

REVIEW

AI-Assisted Dermatology in Provider Shortage Areas: A Systematic Review of Access and Wait Time Outcomes

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INTRODUCTION: Access to dermatologic care remains a persistent challenge in the United States, particularly in rural and underserved areas. Delays in dermatologic evaluation and treatment are compounded by provider shortages, long wait times, and geographic barriers. Emerging tools such as artificial intelligence (AI), AI-assisted triage, and teledermatology platforms might offer scalable solutions to improve access and reduce delays. This article evaluates whether AI-assisted technology, compared to traditional in-person dermatology care, shortens wait times to less than 30 days for patients living in provider shortage areas. **METHODS:** A systematic review was conducted between March and June 2025 following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. PubMed and academic library databases were queried using the following Boolean queries: “Artificial intelligence triage dermatology” and “dermatology AND access AND teledermatology AND care AND wait times.” Studies were screened for relevance, and 41 met the inclusion criteria. A narrative synthesis was used due to heterogeneity in study designs and outcome measures. Each study was appraised using the Joanna Briggs Institute (JBI) critical appraisal tools. **RESULTS:** Included studies demonstrated that AI-assisted technologies, particularly when integrated into teledermatology systems, significantly reduced dermatology wait times, often to fewer than 30 days. Store-and-forward platforms enabled expedited triage, while AI-supported decision tools improved diagnostic accuracy (85–97% sensitivity) and reduced unnecessary referrals. Task shifting to nonspecialist providers with AI support was found to be safe and effective. Despite promising outcomes, concerns related to image quality, algorithmic bias, and uneven implementation remain. **CONCLUSION:** AI-assisted dermatologic tools show strong potential to improve access to care and reduce wait times in provider shortage areas. These technologies could support timely diagnosis, streamline referrals, and enable safe task shifting to primary care teams. Importantly, findings highlight the role of nurse practitioners (NPs), particularly those with limited dermatology training, in leveraging AI as both an educational and clinical decision support tool. By providing differential diagnoses, confidence scores, and visual explanations, AI can strengthen NP diagnostic confidence, reduce unnecessary referrals, and expand access to timely dermatologic care in underserved settings. Future research should focus on implementation in resource-limited settings, nurse-led AI triage models, and long-term health outcomes. **KEYWORDS:** Artificial intelligence, dermatology, teledermatology, access to care, triage, wait times, provider shortage

INTRODUCTION

In the United States (US), the ability to access a dermatologist in a timely fashion can often depend on your zip code. In provider shortage areas, particularly rural communities and urban safety-net systems, patients face dermatology wait times that stretch for weeks or even months. During that wait, suspicious skin lesions can evolve, malignancies can advance, and the window for early detection can quietly close.

Traditional referral models are buckling under the weight of demand, a challenge that is further exacerbated by the projected shortfall in dermatology workforce capacity. At the same time, artificial intelligence (AI) is emerging as a powerful diagnostic adjunct, with applications that include lesion detection, image classification, and clinical decision support. These AI tools, often integrated within teledermatology platforms, promise not just speed but equity, if implemented thoughtfully.

While the diagnostic accuracy of AI in dermatology has been widely studied, there remains a critical gap in the literature: can these technologies actually reduce wait times and improve access to care, particularly in settings where dermatology specialists are scarce?

The purpose of this review is to answer the following PICO question: In patients living in a provider shortage area (P), does the implementation of AI-assisted technology (I), compared to traditional in-person dermatology care (C), shorten wait times to fewer than 30 days (O)? We aim to explore not only whether efficiency improves, but also the implementation realities of these tools in frontline clinical environments. In addition, this article will explore how a multidisciplinary approach and leveraging AI-assisted technology can effectively bridge the dermatology care gap. Specifically, it will examine:

- How primary care providers can leverage AI-assisted technology to improve their knowledge and confidence when diagnosing

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skin disease and collaborate more effectively with dermatologists, decreasing unnecessary referrals and lowering overall healthcare costs.

- How teledermatology and its integration with AI can streamline referrals and optimize the triage process, leading to greater efficiency and cost-effectiveness.
- How we can use AI tools to empower registered nurses (RNs) to take a more impactful role in the triaging, screening, and early detection of skin cancer for dermatology patients, positively impacting wait times, increasing access to dermatology care, and contributing to a reduction in healthcare spending.
- How nurse practitioners (NPs) with limited dermatology training can use AI as an educational and decision-support tool to build diagnostic confidence, reduce unnecessary referrals, expand access to timely dermatologic care, and contribute to lowering overall healthcare costs.

This article is intended for clinicians, educators, and healthcare leaders who are committed to addressing disparities in dermatology care and improving access for patients in need.

METHODS

This systematic review was conducted to explore how the use of AI-assisted technology, in combination with an interdisciplinary care team approach, can reduce wait times and improve access to dermatology care in provider shortage areas. The review was designed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines.¹

To begin our work, a comprehensive literature search was conducted using PubMed, covering the period from March 2020 to March 2025. We used the following search terms and Boolean operators: “Artificial intelligence triage dermatology” and “dermatology AND access AND teledermatology AND care AND wait times.” Filters were applied to restrict our results to English-language articles published within the past 5 years with full-text availability.

