# How can virtual hospitals aid recovery and offer a new relationship between the NHS and the public

Wednesday 21 April 2021

In partnership with NHSE/I East and Eastern AHSN

# Welcome & introductions

**Helen Bevan**

Chief Transformation Officer, NHS Horizons

# Strategic Context

Sam Higginson

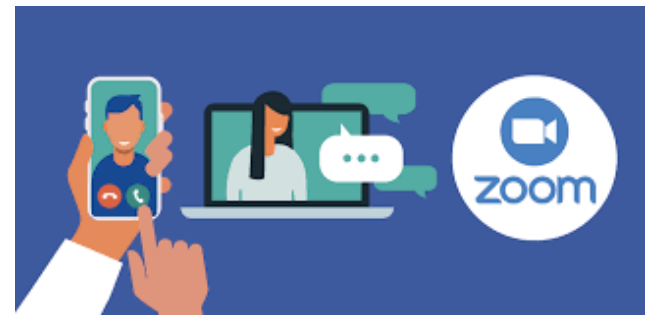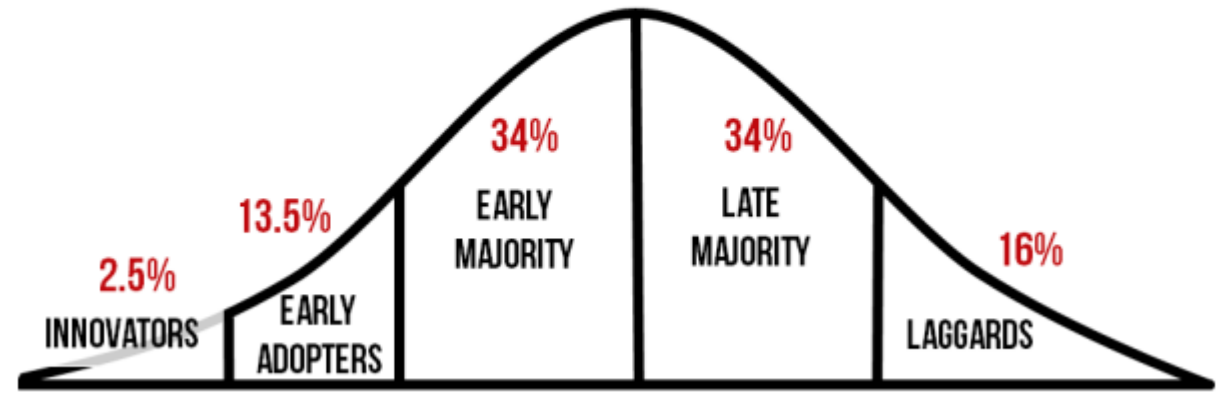CEO, Norfolk & Norwich University Hospitals

# How virtual care has supported care delivery during COVID

- Deployments that should have taken years were completed in weeks
- Cancer care and multi-disciplinary teams meetings all moved to virtual delivery
- Inpatient visiting was delivered en masse via ipad
- COVID Virtual Wards delivered care in the community using a variety of models.
- The urgency for delivery lifted many barriers to change.  A lot of innovation was new ways of using old technology.



**TECHNOLOGY ADOPTION CURVE**

Everett Rogers – Diffusion of Innovations 1962

2.5% INNOVATORS
13.5% EARLY ADOPTERS
34% EARLY MAJORITY
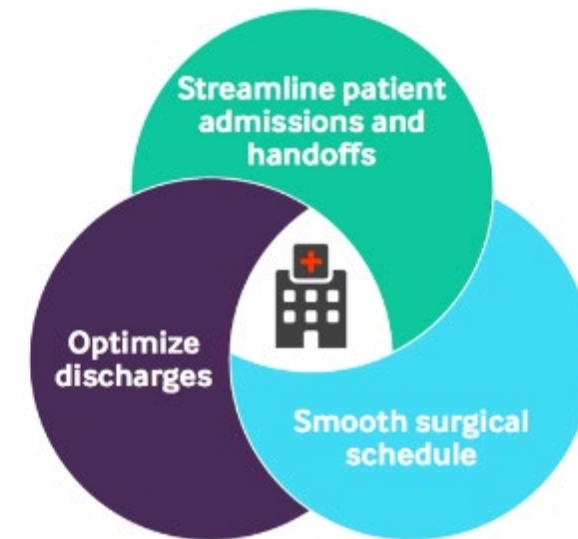34% LATE MAJORITY
16% LAGGARDS

# The potential of virtual wards to support recovery – Flow is key

- We need to maintain the pace of digital transformation that COVID kick-started.

