Classification: Official

Publication approval reference:

A teledermatology roadmap

Implementing safe and effective teledermatology pathways and processes: preparing for new innovations including Artificial Intelligence

Version 2: June 2023

Contents

Summary

Technology for both teledermatology and artificial intelligence (AI) is fast-moving. This updated roadmap considers recent developments. This guidance is not mandatory but sets out how NHS systems can meet the national expectation around accelerating the roll out of teledermatology to support the delivery of dermatology and skin cancer services and prepare for the deployment of AI as appropriate. The teledermatology roadmap is aimed at clinicians, managers and transformation leads working at a local, integrated care system (ICS) or regional level to support planning and delivery of transformation of dermatology services.

Teledermatology describes the use of digital images to triage, diagnose, monitor, or assess skin conditions without the patient being physically present. A high quality teledermatology service, as part of locally agreed pan-system redesign of dermatology services, can support transformation of services and elective recovery. Digital images can be used for any or all the following models to:

- enable specialist advice (advice & guidance) as the 'front door' to dermatology services, for adults and children with skin, hair and nail disorders and non-two-week wait skin lesion diagnosis and management
- support the virtual two-week wait skin cancer pathway which can, where clinically appropriate, replace a face-to-face appointment with a teledermatology pathway
- help prioritise patients on long waiting lists.

Artificial Intelligence (AI) is the use of digital technology to create systems capable of performing tasks previously thought to require human intelligence. Artificial Intelligence as a Medical Device (AIaMD), linked to teledermatology services, is demonstrating potential in the assessment of skin lesions in sites across England. Subject to independent evaluation this will inform future national support to the safe implementation of AI in dermatology at scale. AI as part of teledermatology services will require efficient, safe and effective teledermatology infrastructure.

The document has been developed with stakeholders including Getting It Right First Time (GIRFT), clinicians, relevant professional bodies, such as the British Association of Dermatologists (BAD), Primary Care Dermatology Society (PCDS), British Dermatological Nursing Group (BDNG), the Institute of Medical Illustrators (IMI) and organisations that represent the views and interests of people with lived experience, including the National Eczema Society, Vitiligo Support UK and the Psoriasis Association UK.

Key steps to deliver teledermatology now:

- Review the overall dermatology service to identify where teledermatology fits in; link this to review of low priority frameworks and referral guidance.

- Prioritise patient safety considerations at the outset; in particular when replacing a face-to-face interaction with a teledermatology one.

- Ensure patients are informed about their teledermatology care pathway, diagnosis and management plan, in a clear, compassionate and timely manner (Principle 1).

- Recognise that not all patients or dermatological lesions are suitable for teledermatology; for example rashes and lesions in patients with brown and black skin types may be more challenging to assess and diagnose. Ensure therefore that any teledermatology pathway redesign does not disadvantage patients or exacerbate health inequalities by involving local service users in the development of the pathway (Principle 1)

- Identify all workload to ensure that it will not create additional burden. Teledermatology should be designed to reduce the overall delays in the care pathway for patients without additional burden for healthcare professionals (Principle 2).

- Identify a project team to work collaboratively with all partners across the local healthcare system (including primary, intermediate and secondary care)

and engage with patients, to agree a model for teledermatology services (Step 1).

- Identify who will take high-quality images (including dermoscopic images), at what location, and who will review them; consider a pan-ICS approach. (Step 2).
- Identify the resources and funding required to design and implement the model, including capital, roll out and annual expenditure (Step 3),
- Maintain teledermatology pathways through continuous training across professional groups and care settings (Step 4),
- Accurately record and audit teledermatology activity to
    a. reflect the type of clinical contact
    b. demonstrate benefits
    c. learn from any drawbacks
    d. support sustainable funding (Step 5)
- Be clear about funding arrangements.

Why teledermatology?

There were about three million dermatology outpatient appointments in England in the year to April 2022 and dermatology services receive more urgent referrals for suspected cancer than any other specialty.