To be included, studies were required to be published in English between March 2020 and March 2025 and relevant to improving access to dermatology care using AI-assisted technology, teledermatology, or interdisciplinary care models. All eligible studies had to be clinically relevant, meaning they directly addressed patient care, access, wait times, or workforce strategies in dermatology. Critically, studies had to include patients seeking or referred for dermatological care who are explicitly identified as living in or receiving care through systems serving provider shortage areas. Furthermore, studies were required to evaluate the implementation of AI-assisted technology as a distinct component within the dermatological care pathway. Studies that focused only on general teledermatology without a specific, identifiable AI component were excluded from the primary synthesis, but could be used for context. Finally, full-text articles needed to be available for our review. The following types of studies were also excluded: non-English publications, articles without clinical relevance (eg, purely technical AI development without clinical application), case reports, expert opinions, and editorials.

Study selection was conducted in 3 stages. First, titles were screened to exclude clearly irrelevant articles. Next, abstracts were reviewed for relevance to the research question. Finally, full texts of potentially eligible studies were assessed for inclusion. To ensure accuracy, screening was conducted by 2 independent reviewers, with discrepancies tabled for later resolution.

A standardized data extraction table was developed and used to capture key details from each included study. We extracted data including the study title, author(s), year, country/region, and setting. We also noted the study design and population characteristics, a description of the AI-assisted technology or teledermatology intervention, and the presence of interdisciplinary care teams, including roles for primary care providers (PCPs), NPs, and RNs. The comparator, which was traditional in-person dermatology care, was also captured, along with outcomes such as wait times, patient and provider satisfaction, number of referrals avoided, and cost of care, if reported. Lastly, we noted any collaboration between primary care

and dermatology, key findings, and study limitations. A detailed summary of study characteristics and appraisal results is provided in the critical appraisal table (Appendix C). The full search strategy, study selection materials, and data extraction details are provided in Appendices A, B, and D.

Our findings were then summarized using a narrative synthesis approach, with results presented by key themes. Given the anticipated differences across study designs and outcomes, a formal meta-analysis was not planned. The themes included access to care, wait time reduction, diagnostic performance, task-shifting potential, and implementation feasibility in underserved areas.

RESULTS

In total, 32 studies were included, spanning from 2019 to 2024.^{1–32} The study designs varied, with the majority being observational cross-sectional, diagnostic accuracy studies, and systematic reviews. Most studies were conducted in high-income countries, particularly the United States and Europe, with settings ranging from primary care and academic medical centers to rural telehealth networks. All studies evaluated AI-assisted tools used for dermatologic triage, diagnosis, or workflow integration.

Regarding the impact of AI on wait times, AI-assisted tools, particularly teledermatology platforms and image triage algorithms, consistently demonstrated reductions in dermatology appointment wait times. For instance, Dobry et al⁵ reported a significant improvement in time-to-treatment initiation after deploying a store-and-forward teledermatology platform in a safety-net hospital system. The most notable improvement was in wait times for a dermatology appointment after referrals were made. For traditional referrals, there was a wait time of approximately 64 days vs 36 days for appointments made after the referral was made via the store-and-forward teledermatology platform. Seiger et al⁶ showed that pediatric dermatology eConsults reduced wait times by up to 40%, alongside a decrease in in-person visits. Cyr et al²⁵ modeled various referral pathways and found that integrating AI-supported triage tools could reduce specialist access delays by up to 28 days. Furthermore, Foltz et al⁴ demonstrated

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a 53% reduction in unnecessary in-person dermatology referrals using patient-submitted smartphone images analyzed via AI-assisted systems. These time savings were most evident in settings with limited dermatology capacity, such as federally qualified health centers and rural community clinics.

Diagnostic performance of AI tools was also reported in several studies. Anderson et al⁷ compared dermoscopic AI classifiers to clinicians and found that AI achieved higher sensitivity (91.5%) but a slightly lower specificity (83%) in melanoma detection. Tschandl et al⁸ demonstrated that AI–human collaboration improved accuracy in skin cancer diagnosis versus either alone. Soenksen et al⁹ showed that a deep learning (DL) system analyzing smartphone images achieved dermatologist-level performance by achieving over 90% sensitivity and 89.9% specificity in detecting suspicious lesions. Mashoudy et al² highlighted the importance of high-quality images for AI triage efficacy, noting that lower-quality images reduced accuracy and confidence intervals. Overall, AI systems were found to outperform or match human providers in most diagnostic tasks, especially when used as decision support rather than standalone tools.

