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THE USE OF ARTIFICIAL INTELLIGENCE AND INNOVATIVE SOLUTIONS TO
SUPPORT ETHICAL AND GOOD GOVERNANCE

Digital Technologies and Healthcare

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I have no competing interests. I am Director of the UK NIHR Health Technology Assessment Programme, which funds health and social care research. The views expressed are those of the presenter and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care.



Health care
facility focused
primary care



“Digital will play a pivotal role in ensuring that the health service is fit for the future, NHS England says this week in its long-term plan – as health secretary Matt Hancock continues to press for digital innovation across the service.”

‘Digital first’ in NHS long-term plan
January 8 2019



NHS

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Online version of the NHS Long Term Plan

Chapter 1: A new service model for the 21st century

We will boost ‘out-of-hospital’ care, and finally dissolve the historic divide between primary and community health services

2. The NHS will reduce pressure on emergency hospital services

People will get more control over their own health and more personalised care when they need it

4. Digitally-enabled primary and outpatient care will go mainstream across the NHS

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4. Digitally-enabled primary and outpatient care will go mainstream across the NHS

1.43. **Digital technology will provide convenient ways for patients to access advice and care.** For patients and staff the starting point is interoperability of data and systems, as set out in [Chapter Five](#). Then, building on progress already made on digitising appointments and prescriptions, a digital NHS ‘front door’ through the [NHS App](#) will provide advice, check symptoms and connect people with healthcare professionals – including through telephone and video consultations. Patients will be able to access virtual services alongside face-to-face services via a computer or smart phone. We will continue to invest in the [nhs.uk](#) platform so that everyone can find helpful advice and information regarding their conditions. As technology advances, we will also trial the use of innovative devices such as smart inhalers for better patient care and remote monitoring of conditions. We will also continue to support the development of apps and online resources to support good mental health and enable recovery.



- Digital first' by necessity

March 2020

COVID-19: Needs-led implementation and the immediate potential of remote monitoring

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An ongoing outbreak of coronavirus (COVID-19) is causing public health concern on a global scale.¹ With substantial person-to-person transmission, special attention is needed to reduce transmission and to protect susceptible populations, including older people who live with weakened immune systems.²

As a result of this viral outbreak, the world as we know it is changing and barriers to delivering health care remotely are disappearing rapidly. Projects long in the planning are leapfrogging developmental stages straight into implementation, driven by the urgent need to share healthcare information to mitigate challenges raised by social distancing. For those of us interested in exploring remote ways to support patient care in the primary care setting, the COVID-19 global pandemic presents a unique natural experiment that can inform future best practice for digital health care.

Swift additions to the technological healthcare 'toolkit' include video-based consultation,³ provision of tablet computers to facilitate 'virtual visits',⁴ and telephone-first assessment. Patients and clinicians alike are embracing digital health. A survey reported that 38% of responders increased their use of NHS technology since the start of the outbreak.⁵ People with suspected COVID-19 symptoms have been receiving regular check-ins from an NHS messaging service. The NHS app has been downloaded 434 000 times since 24 February 2020,⁶ offering a gateway to NHS services; patients can use the app to book appointments and view medical records.

Community-based initiatives and digital technologies provide solutions to challenges arising from the COVID-19 pandemic. This current activity also provides an opportunity to reflect on and rethink our approach to how we conduct consultations with patients. While the default face-to-face format has been subject to debate, the sudden implementation of technological alternatives will likely impact discussion around its future role. With the majority of people being asked to stay away from GP practices, we should now be discussing the value of returning to this model of care.

However, this is not a call for 'digital exceptionalism'; significant barriers to uptake and implementation of digital solutions remain, not least around appropriate evaluation, electronic surveillance culture, equitable access, mitigation of health inequalities, cost, and the vital importance of face-to-face contact. Indeed, despite the immediate potential of digital medicines to support health care, it is imperative that we avoid falling into the reactive trap of believing that digital 'solutionism'⁷ is the only way forward. Digital 'fixes' cannot simply replace meaningful political and social change, and must not become the default option as we emerge from the current crisis. Digital health technologies are not inherently positive and progressive, and the UK's track record in the successful delivery of large-scale digital projects has been somewhat inconsistent.

Nonetheless, telemedicine is not a novel concept and using technology to support care delivery is relatively commonplace, particularly in rural and remote settings. As early as 1998, nurses and GPs in a rural village in Scotland, UK were able to support physical ailments, mental

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Intelligent use
of data already
gathered

Wearables and
other forms of
remote
monitoring

Access for
underserved
and
disadvantaged
groups

What are the challenges for health care?



