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LETTER TO THE EDITOR

Smartphone Teledermoscopy Referrals: Comment on the paper by Börve et al.

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Sir,

We read with interest the findings of Börve et al. (1) who compared the outcome for patients with suspected skin cancer referred to two dermatology departments in Sweden via smartphone teledermoscopy compared to traditional paper referrals. They concluded that patients with malignant tumours referred via smartphone teledermoscopy had significantly shorter waiting times for surgical treatment. In addition, they considered that smartphone teledermoscopy triage decisions were more reliable than paper referrals and also that 40% of the teledermoscopy patients could have avoided face-to-face consultations.

In Scotland, we face similarly increasing rates of skin cancer, and consequently an increasing number of referrals to dermatology from primary care, which are not currently matched by increased service provision. With a national 62-day referral to treatment target for malignant melanoma, technological innovations which could potentially reduce referral to treatment time and allow better prioritisation of malignant tumours would be welcomed. While several UK centres currently use teledermatology there is usually an interim step of the patient attending secondary care for clinical images to be taken by a medical photographer. As 3/4 of junior doctors in the UK owned a smartphone in 2012 (2), this suggests that there would not require to be a significant investment in equipment to implement teledermoscopy referral in the UK.

We did, however, identify some methodological concerns with the study. The lack of randomisation seems to have resulted in significant recruitment bias: the group of patients with lesions referred via smartphone teledermoscopy tended to be younger, were more likely to be female, had nearly twice the percentage of malignant melanocytic lesions, and almost half the amount of malignant non-melanocytic lesions than those referred via the traditional system. The acknowledged variation in triage systems and waiting times between the two centres in the study makes it difficult to give credence to the results. In addition, the physicians performing the face-to-face consultations were not blinded to the results of the assessments of the teledermoscopists.

The authors show a short decrease in time to first visit for malignant melanoma (14 to 9 days), melanoma *in situ* (17 to 10 days) and squamous cell carcinoma (21 to 13 days) but these short reductions are unlikely to be clinically relevant – and could potentially be achieved with a straightforward electronic referral system compared to paper letters sent in the post. What was more striking was the reduction in waiting time for surgery for these lesions. However, it is unclear what the relevance of the teledermoscopy referral system was to this as the time to first visit was so similar – was there different allocation of surgical resources to support the teledermoscopy clinics? Or did the teledermoscopy referral system allow for better planning of surgical sessions? While we offer one-stop see-and-treat lesion clinics, a system of pre-booked surgical treatment following teledermoscopic assessment would permit more efficient use of surgical resources and faster treatment times for concerning lesions.

The paper did not clarify why more of the teledermoscopy patients were able to receive primary treatment on a single face-to-face visit with a dermatologist than the paper referral cases and why they required fewer visits than the paper referral group – does this reflect differing complexities of the lesions referred or the fact that patients with multiple lesions had to be referred via the traditional system? One of the major weaknesses of the iDoc24 PRO®app is the inability to refer multiple lesions at once – but perhaps patients with multiple lesions could have the most suspicious lesion photographed, or receive an automatic upgrade in referral priority to circumvent this. It would have been interesting if the authors had attempted to calculate the additional diagnostic benefit of a dermoscopic image compared to a simple clinical photograph; this could be the subject of a subsequent study.

Finally, while the ability to make optimal use of scant dermatological resources makes smartphone teledermoscopy referrals an appealing innovation, the authors' assertion that patients with lesions triaged as benign via teledermoscopy could potentially avoid face-to-face visits with a dermatologist does cause us some concern. As the authors acknowledge, face-to-face visits enable the potentially significant pick up of incidental lesions, (3) as well as opportunities for patient education and health promotion. We applaud the authors on their study and look forward to further developments in this field, particularly clarifying the issues we have identified.

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Response to the Letter by Leitch et al.

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We would like to thank Leitch et al. for their valuable comments and questions regarding our article (1). As the authors suggest, national health care systems such as the ones in Scotland or other areas of the UK in which patients with skin lesions of concern have to see primary care physicians before meeting a dermatologist would benefit greatly from the implementation of simple and straightforward technology for teledermoscopy (TDS) referrals. Implementing teledermatology services as they describe in an interim step in secondary care and having to involve a medical photographer in this process, on the other hand, adds unnecessary waiting times and costs as compared to our model (1).

As pointed out by Leitch et al. and as we already discussed in the article, recruitment bias could have been avoided by randomising the patients to be referred via either traditional paper referrals or smartphone TDS referrals. Randomisation was considered the optimal solution when designing the study, but this idea had to be discarded since it would have been too time-consuming and expensive to carry out in a real-life scenario.