Numerous studies also addressed the use of AI in underserved or resource-constrained settings. Bianchi et al¹⁰ found that 72% of pediatric dermatology cases were resolved remotely without the need for in-person follow-up, emphasizing teledermatology's role in triage. Cantisani et al¹¹ reported high triage success when nonspecialists used AI tools in community health settings. Studies^{11,12} explored task-shifting models, suggesting that AI can support nurses and PCPs in triaging dermatologic conditions in low-access regions. Furthermore, AI in primary care settings improved triage throughput and reduced the dermatology service load.¹³

In our quality appraisal summary, studies were assessed using appropriate Joanna Briggs Institute (JBI) critical appraisal tools. Of the 32 included sources, 26 underwent formal evidence-level grading. Fourteen studies^{4–6,8–10,14–21} were rated as high quality, including rigorous diagnostic accuracy evaluations and systematic reviews. Two studies^{7,13} were rated as moderate-to-high quality, and 10^{2,3,11,12,22–27} were rated as

moderate quality, including narrative reviews and modeling studies with minor limitations. The remaining 6 sources^{1,28–30,30,31} were grey literature reports or methodological frameworks (eg, the PRISMA 2020 statement, GAPP Wait Time Report, American Association of Colleges of Nursing Nursing Workforce Fact Sheet, KFF, Agency for Healthcare Research and Quality, and National Health Expenditure fact sheet) used as contextual references rather than evidence subjected to formal appraisal. Most high-quality studies featured clear outcome reporting, real-world applicability, and comparative methods.⁷

DISCUSSION

Access to dermatology care is an ongoing issue in the US that is not only prevalent in rural areas but can also be seen in urban areas. Limited access to dermatology care is a complex, multifaceted issue, and causes include an inadequate supply of dermatologists, increasing demand for dermatology care, and an inefficient referral system. AI-assisted technology offers a potential solution by streamlining diagnosis and triage, thus improving access and reducing delays. Across multiple studies, AI systems delivered comparable diagnostic performance to human providers while enabling faster triage and reducing unnecessary referrals.

In rural counties, a wait time of 6 to 8 weeks to see a dermatologist is not unusual. However, studies in this review demonstrated that store-and-forward teledermatology systems, powered by AI triage algorithms, could reduce wait times to fewer than 30 days.⁵ In safety-net systems where patients frequently lack transportation, even the ability to resolve a skin condition remotely, without a clinic visit, represents a notable shift in care access.

Beyond efficiency, the data point to the task-shifting potential of AI. Several studies showed that when nondermatology providers were equipped with AI support, triage outcomes improved without compromising safety.⁸ In the context of provider shortages, this might be one of the most meaningful contributions AI can offer: redistributing clinical responsibility in a way that's both evidence-based and sustainable. These findings align with broader health system goals of delivering timely and equitable care.

By redistributing diagnostic responsibility and enhancing primary care capability, AI-assisted teledermatology platforms reduce strain on specialist resources without compromising quality.

Of course, implementation is not without friction. Image quality remains a key barrier, as several studies reported diminished accuracy when photos lacked clarity or consistency.^{2–4} This is compounded by additional challenges, such as the user's digital literacy, internet service, and the availability of providers who speak the patient's language.²²

Furthermore, the current evidence base skews toward well-resourced academic centers, with limited longitudinal data on AI's real-world impact in truly under-resourced environments. There's also the need for critical vigilance: algorithmic bias, data privacy, and algorithmic deference are all legitimate concerns.

Despite these limitations, the momentum is clear. AI is not a future solution; it is a present tool, already reshaping dermatology triage in the spaces where it's needed most. The challenge ahead lies not in proving its potential but in scaling its use responsibly and equitably.

CURRENT BARRIERS TO ACCESS

Many dermatology patients face waits exceeding several months for appointments, leading to delayed diagnoses and treatment. The crisis surrounding dermatology wait times is increasing as "the average wait time to receive a dermatology appointment is 32.3 days, which reflects a 46% increase since 2009."²³ There are several contributing factors limiting access to dermatology care, but this issue is exacerbated by 2 main sources: limited provider availability and geographic disparities.

Provider shortages. One of the greatest barriers driving inadequate access to dermatology is the critical shortage of dermatology providers. There are not enough dermatologists available to meet population needs. With approximately 3.4 dermatologists per 100,000 people, the current supply is insufficient to provide adequate dermatology care in communities.²⁴ Further exacerbating the provider shortage are limited dermatology residency positions, as "In 2019, there were fewer than 500 positions available for

dermatology out of over 33,000 residency positions.”²³ This restricts the number of new dermatologists entering the workforce annually, coupled with a growing number of dermatologists reaching retirement.

Geographic disparities. While it is understood that the shortage of dermatologists affects all areas of the population, the shortage affects rural areas even more significantly, as “Less than 10% of dermatologists practice in rural areas.”²³ Patients living in rural areas often have to travel hours, some patients traveling up to 200 miles, to be seen by a dermatologist in an urban area closest to them.²⁴ The travel time and cost of travel will often discourage patients from prioritizing their skin health and delay care, even when dermatologic care is crucial. These access barriers were directly reflected in several studies included in this review, where AI-based triage and teledermatology tools offered significant improvements in care timeliness and reach.^{5,6,10,23–25}

AI-ASSISTED TECHNOLOGY INTEGRATION: OVERVIEW OF AI IN DERMATOLOGY

Over the last 30 years, skin cancer cases have increased rapidly and continue to grow as the US population grows.²⁵ The increased need for dermatologic care presents a unique opportunity to introduce creative and innovative ways to ensure that patients are receiving the dermatology care they need.

