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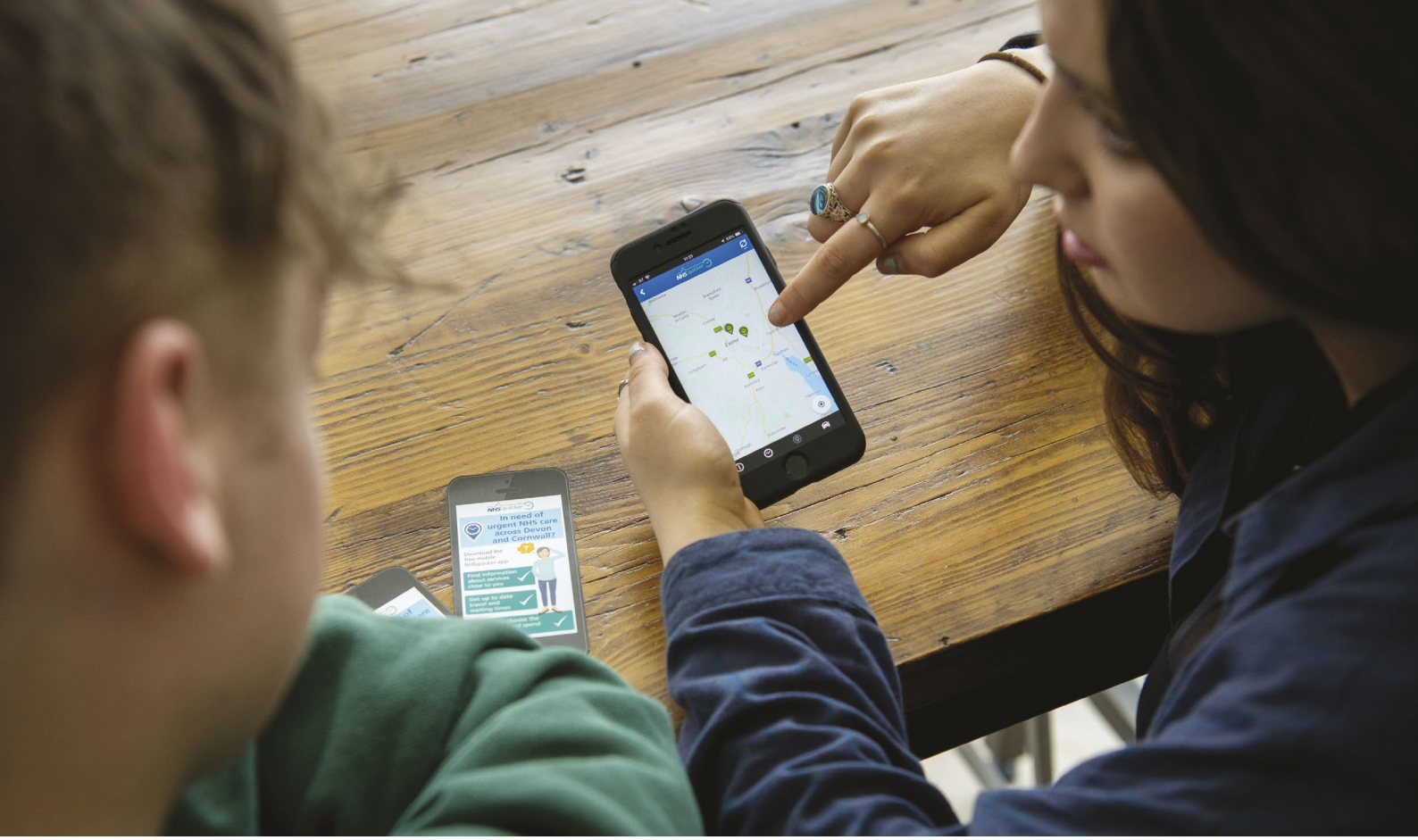

PROVIDING REAL-TIME INFORMATION FOR URGENT CARE

NAV MUSTAFEE AND JOHN POWELL

A&E WAITING TIMES HAVE INCREASED SUBSTANTIALLY OVER RECENT YEARS. In the U.K., it is expected that 95% of patients should be assessed, treated, then either admitted, transferred (to a different provider) or discharged within four hours of presentation. This is commonly referred to as the four-hour standard. Nationally, NHS emergency departments have not met the standard in any year since 2013-14, and it has been missed in every month since July 2015, as reported by the King's Fund (see http://bit.ly/NHS4hour).

This standard also applies to Minor Injury Units (MIUs) and Urgent Care Centres (UCCs), which treat non-life-threatening conditions, and which, together with A&E departments, are part of the NHS Urgent Care Network. Here we explain how the NHSquicker platform was developed to help patients in need of urgent care to make more informed decisions about available healthcare choices, thereby not only reducing the wait time being experienced by the patients but also helping the NHS meet the four-hour standard.