Leitch et al. also mention the fact that the physicians performing the face-to-face (FTF) consultations could have been blinded to the teledermoscopists' assessments. This was however impossible since the referral information needed to carry out and document the outcome of the FTF visit (e.g. patient data and contact details to the referring physician) was integrated with the images and the assessment information sent through the TDS system. Separating all this information could technically have been possible but would have required expensive changes to the TDS system.

Regarding the shorter waiting times for surgical treatment in the TDS referral group as compared to the paper referral group, this was mainly due to the efficiency of the TDS system in predicting the need for surgery. Although, both participating dermatology departments generally try to apply a so-called "one-stop see-and-treat" methodology in their routine clinical work, surgical excisions are not always possible on the patients' first visit due to time restrictions. As the authors suspected, TDS simply allowed for more efficient pre-booking of surgical treatment. For example, the number of malignant melanomas that were treated surgically on the patient's first visit with a dermatologist was 16 out of 19 (84%) in the TDS group and 2 out of 13 (15%) in the paper referral group ($p=0.0002$). Regarding melanoma *in situ*, 11 out of 16 (69%) were excised on the first visit compared to 2 out of 7 (29%) in the paper referral group ($p=0.17$). Furthermore, 12 out of 17 squamous cell carcinomas (SCC) (71%) underwent surgery directly compared to 2 out of 11 (18%) in the paper referral group ($p=0.018$). Excision was carried out on the first visit in 42 of the 55 basal cell carcinomas (76.4%) that were managed surgically in the TDS group as compared to 15 of 69 excised basal cell carcinomas (22%) in the paper referral group ($p<0.0001$). Among the 64 excised dysplastic naevi in the TDS group, 57 (89%) of the surgical procedures were carried out on the first visit, whereas 15 of the 26 excised dysplastic naevi (58%) were treated on the first visit in the control group ($p=0.002$). Finally, all 5 SCC *in situ* (100%) in the TDS group that were deemed to require surgery were excised on the first visit, as compared to 1 out of 4 (25%) of those that were treated directly in the control group ($p=0.048$).

Leitch et al. also comment on the inability to refer multiple lesions at once with the iDoc24 PRO® app. As mentioned in our article, this possibility can easily be fixed technically but requires better 3G coverage or WiFi at the primary healthcare centers (PHCs) in order for the images to be sent over the Internet. Installing WiFi in PHCs using the system to ensure this type of functionality is a simple and inexpensive task, but we could not demand this from the participating PHCs prior to initiating the study. The option of only photographing the most suspicious lesion in patients with multiple lesions of concern, as proposed by the authors, is another viable option to circumvent this issue.

As mentioned in our article, other studies have shown that adding a dermoscopic image to a teledermatology referral can increase the diagnostic accuracy by 15% (4). Although comparing teledermatology vs. teledermoscopy was not our objective, this type of analysis could be carried out in the future using the collected data.

Finally, Leitch et al. are concerned that the use of TDS to avoid unnecessary visits may lead to undiagnosed incidental lesions and less opportunities for patient education. Nevertheless, the almost immediate feedback given to the general practitioner (GP) through smartphone TDS creates an excellent opportunity for them to improve their diagnostic and health promotion skills. In the standardized responses sent back to the GP, dermatologists can always include a recommendation to the GP regarding the importance of carrying out full-body skin

exams. GPs can also be instructed to inform their patients about the risks of unhealthy sun exposure and warning signs of skin cancer. Furthermore, GPs can be reminded by the dermatologist to inform their patients about the importance of performing regular skin self-examinations. By the way, there is an app for that too now (5)!

REFERENCES (for both papers)

1. Börve A, Dahlén Gyllencreutz J, Terstappen K, Johansson Backman E, Aldenbratt A, Danielsson M, et al. Smartphone teledermoscopy referrals: a novel process for improved triage of skin cancer patients. Acta Derm Venereol 2015; 95: 186–190.
2. Payne K, Wharrad H, Watts K. Smartphone and medical related App use among medical students and junior doctors in the United Kingdom (UK): a regional survey. BMC Medical Informatics and Decision Making 2012; 12: 121.
3. Aldridge RB, Naysmith L, Ooi ET, Murray CS, Rees JL. The importance of a full clinical examination: assessment of index lesions referred to a skin cancer clinic without a total body skin examination would miss one in three melanomas. Acta Derm Venereol 2013; 93: 689–692.
4. Warshaw EM, Hillman YJ, Greer NL, Hagel EM, MacDonald R, Rutks IR, Wilt TJ. Teledermatology for diagnosis and management of skin conditions: a systematic review. J Am Acad Dermatol 2011; 64: 759–772.
5. Vañó-Galván S, Paoli J, Ríos-Buceta L, Jaén P. Skin self-examination using smartphone photography to improve the early diagnosis of melanoma. Actas Dermosifiliogr 2015; 106: 75–77.