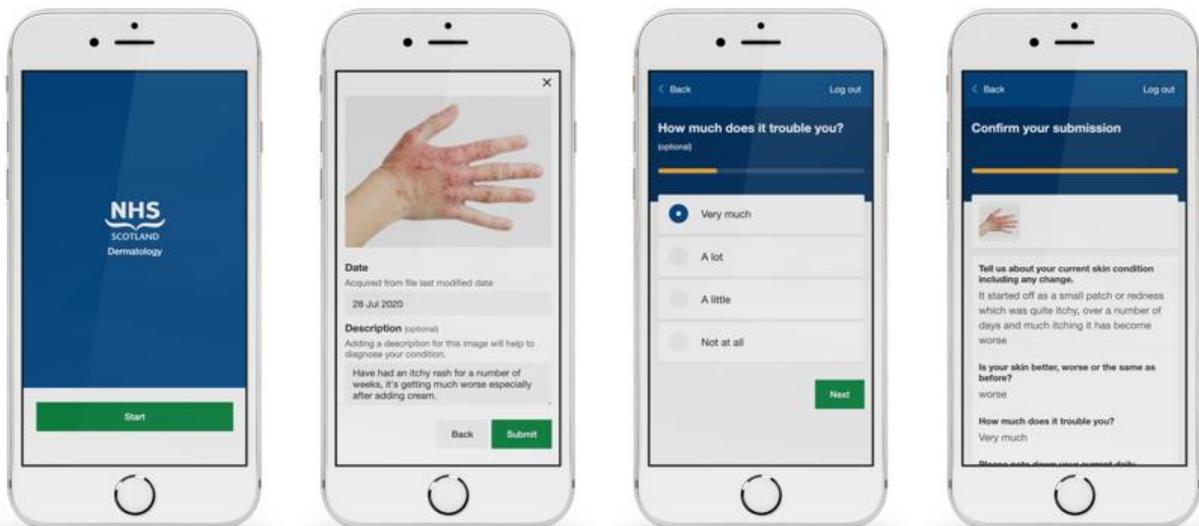


Innovative Medical Technology Overview

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The Scottish asynchronous digital dermatology appointment service (DDAS).



Executive Summary

The Scottish digital dermatology appointment service (DDAS) is an asynchronous virtual dermatology clinic that allows patients to submit images of their skin condition, along with answers to specific questions about their skin condition, to a dermatology specialist. The DDAS is intended to be integrated into current dermatology care pathways as a complement to face-to-face appointments. The DDAS has been piloted in NHS Forth Valley, NHS Grampian, and NHS Greater Glasgow and Clyde.

The innovative aspects of the DDAS are that it is the first asynchronous digital appointment platform for dermatology in NHSScotland; patients submit images directly to the DDAS system where they are reviewed by a specialist; and the system is integrated with the TrakCare patient record system and the TOPAS patient administration system.

Unpublished local data from the pilot boards shows that 2,510 patients had a DDAS appointment in the financial year April 2020 to March 2021. During this period, patients entered information that was subsequently assessed by a dermatology expert in 75% of all DDAS appointments. Actions taken by specialists after assessing a DDAS submission include referring the patient for another appointment (virtual or face-to-face), referral for surgery, and providing advice and guidance on managing the skin condition at home. The DDAS has provided continuity of access to dermatology services in three Scottish health boards during the COVID-19 pandemic.

There are initial costs associated with setting up the DDAS in each health board, plus maintenance costs, such as an annual license, and a server hosting charge. Appointments on the DDAS are currently charged to the NHS nationally at £3.00 per appointment.

Small sample surveys among patients in the DDAS pilot show that patients find the service easy to use. Patient-reported benefits of the DDAS include reduced travel and less need for time off work to attend appointments. Boards that have implemented the DDAS have reported no problems associated with recruiting older patients, children or patients with limited technological skills. All boards have alternatives in place for patients who do not wish to use the DDAS.

Technology

The DDAS was co-designed by NHSScotland dermatology experts and Storm ID Ltd. The DDAS is delivered through the Lenus Health Platform,¹ and can be accessed using a smart device or computer. Patients receive a link to the service by email or Short Message Service (SMS) after being referred to dermatology by their general practitioner (GP).