AI-assisted technology holds immense potential to address these challenges. AI algorithms can be used at each step in the healthcare journey. It can be used to analyze images, assist in diagnosis, and streamline workflows, ultimately improving efficiency and expanding access to care. Nondermatologists have increasingly become more interested in dermatology AI tools as they increase their efficiency in the diagnosis and management of common skin conditions and decrease the need for specialty consultations.¹⁴

Importance of a multidisciplinary approach. A multidisciplinary approach is crucial for addressing complex issues like access to dermatology care. Collaboration between various healthcare professionals can optimize resource utilization and improve patient outcomes. By engaging with an interdisciplinary

care team, we can streamline referrals, reducing the burden on dermatology providers and thereby ensuring their availability to manage complex cases that require a dermatologist’s specialized expertise.

ENHANCING DERMATOLOGIC ACCESS THROUGH PRIMARY CARE COLLABORATION, TELEDERMATOLOGY, AND ARTIFICIAL INTELLIGENCE

PCPs are often the first to evaluate skin concerns, especially in rural or underserved areas with limited dermatology access. However, their central role in triaging patients can be a double-edged sword. While they serve as the front line for dermatologic complaints, many PCPs lack specialized dermatology training and face packed schedules managing chronic and acute conditions. This combination can lead to uncertainty in diagnosis and a high rate of dermatology referrals, many of which are ultimately unnecessary. Studies have shown that a significant proportion of dermatology referrals from PCPs and pediatricians are for benign lesions or conditions that could be managed in primary care with appropriate support. For example, one study found that 79% of referred lesions were later confirmed as benign via biopsy,²⁵ while another noted that many pediatric referrals stemmed from a lack of diagnostic confidence rather than clinical necessity.¹⁰ This contributes to longer wait times for patients with urgent or complex needs and adds to the growing burden on dermatologists.

AI-enhanced tools. AI-assisted technologies can help PCPs feel more confident in evaluating skin conditions and making referral decisions. By analyzing images of skin lesions, AI tools can suggest differential diagnoses, flag concerning patterns, and help distinguish between benign and malignant features. One study showed that AI outperformed PCPs in diagnostic accuracy, correctly identifying conditions in 67% of cases compared to 45% by physicians, rising to 90% accuracy within the AI’s top-3 predictions.²⁶ These tools offer an evidence-based safety net, reducing uncertainty and helping ensure that only the patients who truly need specialist care are referred.

Teledermatology: closing the gap in dermatologic access. Teledermatology, whether store-and-forward or real-time, enables PCPs to consult dermatologists

efficiently by submitting clinical information and high-quality images for review. This model has been shown to reduce unnecessary referrals, speed up access to care, and improve provider confidence. For example, one study found that PCPs using teledermatology were able to manage 62% of pediatric skin lesions independently, with only 37% requiring specialist input and just 1% requiring biopsy. Importantly, the mean wait time for in-person dermatology visits decreased by 78%.¹⁰ The value of teledermatology extends beyond clinical efficiency; it minimizes travel burdens, reduces costs, and enables patients in remote areas to access high-quality dermatologic input without leaving their communities. For PCPs, it serves as both a diagnostic support tool and a pathway to more appropriate, targeted referrals.

Dermoscopy and teledermoscopy.

Dermoscopy is a noninvasive diagnostic method for examining skin lesions. This technique uses a hand-held dermatoscope with a light source to magnify skin lesions beneath the surface of the skin to magnify skin structures. Dermoscopy can improve dermatologists’ diagnostic accuracy for malignant melanoma compared to clinical assessment without diagnostic tools.¹³

Teledermoscopy enhances the effectiveness of store-and-forward models by allowing patients or nondermatology providers to capture dermoscopic images with smartphone attachments. These high-resolution images can be securely shared with dermatologists, improving the accuracy of remote assessments. Whether initiated by providers or self-referred patients, these technologies streamline triage, support early detection, and ensure that in-person visits are reserved for those who truly need them.⁵

AI integration with teledermatology. Advancements in technology have enabled the integration of AI with dermatoscopes, resulting in successful differential diagnoses of skin lesions.²⁶ In recent years, US Food and Drug Administration (FDA) clearance has been granted to some devices, particularly for use by PCPs and dermatologists to analyze dermoscopic images, diagnose, and treat skin lesions. Devices such as NeviSense, Dermasense, and DermEngine (pending FDA approval) are promising, as they have been found to have high sensitivity in detecting lesions like melanoma, but also have been found to carry

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some risk, such as false positives, which can lead to unnecessary biopsies.²⁷ Devices like these can potentially improve access to care in rural areas where there are no dermatologists and a limited number of PCPs. These devices can help PCPs to quickly evaluate, make triage decisions, and facilitate remote collaboration among providers.

THE ROLE OF NPs

The NP role was created to address the primary care physician shortage, and initial training and education help NPs address these healthcare disparities. However, over time, we have seen that NPs can and are being used to address healthcare disparities in other specialties, including dermatology. If NPs are adequately trained, generative AI could potentially be used as a decision-support tool for in-person and teledermatology visits to narrow the differential diagnosis, review clinical images, and help solve difficult cases. Additionally, with sufficient and continuing education, NPs, particularly Doctor of Nursing Practice (DNP) graduates, can serve as chief operating officers, chief technology officers, chief finance officers, chief nursing officers, and chief executive officers, helping business owners and healthcare entities implement and evaluate AI-driven systems. This, in turn, helps businesses utilize the technology ethically and transparently, operate efficiently with lower overhead costs, stay in business, and ensure patients get the care they need when they need it.

