PROCESS AND SYSTEMS **Strategies to promote guideline adoption: lessons learned from the implementation of a national COVID-19 hospital guideline across NHS Wales**

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ABSTRACT

There is little understanding about what proportion of the target audience have read guidelines published through the traditional approach. The COVID-19 pandemic created a particularly difficult scenario for healthcare professionals (HCP) since the evidence base rapidly changed. In response, we established a freely accessible, video-based online resource, which was formally implemented requiring user registration.

The guideline rapidly gained more than 4,500 registrants in the first wave alone, including nearly 100% of respiratory, intensive care or emergency unit consultants in Wales. During the first wave, there were nearly 170,000 page views with over 31,000 video plays and an average of 5.8 visits to the site per registrant. Acceptability using an online survey showed widespread support and that the unsubscribe rates were remarkably low.

We suggest that this novel approach to guideline implementation achieved its aim of widespread engagement and acceptability and serves as a potential model for future medical guidelines and education beyond COVID-19.

Introduction

The emergence of SARS-CoV-2 in December 2019 has given rise to one of the greatest challenges faced by healthcare systems in the last century. The pandemic continues to demand a rapidly evolving evidence base to support the optimal management of patients with COVID-19.

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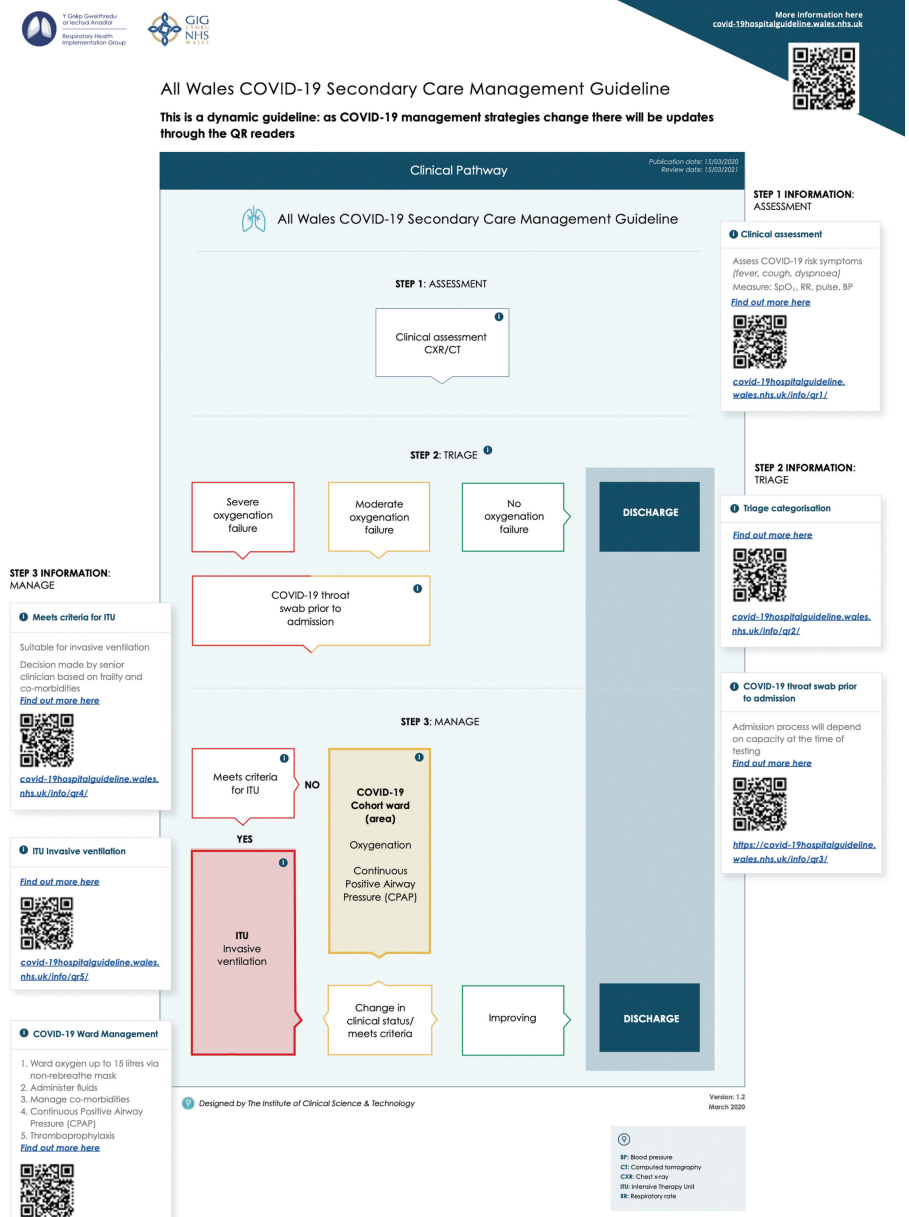
During the first peak of community transmission, rapid redeployment of healthcare workers from a range of specialties has been required to support acute care of hospitalised patients. It was feared that a lack of clear guidance and variable knowledge base would lead to confusion among healthcare professionals (HCPs), potentially introducing variation in care and outcomes for patients. To address this, a novel dynamic national guideline was created early in the first wave to support clinical decision making across all hospitals in Wales.