After registering with the DDAS, patients are asked to submit up to four images of their skin condition and answer a set of six questions about their skin condition (the facility to upload more than four images is being developed). Patients are asked to complete these actions within a five day 'appointment' window. A dermatology nurse specialist or consultant checks their patient list on the DDAS system and assesses any new images and responses. Messaging capabilities within the DDAS system allow the nurse specialist or consultant to ask the patient follow-up questions.² The nurse specialist or consultant then proposes a treatment plan and next steps, normally within one week of image submission. Next steps can include changing a prescription, referral for surgery, or a further appointment ('real-time' virtual or face-to-face).¹ A record of the assessment is sent to the patient's GP for addition to the patient's medical file. Where the DDAS is integrated with the TrakCare and TOPAS healthcare information systems a

copy of the assessment is automatically added to the patient's electronic medical records at the hospital.²

The DDAS was piloted during the COVID-19 pandemic in NHS Forth Valley and NHS Greater Glasgow and Clyde south from June 2019. In September 2020, NHS Grampian began piloting the DDAS service. NHS Lothian, NHS Ayrshire & Arran, NHS Lanarkshire, and NHS Western Isles are set to begin piloting the service in 2021. The service is expected to be rolled out to NHS Highland, NHS Borders, and NHS Fife, with support from the Modernising Patient Pathways Programme from the Scottish Government and NHS National Services Scotland.¹

Innovative aspect

The DDAS is the first asynchronous digital appointment platform for dermatology services to be integrated with NHSScotland systems. Patients submit their own images to the DDAS prior to assessment by a dermatology specialist. The service facilitates direct virtual communication between the patient and specialist. This is in contrast to other asynchronous systems, where images of a patient's skin condition are obtained in a community setting by a GP or an NHS photographer. The GP then submits the images along with a referral to the dermatologist.

Target patient group

The DDAS is intended for use by new and returning dermatology patients seeking specialist advice on dermatological conditions. The service accepts both routine dermatology referrals and referrals for suspected skin cancer. The DDAS has been trialled with adult patients and the parents of paediatric patients.

Some patient groups may not be suitable for the DDAS, including some elderly patients or patients with no access to appropriate technologies, people at high risk of skin cancers who require a full skin survey, people with skin conditions in locations that are physically awkward to photograph, and people who are reluctant to upload images of certain areas of their body, such as the genitals. Other groups may find particular benefit from the service, for example people experiencing a flare up of a long-term condition or patients who have difficulty attending face-to-face appointments.

Current practice: comparators and use of technology in pathway of care

The current gold standard for dermatology assessment is a face-to-face appointment with a dermatology specialist.³ The DDAS is intended to complement face-to-face dermatology services and provides another avenue for patients to access specialist services. During the

COVID-19 pandemic, the DDAS helped facilitate access to dermatology services, when access to face-to-face appointments was reduced.

The three NHSScotland boards piloting the DDAS took slightly different approaches to integrating the DDAS into their care pathways. In NHS Greater Glasgow and Clyde, the DDAS is delivered by consultants, and covers both urgent and routine referrals for primarily new patients. In NHS Forth Valley, the DDAS is used for new and returning patients, for urgent and routine referrals, and for suspected cancer or general dermatology referrals. In NHS Forth Valley, specialist nurses and consultants deliver the service. In NHS Grampian, the service is delivered by consultants and mostly used for returning patients. The DDAS is integrated into the NHS Grampian care pathways for skin lesions, general dermatology, biologics and isotretinoin prescribing, and paediatrics.

Clinicians have suggested that the DDAS has the potential to be part of several care pathways. For example, triaging patients on dermatology waiting lists, dealing with high numbers of 'just in case' referrals for benign skin lesions, monitoring treatment efficacy, monitoring flare ups in patients with long-term skin conditions, or for repeat appointments for patients who have already been assessed or diagnosed face-to-face.