RNs account for the largest segment of the healthcare workforce, at 4.7 million, and are involved in the delivery of most healthcare services.²⁷ The US requires all NPs, of which there are about 308,000, to maintain their RN license to practice.²⁸ Once RNs and NPs are educated and equipped on how to use, evaluate, and educate the public about AI, we'll be able to rapidly improve care delivery when it comes to efficiency, fairness, access, timeliness, and safety. This can reduce healthcare costs, which currently is the second largest consumer of the national gross domestic product (GDP).^{29,30}

HOW AI CAN AID NPs WITH LIMITED DERMATOLOGY TRAINING

DL has quickly become the leading AI method for analyzing complex, high-

dimensional data like medical images. At the center of this advancement are convolutional neural networks (CNNs), powerful algorithms specifically designed to interpret visual information with remarkable precision. What sets DL apart from traditional techniques is its ability to learn directly from data. Instead of relying on human experts to handpick features, these neural networks, modeled after the way the human brain processes information, automatically uncover patterns and relationships between images and diagnostic outcomes. This not only streamlines the process but often surpasses manual methods in both accuracy and efficiency.²⁶

Young et al¹⁹ reported that top-1 and top-3 diagnostic accuracy increased by 7.0% and 10.1%, respectively, for in-person visits, and accuracy was superior (83.0%) when AI and human interpretation were combined, compared to when AI (81.6%) or clinicians (42.9%) operated independently. In a study by Anderson et al,⁷ the AI significantly outperformed ($P < 0.05$) dermatologists ($n = 14$), family physicians ($n = 7$), and primary care NPs and PAs ($n = 12$) when it came to specificity and sensitivity. The participating dermatologists had practiced an average of 16 years (range: 1.5–44 years), 10 used dermoscopy daily (averaging 11 years of use), only 6 received formal training, and there was no correlation between years of experience and accuracy in identifying malignant lesions. Regarding the primary care providers, AI also performed significantly better ($P < 0.05$) than the physicians, NPs, and PAs in terms of accuracy, positive predictive value, and negative predictive value.¹⁴

For NPs transitioning into dermatology, especially without the benefit of extensive specialty training, AI represents more than a technological advancement; it's a potential clinical partner. The promise lies not only in AI's ability to detect patterns in skin lesions with speed and precision but in its capacity to offer decision support that builds confidence, improves diagnostic accuracy, and expands access to care.¹⁴

One of the most valuable features of AI in dermatologic imaging is its ability to quantify uncertainty. Instead of delivering binary diagnoses, these systems often provide ranked differential diagnoses alongside confidence scores. However, before this confidence can be

trusted in clinical decision-making, it must be carefully calibrated for accuracy. Simply put, an AI model must know what it doesn't know, and we need to know when to second-guess it.¹⁴

For NPs, especially those early in their dermatology careers, this level of transparency is critical. Understanding how confident a model is in its prediction, and how that prediction was reached, fosters clinical learning and informed care. It's designed to mimic the brain, not the mind. To integrate AI responsibly, the profession needs standardized methods for evaluating model performance, reporting uncertainty, and ensuring dataset transparency. Without this, it's difficult to recommend widespread use, especially in high-risk scenarios like melanoma detection. But with the right infrastructure, AI has the power to elevate NPs' practices in meaningful ways.¹⁴

Clinically, AI can support NPs by highlighting subtle visual patterns they might not yet be trained to see, helping differentiate benign from suspicious lesions, and providing real-time suggestions that broaden the differential diagnosis. This can be particularly valuable in teledermatology settings, where access to specialists is limited and where early triage decisions are critical.¹⁴

The Le Lay et al¹⁴ study evaluated the performance of DermaDetect[®], an AI-assisted teledermatology platform with 24/7 access, designed for patients to report a cutaneous concern by submitting images and completing a questionnaire. The results revealed how an AI-assisted tele-expertise platform can significantly improve diagnostic accuracy for common inflammatory dermatoses that NPs see daily, such as acne, psoriasis, and atopic dermatitis, conditions prone to misdiagnosis, especially in primary care. For these high-frequency yet often under-recognized conditions, AI served as a decision support tool that elevated diagnostic confidence and consistency. This is particularly meaningful for NPs working in high-volume, low-resource environments where early, accurate triage can dramatically improve patient outcomes and streamline specialist referrals.⁸

Far from replacing the clinician, AI can shift the workload, freeing dermatologists to focus on acute, systemic, or procedural care while empowering NPs to manage more cases

independently and confidently. In this model, dermatology becomes more collaborative, tech-enabled, and accessible. Still, questions remain about reimbursement. Just as current coding differentiates between live-interactive and store-and-forward teledermatology, future billing structures might require new modifiers for AI-supported consultations. But adoption will ultimately depend on one thing: outcomes. The more clearly AI improves patient care, the more likely it is to earn a permanent place in our practice models.²⁹

EXPANDING NP EDUCATION AND TRAINING USING AI

Building on recent findings from Le Lay et al,¹⁴ there is a clear opportunity to evolve NP education in ways that prepare clinicians for meaningful collaboration with AI tools in dermatology. As AI becomes more integrated into teledermatology platforms, educational strategies must emphasize not only technical proficiency but also clinical discernment and ethical application. One critical insight from the study was the positive impact of AI-assisted decision-making on reducing unnecessary interventions. When dermatologists were presented with AI-based probabilities for suspicious lesions, without being reminded of their prior decisions, they shifted from recommending excision to monitoring in 15.5% of benign cases, without increasing the risk of missing malignant ones. This suggests that human–AI collaboration, when well-structured, can lead to more conservative, cost-effective, and patient-centered care. For NPs, replicating these decision points in training, where they assess independently and then reevaluate with AI input, could reinforce reflective practice and foster confidence in using technology as a decision support system, not a diagnostic replacement.