- Organisations will need to make key operational changes to realise the benefits of the virtual ward.
- If the virtual ward releases a bed on a medical ward, this must either be available for use by any speciality for elective work.
- Nursing and AHP staff may need additional training either to work on the ward or to support the ward.
- Significant digital transformation support and change management are needed!

- Organisations with key digital systems will be able to operate more efficient virtual wards.
- "Air-traffic-control" systems that effectively track patients movements.
- Electronic Patient Records that allow remote access and recording of patient information.
- Shared Care Records, which allow sharing of information across providers.

How to improve patient flow



NEJM Catalyst (catalyst.nejm.org) © Massachusetts Medical Society

Somlo, D.R., Repenning, N.P. and Mangi, A.A., 2018. Improving patient flow with dynamic work design. NEJM Catalyst, 4(3).

# Polls

- Are you using a covid virtual ward?
  Yes
  No

- Are you using a non-covid virtual ward?
  Yes
  No

- Those who are using a non-covid virtual ward, please do share what pathway you are using for virtual care for in the question box

# Perspective from Norfolk

21st April 2021

**Dr Ed Prosser-Snelling**

Consultant Obstetrician and Gynaecologist
Chief Clinical Information Officer, Norfolk and Norwich University Hospitals (NNUH)

edward.prosser-snelling@nnuh.nhs.uk
@prossersnelling

# The journey so far:



- 3rd February 2021 began to admit patients to our virtual ward
- On the back of a significant and established programme of work around virtual visiting and plans for remote care
- Established a clinical team to mirror a normal ward
- Engaged shielding staff and trained in virtual care
- Created a governance process to fit into the corporate process, sitting within digital health.
- Our initial focus was COVID, but we knew we wanted to use the VW to support recovery



*"Our primary goal is to provide a safe and effective monitoring and follow-up service for all patients in the virtual ward, and to facilitate early discharge, admission avoidance, and physical bed occupancy reduction where possible and clinically safe."*

# The successes:

## Virtual Ward Dashboard



## Active Virtual Ward Pathways

- Palliative Care
- Hepato-Biliary Surgery
- Vascular Surgery
- Interventional Radiology
- Oncology
- Stroke Medicine

## Services Offered

- 24/7 full monitoring of observations
- Pharmacy and Medicines Support
- Physiotherapy
- Daily Medical Review

# The challenges:



- Initial sceptics were won over by investing in locally recognised champions
- We are the least digitally mature STP in the country, which is reflected both in our patients and staff attitudes to technology as well as the systems which support them.  Record Keeping.
- Keeping the ward staffed following the end of shielding
- Digital Exclusion, poor 4G connectivity
- Kit, logistics, deployment and returns
- Widespread adoption
- Concerns around clinical accountability
- System failure
- Duplication of Effort with other initiatives

# What does the future look like?



- **Phase One** of this development will be transferring those who are already inpatients within the Trust to the VW if they meet the criteria.

- **Phase Two** will look to transfer patients attending the Emergency Department with a high suspicion or confirmed Covid 19 infection who meet the criteria for Covid Virtual Ward.

- **Phase Three** expanding the virtual ward facility to incorporate other appropriate patient pathways - these include but are not limited to – Palliative Care, Oncology, HPB surgery.

- **Phase Four** will be integration of the NNUH Covid Virtual Ward with the systems put in place within the wider Norfolk and Waveney Community teams.

# Poll

- Technology is a tool. What problems do you think virtual care can solve?
  - Quicker access
  - Greater efficiency
  - Greater self care
  - Increased patient confidence
  - Flexibility for patients and staff

# Perspective from Primary Care in E&N Hertfordshire

21st April 2021

**Dr Sian Stanley**

Clinical Director, Stort Valley and Villages Primary Care Network (PCN)

sianstanley@nhs.net

# The journey so far...

- March 2020

- Admission criteria

  **Clinical Judgement**
  **Double Triaging**

- Our Virtual Ward;

392 patients admitted in 12 month period.

5x Patients with raised D-Dimmers on admission

1x 17 year old PIMS

1x Patient Ca Lung

0 Deaths

- Average length of stay 6.5 days.
- Max stay 7 weeks.