Conventional approaches to guideline adoption are variably successful due to several different factors. Firstly, not all key stakeholders are aware of new guidelines, particularly when the evidence base is rapidly changing. Secondly, fidelity is frequently disrupted by varied interpretation of the evidence base. Thirdly, conflicting beliefs around the nature of the evidence may hinder widespread adoption. Recognising these and other factors, we sought to improve guideline adoption by utilising the principles of implementation science. At its simplest, this relatively new discipline is concerned with the processes of achieving widespread compliance with evidence-based practices. In the context of COVID-19, this was distilled into a simple question: how do we get timely, relevant information, instruction and advice for the management of COVID-19 to clinical decision-makers in an easily accessible format to help improve COVID-19 survival rates across the country?

Herein, we report the methodology applied to rapidly disseminating a novel dynamic clinical guideline to all relevant decision-makers across NHS Wales during the first wave of the COVID-19 pandemic. We evaluate engagement and acceptability of our web-based tool as relevant metrics necessary for widespread adherence with the guideline recommendations.

Methodology

Guideline design

The guideline was designed so that HCPs could easily access and understand the basic principles of COVID-19 management, with supplemental detail that could change as new evidence emerged. The fixed component of the guideline represented patient flow (Fig 1).

The guideline was compatible with all hospital structures and, therefore, sufficiently flexible for local adoption across all hospitals in Wales. The dynamic component of the guideline is represented by the QR codes with links to a web-based learning platform highlighting new clinical information as it emerged. Local experts and opinion

Fig 1. All Wales COVID-19 Secondary Care Management Guideline.

leaders from a variety of different professional groups provided contextual and instructional education distilled into brief 3–5-minute videos with summaries, graphs and other visual aids incorporated during the editing process to promote ease of information transfer. All guideline registrants were notified by email with a link to the guideline update as soon as it was uploaded, thereby facilitating a rapid response to the expected changes in clinical instruction.

Leading experts in respiratory, intensive and palliative care developed the guideline content, with the national respiratory lead for Wales acting as the primary author and guideline coordinator. Guideline recommendations were predominantly practical in nature; for example, how to deliver continuous positive airway pressure (CPAP) therapy, how to prone patients or how to provide palliative support, with others outlining emerging national

evidence from clinical trials. Consultation among a network of clinical colleagues enabled consensus decisions around issues with a limited evidence base, such as the target oxygen saturation ranges or decisions about where to provide CPAP.

Implementation strategy

The guideline was implemented across six of the seven health boards (HB) in Wales. The remaining HB was not included since it did not have any district general hospitals (DGHs) within its boundaries. Implementation was achieved using The Institute for Clinical Science and Technology (ICST) implementation framework. The office of the chief medical officer (CMO) in the Welsh Government encouraged the use of the guideline in each

HB in Wales by writing to all HB chief operating officers and medical directors.

We established an organisational structure across NHS Wales facilitating central control through the guideline implementation team. The implementation team also managed locally positioned facilitators to increase widespread adoption by the target audience: these were clinical decision-makers responsible for managing patients admitted with COVID-19. Specifically, these included all emergency department (ED), respiratory and intensive care consultants, which we estimated to be around 176 clinicians across Wales using publicly available records.[1]

The central guideline management team primarily supported facilitator activity, but could also respond quickly to technical issues, user requirements and requests. Implementation software supported the implementation process, enabling locally selected facilitators to increase reach and regional acceptance. The software also provided engagement and activity tools with feedback. This included local cohort management with real-time analytics around engagement and activity to support facilitator activity, and mass invites with recommendations to nudge registration.