Another key finding was the superiority of AI in recognizing contextual clues that clinicians often overlook. Specifically, the study noted that CNNs successfully used background skin changes, such as chronic sun damage, to improve diagnostic accuracy for actinic keratoses, where human experts frequently erred.¹⁴ This highlights the need for educational frameworks that encourage NPs to expand their visual attention beyond the lesion itself. Incorporating image-based training

modules that emphasize environmental and perilesional changes, particularly in diverse skin tones, can enrich pattern recognition and reduce bias in dermatologic assessment.

Equally important is demystifying AI-generated outputs, as familiarizing NPs with visual outputs that show which image areas influenced a model's prediction can increase transparency, reduce skepticism, and empower clinicians to make informed decisions that integrate human insight with algorithmic guidance.¹⁸

These findings also support the use of structured before-and-after diagnostic exercises, where NPs first provide an initial diagnosis and then reflect on how AI input might alter or affirm their clinical reasoning. Such an approach cultivates humility, adaptability, and a deeper understanding of diagnostic variability, skills essential to practicing in a rapidly digitizing healthcare environment.

Finally, AI education for NPs should be framed within the context of ethical care, cultural humility, and clinical leadership. While AI could offer probabilistic guidance, the NP remains accountable for interpreting those results within the nuances of the patient's history, presentation, and lived experience. Integrating AI into training is not simply about mastering a new tool; it's about reinforcing a model of care that is precise, inclusive, and guided by clinical judgment. As NPs continue to lead in dermatologic care, particularly in underserved and telehealth settings, preparing them to use AI thoughtfully is not only beneficial, it is imperative.

UTILIZING RNS FOR TRIAGE, SCREENING, AND EARLY DETECTION OF SKIN CANCER

RNs working in dermatology primarily engage in supportive and administrative roles. While these roles are necessary, there is an opportunity for RNs to expand their contributions in the dermatology field by engaging in triage, screening, and early detection of skin cancer through a practice known as task shifting.

Task shifting in healthcare is defined as “the delegation of tasks and sharing roles between health professions.”¹² RNs could play a crucial role in skin cancer screening and melanoma detection. They are already skilled

in performing detailed patient assessments, working in complex settings, and triaging urgent concerns. Expanding their scope in dermatology to include screening for skin cancer could help alleviate the burden on dermatologists.

Task shifting in dermatology is not a novel concept. Over the past decade, roles traditionally linked to physicians have increasingly been delegated to RNs. For instance, in cosmetic dermatology, RNs perform complex procedures, such as injecting toxins (onabotulinumtoxinA) and dermal fillers, under a physician's direction. Expanding this practice to skin cancer surveillance could improve patient triage, reduce wait times for appointments, and ensure patients with urgent concerns are seen promptly. In countries like Australia and New Zealand, where melanoma rates are among the highest in the world, some primary care nurses serve as screeners, and their primary role is to identify and manage referrals to the appropriate specialist.³¹

When primary care nurses take on responsibilities for screening and triage, fewer benign skin lesions need to be evaluated by general practitioners or dermatologists. This shift allows physicians to devote more time to diagnostic and therapeutic tasks.³² In rural and regional settings, where skin cancer prevalence is high and healthcare staffing is limited, nurse-led services supported by digital technology and collaborative care models can play a critical role in improving patient access.³¹ By giving primary care nurses more responsibility with screening, triaging, and referrals (as it relates to skin cancer detection), nurses can effectively reduce the workload of both PCPs and dermatologists by allowing them to focus on more complex cases.³¹

RNs AND AI-ASSISTED TECHNOLOGY

As AI-assisted tools become more accessible, it is vital to better understand how RNs can leverage these tools to contribute their skills as one potential solution to the limited access to dermatology problem. The review of current literature reveals a significant gap. Few, if any, studies evaluate how nurses can utilize AI-assisted technology in screening, triaging, or early detection of melanoma. More research is needed to determine whether nurses using AI-assisted technology can safely and effectively

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identify malignancies and properly triage the care of patients with skin malignancies. However, with additional evidence and training programs, clear guidelines can be formulated to support the skills required for this advanced care model. Future studies, including DNP projects, should explore real-world integration and usage of AI tools by RNs to examine the impact of RNs using this technology on outcomes, access to care, and wait times in dermatology, specifically in provider shortage areas.

COMPARISON WITH EXISTING LITERATURE

Prior systematic reviews have largely focused on diagnostic accuracy and technological development. This review expands that lens by centering access, triage, and workforce redistribution. Unlike earlier literature, it draws attention to AI's systemic impact, particularly when integrated into primary care or deployed in resource-constrained environments. Studies^{4,9} provided compelling evidence of AI's effectiveness in task-sharing models and improving care coordination.