About half of the one million dermatology referrals per year are suspected skin cancer two-week wait referrals. Patients diagnosed with melanoma and squamous cell carcinoma make up about 8% of all two-week wait skin referrals. Many referred on this pathway have benign (non-clinically concerning) skin lesions. Teledermatology can reduce the number of face-to-face interactions offered for people with low-risk benign lesions. High quality, in focus images can often enable an accurate diagnosis of skin lesions. However, both dermoscopic and macroscopic

images are required to improve diagnostic accuracy for pigmented lesions and melanoma. Without dermoscopic images it is possible to diagnose and manage many benign skin lesions and directly book for surgery some squamous cell carcinomas (SCC) and many basal cell carcinomas (BCC).

Pan-system, locally agreed dermatology pathway redesign integrating teledermatology and AI (subject to satisfactory evaluation), is designed to help prioritise people with skin cancer resulting in less delay in treatment for those with rashes and long-term skin conditions.

A good teledermatology service must increase capacity in intermediate or secondary care for patients who need face-to-face consultations; this must be more than the time taken by clinicians to evaluate images. This will improve equity of access for everyone with skin disease, so patients are seen in the right place, by the right person at the right time.

Principle 1: Patient centred care

A teledermatology service must provide high-quality timely care for the right patients. People must be given clear information about their care.

- Patients must be given information about why images are needed, how they will be transferred and stored and informed about future care. This enables informed consent for the use of the images (eg. clinical care, teaching, research) and requires clear communication.

- Pathways should enable patient choice. Clinicians must be sensitive to people's concerns about being photographed and not directly or indirectly coerce patients to be photographed or share images of themselves. This is particularly important for skin conditions affecting intimate body sites where relevant guidance should be followed.

- Patients must not be disadvantaged if they cannot provide images or do not wish to have images taken. People may not have access to a smart device, they may need someone else to take the photographs and dermoscopy images will usually be needed for skin lesions. Therefore, the option to have images taken by appropriately qualified healthcare professionals in convenient settings should be available. Equity of access must be considered when redesigning dermatology pathways.

- The outcome of the referral must be communicated to the primary healthcare professional and patient in a manner agreed when the teledermatology service was set up and depending on the referral pathway.

- Not all patients or dermatological lesions will be suitable for teledermatology:

    - Patients with brown and black skin types may be more challenging to assess and diagnose.

- Patients with long-term inflammatory skin disease should usually only be managed via teledermatology if the referring clinician has the facilities and clinical experience to provide ongoing patient support and review based on the skin care management plan and support provided by the reporting skin specialist.

Principle 2: Avoid creating additional burden

Sustainable teledermatology pathways should make use of additional digital tools and be quick and simple so as not to increase burden for healthcare professionals or create additional steps in the patient journey. The following are important considerations:

- Teledermatology services require careful modelling and pathway design to reduce hospital attendances and make productivity gains. Consider pan-region models to share learning and benefit from economies of scale.

- Dedicated teledermatology platforms can add value by offering a direct patient interface, streamlining data capture and optimising the referral process. They can also be costly and time-consuming to implement and are not a pre-requisite to initiating teledermatology services.

- Administrative support is essential to realise efficiency gains with improved slot utilisation and cost-effective use of clinical time.

- The threshold of disease severity when asking for dermatology advice should be at the point that an outpatient referral would be made. Although this may be difficult to achieve, this is important to avoid overwhelming services and creating unwarranted variation.

- High quality, accurate images will reduce unnecessary ‘double activity’ of a teledermatology referral and a subsequent face-to-face consultation.

- Images must be accompanied by relevant clinical information (template proformas are available) so that the reporting clinician has enough information to make a diagnosis and management plan at the first teledermatology interaction.

Step 1 Identify the role of teledermatology in the local dermatology pathway

Systems should review local pathways of care for people with skin conditions and agree with key stakeholders the role of teledermatology within the whole service.