MOTIVATION

In 2015, while working on a project modelling the A&E department at Torbay Hospital, we found that in the Torbay Urgent Care Network, which in 2015 consisted of one A&E and seven MIU/UCC centres, all MIU/UCCs met the four-hour standard, while A&E underperformed by nearly 20%. We concluded that research on the levelling of demand across the Network would offer an exciting new dimension to our existing A&E patient flow simulation work. A further motivation of our work was the 2013 Keogh Review of urgent and emergency care. It stated that patients with urgent but non-life-threatening needs should be treated outside of hospitals by services that deliver care in or as close to people's homes as possible, in MIU/UCCs, while those with more serious or life-threatening emergency needs are treated in centres (A&E departments) having the very best expertise and facilities specific to those needs. It was argued that increased localisation of the treatment of those with less serious needs will relieve pressure on the hospital-based emergency services, thus freeing up resources to cater for patients with more serious and life-threatening conditions such as severe chest pain, serious blood loss, choking and unconsciousness. The success of this partitioning policy is dependent on two related factors, namely the presentation of patients at the appropriate treatment facility and the capacity of the A&E, in particular, to cope with demand. Inevitably the capacity of A&E departments is finite, and it is highly desirable that patient demand be spread among the available facilities in a given region, so as to reduce waiting time and to shape demand, thus spreading the pressures on staff and facilities.

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PARTNERSHIP BETWEEN THE UNIVERSITY AND THE NHS

In response to these policies and requirements, we worked with several NHS Trusts in the South West of England to investigate how existing data, already being captured by NHS, could be used to relieve pressure on A&E departments. We founded the Health and Care IMPACT Network in 2016 through a collaboration between the University of Exeter Business School and Torbay and South Devon NHS Foundation Trust (Directorate of Strategy & Improvement). The purpose of the Network, Co-Chaired by Professor Nav Mustafee and Dr Andrew Fordyce from Torbay Hospital, is to improve delivery of health and care through applied research, knowledge dissemination and decision support.

The Network enabled us to bring together clinicians, managers and O.R./data people from multiple NHS Trusts in the South West of England and to work towards agreeing on a format for A&E waiting time data. A common data standard was necessary as our objective was to develop a digital platform at a regional level (rather than a Trust-specific solution), and as the Trusts deploy various A&E patient flow systems (I.T. systems such as Symphony, PatientFirst and IMS Maxims), a consistent data format would ensure that the platform would receive data feeds from multiple systems. Further, the design and user interface of the NHSquicker app was co-developed with the NHS. Towards this, in June 2017, we organised the third IMPACT Network workshop on Urgent and Emergency Care in Exeter Business School. Susan Martin (Quality Lead at Torbay and South Devon NHS Foundation Trust) can be seen leading a session in Figure 1.

AN APP FOR URGENT CARE FOR THE SOUTHWEST

The co-development work was instrumental in outlining the design of the architecture of the real-time platform and the app. We worked with an SME for the implementation work (funded through a grant). In a nutshell, the NHSquicker platform provides indirect suggestions (nudges) to support patients in need of urgent care to help them make more informed decisions about available healthcare choices. The platform comprises (a) a user-facing app (Android and iOS) that provides nudges taking into account the live waiting time from the urgent care centres and combining them with real-time travel time (retrieved through Google Maps APIs); (b) the platform backend that receives real-time feeds and allows for easy integration of new feeds; (c) a business intelligence dashboard designed for use in MIU/UCCs and A&E.

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The NHSquicker app helps patients make informed decisions, for example,

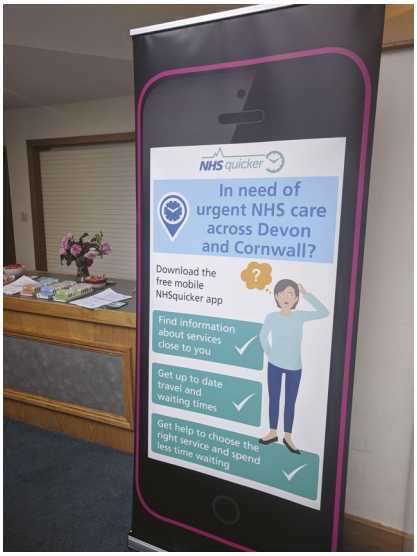
FIGURE 1 THE CO-DEVELOPMENT WORKSHOP FOR NHSQUICKER

whether to visit a facility which may be nearer to them but with a long waiting time or travel to an alternative location that is further away but with a shorter waiting time. By transforming real-time wait time data to actionable insights and nudges, NHSquicker seeks to:

a) Encourage prospective patients to choose the appropriate type of treatment facility for their condition, so that only those with more serious needs present at the A&E. The aim of this is to reduce the overall demand on the A&E facilities by redirecting less serious cases to the more appropriate facilities of MIUs/UCCs, thus reducing waiting times at the A&E facilities.
b) Shape demand at A&E facilities by encouraging patients needing such facilities to choose a destination with a lower waiting time.