POLICY AND PRACTICE IMPLICATIONS

Findings support broader adoption of AI-assisted triage tools, especially in areas affected by workforce shortages. These tools empower PCPs, advanced practice nurses, and RNs to make better-informed decisions, reduce unnecessary referrals, and triage patients more appropriately. Policy changes that expand NP training, modernize scope-of-practice regulations, and enable reimbursement for AI-assisted services could facilitate sustainable integration. Furthermore, health systems should consider investing in AI tools that are interoperable with teledermatology platforms and tailored for underserved populations.

HEALTHCARE ACCESS CONSIDERATIONS

AI tools hold transformative potential but also present risks if not designed and deployed justly. Several studies in this review reported decreased accuracy with poor-quality images, which was more likely in lower-resource settings. In addition, limited racial and ethnic diversity in AI training datasets might lead to reduced performance across skin

tones. Intentional design efforts, including diverse dataset inclusion, usability testing in rural clinics, and training protocols for nonspecialists, are critical to ensuring AI serves all patients fairly.

STRENGTHS AND LIMITATIONS OF THE REVIEW

This review adhered to PRISMA guidelines and applied the JBI framework to critically appraise both primary and secondary studies. Its strengths include a PICO-aligned strategy, structured synthesis of results, and inclusion of both diagnostic accuracy and access-focused outcomes. Limitations include the heterogeneity of outcome measures, with some studies reporting sensitivity and specificity, while others emphasize referral patterns or time to diagnosis. In addition, real-world implementation data remain sparse. There was also limited exploration of AI use by RNs, representing a gap in current research.

SUGGESTIONS FOR FUTURE RESEARCH

Future studies should explore longitudinal outcomes, cost-effectiveness, patient satisfaction, and AI's real-world implementation in community settings. There's a particular need for research on nurse-led AI use in dermatology, especially in rural and underserved areas. Evaluation of AI performance across diverse skin tones and integration with mobile and teledermoscopy platforms are also crucial areas for expansion.

CONCLUSION

The evidence synthesized in this systematic review provides a clear and affirmative answer to our central question: AI-assisted technology, particularly when integrated within teledermatology frameworks, demonstrates strong potential to reduce dermatology wait times to less than 30 days in provider shortage areas. The findings consistently show that these tools can effectively streamline referrals, improve diagnostic accuracy for nonspecialists, reduce healthcare costs, and enable safe and effective task-shifting to PCPs, including NPs and RNs.

The promise of AI, however, is not without its caveats. The successful implementation of these technologies is not a simple plug-and-play solution. It is contingent upon addressing significant challenges, including the need

for high-quality, consistent imaging, the critical imperative to mitigate algorithmic bias with diverse and representative training datasets, and the current paucity of real-world implementation data from truly under-resourced community settings.

For the practicing NP and physician assistant (PA), these findings are not merely academic; they are a call to leadership. As clinicians created to bridge gaps in care, we are uniquely positioned to be at the forefront of this technological revolution. The opportunity extends far beyond using AI as a clinical adjunct. It is an invitation to lead the charge in developing and implementing these systems ethically and effectively. We can and should be the ones conducting the future research on clinician-led AI triage models, creating the educational frameworks to ensure digital fluency, and advocating for policies that support the integration of these tools into our practices.

Ultimately, AI-assisted technology is not a replacement for clinical judgment, but a powerful amplifier of it. It offers a pathway to a more efficient and accessible system of dermatologic care. The future of dermatology will be defined not by the algorithm alone, but by the skilled clinicians who learn to wield it with wisdom, clinical acumen, and a steadfast commitment to the patient. NPs and PAs are poised to lead that charge.

SUPPLEMENTARY MATERIALS

To access Supplementary Materials, please visit https://jcadonline.com/wp-content/uploads/Madison_Appendix.pdf.

REFERENCES

1. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71.
2. Mashoudy KD, Perez SM, Nouri K. From diagnosis to intervention: a review of telemedicine's role in skin cancer care. *Arch Dermatol Res*. 2024;316(5):139.
3. Brown AE, Najmi M, Duke T, et al. Skin cancer education interventions for primary care providers: a scoping review. *J Gen Intern Med*. 2022;37(9):2267–2279.
4. Foltz EA, Ludzik J, Leachman S, et al. Revolutionizing skin Cancer triage: the role of patient-initiated teledermoscopy in remote

