience for dermatology trainees, in which dermatology students and residents can learn how to triage, evaluate, and manage complex hospitalized patients with skin disease. Additionally, an inpatient dermatology service provides rich educational value for primary inpatient teams, largely non-dermatologists, who routinely manage dermatologic conditions and cutaneous manifestations of systemic diseases in hospitalized patients.[2] Consultative dermatology services have contributed greatly to both patient care and education through improvements in diagnostic accuracy and the work-up and management of hospitalized patients with cutaneous findings.[3-5] Optimizing education in balance with high-quality consultative services is both a challenge and an opportunity for dermatology consult teams. We present a narrative review of the literature of effective teaching strategies for inpatient dermatology consult services, building upon core principles of curriculum development and workplace learning in medical education. We highlight the available literature, integrating best practices in inpatient dermatology education and other relevant educational programs in the inpatient setting.[6-9]

Methods

A Pubmed, Medline, and Embase search of articles ranging from 1966 to October 2016 regarding educational practices of inpatient dermatology consultation services was performed. The search was expanded to include teaching practices in outpatient dermatology clinic settings and inpatient services from other specialties to identify studies describing teaching practices that may be applicable to consultative dermatology. An outline of the search terms is found in Table 1. Bibliographies of all selected articles were reviewed, and additional references were identified and included based on relevance. Studies were excluded if they involved continuing medical education/biomedical advances, non-dermatology outpatient settings, teaching surgical/procedural competencies, included learners who were not in the medical field, or if they were written in a non-English language. Medical education-related studies in the field of inpatient or consultative dermatology, as well as relevant information from select studies involving teaching practices in other specialties within the inpatient setting, were reviewed and summarized. A summary of recommendations based on 58 articles is provided in Table 2.

Discussion

Inpatient consultative dermatology curriculum may be developed using exemplary frameworks of medical education and utilizing principles of workplace learning.[6,9] These frameworks involve establishing general educational needs, competencies for each type of learner, learning objectives, curriculum content, educational methods that best meet learning objectives, and feedback within a patient-care setting.[6]

General and targeted needs assessment

The overall learning goals for an inpatient dermatology consultation service cover a broad range of competencies in domains of medical knowledge, patient care, communication, professionalism, systems-based practice, and problem-based learning and improvement. Trainees learn how to triage, evaluate, and manage complex hospitalized patients with skin disease, hone morphology skills, develop differential diagnoses, and gain competency in interpro-

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TABLE 1. Narrative review search terms and results

Database	Search Terms	Hits
Pubmed	Dermatology AND inpatient AND teaching	27
Pubmed	Dermatology AND inpatient AND education	42
Pubmed	Dermatology AND consult AND education	9
Pubmed	Dermatology AND medical AND education	810
Pubmed	Hospitalists AND medical AND education	366
Pubmed	Inpatient AND consult AND service AND education	129
Pubmed	Bedside AND teaching AND rounds	192
Pubmed	Morning AND report AND education	280
Pubmed	Grand AND rounds AND education	464
Embase+Medline	Dermatology AND inpatient AND teaching	35
Embase+Medline	Dermatology AND inpatient AND education	222
Embase+Medline	Dermatology AND consult AND education	35
Embase+Medline	Dermatology AND medical AND education	39
Embase+Medline	Hospitalists AND teaching	279
Embase+Medline	Inpatient AND consult AND service AND education	57
Embase+Medline	Bedside AND teaching AND rounds	164
Embase+Medline	Morning AND report AND education	414
Embase+Medline	Grand AND rounds AND education	476
References included		58

fessional patient care within a hospital setting.