This pan-system approach will require:

- Review of existing patient pathways in the context of nationally developed guidance on referral optimisation, patient initiated follow UP (PIFU), remote consultations and equity of access to services.
- Review of referral guidelines for different skin conditions and locally agreed approval (low-priority) frameworks will form part of this process. Information and links to referral pathways are included in the resources section.
- Identification of the capacity of the local system to engage with pathway redesign and to develop and implement teledermatology services.

Consider including one or more of the following teledermatology models as part of redesigning local dermatology services:

1. The use of digital images to enable specialist advice (A&G) as the front door to dermatology services.

The greatest demand on dermatology services is for the diagnosis and management of skin lesions and in many cases, appropriate clinicians can often determine that a lesion is benign from good images supported by adequate clinical information.

The use of specialist advice and guidance (A&G) supported by images, including demoscopic images for skin lesions, with the option of conversion to a referral, is therefore recommended as the 'front door' to all dermatology services except for two-week wait suspected skin cancer referrals. This includes people with rashes

and is particularly suited to patients where there is a concern about a single lesion. This will enable people to be triaged to the appropriate clinical service.

Specialist advice and guidance supported by images involves secondary care specialist teams and GPs with an Extended Role (GPwERs/GPwSI) in dermatology working in intermediate dermatology services (appropriate clinicians) reviewing teledermatology referrals into their service and deciding whether the patient:

- can be managed in primary care with advice and guidance
- should be seen urgently or routinely by the relevant clinician in the best setting for the patient which might be in intermediate care or secondary care
- needs the referral updating to a suspected skin cancer two-week wait appointment
- would benefit from a remote consultation (video or telephone)
- can be booked directly for further diagnostics or surgery into an appropriate service in a timely fashion
- should be redirected to a more appropriate service such as to plastic surgery, ophthalmology or maxillo-facial services according to local agreements, pathways and skill mix.

This will streamline and prioritise patient care and ensure face-to-face attendances only when necessary. There will still be instances where it is not possible or appropriate to include an image (see Principle 1).

2. The virtual two-week-wait skin cancer pathway

The increase in referrals for suspected skin cancer and the need to appropriately manage these people requires efficient identification of people with early melanoma and SCC.

Guidance to optimise the skin cancer two-week wait pathway removes the previous requirement for a face-to-face consultation and instead proposes a teledermatology interaction for selected patients. This meets the requirements of the NHS constitution so systems may wish to introduce this pathway. The considerations and requirements for implementation of this pathway are in the guidance document.

Although GPwERs working in integrated intermediate community dermatology services may triage skin lesions they will not review two-week wait referrals unless they are members of the specialist dermatology two-week-wait service.

3. Validation and clinical prioritisation of patients on non-admitted waiting list

Guidance on the clinical prioritisation of the dermatology on-admitted (outpatient) waiting list is underpinned by the need for high quality, up to date images. Prioritisation triage takes place without direct patient interaction and requires available information, including outcome of a recent patient discussion, the original referral letter, and recent images. Each patient is then prioritised to reflect need and urgency for a face-to-face consultation. If the patient's condition changes whilst waiting, A&G teledermatology can highlight the change in status and support appropriate reprioritisation.

Step 2: Design the teledermatology service

High quality images should be taken in an appropriate setting, convenient for the patient, be accompanied by relevant supporting clinical information, sent using secure platforms and reviewed and the outcome managed by a suitably trained appropriate clinician. Useful information can be found on the Institute of Medical Illustrators website teledermatology toolkit.

This section considers these parts of the patient pathway. Locally agreed solutions will be important, one size does not fit all.

1. Image taking services and collecting supporting clinical information

Who can take the images*?*

Anyone taking images and collecting the required supporting clinical information will require appropriate training, feedback and audit of performance. More detail relating to taking images using mobile devices, can be found in Guidance on the use of Mobile Photographic Devices in Dermatology. Training packages are in development by the Institute of Medical Illustrators and will be available as part of their Teledermatology toolkit in due course.