Implementation outcomes

Adoption of the guideline was determined by assessing registration data from the guideline platform and comparing this with the target population numbers nationally and regionally. Accessibility and acceptance were assessed based on a survey. We used SurveyMonkey to conduct an anonymised registrant survey between 08 June 2021 to 22 June 2021. The survey was emailed to all participants with a further two reminders within the 2-week period to increase participation. Briefly, this comprised 11 multiple-choice questions, three open questions, a star rating for overall quality, and sliding scales to determine ease of use and by how much the guideline had influenced their practice. Guideline acceptance measures were generated from validated sources.[2]

Results

Guideline adoption

From 21 March 2020 to 28 March 2020, 18 DGHs in Wales received several hundred hardcopy guideline posters, subsequently distributed in areas where relevant HCPs could easily access them, such as COVID-19 wards, medical assessment units and EDs. Fig 2
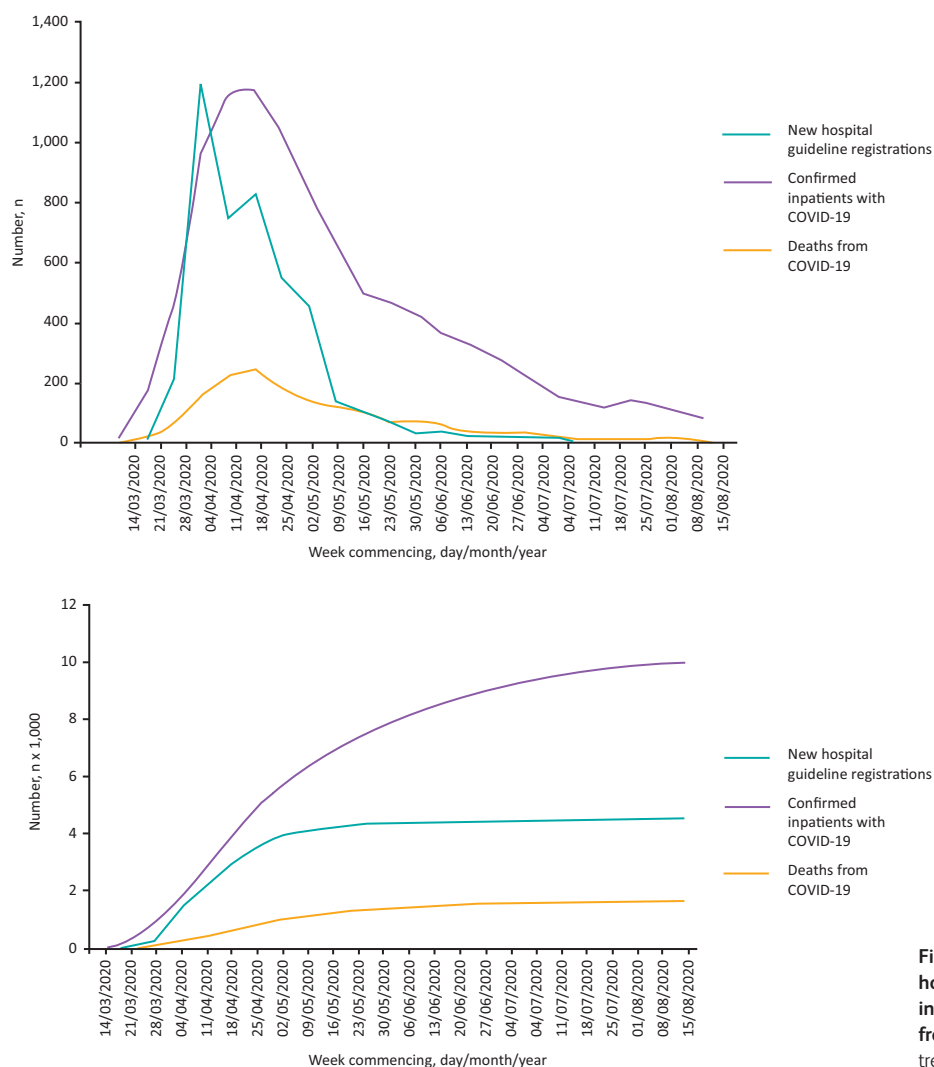

Fig 2. Registration for national COVID-19 hospital guideline compared with inpatients with COVID-19 and deaths from COVID-19. a) New guideline registrant trend. b) Cumulative guideline registrant trend.

highlights that the initial publication of the guideline coincided when total confirmed COVID-19 inpatients and COVID-19 deaths were relatively low.