Targeted educational need assessments benefit curriculum development for specific learners. In one American survey, dermatology residents on average rated the importance of bedside teaching rounds (BTR) higher than their satisfaction score based on their residency experience, highlighting that dermatology residents may perceive inadequate opportunities for BTRs in their curriculum.[10] In addition to educational methods, deficits in curriculum content can also be identified. A survey of primary care physicians identified important and inadequately taught topics in undergraduate medical education: skin infections, leg ulcers/wound care, cutaneous drug eruptions, infestations and viral exanthems.[11] Topics considered less important but inadequately taught included vasculitis/purpura, skin signs of connective tissue disease, alopecia, and HIV dermatology.[11] Dermatology consults are frequently ordered from internal medicine (IM), surgery, pediatrics, neurology, emergency medicine, and psychiatry services; leading consult questions include infection-related dermatoses, eczema, drug eruptions, cellulitis, and contact dermatitis.[12-15] These findings highlight the concept of consult registries as a proxy for educational needs assessment and identify specialties that will benefit from consultative dermatology teaching and potential topics to emphasize within the curriculum targeting these learners.[16]

Goals and objectives

The development of goals and objectives is specific to each type of learner: senior dermatology resident, junior dermatology resident, non-dermatology resident, and medical student. Objectives for dermatology residents entail recognition and management of skin diseases frequently encountered within the hospital and acquiring expertise in ordering, performing, and interpreting various diagnostic studies (ie, skin biopsies, KOH preparations, Tzanck smears, and serologies). These educational objectives are stepwise in the milestone progression for dermatology trainees based on resident year. In contrast, goals for non-dermatology residents and medical students may focus on fundamental basic knowledge of dermatology, recognition of common and life-threatening skin diseases, and a basic management strategy, as they are not expected to achieve a comprehensive knowledge of all aspects of consultative dermatology. Non-dermatology residents may benefit from curriculum prioritizing diseases commonly managed by that specialty.

Educational strategies, implementation, and feedback

Unlike traditional classrooms, the hospital environment is a very dynamic educational setting with alternating instructors and learners, unpredictable topics and free time for teaching, and where patient care is prioritized over educational activities.[9] Principles of workplace learning can be utilized to optimize teaching.[7-9] Inpatient consultative service educational settings can be organized into (1) direct patient-care setting: BTRs and direct patient management activities (ie, orders/written notes) and (2) nondirect patient-care setting (ie, case presentation conferences, didactics, online module and assignments, and other educational strategies). A meta-analysis evaluating efficacy of educational practices in improving diagnostic skill of skin diseases determined educational strategies integrating a variety of activities and for longer durations (such as a dermatology elective) were more effective compared to single-component interventions (ie, traditional lectures, audit and feedback, computer-based learning, and use of moulage).[17] Based on these findings, a blended curriculum that integrates multiple modalities of clinical dermatology teaching may be the most effective approach to optimally engage learners and consistently meet learning objectives. Specific strategies to accomplish a blended model of teaching are now discussed for both direct patient care-based clinical teaching and for teaching in nonpatient care-related settings.

Direct patient care-based clinical teaching

BTRs have declined over the past few decades and have been replaced by hallway and conference room rounds or an absence of rounding altogether.[18-21] Despite this decline, attendings, residents, and medical students have consistently reported BTR as being advantageous in patient care, teaching, as well as role-modeling, professionalism, enhancing communication skills, advancing physical exam and history-taking skills, and being an integral part of training.[22-24] This is particularly relevant in the field of dermatology, where visual observation and the physical exam are important for patient assessment and generation of a differential diagnosis based on morphology. Braverman proposed a model of experiential learning with a focus on visual training to enhance observational skills through art interpretation exercises.[25] Visual training is an

TABLE 2. Summary of best practices for teaching on the inpatient consultative dermatology service