Primary care

Suitably trained primary care healthcare professionals may be well placed to take images in primary care settings which are convenient to the patient. However, GPs or advanced clinical practitioners (ACPs) should not be expected to undertake this role unless they had the capacity to do so. Primary care-based image taking hubs established across 'places' or Primary Care Networks (PCNs) work well.

Clinical photographers

- Clinical photographers working as part of specialist dermatology teams who could also work from community settings. The benefit of this approach is that

images are consistently high quality and accurate which improves clinical decision making.

- Clinical photography services can support the training and development of suitably trained healthcare professionals, including nurses, technicians and healthcare support workers to take images, including dermoscopic images.

Members of the dermatology specialist team

- Suitably trained members of the specialist dermatology team can provide image taking services and are likely to be more familiar with the clinical information required to support the images.

- In some centres, members of the specialist dermatology team taking the images, such as dermatology specialist nurses, can also provide information and advice about 'next steps' and prepare patients for a possible surgical procedure.

Images taken by patients

Local agreement is required about whether patients own images are appropriate for the teledermatology pathways. The following need to be considered:

- When patients take their own images to be sent for specialist review, the quality can be variable. If patients are being asked to take their own images; resources are available to provide guidance.
- Secondary and community care led teledermatology services can use patient communication platforms to send patients a link to instructions on how to take and share their own images; however, until image quality can be assured and appropriate dermoscopic devices have been developed for patients, this will not be suitable for suspected skin cancer pathways where a dermoscopic image is required.

Taking the images: where and what equipment?

The images should be taken in a convenient and accessible location for the patient, such as primary care facilities, community hospitals and community diagnostic centres. Where images are taken in a hospital setting these considerations are particularly important, as it must confer benefit over a face-to-face appointment in the same setting. The space used should meet required space and lighting standards to optimise the image quality and ensure privacy and dignity for the patient.

Required equipment will include dermatoscope attachments for cameras and smartphones and access to information governance compliant technology solutions.

What images and clinical information is required?

- The number and type of images for different clinical scenarios should be agreed locally. For example, for skin lesions one locator image and at least one close-up with a measurement scale and one without. Dermoscopic images are essential for the two-week wait pathway. For lesions which are raised from the skin, it may be appropriate to take an extra close-up of the lesion to show this in profile. Useful resources to support image taking are available.

- Referrals should be accompanied by a referral proforma or a conventional referral letter which should be agreed locally. It's likely that different proformas may be required for skin lesions and rashes; existing two-week wait suspected skin cancer referral proformas can be modified to include use of the virtual pathway.

2. Sending and transferring the images

- All systems must be compliant with General Data Protection Regulations (GDPR), including cloud data storage systems. There should be clear processes on the capture and storage of any data alongside the images.
- Specialist advice and guidance (A&G) with images is advocated as the main route to specialist opinion for primary care healthcare professionals. Specialist advice & guidance can be requested via e-RS or via alternative commercial platforms, which can link to e-RS pathways should conversion to referral be required.
- GDPR compliant apps to support image sharing can be commissioned as stand-alone apps to allow images to be securely uploaded to e-RS, or alternatively as part of a potential alternative commercial A&G pathway. These allow images to be captured securely with personal mobile phones and transferred safely to e-RS or other clinical systems. Further information can be found in the digital playbook and on the British Association of Dermatologists website.

Other points of note:

- There may be limitations to file sizes and the number of images which can be attached, and service users need to be aware of these.

- Some commercially available GDPR compliant photo apps can automatically adjust the file size and resolution to support attachment to e-RS. Application-programme interfaces (APIs) have been developed that allow external applications to initiate referrals on e-RS and can be used to deliver similar functionality. However, this is dependent on external application suppliers cooperating with the APIs.

- A&G requests supported by images can be converted to a referral, if pre-emptively authorised by the referrer. This functionality is available to A&G requests raised through e-RS only. APIs have also been developed that allow providers to manage e-RS A&G conversations and referral conversion

within their own systems. System suppliers will need to develop their systems against these APIs.