Product performance

A pre-publication article reported on the use of the DDAS during the first 11-week COVID-19 lockdown in March to June 2020, when a total of 405 digital appointments for 394 patients were completed.⁴ The service was offered to patients needing an urgent dermatology referral. Mean patient age was 48 (range 1 to 98) and the majority of patients (73%) were new referrals. Patients had potentially cancerous skin lesions (72%) or inflammatory dermatoses (28%). Eighty percent of images submitted by patients were considered by clinicians to be of sufficient quality for assessment. The average DDAS appointment time in 312 patients (10 minutes) was 3 minutes shorter than the average face-to-face consultation time. This 10 minute appointment time is based on the estimated time needed for the clinician to open the application, select a patient, review their submission (including images), request any additional information, complete the outcome fields communicating next steps to the patient and GP, and book any future appointments or procedures for the patient.

Outcomes from DDAS assessments in this study included 47% of patients needing a face-to-face appointment, 16% receiving a second DDAS review, 11% being referred for a biopsy, and 22% being discharged from dermatology services. In 70% of cases (n=218), clinicians assessed the patient submissions from home. The focus during the pandemic was on triaging all patients, which may have increased the number of patients requiring a face-to-face appointment as the DDAS was not limited to patients likely to receive definitive care based on a virtual appointment. Sixteen percent of patients presenting with skin lesions were referred for surgery. Histological diagnoses for 42 patients referred for surgery or biopsy in one board

showed that three melanomas and eight non-melanoma skin cancers were promptly identified and treated.

A conference abstract reported on 54 returning patient DDAS appointments in two Scottish health boards during a 6 month trial of the DDAS.² During the trial, 42 patients had completed appointments, ten patients did not complete the appointment process, and two patients cancelled their appointment. The majority of patients (87%) had inflammatory dermatoses, such as eczema or psoriasis. Based on login and logout times on the DDAS platform, appointments lasted a median of 5 minutes 28 seconds. Forty-four follow-up appointments were scheduled, 25 of which were DDAS appointments.

Product performance: local data

Digital dermatology clinics

Three Scottish health boards provided data on dermatology clinics delivered partly or fully using the DDAS (*Table 1*).

Table 1: Summary data on dermatology clinics using the DDAS during the pilot phase

	NHS Forth Valley	NHS Grampian	NHS GGC (south)
n clinics per week	1-2	2-3	12
n clinicians	4	3	8
Types of patient	Returning New routine referrals, for example, acne	Returning Stable New (occasionally) Patients on systemic drugs	Returning Stable New (mostly)
Types of condition	Severe chronic conditions Flare up of a known chronic condition Skin lesions	Various, identified as suitable on a case-by- case basis	New lesions mainly. Approx. 10% general dermatoses, for example, acne

Usage data 2020–2021

The Modernising Patient Pathways Programme provided local data on the use of the DDAS between April 2020 and March 2021 in NHS Forth Valley, NHS Grampian, and NHS Greater Glasgow and Clyde (south). During this time, the DDAS registered 2,510 completed dermatology appointments across the three participating health boards (*Table 2*). Patient engagement with the DDAS was measured as the proportion of DDAS appointments offered that were completed (the patient submitted information that was then assessed by a dermatology expert). Engagement was 75% overall, with more than 70% engagement in all three boards.

Table 2: Local DDAS data from three Scottish health boards from April 2020 to March 2021*

	Completed digital appointments	Incomplete digital appointments	Engagement
NHS Forth Valley	960	278	78%
NHS Grampian	308	102	75%
NHS GGC	1,242	451	73%
Total	2,510	831	75%

*Data are not for a complete financial year in all boards as different boards started using the DDAS at different points in time.

NHS Forth Valley and NHS Greater Glasgow and Clyde both primarily use the DDAS for new patient appointments (Table 3). NHS Grampian use the DDAS exclusively for returning patients.

Table 3: Completed new and returning patient appointments from January to 24 March 2021

	n new patients (%)	n returning patients (%)
NHS Forth Valley	109 (93%)	8 (7%)
NHS Grampian	-	295 (100%)
NHS GGC	201 (97%)	6 (3%)

It is likely that the uptake of DDAS appointments in all boards has been positively affected by the COVID-19 pandemic, which reduced access to face-to-face dermatology appointments. Ongoing availability of the DDAS may assist the Scottish Government’s NHS recovery plan by helping to minimise dermatology appointment backlogs.

The COVID-19 pandemic as a confounding factor has made it impossible to determine impact of the DDAS on dermatology waiting times.