- EA Weekend cover

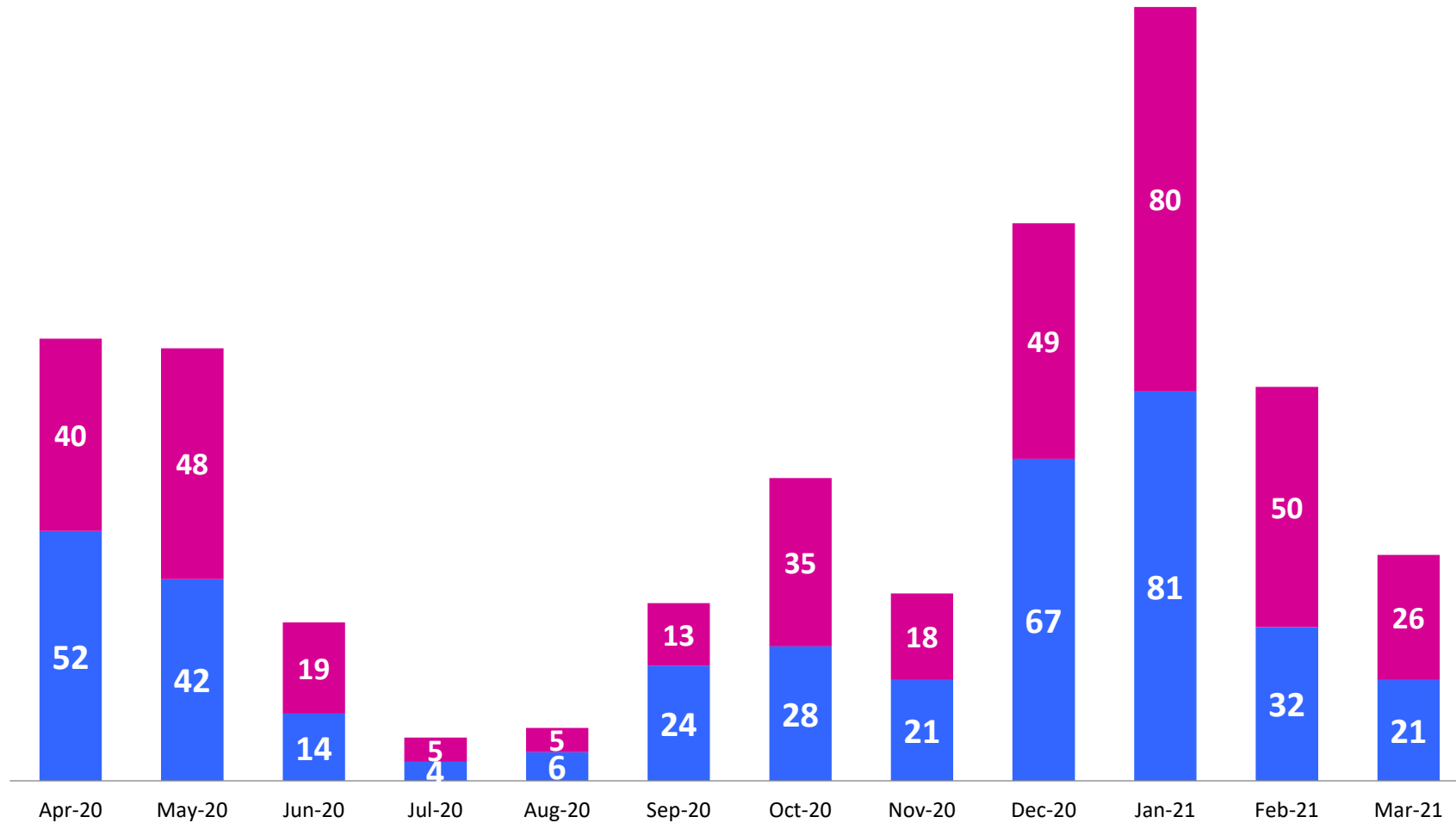Patients more ill than expected- why?

HOT clinic assessment then admission to virtual ward

Now called Covid at home

# Virtual Ward Data - Patients added/removed per month

■ Patients Added  ■ Patients Removed



| Month | Patients Added | Patients Removed |
|-------|---------------|------------------|
| Apr-20 | 52 | 40 |
| May-20 | 42 | 48 |
| Jun-20 | 14 | 19 |
| Jul-20 | 4 | 5 |
| Aug-20 | 6 | 5 |
| Sep-20 | 24 | 13 |
| Oct-20 | 28 | 35 |
| Nov-20 | 21 | 18 |
| Dec-20 | 67 | 49 |
| Jan-21 | 81 | 80 |
| Feb-21 | 32 | 50 |
| Mar-21 | 21 | 26 |

# The successes



- **Right patients in the Right setting, getting the Right help at the Right time**
  Not about POA



- Patient feedback

- We did not drop a patient

# The challenges

- Getting buy in

- Time Consuming

- Clinical dumping

- Discharging

- Other illnesses and not covid.