Image storage and retrieval

There needs to be clarity about where the images are stored and how they will be readily retrieved by the reviewing clinicians.

- Patient images supporting either a referral or A&G request should be accessible from provider hospital IT platforms, either in e-RS, or transferred via a suitable GDPR compliant platform and ideally be stored directly in the electronic patient record of both the primary care and specialist service.

- Receiving clinicians should be able to easily review images and patient information in a digital format and action them directly in the system.

- Images received via e-RS referrals will remain archived in e-RS and accessible from both primary and secondary care. Patient images should be added to the electronic patient record, or to a secure digital image management database.

- National e-RS workstreams are in place to improve the interoperability between e-RS referrer and provider organisations to facilitate transfer of A&G dialogue and images into primary and secondary care patient records, reducing the burden on administrative teams.

- Patient images that are sent via email, even to a secure mailbox, need to be managed and stored properly within the patient record. Without a suitable archive system, the images may not be immediately accessible or require the clinician or administrator to perform many separate computer processes.

- Many clinical photography departments manage such mailboxes and upload images to patient records so this may be something that clinical photographers are able to offer support with.

3. Review of the images, management, and communication of the outcome

‘Appropriate clinicians’

Systems need to identify the appropriate clinicians that will review the images and convey the outcome back to the referrer and/or the patient in a timely fashion. The method of communication and who will communicate the outcome should be agreed as part of the design of the service. Capacity modelling is required to ensure that adequate resource is available to manage the expected activity, although good teledermatology should reduce the overall requirement for clinical time.

Appropriate clinicians include:

- members of secondary care specialist teams, this may include suitably trained specialist nurses
- GPwERs/GPSIs, ideally working in consultant-led intermediate dermatology services
- suitably trained private providers offering outsourced teledermatology services; working to agreed standards and ideally linked to the local dermatology service.

Usually, clinicians undertaking teledermatology activity would be expected to maintain clinical skills by also doing face-to-face consultations. Except for specific situations, teledermatology is expected to be only one part of clinical activity for most clinicians.

In face-to-face medicine it is considered poor practice for clinicians to work in isolation and the same applies to teledermatology. This is best suited to clinicians working collaboratively to give rapid second opinions, enabling discussion of difficult cases, sharing learning and reducing the risk of mistakes.

Skin cancer recognition requires a high degree of diagnostic accuracy and regular calibration of clinical practice, working alongside other clinicians helps to maintain this, identifies early any deviation from safe practice and enables rapid second opinions for borderline or difficult cases.

The following considerations are also important:

- Appropriate time should be set aside for teledermatology and included as part of the appropriate clinician's weekly sessional timetable; this should include review of the images and all supporting administration.
- In secondary care, teledermatology should be included within the direct clinical care (DCC) activities for doctors, using the time previously spent on face-to-face appointments.
- Creating teledermatology activity will inevitably take clinicians away from other forms of clinical activity; this needs to be recognised and managed appropriately.
- Guidance from the British Association of Dermatologists recommends the number of teledermatology interactions in a programmed activity.

Managing and communicating the outcome

The appropriate clinician should be able to manage appropriate outcomes in a timely fashion. The outcomes should be agreed during development of the teledermatology pathway. Important considerations include:

- Outcomes should be linked to a locally agreed Optimal Pathway and will include options such as reassurance, advice about treatments, booking for surgery, arranging a routine or urgent face-to-face consultation.
- Systems should agree reasonable timeframes for an appropriate clinician to respond to a specialist A&G teledermatology interaction.

- For the two-week wait virtual teledermatology pathway systems must adhere to the relevant two-week wait pathway and 28 day Faster Diagnostic Standard ‘clock stop’ guidance.

- Agreeing clinical responsibility for timely and effective communication with the referring clinician and patient, where possible include links to relevant patient information resources.

