Given the new normal post COVID-19, what changes do you see in dermatology services over the next 5 years?

Introduction:

COVID-19 has drastically impacted dermatology through the use of telemedicine consultations, the increase in artificial intelligence (AI) and machine learning (ML) approaches to dermatology and reduced surgical treatment. In this essay, I shall discuss how these will continue to change dermatology services over the next five years.

Telemedicine:

Since the pandemic started, we have seen a shift towards remote consultations in both primary and secondary care. According to a study evaluating telemedicine in the Mayo Clinic during the pandemic, it has helped to maintain continuity of care whilst maximising patient and healthcare worker safety (1). It has also provided more efficient care, particularly for unwell patients who could not travel into the hospital or GP surgery for face-to-face appointments (1). Telemedicine has also improved patient satisfaction since patients can now have a telephone or video appointment during their working day instead of having to miss work or school for their face-to-face appointment, highlighting its benefits.

Telemedicine has been used for some time in dermatology (teledermatology) before the pandemic but has only just emerged in primary care. During a GP placement, my GP tutor highlighted how they could now send photos of skin lesions to dermatologists and receive prompt responses whereas before, patients would have to wait for an appointment with a

dermatologist after referral. This is due to many trusts creating new 'Advice and Guidance' request pathways where dermatologists would reply to GPs within 48 hours (2).

However, teledermatology does have drawbacks. For instance, photos of skin lesions would be of reduced quality than seeing patients' skin face-to-face, which could increase misdiagnoses. The aforementioned BAD report highlighted this as a key issue across all Trusts (2) and reduces the efficiency of care provision since patients would require a face-to-face review. Misdiagnoses are more common in patients of coloured skin due to gaps in knowledge, which are now being narrowed in medical education through including coloured skin images in the BAD Dermatology Handbook for example (3).

Another key issue with teledermatology is that GPs and dermatologists can only inspect and not palpate photos of patients' skin. There are also issues with privacy and data protection of patient images since the BAD remote teledermatology guidance has stated that GPs have been transferring them via generic email addresses and mobile text messages (4). Departments need to develop secure pathways for image transfer if teledermatology will stay long-term.

Therefore, as we recover from the pandemic during the next 5 years, it is important that we investigate teledermatology services to find out which patient groups it is useful for whilst ensuring that it is safe, efficient and easy to use.

Artificial intelligence and machine learning in dermatology:

There is evidence that artificial intelligence (AI) can assist clinicians to improve human clinical decision making due to more healthcare data being available and rapid development of big data analysis (5). Machine-learning (ML) approaches such as support vector machines and convolutional neural networks have been shown to be the most accurate at skin cancer detection (6), with a rapid development of commercially-developed applications that claim to detect early skin cancer using ML. Many (especially smartphone applications) can be used from the patient's home without having to visit a healthcare professional. Three examples, Skin Vision, Skin Analytics and Fotofinder Moleanalyser Pro show promising accuracy (7, 8, 9) (Figure 1).

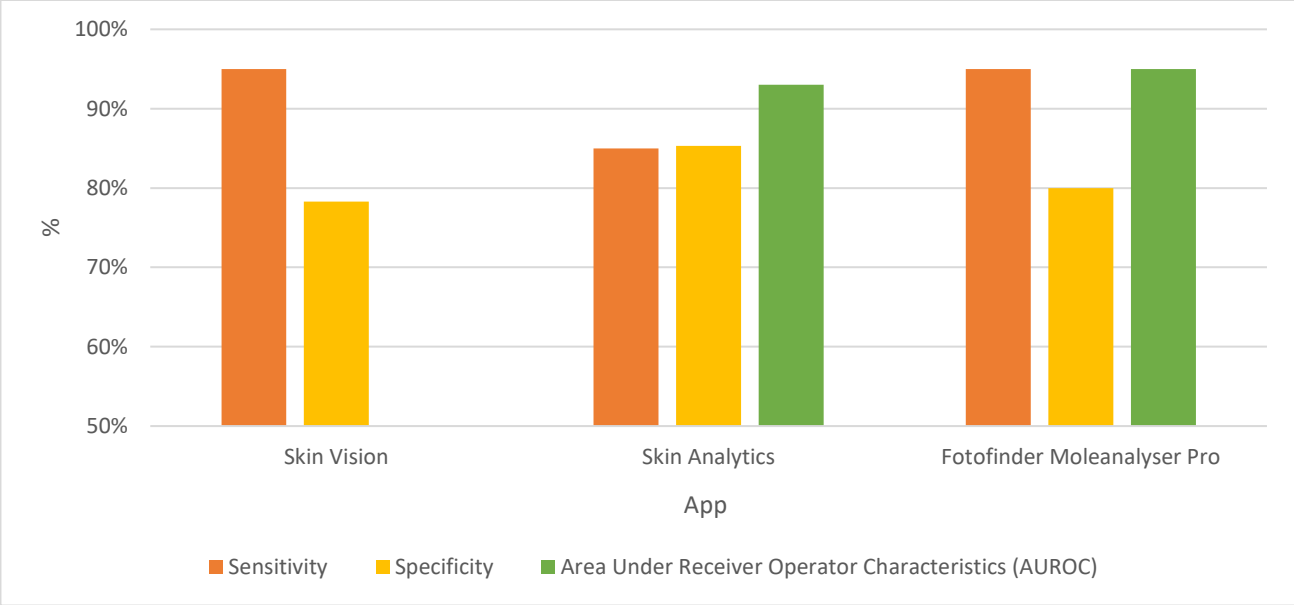

Figure 1: A graph showing the accuracy measures of three commercially-developed applications

However, these apps show false positive rates of above 10%. This can make patients with benign moles worried that they have cancer, and with the pandemic already increasing their stress and anxiety levels, you can imagine how this would impact their mental health. These

apps may thus do more harm than good. Furthermore, only the applications specified above have any published evidence evaluating their accuracy. Further research evaluating the accuracy of other apps as well as patient and clinician acceptability must be done to determine their utility in skin cancer detection.