- Scaling up to Virtual hospital been more challenging
  Access to diagnostic tests
  Could we do a virtual hospital without having to involve the ED?

Vision vs Reality

# What does the future look like?

- What ever virtual world we decide to use it needs to be supported and funded properly.

- The technology is there as are the pathways and the will is there BUT it <u>cannot</u> be on top of BAU

- The model needs to be safe, and get the support  it needs to be reliable.

- Any virtual model will need the most experienced clinicians to admit/ discharge it as it could become overwhelmed very quickly.

- Admission is easy, monitoring is straightforward but discharge seems to be more difficult

- Increasing diagnostic testing in primary care could lead to an interface where patients are co managed by both primary and secondary care teams with step up step down pathways. We need to create new ways of working that reflect the strengths of both partners.

# THE WEST HERTS COVID-19 VIRTUAL HOSPITAL

21st April 2021

**Dr Andy Barlow**

Consultant Respiratory Physician
NHSE/I Clinical Lead (East of England) for covid Virtual Hospitals and oximetry@home
Divisional Director for Medicine, West Hertfordshire Hospitals NHS Trust

a.barlow1@nhs.net
@AndyatFrogmore

# Identifying the problem that needs solving



**FEBRUARY 22, 2020**

## CASES IN LOMBARDY

On 22 February, the Italian authorities report clusters of cases in Lombardy and additional cases from two other regions, Piedmont and Veneto. Over the following days, cases were reported from several other regions. Transmission appeared to have occurred locally, in contrast to first-generation transmission from people returning from affected areas. Transmission events were also reported from hospitals, with COVID-19 cases identified among healthcare workers and patients.

During the following week, several European countries reported cases of COVID-19 in travellers from the affected areas in Italy, as well as cases without epidemiological links to Italy, China or other countries with ongoing transmission.



# Covid-19 Podcast from Italy with Roberto Cosentini. St Emlyn's
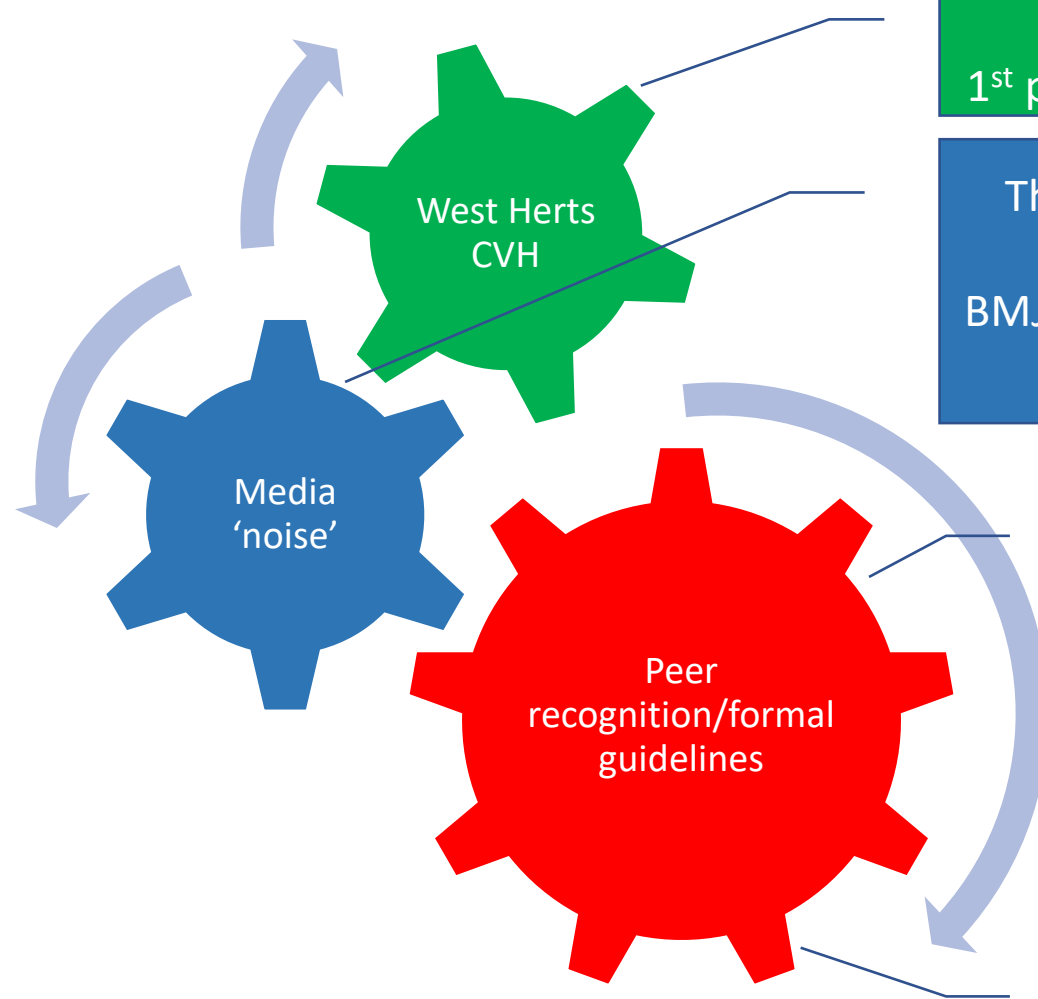
Simon Carley on March 14, 2020