- The teledermatology interaction should provide the opportunity for shared learning between primary care referrers and clinicians reviewing the images.

- Where teledermatology services are outsourced to private providers it is essential that systems have clearly identified and agreed pathways to link activity to local dermatology services, which patients can access without advantage or disadvantage, should the outcome of the interaction require this. It is important that there is no ‘queue- jumping’ and images are available on the relevant patient record.

Step 3: Accurately model and identify the resources required, including funding, to set up and maintain the service

Teledermatology funding and payments

ICS's will fund teledermatology services using existing locally agreed funding arrangements, usually as part of block contracts. The expectation is that new arrangements will be developed in due course. Monitoring and recording teledermatology activity and costs is important to support the development of sustainable funding models for the future.

Setting up the teledermatology service

Time should be allocated for all those involved designing and setting up the teledermatology service, including short term project management to:

- develop and administer the pan-health community stakeholder group and support clinician and user engagement
- agree the model of teledermatology service, design the patient pathway and supporting resources, such as referral proformas, patient questionnaires, consent forms and letter templates
- develop and implement the image taking service required, including training needs for those taking the images
- identify the platform to deliver the service and train users, including clinical and non-clinical staff, in all required technology
- collect baseline data, develop outcome measures and ensure prospective collection of performance data so that the service can be constantly evaluated (including at a clinician level) and modified as required

- run an initial pilot to identify issues, establish realistic expectations and ensure adequate job planning.

Primary care healthcare professionals

The burden on primary care healthcare professionals should be kept to a minimum. The following considerations are important:

- A teledermatology ‘champion’ should be identified within a Primary care network; time and resource should be allocated for these roles.
- Where possible, teledermatology systems should be well integrated with the practice system for future reference.
- For staff and patients to be confident that the digital tools being used are clinically safe systems, Digital Technology Assessment Criteria (DTAC) standards should be met.
- Systems should be simple to use and set up; implementation should be supported by training for all those involved.

Image taking services

The resources required to provide an image taking service will include:

- Equipping an appropriate space with purchase of necessary equipment including cameras or smart phones, dermatoscopes and adapters, laptops, lighting and internet access. Guidance on this can be found here.
- Recruitment and training of an appropriate workforce to take and send the images with the necessary clinical information, funding for ongoing training development support and audit of service.
- Any licensing costs for software packages.
- Ability to securely link into and upload images to relevant secure systems.

Appropriate clinicians reviewing teledermatology referrals

The clinical time for appropriate clinicians to perform teledermatology activity should be carefully itemised and include time to perform the following:

- Review the images and clinical information received.
- Respond to the referring clinician (and patient where appropriate) using the agreed process of communication.
- Perform any necessary administrative processes such as arranging skin surgery and sending the patient relevant information.
- Undertake regular review and audit of teledermatology activity to quantify patient experience, short and long-term outcomes, service efficiency and benefits analysis.
- Teach, train, and support other appropriate clinicians.

Additionally:

- Additional clerical and administrative support will need to be identified; booking patients into appointments, particularly as part of timed skin cancer pathways is more time consuming than for similar patients on a two-week-wait pathway.

Step 4: Training and development

Continuous training and shared learning are necessary to maintain teledermatology pathways as part of a sustainable, integrated multidisciplinary dermatology service.

Training on teledermatology processes should be regularly refreshed for primary, intermediate, and secondary care teams and the training needs considered for the entire clinical and administrative workforce – not just specialists, dermatologists in training, Dermatology GPwERs/GPwSIs and GPs. Healthcare professionals working within teledermatology services will be expected to meet all relevant nationally agreed Continuing Professional Development (CPD) standards appropriate to their roles.

Software developments may provide opportunities for greater productivity that are missed if staff are not made aware of them or do not know how to use them. New staff joining a practice or department should be trained in the local teledermatology pathway as part of their induction. The training needs of Specialist Registrars (SpRs) in primary and secondary need to be considered. Developing local teledermatology champions across primary and secondary care can help to make sure this focus is sustained.