Registration rates peaked at 1,199/week around 28 March 2021, following a range of alignment and facilitation activity that included email campaigns, formal guideline on-boarding and discussions promoting adoption with executive teams. Weekly registration rates continued during April (mean 832/week) before declining to 450/week in early May (Fig 2), coinciding with a reduction in the rate of patients admitted to hospital and dying from COVID-19.

Total registrants reached 4,521 during the first wave. Consultants were the primary target audience and accounted for the greatest proportion of professionals registered with the guideline platform (23%). In total, 46% of all consultants employed in Wales were registered (Fig 3). We also observed uptake across allied health professionals (including middle grade and junior doctors, physiotherapists, pharmacists, dietitians, and occupational therapists), accounting for 21.4% of registrants, and nurses for 20.6%. There were 607 registrations for specialist registrars, 389 for core trainees and 385 for foundation years doctors, demonstrating a wide uptake across all grades of doctors.

We evaluated uptake for consultants predicted to manage patients admitted with COVID-19 together with the total number of consultants of any specialty in Wales (Fig 3). The results demonstrate penetration in the key specialties of respiratory, intensive care and emergency medicine. The apparent discrepancies with more registrations than staff relate to incomplete data for intensive care and emergency medicine staff numbers available from StatsWales, hence the numbers are best estimates.[1]

Guideline accessibility

At the time of writing, more than 180 pre-recorded video tutorials featuring 45 clinical specialists are freely available to registrants online. This site (www.covid-19hospitalguideline. wales.nhs.uk) has subsequently migrated (www.allwales.icst.org. uk) to accommodate a range of other guidelines and relevant educational resources for NHS staff in Wales. Video updates were communicated rapidly in the first 6 weeks as new information and evidence emerged (Fig 4). During the first wave alone, there were nearly 170,000 page views and 31,000 video plays from clinicians in Wales registered with the guideline platform. Google Analytics shows approximately 40,000 sessions, averaging 4.2 page views per session and average session duration of over 5 minutes. On average, there were 5.8 visits to the site per registrant.

In total, 178 healthcare professionals responded to the survey representing 3.9% of the total number of registrants at the time. Of all responses, 33.9% of these were consultants, with 23.1% nurses and 26.0% reported as 'other'. The majority of respondents reported using the guideline frequently, including 22.6% on a daily basis, 23.2% 2–3 times a week and 26.6% weekly. Most respondents accessed the guideline most often while on duty at work (53.2%), while 26.3% accessed it most often not on duty from home, and a further 19.3% not on duty at work. The mean sliding scale score for the extent to which the guideline informed their practice was 63 out of 100, indicating most respondents found the guideline informed their clinical practice.

Guideline acceptability

The average rating of the guideline platform was 4.01 out of a maximum of five stars. Of all respondents from the survey, 68% had encouraged others to use the guideline platform, 28% had not. Eighty-one per cent of respondents indicated that they would like the update emails to continue. There were 101 email campaigns (clinical updates and video synopses to registrants). In total, 207 registrants unsubscribed to the emails (4.6% of total registrants). Of the un-subscribers who entered their job title (91% (n=189) of un-subscribers), the highest proportion came from medical students (21% (n=40)), followed by 'other healthcare professional' (17% (n=33)) and registrars (16% (n=31)). Only 0.4% of consultants unsubscribed.

