MetaOptima

White Paper | DermEngine: Intelligent Solutions For Patient-Centric Care

DermEngine | Intelligent Solutions For Patient-Centric Care

Abstract

As the rates of skin cancer cases continues to rise at an annual rate of 7.7%, dermatologists, GPs and other medical professionals are unable to meet the growing need for detecting this disease at the earliest possible stage for optimized health outcomes. DermEngine, an intelligent dermatology platform, can support this demand through increasing the accessibility, efficiency, and quality of provided services through features such as teledermatology, clinical decision support, communications network, and cross-platform accessibility.

Introduction

Nearly two-thirds of dermatology practices in the U.S. serve an abundance of patients suffering from general dermatology cases.[1] In addition to this backlog of patient cases for general concerns, one in five Americans are projected to be diagnosed with a form of skin cancer within their lifetime.[2] To overcome these life-threatening burdens, patients must be able to quickly receive fast, accessible, and quality care from their healthcare provider to promote the early detection of skin cancer and achieve sustainable positive care outcomes. Unfortunately, in many areas this fails to be the case, as wait times of over 60 days.[3]

Below are DermEngine's solutions to current problems overwhelming the healthcare systems when it comes to dermatological problems : *accessibility, efficiency, and quality*. For each challenge, the platform applies the latest technology in artificial intelligence (AI) designed to adapt to a variety of scenarios while streamlining everyday dermatology and primary care workflows.

[1] https://brandongaille.com/23-dermatology-industry-statistics-and-trends/
[2] https://www.myamf.org/statistics
[3] https://practicaldermatology.com/archive/2019

1. Accessibility

Unfortunately, due to an ongoing dermatologist shortage, over 40% of the U.S. population lives in areas underserved by dermatologists, with many being forced to wait over 60 days for an appointment.[4] The lack of specialists poses a direct challenge to patients receiving life-saving skin checks, resulting in a bottleneck of inefficiency for provided care. This directly hinders early detection initiatives, leaving patients with a much greater risk of identifying the condition at a later stage, when chances of survival have greatly decreased.

Teledermatology for Advanced eTriage

Recognized as the largest and fastest-growing telemedicine sector in the world, teledermatology constitutes roughly 30% of the market share, with a projected CAGR of 8.7% from 2016-2024, valued at an estimated $8.6 billion by the end of the forecast period.[5]

Teledermatology is becoming widely adopted for its accessibility and credibility, with multiple studies determining that these services act as a highly effective triaging tool. As part of eTriage, face-to-face referrals can be reduced by as much as 88% alongside surgery wait times and no-shows in an attempt to declutter general care patient volume.[6] Utilizing this proven model, DermEngine helps partners streamline consultations with its unique smart teledermatology technologies, thus increasing connectivity and rapid care between a healthcare professional and patients in need.

The delay in access to quality skincare represents a multi-faceted problem within the healthcare system. In addition to deterring time-sensitive early detection efforts, GPs are seeing a significant increase in dermatology-related consultations; as of 2018, in the U.S. only 30% of these cases are evaluated by a dermatologist.[7] Furthermore, the level of expertise required to diagnose a dermatology case can exceed the scope of a GP's skill set- unless they have received additional training- resulting in a greater risk for loss of confidence for clinical decisions.

DermEngine is a cloud-based platform designed to address the unique challenges present in today's healthcare framework. Utilizing the software's connective network, GPs can refer complex skin cases to their colleagues (both in and out of the system) in real time to prevent care delays while eliminating valuable time lost on uploads or transfers. As a direct result, medical professionals are able to provide streamlined care supported by confident, informed decisions at every step of the process.

---

[4] https://practicaldermatology.com/issues/2015-sep
[5] https://www.goldsteinresearch.com/report/tele-dermatology-market-outlook-2024-global-opportunity-and-demand-analysis-market-forecast-2016-2024
[6] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6092076/
[7] https://brandongaille.com/23-dermatology-industry-statistics-and-trends/

Building on this patient-centric model, medical professionals have the opportunity to empower their patients with a mobile dermoscope for in-home imaging. Since 70% of skin cancer cases are initially detected by the patient themselves or their loved ones, why not equip them with the tools to support continued engagement in the ongoing care for their skin health? By submitting high-quality images directly through the associated patient portal to DermEngine, medical professionals can limit unnecessary in-clinic visits and prioritize high-risk cases.