As the use of AI and ML in dermatology will only increase over the next 5 years, it is important that it is used well to preserve doctor-patient integrity and minimise patient anxiety.

The surgical aspect of dermatology:

The pandemic has severely impacted dermatology's surgical aspect. The results of a survey exploring the impact of COVID-19 on Mohs surgery services in the UK show that not only has it caused a shift from face-to-face to telephone consultations but also a change in surgical technique itself, with reduced external reconstruction and increased use of dissolvable sutures (10). This removes the need for patients to return to theatre for suture removal, reducing the number of patients entering hospital during the pandemic.

During the first wave of COVID-19, we saw a cancellation of elective surgeries worldwide (10). Since this increased the risk of tumorigenesis for cancer patients, the Society of Surgical Oncology created risk assessment resources for the surgical management of cancers on a case-by-case basis. For melanoma, the resource stated that surgical resection of T3/T4 melanomas (>2mm thickness) should take priority, sentinel node biopsy should only be performed on lesions >1mm and that metastatic resections should cease for now (11). Since patients with lower-grade or metastatic melanomas could not have surgery during this time,

they may have undergone alternative cancer treatments such as chemotherapy and radiotherapy. During the next 5 years, we may see an increase and plateau of these treatment forms as well as further development of technology that may enable surgeons and theatre staff to scrub in remotely using mobile devices and extended services to hard-to-reach populations (12).

Conclusion:

I believe that the use of telemedicine and AI will continue over the next 5 years as we recover from the pandemic. Whilst the pandemic has taught us that we can use these services in dermatology, it is now important for us to learn when the use of these services will be appropriate and how we can balance patient care to ensure that it is accurate, efficient, safe and user-friendly.

Word count: 999

References:

1. Temesgen ZM, DeSimone DC, Mahmood M, Libertin CR, Palraj BRV, Berbari EF. Health Care After the COVID-19 Pandemic and the Influence of Telemedicine. Mayo Clinic Proceedings. 2020 Sep 1;95(9):S66–8.

2. Dermatology: Response to and Lessons Learnt during the COVID-19 Pandemic [Internet]. Bad.org.uk. 2020 [cited 4 January 2021]. Available from: https://www.bad.org.uk/shared/get-file.ashx?itemtype=document&id=6964

3. 3. Chiang N, Verbov J. Dermatology: A handbook for medical students and junior doctors [Internet]. 3rd ed. 2020 [cited 5 January 2021]. Available from: https://www.bad.org.uk/shared/get-file.ashx?itemtype=document&id=6595

4. British Association of Dermatologists - COVID-19: Clinical guidelines for the management of dermatology patients remotely [Internet]. Bad.org.uk. 2020 [cited 4 January 2021]. Available from: https://www.bad.org.uk/healthcare-professionals/covid-19/remote-dermatology-guidance

5. Esteva A, Kuprel B, Novoa RA, Ko J, Swetter SM, Blau HM, et al. Dermatologist-level classification of skin cancer with deep neural networks. Nature. 2017 Feb;542(7639):115–8.

6. Rodrigues D de A, Ivo RF, Satapathy SC, Wang S, Hemanth J, Filho PPR. A new approach for classification skin lesion based on transfer learning, deep learning, and IoT system. Pattern Recognition Letters. 2020 Aug 1;136:8–15.

7. Udrea A, Mitra GD, Costea D, Noels EC, Wakkee M, Siegel DM, et al. Accuracy of a smartphone application for triage of skin lesions based on machine learning algorithms. Journal of the European Academy of Dermatology and Venereology. 2020;34(3):648–55.

8. Phillips M, Greenhalgh J, Marsden H, Palamaras I. Detection of Malignant Melanoma Using Artificial Intelligence: An Observational Study of Diagnostic Accuracy. Dermatol Pract Concept [Internet]. 2019 Dec 31 [cited 2020 Dec 21];10(1). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6936633/

9. Haenssle HA, Fink C, Schneiderbauer R, Toberer F, Buhl T, Blum A, et al. Man against machine: diagnostic performance of a deep learning convolutional neural network for dermoscopic melanoma recognition in comparison to 58 dermatologists. Annals of Oncology. 2018 Aug 1;29(8):1836–42.

10. Nicholson P, Ali FR, Mallipeddi R. Impact of COVID-19 on Mohs micrographic surgery: UK-wide survey and recommendations for practice. Clinical and Experimental Dermatology. 2020;45(7):901–2.

11. Anon. Surgonc.org. 2020 [cited 26 December 2020]. Available from: https://www.surgonc.org/wp-content/uploads/2020/03/Melanoma-Resource-during-COVID-19-3.30.20.pdf

12. Karim JS, Hachach-Haram N, Dasgupta P. Bolstering the surgical response to COVID-19: how virtual technology will save lives and safeguard surgical practice. BJU International. 2020;125(6):E18–9.