General needs assessment: establish educational needs of a consultative dermatology service
• Include domains of medical knowledge, patient care, communication, professionalism, systems-based practice, and problem-based learning and improvement
Targeted needs assessment: define competencies for each type of learner
• Dermatology residents o Specific for PGY2, PGY3, and PGY4 • Non-dermatology residents: o Highlight skin diseases that are frequently encountered by that specialty: internal medicine, pediatrics, neurology, surgery, emergency medicine, etc • Medical students: o Specific for level of learning, course type, and length of rotation
Objectives and goals: tailored objectives and goals for each type of learner
• Dermatology residents: recognition and expert management of skin diseases • Non-dermatology residents: recognition and management of prioritized list of skin diseases • Medical students: recognition and early management of prioritized list of common skin diseases
Educational strategies and implementation
• Maximize opportunities to enroll in a rotation/elective (ie, medical student subinternship) • A blended curriculum that integrates multiple teaching methods
Recommendations for direct patient care setting: clinical teaching methods
• Select bedside teaching round strategy: traditional, one-piece flow and/or family rounds o Outline a clear rounding structure and expectations for each team member o Recommendations for dermatology residents: + Provide sufficient supervision to accelerate learning + Balance supervision with autonomy/leadership by use of a pre-round huddle o Recommendations for non-dermatology residents and medical students: + Emphasize observational skills at the bedside, including normal skin findings + Implementation of a priority list of skin diseases these learners should seek to observe on the wards o Utilize patient notes to teach learners through feedback o Plan a list of teaching points for before, during, or after rounds when time permits o Routinize teaching points for anticipated opportunities (ie, skin exam teaching points at the bedside) o Utilize technology such as mobile phones and tablets to assist with on-the-go learning
Recommendations for nondirect patient care settings: case presentations
• Incorporate resident presentations for Dermatology Grand Rounds • Consider joint morning reports with multiple inpatient dermatology consult teams from different hospitals to discuss patient cases with supervising dermatologists and learners • Participate in Morning Report, Grand Round, and Morbidity and Mortality conferences with other specialties • Standardize and teach residents how to give an effective case presentation or use of standardized cases • Supplement with teaching points using question and answer format with didactic style reinforcement • Incorporate other subspecialities of dermatology such as dermatopathology
Nondirect patient care settings: other educational methods
• Self-study o American Academy of Dermatology online modules or other computer-based modules o Reading assignments (textbook, online resources, and journal articles) • Case-based seminars/discussion groups: highlight key points from readings or case- based discussion • The use of traditional didactics is best used in conjunction with other learning modalities • Art interpretation exercises to enhance observational skills
Feedback
• Implement a system of feedback: using pre and post tests, surveys, feedback sessions

important aspect of BTR in dermatology, whereby trainees gather their own observational data to assemble logical and coherent diagnostic evaluations with guidance from the supervising attending.[25]

A study in the United Kingdom involving trainees on neurology, dermatology, rheumatology, and infectious disease consultation teams found 50% to 60% of supervising consultants do not see patients with the resident trainee, as well as infrequent same-day supervision and inadequate oversight of note writing.[26] BTR provides direct supervision, which accelerates clinical skills mastery and is associated with improved patient safety and quality of care.[27-30] A survey of SDH members found traditional BTR to be the most popular rounding format (78.3%) followed by one-piece flow rounds (completing all orders/tasks before moving on to the next patient; 21.7%), hallway rounds (21.7%), table rounds (21.7%), and family-centered teaching rounds (4.3%) (unpublished results, 23 respondents).

Resident supervision is balanced with stepwise, graduated independence for residents. A barrier of BTR reported by housestaff is the concern for patients recognizing the resident as a learner during BTR, compromising their role as the primary doctor. One suggested strategy to address this concern during rounding entailed planning a pre-round huddle between supervisor and senior housestaff to address questions regarding patient management and rounding structure; this allowed the resident to lead the team during rounds more effectively, ultimately enhancing their learning experience.[31]

BTRs are central for experiential learning for non-dermatology residents and medical students during dermatology electives and rotations. Given the minimal exposure to dermatology in medical school education, the dermatology elective/rotation is an effective educational opportunity for these learners, as demonstrated through improved test scores and diagnostic skills with minimal attrition over time.[32-36] To expand on this opportunity, a novel 4-week acting internship in dermatology has been piloted, providing medical students greater direct patient care responsibilities and an opportunity to perform at a first-year dermatology resident level on a consulting team.[37]

Alhough ideal, providing every medical student and non-dermatology resident an opportunity to rotate with the consultative dermatology team may not be feasible at every institution. An alternative strategy was piloted at the University of Texas Southwestern in collaboration with the IM department.[38] During the IM core clerkship, medical students received 2 dermatology-focused didactic sessions and 1-hour weekly "skin rounds" with dermatology faculty. In this study, 92% of students reported satisfaction with the intervention; however, compared to the prior year, no significant improvement in student performance within the dermatology section of the IM national board exam (shelf exam) was found. The value of this study lies in the notion of integrating dermatology clinical teaching into established core clerkships to increase dermatology exposure of all medical students.