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- diagnosis. *Cancers*. 2024;16(14):2565.
5. Dobry A, Begaj T, Mengistu K, et al. Implementation and impact of a store-and-forward teledermatology platform in an urban academic safety-net health care system. *Telemed E-Health*. 2021;27(3):308–315.
 6. Seiger K, Hawryluk EB, Kroshinsky D, et al. Pediatric dermatology eConsults: reduced wait times and dermatology office visits. *Pediatr Dermatol*. 2020;37(5):804–810.
 7. Anderson JM, Tejani I, Jarmain T, et al. Artificial intelligence vs medical providers in the dermoscopic diagnosis of melanoma. *Cutis*. 2023;111(5):254–258.
 8. Tschandl P, Rinner C, Apalla Z, et al. Human–computer collaboration for skin cancer recognition. *Nat Med*. 2020;26(8):1229–1234.
 9. Soenksen LR, Kassir T, Conover ST, et al. Using deep learning for dermatologist-level detection of suspicious pigmented skin lesions from wide-field images. *Sci Transl Med*. 2021;13(581):eabb3652.
 10. Giavina Bianchi M, Santos AP, Cordioli E. The majority of skin lesions in pediatric primary care attention could be managed by teledermatology. *PLoS ONE*. 2019;14(12):e0225479.
 11. Cantisani C, Ambrosio L, Cucchi C, et al. Melanoma detection by non-specialists: an untapped potential for triage? *Diagnostics*. 2022;12(11):2821.
 12. Saga E, Egilsdottir HÖ, Bing-Jonsson PC, et al. It's not the task, it's the shifting: exploring physicians' and leaders' perspectives on task shifting in emergency departments in Norway. *BMC Nurs*. 2024;23(1):571.
 13. Escalé-Besa A, Vidal-Alaball J, Miró Catalina Q, et al. The use of artificial intelligence for skin disease diagnosis in primary care settings: a systematic review. *Healthcare*. 2024;12(12):1192.
 14. Le Lay F, Barzilay O, Cerasuolo D, et al. Assessing diagnostic performance for common skin diseases using an AI-assisted tele-expertise platform: a proof of concept. *Eur J Dermatol*. 2024;34(6):595–603.
 15. Witkowski AM, Burshtein J, Christopher M, et al. Clinical utility of a digital dermoscopy image-based artificial intelligence device in the diagnosis and management of skin cancer by dermatologists. *Cancers*. 2024;16(21):3592.
 16. Daneshjou R, Vodrahalli K, Novoa RA, et al. Disparities in dermatology AI performance on a diverse, curated clinical image set. *Sci Adv*. 8(32):eabq6147.
 17. Marsden H, Kemos P, Venzi M, et al. Accuracy of an artificial intelligence as a medical device as part of a UK-based skin cancer teledermatology service. *Front Med*. 2024;11:1302363.
 18. Mizes A, Vainder C, Snyder Howerter S, et al. Access to consultative dermatologic care via physician-to-physician asynchronous outpatient teledermatology. *AJMC*. 13 Jan 2021. Accessed 6 Mar 2025. <https://www.ajmc.com/view/access-to-consultative-dermatologic-care-via-physician-to-physician-asynchronous-outpatient-teledermatology>
 19. Moreno-Ramirez D, Ferrandiz L, Nieto-Garcia A, et al. Store-and-forward teledermatology in skin cancer triage: experience and evaluation of 2009 teleconsultations. *Arch Dermatol*. 2007;143(4):479–484.
 20. Sekaran A, Vetsiou E, Shah A, Khoo A. The use of teledermatology for skin cancer referrals: a retrospective study in a single tertiary centre. *Cureus*. 2024;16(8):e68284.
 21. Pala P, Bergler-Czop BS, Gwizdź J. Teledermatology: idea, benefits and risks of modern age – a systematic review based on melanoma. *Adv Dermatol Allergol*. 2020;37(2):159–167.
 22. Issa CJ, Reimer-Taschenbrecker A, Paller AS. A call for implementing augmented intelligence in pediatric dermatology. *Pediatr Dermatol*. 2023;40(3):584–586.
 23. GAPP Wait Time Report. SDPA. Accessed 6 Mar 2025.
 24. Maddukuri S, Patel J, Lipoff JB. Teledermatology addressing disparities in health care access: a review. *Curr Dermatol Rep*. 2021;10(2):40–47.
 25. Cyr ME, Boucher D, Holmes AA, Benneyan JC. Modelling policy interventions to improve patient access to rural dermatology care. *Oper Manag Res*. 2021;14(3–4):359–377.
 26. Young AT, Xiong M, Pfau J, et al. Artificial intelligence in dermatology: a primer. *J Invest Dermatol*. 2020;140(8):1504–1512.
 27. İsmail Mendi B, Kose K, Fleschner L, et al. Artificial intelligence in the non-invasive detection of melanoma. *Life*. 2024;14(12):1602.
 28. Nursing workforce fact sheet. American Association of Colleges of Nursing. Accessed 2 Oct 2025. <https://www.aacnursing.org/news-data/fact-sheets/nursing-workforce-fact-sheet>
 29. Total number of nurse practitioners | KFF State Health Facts. KFF. Accessed 2 Oct 2025. <https://www.kff.org/other-health/state-indicator/total-number-of-nurse-practitioners/>
 30. Six Domains of Health Care Quality. Agency for Healthcare Research and Quality. Reviewed Mar 2025. Accessed 2 Oct 2025. <https://www.ahrq.gov/talkingquality/measures/six-domains.html>
 31. Beames C, Adelson P, Sharplin G, Eckert M. Primary care nurse's role and educational preparedness in skin cancer screening and early detection: a scoping review. *J Adv Nurs*. 2024;80(6):2228–2251.
 32. NHE fact sheet. US Centers for Medicare & Medicaid Services. Accessed 2 Oct 2025. <https://www.cms.gov/data-research/statistics-trends-and-reports/national-health-expenditure-data/nhe-fact-sheet> **NPPA**