Safety, equality, and data storage issues

Potential safety issues surrounding the DDAS include:

- Photographs taken by patients and submitted on the DDAS are of a localised area of skin, therefore the dermatology specialist has less information on which to base their diagnosis and treatment plan compared with face-to-face appointments.³ This could lead to less accurate diagnosis and treatment, or to clinicians missing other relevant lesions.
- The quality of images submitted by patients on the DDAS has been deemed to be sufficient in 80% of cases in evaluation of the service.⁴ Alternatives to submitting images through the DDAS need to be provided for the 20% of patient images that lack sufficient detail, for example by providing access to medical illustration services.

Currently, when images are not found to be sufficient, further images are requested or the patient is invited to attend a face-to-face appointment.

- Taking photographs of certain parts of the body or skin types can be complex. For example, obtaining images of the scalp or skin conditions in people with very dark skin colouration. Assessing these images remotely may not be sufficient to make an accurate diagnosis.
- Patients submit images and their responses to questions over an internet connection, therefore transmission, storage and retrieval of data must be safe and aligned with local information governance requirements. Patient information and images are stored on the Lenus Health Platform. Storm ID Ltd states that the DDAS platform is compliant with General Data Protection Regulations (GDPR) and their quality management system is compliant with ISO 13485 for medical devices.
- Messages from the DDAS system are sometimes redirected to the patients' email spam folder, resulting in patients not realising they have an appointment (virtual or face-to-face).

Economic and cost considerations

There is a £7,500 fee payable to Storm ID for setting up the DDAS in each health board, plus an annual licence fee of £7,500 per board. Appointment fees are payable at a national level based on total volume of patients (*Table 4*). Based on current volume, NHSScotland is paying £3.00 per DDAS appointment.

Table 4: Fees payable per completed DDAS appointment by patient volume

n completed DDAS appointments	Fee per appointment
Up to 50,000	£3.00
50,001 to 100,000	£2.50
100,001 to 1,000,000	£2.00

In addition to running costs, there is a charge for hosting the DDAS service. Over the past year (2020–2021), the Lenus Health Platform has been hosted within the NHS Greater Glasgow and Clyde Azure tenancy at a cost of approximately £150,000 including VAT. From April 2021, the platform hosting costs were underwritten by NHS Greater Glasgow and Clyde, NHS Lothian and NHS Grampian for approximately £300,000. These hosting costs are shared across a number of programmes and therefore are not attributable to the DDAS alone. The intention is that service management for the DDAS will eventually become the responsibility of NHS National Services Scotland.

User experience and other considerations

Potential benefits to patients of the DDAS include a reduction in travel to appointments, increased convenience as they can submit images at a time that suits them, and a reduction in the need for time off work to attend appointments.

Patient feedback

In the pre-publication article described above, a patient satisfaction survey was conducted among patients (n=112) in two health boards using the DDAS during 11 weeks of the first COVID-19 lockdown.⁴ Not needing to take time off work and reduced travel were the two key benefits of the DDAS identified by patients in the survey. Eighty-two percent of respondents reported the DDAS was easy to use. Forty-two percent of patients stated they would have needed time off work to attend a face-to-face appointment and 21% would have travelled more than 30 minutes to their appointment. New patients were more likely to want a face-to-face appointment to increase dialogue with the specialists.

A report to the funding body on the initial pilot of the DDAS among a small number of patients in NHS Forth Valley and NHS Greater Glasgow and Clyde described the results of another patient feedback questionnaire (*Table 5*). In NHS Forth Valley, the majority of respondents preferred DDAS appointments, while in NHS Greater Glasgow and Clyde, most patients preferred a face-to-face appointment.

Table 5: Patient feedback from an initial pilot of the DDAS in two health boards

	NHS Forth Valley	NHS GGC
Completed survey (n)	8	11
Easy or very easy registration and logging in (n)	7	10
Difficulty uploading images (n)	1	0
Required technical support (n)	3	1
Satisfied with quality of care (n)	8	10
Patient travel method	Car	Car, bus, taxi, walking
Patient travel time	5 travel >15min	7 travel 15-30min
Need time off work for face-to-face appointment (n)	6	8
Prefer DDAS appointment (n) (compared with face-to-face)	7	2

The digital divide and patient preferences

One potential concern is whether a digital divide could prevent people who are not technologically literate from engaging with the DDAS. There are also potentially patients who have limited understanding of the English language or low literacy (including health literacy) who might struggle to access the DDAS. Every dermatology team that implemented the DDAS

recognised these issues and made alternative arrangements for patients unable to use the DDAS or who preferred a face-to face appointment.