Rise of long-term conditions



Challenge of infectious disease



Novel technology including computers



Availability of big data



Globalisation



MacKillop, et al. *JMIR mHealth and uHealth* 2018; **6**, e71

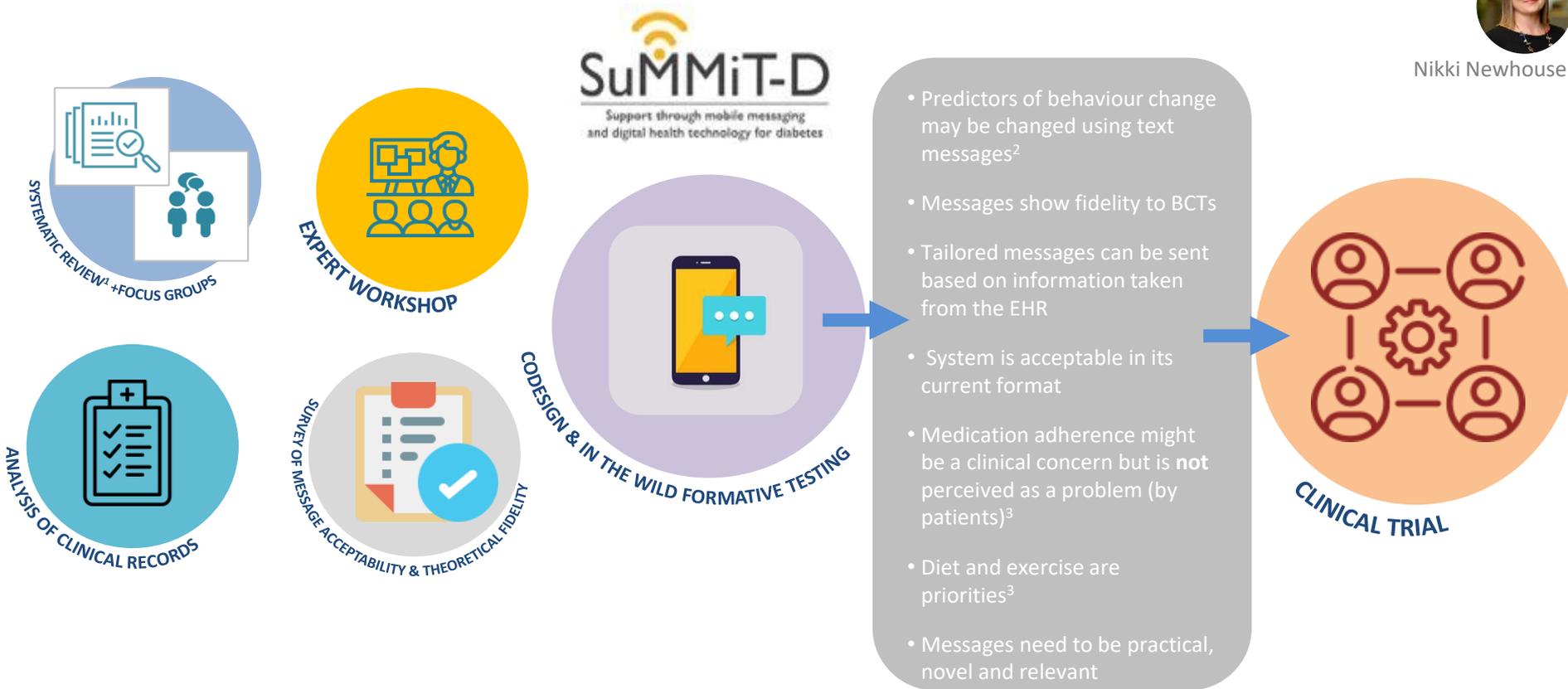
Bobrow, Farmer et al. *Circulation* 2016;;133: 592-600.

Farmer et al. *Diabetes Care* 2005; **28**:2697-702

SuMMiT-D: Support through mobile messaging and digital health technology for diabetes



Nikki Newhouse



¹Farmer, A.J., McSharry, J., Rowbotham, S., et al., 2016. Effects of interventions promoting monitoring of medication use and brief messaging on medication adherence for people with Type 2 diabetes: a systematic review of randomized trials. *Diabetic Medicine*, 33(5), pp.565-579

²Bartlett, Y.K., et al. A text message intervention to support medication adherence in type 2 diabetes: Effects on psychological constructs and correlation between changes to psychological constructs and medication adherence. (*Under review*)

³Bartlett, Y.K., Newhouse, N., Long, H.A., et al., 2019. What do people with type 2 diabetes want from a brief messaging system to support medication adherence?. *Patient preference and adherence*, 13, p.1629.

EDGE2: A multi-component, digital health intervention to improve outcomes for people with COPD



Nikki Newhouse



EDGE1

- System is acceptable to users¹
- Data forms part of ongoing care package
- Community recruitment is feasible

EDGE2 - HOSPITAL RECRUITMENT



THE COVID RESPONSE

- Hospital recruitment is not feasible²
- Burden of coping with acute illness following exacerbation and admission

- Reconfiguration of care³: exacerbation – admission – discharge into 'virtual ward'
- Recruitment is feasible
- Renewed buy-in from clinical team

¹Williams, V., Price, J., Hardinge, M., et al., 2014. Using a mobile health application to support self-management in COPD: a qualitative study. *British Journal of General Practice*, 64(624), pp.e392-e400.

²Whelan, M.E., Biggs, C., Areia, C. et al., Recruiting patients to a digital self-management study whilst in hospital for a chronic obstructive pulmonary disease exacerbation: A feasibility analysis (*Under review*)

³Newhouse, N., Farmer, A. and Whelan, M.E., 2020. COVID-19: Needs-led implementation and the immediate potential of remote monitoring. *BJGP Open*, 4(2).

Implementing support for people with long-term conditions using cell-phones

Monitor the condition and the treatment



Provide facility for shared care using common data

Provide individualized interpretation of data



Charting and decision support

Provide support for behavior change



Tools to improve decision making and monitoring behavior

Timely communication of prompts, reminders recommendations and advice



SMS messages to provide prompts and reminders linked to SMBG data and diary

Offer support for learning



Facility for educational packages

The innovation pathway



WHAT IS THE IS THE
INNOVATION?



FITTING THE
INNOVATION INTO
DAY-TO-DAY LIFE



CAN IT WORK UNDER
IDEAL
CIRCUMSTANCES?



DOES IT WORK AT
SCALE?



Digital innovations don't benefit patients unless underpinned by stable and available care processes



Technologies that are being widely adopted can be integrated into health care – but with shared data



Translation of innovations into clinical care pathways is an iterative co-design process – technical alongside feasibility and acceptability



If there is a convincing case that a digital technology is useful, then consider how to test it out and scale up whilst still including a well designed and rigorous evaluation of impact and benefit.