

On target

Eleanore Robinson looks at the independent sector's role in early cancer diagnosis and treatment

New chapter

PHIN chair Jayne Scott on the renewed push to deliver meaningful information for patients

New image

Marwood Group examines emerging opportunities in Europe's radiology markets

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In focus

Feeling the pressure

Cancer care is in the spotlight as the pandemic exposes weaknesses in a system under strain

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The Covid-19 pandemic has driven digitalisation across healthcare services, including cancer care. **Gordon Wishart**, chief medical officer at Check4Cancer and visiting professor of cancer surgery at Anglia Ruskin University, looks at how lockdown spurred on the development of digital pathways and AI-powered diagnostics that could have a lasting impact on service delivery



Digitalising cancer pathways



One of the biggest challenges of the pandemic was the urgent requirement to find alternative solutions to face-to-face consultations across all parts of the healthcare ecosystem, from general practice to secondary care. While some patients have raised concern that the balance between personal and video/telephone consultations has still to be found, especially in cancer diagnostics, there is now no doubt that in future many patients will expect a digital healthcare option or solution to streamline and enhance the patient journey. We were therefore delighted that our online cancer risk assessment questionnaire (MyCancerRisk) won the *Innovation in Health Tech* award at the November 2021 LaingBuisson awards.

From a cancer services perspective, the UK has a long way to go to deliver the 2019 NHS *Long Term Plan* to increase the number of patients diagnosed with early-stage cancer (Stages 1 & 2) from 50% to 75% by 2028, especially with the delays to diagnosis and treatment

that resulted from the pandemic and lockdown restrictions.

However, the main NHS cancer waiting time targets were failing long before lockdown and one of the recommendations in the cross party *Cancer Summit Report* published in May 2021 was to digitalise cancer services where appropriate. The move to increase digitalisation of cancer services, by harnessing new technologies while protecting clinical and information governance, is essential if we are to improve early cancer detection in the UK.

Improved triage in primary care

It is likely that the diagnosis of the commonest cancers can be accelerated by use of at-home testing or clinical investigations to triage and identify patients who require urgent hospital referral.

For example, in the recent NICE FIT study, the FIT test currently used for

bowel cancer screening was used to triage patients with suspected symptoms of bowel cancer. A negative test at the lowest cut-off point almost excluded the likelihood of bowel cancer being present and, those with a positive test proceeded directly to colonoscopy to accelerate the diagnostic pathway. Other diagnostic pathways could be optimised in a similar fashion, with smaller numbers of patients at higher risk progressing to rapid access, streamlined diagnostic pathways.

Skin cancer is now the commonest cancer in the UK and recent data from NHS Digital has reported that 224,000 skin cancers were diagnosed in England in 2019, a 26.1% rise from 2013, of which only 15,332 patients were diagnosed with melanoma, the most lethal type of skin cancer if picked up late.

Unfortunately, only NHS patients with suspected melanoma are eligible for the two-week pathway and all other patients with suspicious skin lesions or moles wait much longer to be seen for investigation. In the private sector, waiting

times for investigation of a suspicious skin lesion by dermatologists or plastic surgeons can be as long as ten weeks due to the massive number of patients being referred.

So how can we safely triage patients effectively in the community to ensure that only those who require further investigation are referred to hospital, while reassuring those with benign features in a timely manner?

Innovative cancer pathways

In 2016, as a way to tackle long private waiting times to see a consultant as well as an inflated biopsy rate of around 60% when patients were eventually seen, Check4Cancer established a nurse-led skin diagnosis service for patients with a suspicious skin lesion, with telemedicine reporting by consultant specialists. This streamlined service allows patients to be seen within two weeks, with 85% reassured following initial triage. This award-winning service has reduced the biopsy rate to 15%, with a cancer detection rate of 3.8% and high patient satisfaction. Clearly the bar has been set very high by this streamlined pathway but, telemedicine reporters are in short supply so, during lockdown Check4Cancer started a journey to create a digital skin cancer pathway that improved patient choice, allowed scalability and had inherent resilience from future pandemics.

Developing a digital skin cancer pathway

During successive lockdowns, many NHS and private patients sent smartphone images of suspicious skin lesions to their GP or consultant. Unfortunately, due to over-processing of the photos and lack of a standardised methodology, many of these images were out of focus, dark or lacked resolution.

It is possible, however, to build a smartphone App that takes control of the camera to allow capture of high-resolution skin lesion images together with relevant clinical data. Check4Cancer is now working with Vivolution Limited to build a prototype of such an App for

testing in clinic to compare with traditional digital and dermoscopic images. The App will also collect the clinical metadata for that patient including patient details, lesion history and lifetime melanoma risk score and will be ready for pilot studies in the private sector in the second half of 2022.

It is anticipated that in future, the App will be the start of the patient pathway for many patients in the private and NHS sectors, reducing hospital referral and playing a key role in our ESG strategy going forward. Although there will always be patients that would prefer a face-to-face consultation, the App can provide a digital option for a significant number of patients, especially in more remote geographical areas where clinic locations are not nearby.

SKIN CANCER
IS NOW THE
COMMONEST
CANCER IN THE
UK... RECENT DATA
REPORTED A 26%
RISE FROM 2013

The next challenge in creating a digital skin cancer pathway is to automate or partly automate the skin cancer reporting process by using artificial intelligence (AI). A number of AI models have been developed for skin cancer but the majority have focused on detecting melanoma, the pigmented and potentially lethal form of skin cancer if detected late. Melanoma looks very different to the other types of skin cancer so, the final AI model is likely to require a number of different algorithms working in combination to classify images as suspicious or not-suspicious.

In November 2020, Check4Cancer ran a successful Proof of Concept (POC) project using IBM proprietary software, with data science and academic support from

the University of Essex, to create machine learning models based on C4C's large bank of over 40,000 suspicious skin images.

By writing a specific algorithm to prioritise correct classification of (a) biopsy-proven cancers over (b) all SUSPICIOUS lesions over (c) NON-SUSPICIOUS lesions, it was possible to identify the most accurate model that was able to pick up all the cancers, the majority of the reds while correctly classifying 50% of the greens.

Such a model has the potential to automate 50% of lesions currently reported by Check4Cancer or reduce NHS urgent referrals to skin specialist clinics by 50%.

Collaboration between industry and academia

The academic alliance with the University of Essex has continued and, in April 2022 Check4Cancer received a £180,000 grant from Innovate UK as part of a Knowledge Transfer Partnership (KTP) which will allow appointment of an in-house data scientist for two years to continue the work on the AI model with academic support from the University.

By having access to academic experts in machine learning, computer vision and convolutional neural networks, Check4Cancer has a unique opportunity to build a high-quality model, using our own images and linked clinical data, that can be tested prospectively against the current clinical pathway. The evidence base that is produced will be crucial in registering the finished model as a regulated Medical Device.

So, what started as a rapid response to maintaining cancer screening and diagnostics during successive lockdowns has launched a paradigm shift in the delivery of patient-centred cancer pathways. The adoption of new technologies and increased digitalisation can accelerate this programme of change, and artificial intelligence (AI) is currently being tested in cancer pathology and radiology reporting.

If we can build the evidence base for harnessing new technologies in cancer services, while ensuring patients receive a quicker and/or more accurate diagnosis, we will create a real opportunity to improve early cancer detection in the UK.