In NHS Greater Glasgow and Clyde, new patients are asked if they can, and want to, use the DDAS. This process has been time consuming for the referral management team who contact all patients to determine their preferred appointment type. If patients decline a DDAS appointment, they are allocated a face-to-face appointment. Fewer than 5% of patients in NHS Greater Glasgow and Clyde declined the DDAS appointment. Patients registered for the DDAS in NHS Greater Glasgow and Clyde include elderly patients (aged >80) who have successfully submitted images and engaged well with the service.

In NHS Forth Valley, a policy is in place to ensure patients are offered alternatives if they decline a DDAS appointment. Patients of all ages participate in the DDAS, with a mean age of 48. Adults aged over 60 make up 31% of DDAS patients and parents of 12 paediatric patients have also successfully completed a DDAS appointment.

Clinician feedback

NHS Grampian provided the following quotes from clinical staff involved with the DDAS:

- ‘...it frees up our in-person appointments for patients in need of these.’ (Doctor)
- ‘Response to patient messaging has been mixed with some families failing to respond. I’m not clear whether the messages have been read and they have chosen not to respond or whether they never saw the message.’ (Consultant dermatologist)
- ‘The only feedback I have had from patients so far are those that I have reverted to face-to-face appointment, who found it easy to use and were happy with the ultimate outcome.’ (Consultant dermatologist)
- ‘...the majority seem to like it but, in my experience, prefer to have access to face to face or Near Me appointments as well. In my clinic, this has led to patients declining this [DDAS] as a review and asking for alternative appointments. I think from a clinical perspective the imaging can be a mixed bag, some better than others. Patients' responses to questions can sometimes be very clear or vague just like at clinic. This either leads to a very quick turnaround in responses or long drawn-out discussions over days.’ (Dermatology nurse practitioner)

Recommendations for research

Future research on the DDAS should consider:

- comparisons of diagnostic accuracy and treatment outcomes for patients between DDAS appointments and face-to-face appointments
- the impact of the DDAS on the number of face-to-face dermatology appointments
- the effect of the DDAS on patient waiting times as part of service recovery after the COVID-19 pandemic

- comparisons of clinician time in providing DDAS, face-to-face, and Near Me appointments, and
- economic evaluations comparing the DDAS as a complement to face-to-face appointments with face-to-face appointments only.

Conclusions

Local data from three health boards has illustrated the importance of the DDAS during the COVID-19 pandemic, where it has facilitated continued patient access to specialist dermatology assessment. It is likely that the DDAS, alongside face-to-face appointments and Near Me services, will continue to support NHS dermatology services as they begin the process of recovering from the pandemic and addressing the consequent long waiting lists for specialist care.

The innovative DDAS has the potential to bring benefits to patients who cannot afford to take time off work or to travel long distances for a face-to-face dermatology appointment. It also has the potential to speed up access to diagnosis and treatment of skin conditions. The planned roll out of the DDAS to additional health boards across Scotland should provide more data, with the potential for further performance and economic analyses of the service.

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Acknowledgment of professional commentators, fact checking and patient organisational input

Professional commentary was provided by:

- Three consultant dermatologists, NHSScotland

Fact checking was conducted by the developer, Lead Consultant Dermatologist, NHS Forth Valley and two other individuals from the DDAS Delivery Group.

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Declarations of interests were obtained from professional commentators and the Patient Organisations.

What is an IMTO?

An IMTO provides a high-level summary of the evidence surrounding health and care innovation in Scotland. IMTOs may include:

- a review of local evaluation(s) undertaken within NHSScotland
- an appraisal of the evidence, based on the health technology assessment framework
- bespoke analysis and advice towards the development of evidence.

The purpose of an IMTO is to raise awareness of promising innovations and to assist local decision making by health and care colleagues. Further information about the IMTO process can be found on the SHTG [website](#).