2. Efficiency

The average dermatology appointment lasts approximately 20 minutes per patient, resulting in professionals being able to see 28-30 patients a day. Surprisingly, research shows that there are dermatologists seeing an overwhelming 60+ patients per workday, which unfortunately reduces consultation quality.[8]

How is AI adding value?

In order to manage this growing demand while continuing to provide high quality care, medical professionals need to take advantage of the added value of AI as an intelligent assistant. State-of-the-art medical technology enables a sustainable initiative that equips doctors with tools to revolutionize how practices see critical patient cases at a faster pace.

DermEngine's Visual Search utilizes award-winning software powered by artificial intelligence to support medical professionals with the resources for confident, evidence-based decisions. Set to revolutionize the dermatology industry, DermEngine acts as an intelligent assistant to support for medical experts with their skin consultations. Trained by tens of thousands of previously histopathologically-labelled lesions, Visual Search perfectly complements a GP or dermatologists extensive medical knowledge.[9]

Driven by a proven model designed to learn from a growing wealth of comparable data, DermEngine's Visual Search equips medical professionals with a powerful resource for training and education, leading to higher accuracy in clinical decisions while preventing mental fatigue on repetitive tasks, thus improving care outcomes. Indeed, if dermoscopy training is made available and the right tools provided, medical professionals have the opportunity to raise the accuracy of skin cancer detection by as much as 35% through practicing dermoscopy while increasing survival rates by up to 85%,[10] resulting in as many as 8,000 lives saved in the United States alone.[11]

With nearly one American dying from melanoma each hour,[12] DermEngine is on the front lines in the fight against skin cancer by providing dermatologists and physicians with tools designed to optimize decision making management. The widespread usage of this strategy holds great

---

[8] https://www.statista.com/statistics/250219/us-physicians-opinion-about-their-compensation/
[9] https://www.dermengine.com/blog/metaoptima-isic-2018-skin-disease-classification-artificial-intelligence
[10] https://www.dermnetnz.org/cme/dermoscopy-course/introduction-to-dermoscopy/
[11] https://www.nature.com/articles/s41746-017-0012-2
[12] https://www.aad.org/media/stats/conditions/skin-conditions-by-the-numbers

potential to relieve practices from inadequate and inefficient workflows in an attempt to help fight against melanoma and the other 3 million skin cancer cases projected to be diagnosed in the United States over the next year.[13]

Total Body Photography (TBP)

The early detection of skin cancer is imperative to high survival rates. It follows that skin checks (recognized for their ability to promote early detection) should be performed on body parts of at-risk patients. However, traditional TBP equipment requires significant capital investments and custom-made facilities to accommodate large, costly equipment for time-consuming procedures.

DermEngine offers the power of TBP with the ease of image capturing either through a smartphone or DermEngine's intelligent imaging drone, DermDrone- set to refine how consultations are performed.

Smartphone Imaging

Equipped with intuitive features like template-guided imaging, the DermEngine app lets medical professionals take high quality images directly with their smartphone, where they'll be synced with the web platform in real time for streamlined workflows.

Of similar convenience, DermEngine's TBP solution is compatible with other machines such as MoleMax, FotoFinder, DermoScan, and other well-known brands available in the market. DermEngine is also capable of integrating with established EMR systems to allow an easy and practical flow of data in real time enabling medical professionals to take advantage of the latest AI-driven tools on DermEngine.

DermDrone

Compiled of the latest innovations for AI in dermatology, DermDrone is programmed to carry out total body photography with a minimalistic solution. Compared to current standards, this drone is a fraction of the typical costs and eliminates the need for large rooms to hold bulky machines.

Captured images are synced with DermEngine, where the Mole Mapping tool can perform a smart mapping of the patient's spots to their virtual 3D Body Map. When the patient returns for their next imaging session, Mole Matching will then identify differences between two consecutive images and sorting them based on the amount of change, allowing risk factors to be assessed and prioritized for optimum patient care. As part of this initiative to promote optimized workflows, DermEngine's intelligent TBP solutions perform this complex imaging in less than 6 minutes - a drastic reduction of 92% compared to traditional TBP machines.[14,15]

---

[13] https://www.aad.org/media/stats/conditions/skin-conditions-by-the-numbers
[14] https://patienteducation.osumc.edu/Documents/FullBodyPhoto.pdf
[15] (10min-120min)/120min*100=-91.67%

3. Quality

Melanoma, the deadliest form of skin cancer can become lethal in as little as six weeks.[4] When detected in its early stages, survival rates are over 98%, however, when left unnoticed the chance of survival drops to only 16%.[16] These effects are reported to cost the US government a projected $3.16 billion by 2022, resulting in a significant cost increase of 34% over the past decade.

