Chatbot utilization in dermatology: a potential amelioration to burnout in dermatology

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To the Editor:

Chatbots are software applications that use steps or scripts to automate natural communication with users [1, 2]. Chatbots were first trialed in 1964 with ELIZA created by Joseph Weizenbaum, designed to act as a Rogerian psychotherapist [2,3]. Chatbots have been used in virtually every industry to afford customers communication via messaging without speaking with a human associate [3]. There are over 5100 chatbot programs today, with over 100 used in healthcare applications [4]. In 2020, the chatbot market was valued at US$ 17.17 billion and is projected to reach $102.29 billion by 2026. Major stakeholders in the market include IBM, Google, Amazon, Creative Virtual Ltd, LiveChat, and Facebook [5].

In healthcare, chatbots have the potential to improve the quality of the patient experience and care by facilitating communication, improving workflow and efficiency of appointment scheduling and reminders, and assisting with diagnostics, treatment discussions, and patient education [5,7]. They have been instrumental in various areas including providing support to patients with breast cancer [6], increasing nicotine abstinence rates in smoking cessation trials [1], conversing with non-verbal children on the autism spectrum [7], and improving cardiovascular medication adherence [8]. In dermatology, however, they have not become widely used clinically. With steadily rising rates of communication through patient electronic medical records (EMR), a potential use lies within artificial intelligence (AI) and chatbot technology to triage, diagnose, and manage skin disorders in a more efficient manner, further widening dermatologic access [9].

The implementation of electronic medical records interfacing with patient portals has created a marked rise in communication between patients and providers [9]. Patients can easily and with little effort report new problems, follow-up on previous visits, schedule appointments, and ask questions [6]. The portal offers expedited evaluation and treatment, time saving, and increased efficiency in managing patient care. Additional benefits include improved medication adherence and decreased no-show rates [9]. This has led to a substantial increase in the number of messages received annually, with primary care providers reporting an average of 66.8 minutes per day processing notifications [10, 11]. From 2013 to 2018, primary care provider message responses increased from 153 to 322 per provider per year, a 110% change [11]. For multispecialty providers at one institution, an increase of 253% was observed, from 15 to 53 responses per provider per year [11]. In another multispecialty, institution-wide study, a 348% increase in annual portal message threads was documented, increasing from 108,121 threads in 2008 to 484,374 in 2010 [12]. Among the medical specialties, dermatology ranked second in growth rate of message utilization and reported an 84.4% probability of using online messaging [13]. An additional report showed a mean of 24.57 messages received per half-day session by dermatologists [13].

Furthermore, one study demonstrated that dermatology practitioners received a higher proportion of messages with image attachments than non-dermatology specialties (31.44 messages per 100 arrived visits versus 26.11, respectively, P<0.05), providing an additional burden to dermatologists [14]. However, more studies are needed to quantify the full extent of dermatology messaging burden.

As the rate of patient messages increases each year, there is an observed increase in the degree of physician burnout [15]. In 2021, 42% of physicians reported burnout, largely driven by too many bureaucratic tasks and exacerbated by increased computerization of practice [16]. Low satisfaction with EMR was associated with a 30% increased risk of burning out [17]. In dermatology, 29% of providers reported burnout in 2021, with the most common cause being excessive documentation and time spent on the EMR [17,19]. A prominent solution proposed, in addition to reducing work hours, is adjustments to workflow and staff changes to ease workflow [16].

Discussion

Patient messaging content can be categorized into diagnosis, treatment options, appointment scheduling and reminders, and patient education and support [4]. Virtual chatbot history gathering is an area of active study [18]. The possibilities for chatbots in dermatology assisting with diagnosis would involve gathering symptom data, which can be obtained both from patient free form messages, followed by a list of ensuing checkbox type questions and pictures of active skin disease. Triage capabilities could similarly be assessed by severity categorization, thus aiding in scheduling recommendations. In fact, EMR triage technology has been implemented for patients experiencing adverse effects associated with immune-checkpoint inhibitor toxicities [19]. Furthermore, machine learning models have been trained on patient portal messages leading to automation of medical decision-making complexity [20]. Dermatologists receive significantly more images in patient-generated messages, compared to other specialties and can thus benefit from AI chatbots trained on image recognition [14]. The biggest benefit of chatbots for dermatologists is the decrease in both number of patient messages to respond to, and number of interruptions to workflow. This would allow for better triaging of messaging, allowing for higher risk patients to be scheduled for in-person appointments in an expedited manner.

From a patient perspective, chatbots offer early screening and diagnosis, discussions regarding treatment options, after visit follow-ups, and routine monitoring. This increased support is provided while affording the opportunity of fewer in-person visits [21]. Patients can interact with chatbots to detail their symptoms, answer questions about their mental health, receive information about their diagnosis, and explore pertinent therapies/side effects. They can answer personal questions and some studies have shown patients prefer chatbot communication over computer based questionnaires [22]. Regarding current applications in dermatology, a hidradenitis suppurativa chatbot has been implemented, providing supplemental communication with hidradenitis suppurativa patients [23]. In addition, a chatbot, 'Beautybot', provides information to patients on topics like wrinkles and pigmentation [24].

Additionally, scheduling information can be programmed into chatbots, allowing patients to select from available appointment dates. Provided the amount of image attachments dermatologists receive, one practical chatbot intervention could be converting a 'new lesion' image into a teledermatology or in-person visit. After a diagnosis is reached, patients can be provided with information including information about treatment side effects and monitoring. Continued symptom monitoring may be ongoing and assessment for impact on quality of life is possible. Furthermore, after-visit follow-up questions and clarification regarding treatment course and plan can be addressed in a timely manner without requiring further appointments or calls. Thus far, studies have shown patients are responsive to communication with chatbots. One non-inferiority trial in breast

cancer communication found chatbots noninferior to physicians in communicating diagnosis, prognosis, and treatment [25].

Conclusion

The practice of clinical medicine is changing at unprecedented rates. The emergence of new avenues for patient care and communication offers exciting promise for expedited care, while at the same time further exacerbating physician dissatisfaction with EMR and exacerbating burnout. As AI and machine learning technology continues to progress, chatbot technology offers a promising option for automation within the field of dermatology. Furthermore, given the visual nature of dermatology, integration of chatbots with image classification technology could be a particularly interesting application of specialized technology in the field.

Potential conflicts of interest

The authors declare no conflicts of interest.

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