Training needs to be directed towards those taking and uploading high quality images. For skin lesions this will include taking high quality dermoscopic images.

Step 5: Audit, metrics and quality assurance

The teledermatology service should be regularly reviewed, metrics agreed at the outset and data collected and shared regularly with all key stakeholders. Baseline metrics are essential before the service is introduced and will include:

- patient satisfaction with the service and the quality of advice provided; did they think their care was managed appropriately and in a timely fashion?
- number and type of teledermatology interactions
- outcomes of the interactions, for example: advice only, conversion to face-to-face interaction, upgrade to two-week wait referral
- clinician time, capacity, and demand modelling for the service
- 'burden' impact on those involved
- referral data from individual practices, including levels of unsatisfactory images received to support targeted educational interventions
- audit of referrers against referral criteria, diagnosis and outcomes
- impact on waiting list and waiting times
- effect on overall referral rates (pre and post teledermatology)
- A&G data at departmental and clinician level: monthly A&G, % returned with advice and % not requiring appointment within six months, % converted, turn-around time (< 2 days, 3-5 days, 6-10 days)
- two-week wait teledermatology: turn-around against two-week wait and Faster Diagnostic Standards, % returned with advice, % booked for face-to-face, % booked straight to surgery, peer review of outcome decisions to improve standardisation across teams
- delayed diagnosis and surgery of skin cancers using measures such as re-referrals.

A benefits analysis of the investment of time and resource invested in the development of the service is needed.

Suggested audits are included in the Quality Standards for Teledermatology Services document and should include:

- obtaining the views and feedback from service users and providers including patients and staff
- reviewing the quality of the teledermatology referrals, in particular image quality
- assessment of effectiveness of communication between healthcare professionals and patients
- organisation, storage and retrieval of data (information governance audit)
- training and continuing professional development needs.

For clinicians reviewing teledermatology referrals:

- audit their practice in respect of to the numbers of patients converted to face-to-face appointments
- GP and patient satisfaction
- clinical diagnoses and outcomes particularly of those with suspected skin cancer.

Going further

This roadmap outlines what all systems can do now to optimise dermatology services to manage demand and reduce unnecessary patient attendances thereby freeing up outpatient capacity. Further opportunities have been identified for digital technology and teledermatology to be used in new and innovative ways to deliver more personalised and better integrated care:

- Shared patient records give patients greater control over their condition. Images of the patient's skin condition, results from blood tests and other information can be shared with the specialist team to be reviewed in their appointment or to support a personalised schedule for follow up appointments.

- Teledermatology can support integrated care between different secondary care and community providers by supporting access for patients in areas with particularly low numbers of consultants. It can also be used for virtual multi-disciplinary specialist teams managing complex patients.

- There are apps available and in development that can help patients take pictures of their own skin condition and monitor changes over time. This technology could be used as part of long-term management to help patients monitor their own condition, and support dermatology pathways.

Artificial Intelligence as a Medical Device (AIaMD)

The adoption of artificial intelligence solutions across healthcare settings is developing rapidly. The Regulatory Horizons Council recognised the importance of a having an appropriate regulatory framework that can permit the innovation of digital technologies without exposing the population to AIaMDs that may do them harm. The NHS AI Lab is working with innovators as they define the purpose of their products and is guiding and developing recommendations to health and care professionals as they use these technologies to assist them in providing care.

Currently all AIaMDs must have a UK Conformity Assessment (UKCA) medical device classification and be used accordingly. Class IIA medical devices have received the required MHRA classification to allow the device to be used for direct diagnosis. At the time of publication there is only one UKCA Class IIA-certified AIaMD available that is being used to triage lesions in urgent skin cancer teledermatology pathways in primary and secondary care at various centres across England. There are however over 60 commercially available AI technologies in the UK specifically focused on skin cancer diagnostics/triage with variable and often limited published and independently verifiable data supporting safety and effectiveness.