https://www.podbean.com/media/share/pb-sfm9j-d632e0?utm_campaign=w_share_ep&utm_medium=dlink&utm_source=w_share

# Revolution in the COVID era

- Shared vision/effective leadership
- Supportive culture
- Appetite for change
- Handling conservatism
- Deliver
- QI principles

West Herts CVH

Media 'noise'

Peer recognition/formal guidelines

'Conceived': 9/3/20
1st patient on-boarded 14/3/20

The "virtual wards" supporting patients with covid-19 in the community
BMJ 2020; 369 doi: https://doi.org/10.1136/bmj.m2119: June 2020

Remote home monitoring (virtual wards) during the COVID-19 pandemic: a systematic review
Cecilia Vindrola-Padros…Naomi J Fulop
https://doi.org/10.1101/2020.10.07.20208587: October 2020

NICE position statement: Nov 2020
NHSE/I: January 2021

| SOARS score mortality | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1.4% | 5.3% | 5.9% | 23.4% | 35.4% | 53.9% | 72.5% | 78.6% | >78.6% |

0-1

GREEN

**SOARS SCORE 0-1**

1) **Discharge to Virtual Hospital**\*\*

2) **Give patient Advice Pack (with oximeter)**

\*\***Make referral via Infloflex Web COVID 19 or email** <u>westherts.respcovid19@nhs.net</u> **if Infloflex unavailable**

Original research

# Early prognostication of COVID-19 to guide hospitalisation versus outpatient monitoring using a point-of-test risk prediction score
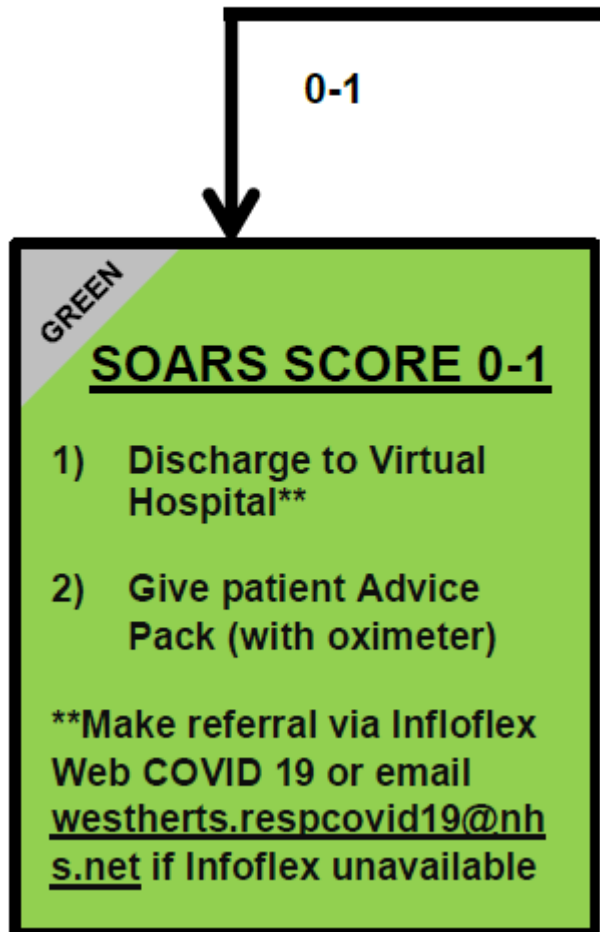
Felix Chua [1,2] Rama Vancheeswaran,[3] Adrian Draper,[4] Tejal Vaghela,[5] Matthew Knight,[3] Rahul Mogal,[3] Jaswinder Singh,[6] Lisa G Spencer [7] Erica Thwaite,[8] Harry Mitchell,[3] Sam Calmonson,[3] Noor Mahdi,[3] Shershah Assadullah,[3] Matthew Leung,[3] Aisling O'Neill,[3] Chhaya Popat,[3] Radhika Kumar,[3] Thomas Humphries,[7] Rebecca Talbutt,[7] Sarika Raghunath,[7] Philip L Molyneaux [1,2] Miriam Schechter,[5] Jeremy Lowe,[5] Andrew Barlow[3]