NHSquicker aims to influence destination choices made by prospective patients so as to aid NHS frontline staff in their day-to-day operations, firstly by improving the appropriateness of centre choice and secondly by smoothing demand over inevitably stretched facilities, particularly those offering emergency treatment. What effect does (a) have on (b)? Patients do not have a direct role in managing the operations of an urgent care facility. However, the decisions they take have a bearing on its performance. For example, when confronted with the need for urgent treatment, the intended users have to make location decisions as to the place of treatment. If they are unaware of the availability of urgent care services appropriate to meet their needs close to where they are located, they will usually choose to go to A&E as they are confident they will be seen and have their needs met. This may lead to the overcrowding of A&E, while at the same time, MIU/UCCs that are located nearby may be operating under capacity; both cases will have operational implications.

NHSquicker (version 1) was launched in December 2017. Since then, the solution has worked uninterruptedly for almost three years. We have worked to expand its reach and to develop the real-time platform further (e.g. version 2 was released in February 2020 and now includes integration with the *NHS Directory of Services*). At the time of writing (December 2020), NHSquicker receives real-time data on waiting times from 27 A&E departments and Urgent Care Centres (UCC) that are operated by seven NHS Trusts in Devon, Cornwall, Somerset and Bristol. The wait time data is not open-source data, but data that is available only to us through Trust-level contacts made possible through the Health and Care IMPACT Network which we developed.



BENEFIT OF THE O.R. SOLUTION

We outline three instances which demonstrate the efficacy of NHSquicker and the benefits being experienced by both patients and by the Trusts.

First, NHS Trusts in the South West have adopted this technology by interfacing their I.T. systems with NHSquicker. At launch (Dec 2017), only data feeds from Torbay & South Devon NHS Foundation Trust (TSDFT), Royal Devon & Exeter (RD&E) and Northern Devon Healthcare NHS Trust (NDFT) were integrated. As of December 2020, NHSquicker receives data from all four acute Trusts in the Devon STP (sustainability and transformation partnership), the Cornwall and the Isles of Scilly STP, one Trust from the Somerset STP and one from Bristol. Trusts invest in terms of their technical manpower to integrate our app with their services and for the operational upkeep. This demonstrates the benefits realised by Trusts in using the app. Nic Harrison, data analyst at NDFT, said: "We collect a huge amount of data in the NHS to help us to monitor and improve the care we provide. This project was about using information that is already available in a new way which helps to improve the experience of our services and helps us to make sure NHS resources are focused where they are most needed."

Second, patients are finding the app useful. We know this because we developed an in-app questionnaire and integrated it with NHSquicker version 2 (launched Feb 2020). We received 543 responses between 24/03/2020 and 10/09/2020. The analysis of the questionnaire shows that ~78% (424) of the users agreed that NHSquicker helped them decide where to go and a further 4% responded that NHSquicker provided helpful information at the point of use (in addition to real-time wait time and information from NHS Directory of Services on local services, the app also includes links for users to find information on conditions and treatment and a link to access NHS 111 Online - 111.nhs.uk).

Third, evidence from two early adopters of NHSquicker (TSDFT and NDFT) has shown that our solution is having the desired impact of signposting patients away from busy A&E department at peak times. For TSDFT, when analysing the data at peak time (between 11.00-18.00), our data analysis for the period Jan. 2016–Feb. 2019 has shown that there is a significant shift from the start of 2018 (when NHSquicker was first launched and we benefited from media publicity) in the pattern of attendances, with a reduction in A&E attendances and an increase in MIU attendances. The quarterly changes from the previous equivalent quarter confirm this. Our analysis of data for NDFT shows a similar pattern. Dr Nick Mathieu, consultant in emergency medicine and clinical director of the emergency department at TSDFT, said: "This app will give people the information they need so they can make informed decisions about where to go for treatment. We hope this will improve things for patients, as they may be able to receive the care they need more quickly and perhaps closer to home than they realise. NHS services across England are busier than ever and we hope NHSquicker will increase awareness of the different options for treating minor injuries and illnesses. We hope this will contribute to reducing pressure on emergency departments, so they can focus on the most urgent cases."

In conclusion, it has been a rich experience working with the NHS and various other organisations like NHS Digital and Reactor15 (SME).

We have shown that local-level digital initiatives can be scaled-up to regional level solutions. We have demonstrated that unlocking existing data, captured in different A&E systems and stored in a multitude of databases, is possible through common standards and that it could also be accessible at real-time. We have shown how data from multiple sources could be joined (wait time data with travel data), and then transformed into a form that helps empower patient decision making.

ACKNOWLEDGEMENTS

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