No evidence-based strategies for BTR in dermatology have been published to date; however, research in non-dermatology specialties highlights effective rounding practices that can be applied to dermatology. Implementation of formal structure within a rounding team (role assignment, communication protocols, and weekly feedback) and patient-/family-centered rounds (integration of the family into the medical decision-making discussion) improve patient-care outcomes, including discharge times.[39,40] Additionally, rounding efficiency may be optimized through the integration of a one-piece flow rounding model in which all patient tasks are completed before moving on to the next patient.[41] Incorporation of technological devices (ie, tablets) has also been found to improve rounding efficiency and resident experiences on an inpatient otolaryngology consult service.[42]

Ensuring a consistent learning experience for students and residents rotating on the inpatient service can be a challenge, as learning is strongly tethered to the cases assigned to the consult team. Curated, nonevidence-based strategies have been attempted in dermatology such as using a "birdwatching list" and "travel guide" designed to enhance bedside learning for medical students and non-dermatology learners to prioritize which skin conditions are most important to learn during the time available.[43] Based on curriculum learning objectives, a list of skin conditions (eg, birdwatching list) the learner should see during the rotation is provided with space for written notes regarding morphology, work-up, and management principles. Use of a similar "travel guide" for dermatology electives prioritizes teaching topics to ensure competencies in specific skin disorders are achieved commensurate to the time available for learning (ie, graduated learning objectives based on how many weeks the learner will be on elective).[43] The integration of a computerized diagnostic decision support system compatible on mobile phone and tablet device technologies for education purposes in a clinical setting has also been piloted in dermatology and has demonstrated improved diagnostic accuracy among medical students.[44] Large randomized controlled studies are needed to validate the use of all of these strategies in improving dermatology education in the clinical setting; implementing simpler strategies such as the "birdwatching list" or "travel guide" may provide equal benefits at a low cost.

Formal teaching by the supervising attending during rounds can be challenging given time constraints. Proposed solutions by IM attendings include dedicating time before rounds with focused teaching while being cognizant to not overwhelm learners with large volumes of information (consistent with principles of cognitive overload theory).[45] Given duty hour restrictions and an increasing proportion of millennial learners, potential strategies for hospitalists have been developed to improve learning on the wards in an efficient style that appeals to this new generation of learners.[46] These FUTURE strategies include *flipping the wards* (encouraging self-study followed by interactive group time discussion), *using documentation to teach* (use note writing to delineate thought process and role modeling in clinical documentation), *technology-enabled teaching* (enhance teaching points with mobile apps and tablets), *using guerilla teaching tactics* (exploiting the natural learning environment to facilitate teaching points (ie, foley catheter teaching points upon sight in a patient room), *rainy day teaching* (saving important teaching points for less busy times on the service), and *embedding teaching moments into rounds* (routinizing teaching moments into rounds such as physical exam pearls or other clinical skills development such as counseling).[46]

Nondirect patient care teaching: case presentations (including morning report, morbidity and mortality conferences, and grand rounds)

Case presentation outside of rounding is a common practice to discuss patient care in a collaborative setting and highlight important teaching points for learners. In an unpublished SDH survey, 78%

of respondents reported presenting consult dermatology patient cases at Dermatology Grand Rounds, and 61% of respondents reported participating in patient presentation conferences with other specialties: IM (56.5%), pediatrics (17.4%), emergency medicine (17.4%), obstetrics/gynecology (13%), and surgery (4.3%). Opportunities for case presentations in these settings involving a broad audience of learners educate both dermatology and non-dermatology housestaff regarding the most interesting and instructive dermatology cases. Following an IM Grand Rounds presentation discussing the clinical effectiveness of the dermatology consults, the quality of consultations improved, including increased appropriate consults for acute skin disease and fewer consults for chronic, nonurgent skin diseases.[47]