There is an aim that AIaMD will address the increased demand for dermatology services by recognising innocent benign skin lesions and further peer reviewed data and evaluations are awaited. The current deployments include a consultant dermatologist second read review of all cases to gain experience and build user confidence although the 'intended use' does not require this to happen.

For AIaMD to be deployed at scale in urgent skin cancer pathways, clinical and patient confidence in the safety and effectiveness of the technology is critical. To this end, in 2023/24 there is a focus on accelerating real-world independent evaluation to provide assurance of the sensitivity, specificity, generalisability, patient acceptability and system integration of any solutions.

Successful deployment of AIaMD in dermatology will need:

- Robust and standardised teledermatology services supported by good quality images and relevant clinical information.
- A clearly defined intended use of the AIaMD, deployed accordingly. Guidance on clearly defining the intended use or purpose of the AIaMD is available.

- Appropriate information provided to the patient about the intended purpose of the AIaMD technology, what data will be collected, how their data will be used/shared/stored, and consent must be documented.
- Appropriate image capture devices to be used which comply with the necessary standards in terms of information governance.
- Image quality to meet the minimum requirements for any given AIaMD; automated checks to ensure image quality is adequate.
- Clearly defined inclusion and exclusion criteria for which the AIaMD has been validated, eg size or site of lesion including for example the exclusion of mucosal, palmoplantar or subungual surfaces.
- An initial pilot/study for an agreed number of cases to allow performance to be validated and optimised for safe onward deployment and upscaling for the given population, eg including a clinician second read.
- Optimisation of data diversity through increased inclusion of underrepresented groups, such as those with brown or black or skin types and those with lower digital literacy levels, to avoid exacerbating pre-existing biases.
- The tool to be inclusive and comprehensively represent the diversity of the local population.
- Agreement of a clear post-marketing surveillance plan before deployment. Regular performance reports should demonstrate ongoing clinical monitoring to ensure that the system is still meeting the required performance targets and to identify algorithm drift or model decay (eg the tendency for AI model performance to drop over time as data and patient characteristics change).
- Local incident reporting tools to capture false negatives whereby a full root cause analysis should be completed, and a risk register compiled to identify system wide issues or recurring themes.
- Patients who are discharged to receive clear advice on how to monitor their skin, signs of skin cancer and how to access further care if they develop future concerns.

In summary, AIaMD tools for dermatology are being evaluated and comprehensive data regarding the safety and effectiveness of the tools that are in use will be released in 2023/24. Systems should be developing and implementing teledermatology services underpinned by high quality image taking services so that they will be ‘AI ready’ and be able to upscale at pace.

Tools and further guidance

A range of resources are available on the dermatology pages on the Outpatient Recovery and Transformation FutureNHS platform.

Referral guidelines

- PCDS concise guidance: national primary care treatment and referral guidelines for common skin conditions
- BAD referral guidance
- NICE referral guidance for skin conditions
- Get it Right First Time pathways guidance

Image taking

- Institute of medical Illustrators teledermatology toolkit
  - How to take the best photographs of your skin lesion or rash (Gloucestershire Hospitals NHS Foundation Trust)
  - NHSE Guidance Videos for image taking

Other resources

- NHS: Dermatology Digital Playbook
- The British Association of Dermatologists' (BAD) teledermatology webpages
- Royal College of General Practitioners (RCGP) dermatology toolkit
- BAD, Outpatients case studies, 2019
- NHS e-RS
- A&G toolkit for the NHS e-RS
- Future GP IT systems and services
- A guide to job planning for Dermatologists

Artificial Intelligence

- The BAD position statement on Artificial Intelligence
- The British Association of Dermatologists position statement on Artificial Intelligence.
  - BAD Artificial intelligence regulatory framework
  - NHS AI and Digital healthcare technologies – applying the framework and next steps
  - Development and Clinical Evaluation of an Artificial Intelligence Support Tool for Improving Telemedicine Photo Quality