Development of a national dataset of skin images to support evidence-based Artificial Intelligence (AI) in Dermatology

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Deep learning techniques for skin cancer diagnostics are evolving, with potential for rapid diagnosis and disruption of long established clinical pathways. Current commercial AI products show promise in focussed applications, however in-licence use require clinicians to confirm diagnoses, negating the potential of AI to replace human judgements in specific situations. Applications are not yet viable across the wide spectrum of skin disease presentations. To train AI to be part of an efficient integrated healthcare pathway for patients, there is a need for large image datasets. A collection of accurately labelled skin images (confirmed in-clinic or by histopathology) encompassing the diversity of skin types and variety of disease presentations is required to reflect real-world practice and create enduring AI.

Many dermatology departments hold image archives, but most collections are non-standardised; variably labelled, variably consented, captured with a multiplicity of software and hardware devices, non-anonymised with inherent biases e.g. rare cases or atypical clinical presentations. Our involvement in curating two such databases, during 2019/2020 has required approximately 15 minutes of medical time per final curated image ready for AI analysis confirming that a prospective approach is required to improve efficiency in data capture.

We describe the critical steps to create a centralised national clinical image dataset; including creating narratives for lay public and health service managers; standardising image capture operating procedures: identifying image capture hardware; formalizing quality standards for images and adapting DICOM (Digital Imaging and Communications in Medicine) standards and minimum information datasets to link image with key metadata to optimize performance of AI solutions. Novel approaches to increase the attachment of images with suitable referrals include community and locality imaging centres (CLICs) and encouraging wider use of approved pass-through apps on smart devices. Formal mapping of existing technical architecture for capture and storage of skin images will inform development of bespoke solutions, which will vary amongst health providers, depending on geography, demographics and existing infrastructure.

Whilst an AI platform may perform best with high-quality macroscopic and dermoscopic images, our intention is to also capture lower quality patient or remotely generated images to permit optimal training for AI digital platforms deployed along the entire patient pathway. We describe initial steps in the creation of a large national skin image database to substantially build momentum in this field to support the training and validation of AI platforms, to ensure evidence-based evaluation prior to deployment into routine clinical practice.