Academic centers with separate inpatient dermatology consult services based at different hospitals can provide a rich learning environment and enhance patient care through joint case discussion conferences (ie, morning report) to discuss diagnostic and management strategies. The inpatient dermatology consult team may also participate in the case discussion conferences of primary inpatient teams to advance dermatology education in other departments. A systematic review evaluating the value and effectiveness of morning report conferences was unable to identify a prominent effective format and recommended residency programs create morning reports personalized to their unique needs.[48] Residents recommended morning report to be primarily educational rather than an opportunity for faculty to evaluate their knowledge base, limited to 30-45 minutes, held at protected and convenient times, prioritizing rare and challenging cases and utilizing a primarily question-answer format supplemented with didactic style teaching.[49-52] To address the variable quality of morning report, an intervention training IM residents to deliver a standardized session format found a modest increase in favorable opinion among participating residents.[53] However, one caveat was the finding that this format also enhanced resident concerns for being evaluated. Another strategy found a 30%-40% increase in resident attendance following use of scripted case presentations and having residents compete for the diagnosis.[54] The presence of certain faculty, such as a pathologist, has been suggested to aid in discussion about differential diagnosis.[55] This may be of particular benefit to consultative dermatology education, as biopsies are routinely ordered in the work-up for patients; several US institutions have inpatient case review as a collaborative teaching effort between medical dermatologists and dermatopathologists (unpublished data).

Other educational interventions

Formal didactics, reading assignments, online modules/computer-based learning, and various other techniques may be utilized for teaching on inpatient consultation teams. A study assessing formal dermatology didactics for IM residents found no improvement in diagnostic accuracy following a dermatology lecture series.[16] Similarly, a meta-analysis of dermatology educational interventions demonstrated lectures to have a smaller effect size compared to other interventions.[17] Due to multiple reports of limited benefits of passive learning, a shift towards active learning methods and self-directed learning is a prominent trend in medical education. Examples include online modules, workshops, use of social media, and small group sessions; specific to dermatology, examples include American Academy of Dermatology (AAD) online modules, workbooks, visual art exercises, practical clinical sessions, and moulage.[56-60] Various studies have demonstrated positive feedback with the AAD modules for medical students and non-dermatology residents as well as other computer-based learning.[33,61-63] Visual skills-building courses, in which students are asked to describe paintings and interpret the images in order to enhance observational skill, have also shown to provide benefit to learners in dermatology.[25] Inpatient dermatology consult services should consider utilizing a combination of teaching tools, as multicomponent interventions have demonstrated the greatest effect size in improving diagnostic accuracy of skin diseases, although these studies primarily involved education in skin cancer.[17]

Conclusion

In addition to patient care, a critical objective of an inpatient dermatology consult service is education for a variety of learners, which can be achieved during patient care activities such as BTR and note-writing and through nonpatient care activities such as case presentations, didactics, online modules, reading lists, and other skills development exercises. BTR is an integral aspect of clinical teaching on the inpatient dermatology consultative service, as morphology-based diagnostic assessment and evaluation is a key learning objective for dermatology trainees. BTR may be enhanced with pre-rounding huddles, clear rounding structure, routinizing teaching points, as well as the use of work booklets, tablets, and mobile devices to help prioritize learning objectives and organize learning stemming from direct patient care. Outside of patient care responsibilities, the evidence supports use of a blended curriculum format for learners such as a combination of online modules, assigned readings, didactic sessions, and small case-based seminars to achieve consistent learning objectives. Passive learning such as didactics has been under scrutiny, and a call to action for more effective teaching strategies, particularly active teaching strategies, is needed.[16] Additionally, identifying dermatology teaching opportunities that best synergize with other existing educational programs in the inpatient setting will be critical to provide efficient, effective, and integrated learning. Importantly, prospective studies of educational interventions will be needed to provide evidence for best practices in dermatology teaching in the inpatient setting. Recognizing barriers to teaching and identifying specific local needs may be important to developing educational strategies at a given institution.[6]

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