Discussion

During the first wave of the COVID-19 pandemic, the evidence base was initially weak, and subsequently subject to rapid changes. Recognising that this scenario would be likely to create variation in care, we sought to deliver a guideline in a different way by focusing on the principles of implementation science. We had previous experience of success with this approach while developing national guidelines for both asthma and chronic obstructive pulmonary disease (COPD) in Wales.[3] In essence, this involved utilising an implementation framework and an implementation strategy that ensured stakeholder alignment and the identification of local champions who facilitated guideline dissemination and adherence. We also utilised key opinion leaders in Wales to deliver education components in a short (3–5 minute) video-based format to improve acceptance of the recommendations. We believe that this approach to disseminating evidence promotes adoption more effectively than traditional approaches to guideline delivery. Moreover, because users were signed into the platform, we were able to measure engagement with the guideline, a unique aspect in terms of medical guideline delivery, but something that is normalised on social media platforms.
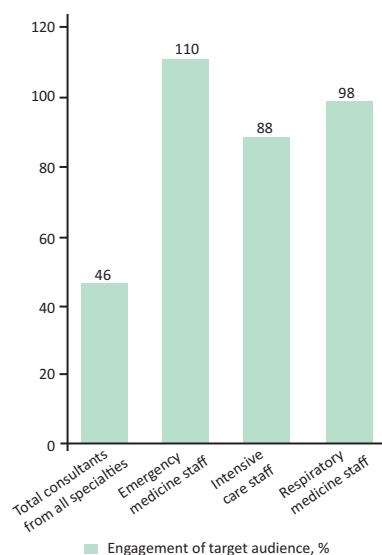

Fig 3. Guideline registrations by specialty. Discrepancies with oversubscription result from best estimates from incomplete available data.
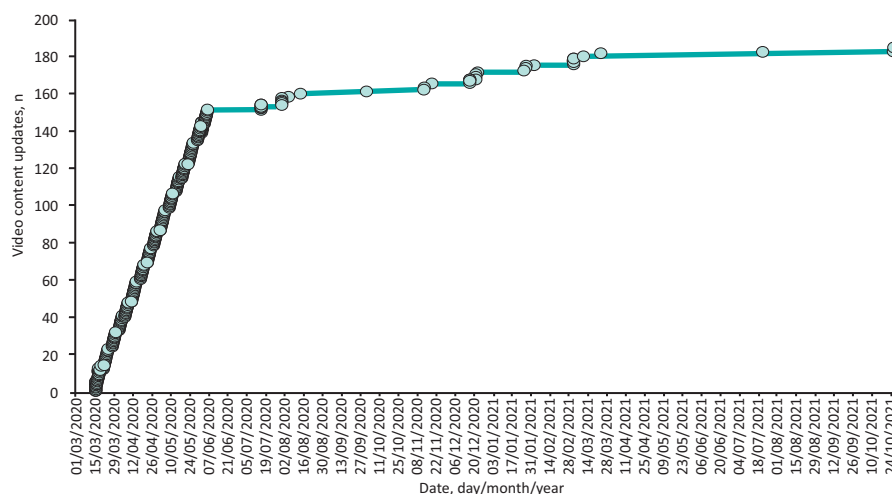
Fig 4. Guideline content notifications. Note the progressive rise in knowledge transferred during the initial phase of the pandemic (between 15 March 2020 and 07 June2020) reflecting new evidence and emerging recommendations to managing patients with COVID-19.

Our target population was consultants whose primary role was in delivering COVID-19 care, since we recognised that this was a consultant-led and delivered service. We demonstrated a remarkably rapid penetration of the target population with all emergency care consultants, 88% of intensive care consultants and 98% of respiratory consultants employed in Wales registered during the first wave. It was intriguing that large numbers of consultants from across all specialties were registered (46% of all consultants employed by NHS Wales), probably reflecting concerns that they would be involved in direct COVID-19 care. Indeed, this was the case in some hospitals where large amalgamated COVID-19 rotas were created. Evidence that consultants continued to find the guideline of value was that they were the professional group least likely to unsubscribe from email updates (0.4% of all consultants registered).

New registration trends mirrored the rise in new hospital admissions and deaths from COVID-19, suggesting the guideline was accessible when it was needed the most (Fig 2). It is also notable that over 80% of respondents to the survey requested on-going email updates and nearly 70% endorsed the guideline by recommending it to others, albeit from a relatively small sample of survey responses. The timeliness of the guideline publication when COVID-19 admissions in Wales were low, and formal endorsement by the chief medical officer for the Welsh Government were undoubtedly factors that supported guideline adoption.