MetaOptima offers solutions to these problems by creating a patient-centric ecosystem that maximizes the quality of care using efficient and accessible tools. MoleScope and DermEngine provides doctors and patients access to cutting-edge technology that captures medical-grade quality images for dermatology analysis. Following this model, skin cancer experts can conveniently manage and analyze dermoscopic images, which enhances the chances of the early detection of melanoma by 15.6 times compared to naked-eye examinations.[17]

The combined negative effects of the patient surplus and dermatologist shortage is overwhelming the health system, leading to a growing demand for general dermatology in practices of all kinds, including mid-level care providers. However, the quality of skin care in these practices does not always equate to the care provided by a board-certified dermatologist.[18] In addition to high-quality skin cancer detection tools, DermEngine's versatility offers solutions to these challenges of addressing general skin cases in the health system. Our intelligent dermatology platform satisfies the unique needs of today's healthcare and skincare framework by providing the latest medical-grade quality technology and educational resources to a wider variety of medical professionals for confident care assessments.[19]

Additionally, medical professionals have the opportunity to connect with their colleagues using DermEngine's network sharing feature, to further increase the quality of care provided. At any point in the care cycle, whether the medical professional is a member of the platform or using another software, the physician has the ability to refer a challenging case to a dermatologist or other expert in their network for deeper insights. As an alternative to connecting with colleagues, DermEngine's AI algorithms are able to act as an intelligent assistant, as recently shown in a study by Tschandl *et al* (2019).[20] Their findings demonstrated that AI algorithms produced an average of 2.01 more accurately classified images than human classification readers. When tested on a variety of lesions, the top three algorithms produced a classification scoring power of 25.42 correct images (out of a total of 30) while a large group of human experts were able to achieve fewer than 19 correct answers. Though still in its early stages of application, this AI-based technology is set to integrate

---

[16] https://www.cancer.net/cancer-types/melanoma/statistics

[17] https://wiki.cancer.org.au/australia/Clinical_question:What_is_the_role_of_dermoscopy_in_melanoma_diagnosis%3F

[18] https://jamanetwork.com/journals/jamadermatology/article-abstract/2678685

[19] https://www.dermatologytimes.com/skin-cancer/treating-melanoma-cost-care-vs-value-life

[20] Tschandl, P. *et al*. Comparison of the accuracy of human readers versus machine-learning algorithms for pigmented skin lesion classification: an open, web-based, international, diagnostic study. The Lancet Oncology (2019) Vol. 20, Issue 7, 938-947.

with real-life practice and bring a new era of intelligent analysis to dermatology. In turn, this holds immeasurable potential to positively affect millions of patients' lives and healthcare stakeholders worldwide with better, safer and cost-effective care.

Using either form of decision support - whether it be traditional peer-to-peer networking or an intelligent assistant - adding different perspectives from trusted and proven sources within a network demonstrates a patient-centric approach that collaborates with other medical professionals and new technologies to ensure a higher level of care outcomes.

Conclusion

The overburdened health system in the U.S. - linked to excessive patient demand that greatly exceeds dermatologist supply - creates a negative ripple effect among skin care specialists, thus influencing general practitioners to accommodate unseen dermatology patients. By combining advanced technology with intuitive medical tools, DermEngine is able to suit the needs of practices of any nature, including dermatology and primary care providers.

DermEngine provides high-quality medical tools to users regardless of geographic location using cloud-based technology, which in turn increases practices ability to serve more patients.

The unmatched efficiency of the platform's award-winning AI algorithms are currently being proven in real-world practices to act as a successful clinical assistant that leave doctors with confident, evidence-based decision making power. DermEngine's Visual Search and Total Body Photography features relieve practices of time-consuming and tedious tasks, while supporting the fight against skin cancer to increase survival rates across the country.

Using intelligent dermatology in a patient-centric ecosystem, DermEngine uses accessibility, efficiency and quality to not only address the common challenges that dermatology and general healthcare practices face everyday, but also create new opportunities that streamline clinical workflows and increase positive patient outcomes.