**ABSTRACT**
**Introduction** Risk factors of adverse outcomes in COVID-19 are defined but stratification of mortality using non-laboratory measured scores, particularly at the time of prehospital SARS-CoV-2 testing, is lacking.
**Methods** Multivariate regression with bootstrapping was used to identify independent mortality predictors in patients admitted to an acute hospital with a confirmed diagnosis of COVID-19. Predictions were externally validated in a large random sample of the ISARIC cohort (N=14 231) and a smaller cohort from Aintree (N=290).
**Results** 983 patients (median age 70, IQR 53–83; in-hospital mortality 29.9%) were recruited over an 11-week study period. Through sequential modelling, a five-predictor score termed SOARS (SpO2, Obesity, Age, Respiratory rate, Stroke history) was developed to correlate COVID-19 severity across low, moderate and high strata of mortality risk. The score discriminated well for in-hospital death, with area under the receiver operating characteristic values of 0.82, 0.80 and 0.74 in the derivation, Aintree and ISARIC validation cohorts,

**Key messages**

**What is the key question?**
► Can patients with COVID-19 be risk stratified in the prehospital setting without laboratory-measured data?
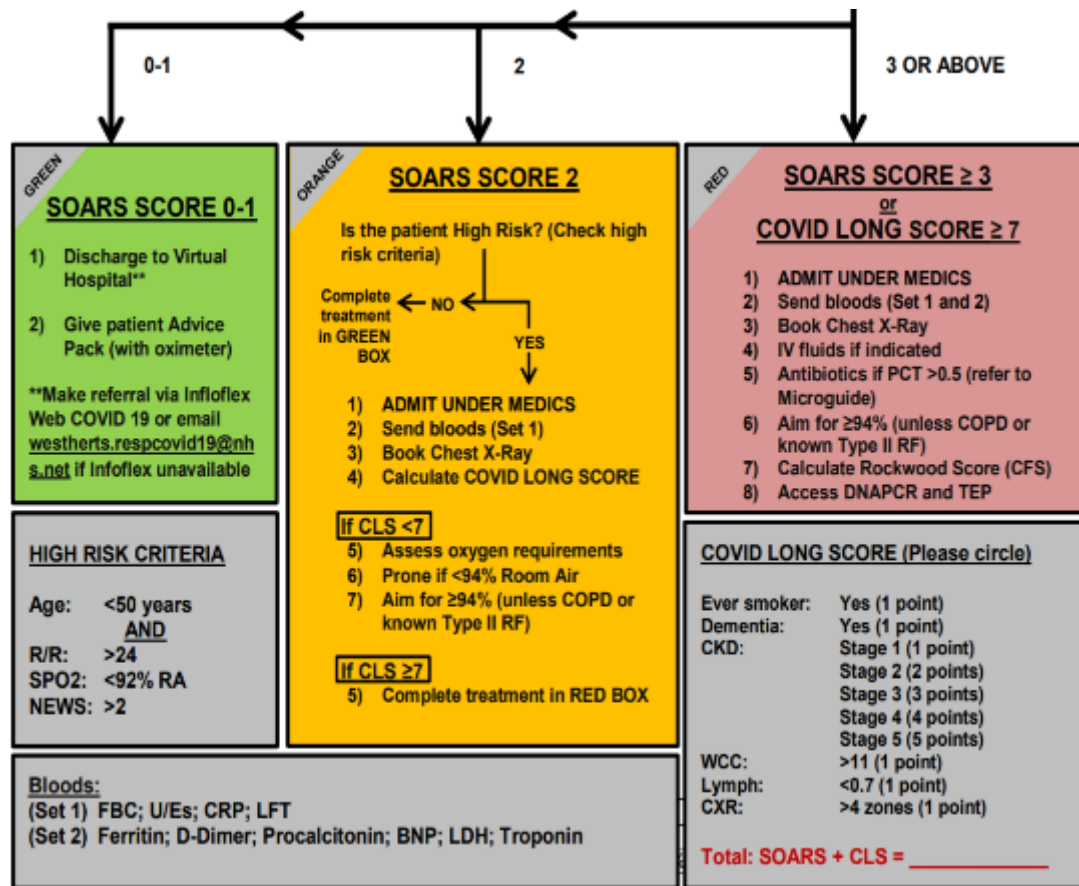
**What is the bottom line?**
► A five-predictor risk prediction score (SOARS) based on demographic and clinical characteristics can quickly and reliably identify COVID-19-positive patients who have a low probability of mortality for outpatient monitoring and management.
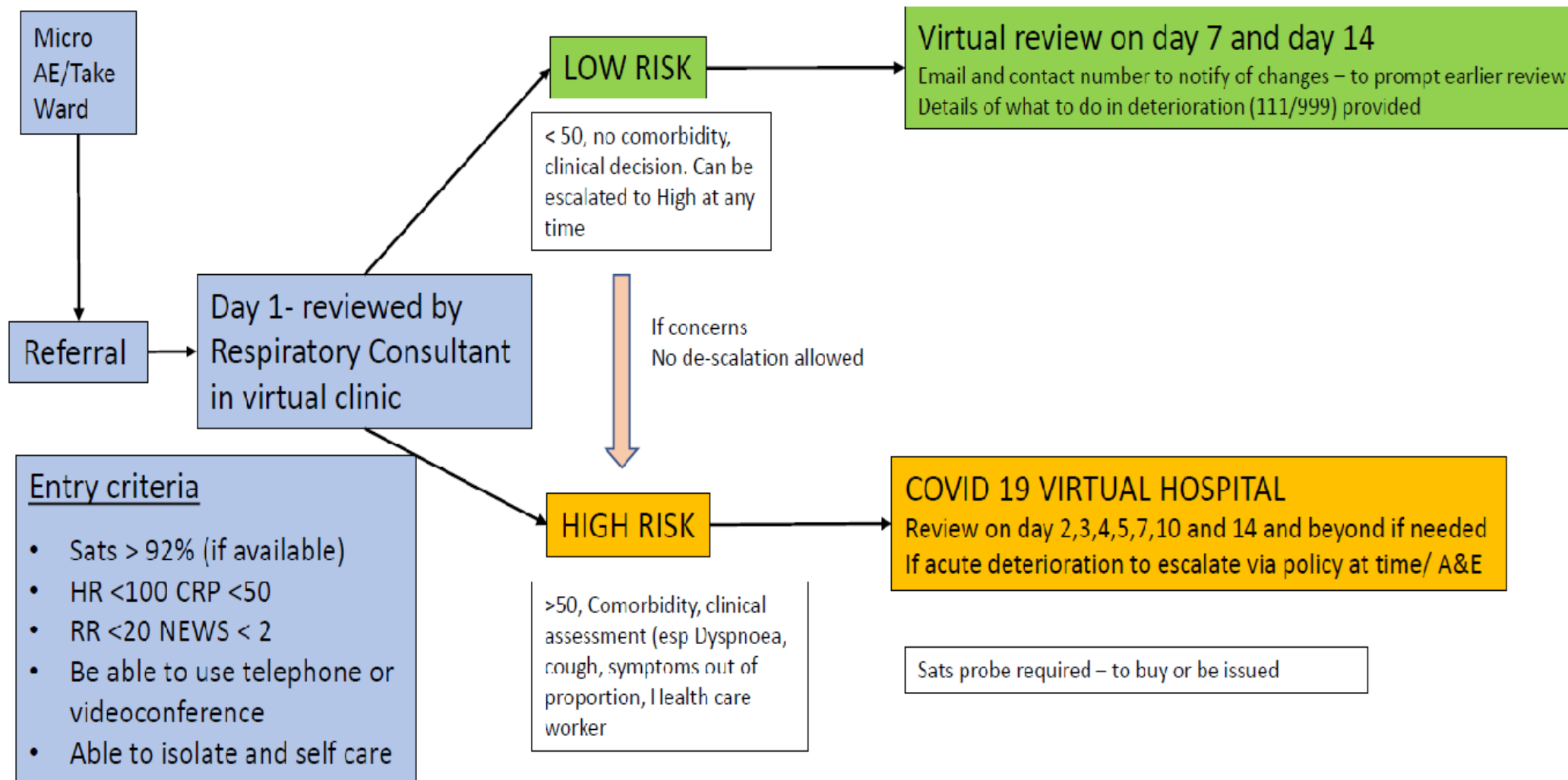
**Why read on?**
► Information from the prognostication of SARS-CoV-2-infected individuals early in their illness can be used to guide clinical decision-making with respect to the level of subsequent care.