Finally, analysis of website traffic demonstrated sustained and significant engagement with the online resources, consistent with the role of this tool in informing clinical practice. This approach is a much more comprehensive mechanism to raising the awareness of new guidelines, with the techniques applied increasing the acceptance and potential adoption of the recommendations within it when compared with traditional methods.

It is of relevance that Wales had one of the lowest mortality rates in the UK for COVID-19 during the first wave of the pandemic (75.7 deaths per 100,000 people in Wales (95% confidence interval (CI) 72.7–78.6) versus 90.9 deaths per 100,000 in England (95% CI 90.1–91.8)).[4] These results are unusual since Wales has a significantly older population and a higher proportion of people with comorbidities than England, both known to be important factors for increasing the probability of death from COVID-19.[5–8]

While we acknowledge that there are multiple factors that could influence mortality from COVID-19 including lockdown timings, population demographics, vaccinations rates (not relevant in the first wave) and the effectiveness of contact tracing, we suggest that implementing a national COVID-19 guideline in the way that we have described has been an important factor.

Limitations

We created a number of resources mainly for the benefit of nursing staff on COVID-19 wards, including how to use CPAP and high-flow nasal oxygen, how to prone, and how to palliate a dying patient. However, we noted that there were barriers to nurses and other HCPs engaging with the platform, which highlights the limitations to our implementation strategy. First, ward computers were generically logged-in, which likely underestimates the true number of unique users of the guideline. Furthermore, some NHS sites initially blocked the site as a blanket policy to restrict new sites containing the term 'COVID-19' as a cyber security measure, despite our proactive efforts to mitigate this risk by including senior IT stakeholders early in the development phase. Thirdly, nurses, physiotherapists and other HCPs rarely use NHS emails, which was the primary mode of communicating updates. These highlight some of the complexities in delivering web-based guidelines to a wide-ranging target audience.

Conclusion

We have provided evidence that guidelines can be created and disseminated at scale and pace by utilising the principles of implementation science. We suggest that this novel approach to guideline implementation achieved its aim of widespread acceptability and engagement and serves as a potential model to increase the adoption of evidence-based practices beyond those recommended for COVID-19. ∎

Acknowledgements

the direct application of the guideline into delivering excellent quality clinical care to patients admitted into hospital within each of the health boards across Wales. Thanks to Prof Chris Davies' team at The Institute for Clinical Science and Technology who partnered with NHS Wales to successfully implement the national guideline and to Dr Daniel Farewell for careful reading and statistical supervision.

References

1   StatsWales. *Detailed official data on Wales*. Welsh Government. https://statswales.gov.wales/Catalogue [Accessed 01 November 2021].

2   Weiner BJ, Lewis CC, Stanick C *et al*. Psychometric assessment of three newly developed implementation outcome measures. *Implement Sci* 2017;12:108.

3   The Institute for Clinical Science and Technology. *All-Wales adult asthma management and prescribing guideline*. ICST, 2020. https://allwales.icst.org.uk/guidelines/all-wales-adult-asthma-management-guidelines [Accessed 10 November 2021].

4   Office for National Statistics. *Coronavirus (COVID-19) roundup, 24 to 28 August 2020*. ONS, 2020. www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid19roundup24to28august2020/2020-08-28 [Accessed 25 March 2021].

5   Office for National Statistics. *Living longer: trends in subnational ageing across the UK*. ONS, 2020. www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/ageing/articles/livinglongertrendsinsubnationalageingacrosstheuk/2020-07-20 [Accessed 24 March 2021].

6   Bevan G, Karanikolos M, Exley J, Nolte E, Connolly S, Mays N. *The four health systems of the United Kingdom: how do they compare?* Nuffield Trust, 2014. www.nuffieldtrust.org.uk/files/2017-01/4-countries-report-web-final.pdf

7   Ponsford MJ, Jefferies R, Davies C *et al*. Burden of nosocomial COVID-19 in Wales: results from a multicentre retrospective observational study of 2508 hospitalised adults. *Thorax* 2021;76:1246–9.

8   Williamson EJ, Walker AJ, Bhaskaran K *et al*. Factors associated with COVID-19-related death using OpenSAFELY. *Nature* 2020;584:430–6.

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