# Integration of evidence to refine the clinical pathway



| | WAVE 1 | WAVE 2 |
|---|---|---|
| Total through-put | 1500 | 2156 |
| Admission prevention | 720 | 1682 |
| Facilitated discharge | 780 | 474 |
| Mean age | 56 | 44 |
| (re)admission rate | 4.8% | 1.8% (36/3) |
| Mortality | 1.2% (18) | 0.69% (15) |

# Entry into the Virtual Hospital, March 2020

# BMJ Open

# Predictors of clinical deterioration in patients with suspected COVID-19 managed in a 'virtual hospital' setting: a cohort study

Nick A Francis [ID],[1] Beth Stuart,[1] Matthew Knight,[2] Rama Vancheeswaran,[2] Charles Oliver,[2] Merlin Willcox [ID],[1] Andrew Barlow,[2] Michael Moore [ID] [1]

## ABSTRACT

**Objective** Identify predictors of clinical deterioration in a virtual hospital (VH) setting for COVID-19.

**Design** Real-world prospective observational study.

**Setting** VH remote assessment service in West Hertfordshire NHS Trust, UK.

**Participants** Patients with suspected COVID-19 illness enrolled directly from the community (postaccident and emergency (A&E) or medical intake assessment) or postinpatient admission.

**Main outcome measure** Death or (re-)admission to inpatient hospital care during VH follow-up and for 2 weeks post-VH discharge.

**Results** 900 patients with a clinical diagnosis of COVID-19 (455 referred from A&E or medical intake and 445 postinpatient) were included in the analysis. 76 (8.4%) of these experienced clinical deterioration (15 deaths in admitted patients, 3 deaths in patients not admitted and 58 additional inpatient admissions). Predictors of clinical deterioration were increase in age (OR 1.04 (95% CI 1.02 to 1.06) per year of age), history of cancer (OR 2.87 (95% CI 1.41 to 5.82)), history of mental health problems

## Strengths and limitations of this study

- ► The study uses anonymised data from all patients registered for the virtual hospital (VH) between 17 March 2020 and 17 May 2020, and therefore selection bias is not an issue.
- ► At the time of this study, this was the only service providing remote follow-up for patients with suspected COVID-19 in the area, and therefore our findings are likely to be relevant to primary care patients receiving remote follow-up.
- ► We were able to collect reliable data on a wide range of clinical and demographic features, and reliably follow all patients for the primary outcome for at least 2 weeks following their discharge from the VH.
- ► We were not able to extract detailed symptom or clinical examination data on all participants, and had to use laboratory result data from initial presentation (including in those who had an inpatient admission).
- ► Our study is likely underpowered to detect all predictors, especially in the analysis of our two subgroups.

# Epidemiology of post-COVID syndrome following hospitalisation with coronavirus: a retrospective cohort study

Daniel Ayoubkhani, Kamlesh Khunti, Vahé Nafilyan, Thomas Maddox, Ben Humberstone, Sir Ian Diamond, Amitava Banerjee

Table 2. Counts and rates of death, readmission and respiratory disease contrasting individuals with COVID-19 in England discharged from hospital by 31 August 2020 with matched controls

| Adverse event (sample size per group) | COVID-19 cases | | Control group | |
|---|---|---|---|---|
| | Events (n, %) | Rate per 1,000 person-years (95% CI) | Events (n, %) | Rate per 1,000 person-years (95% CI) |
| Death (n = 47,780) | 5,875 (12.3%) | 320.0 (311.9 to 328.3) | 830 (1.7%) | 41.3 (38.6 to 44.3) |
| Readmission to hospital (n = 47,780) | 14,060 (29.4%) | 766.0 (753.4 to 778.8) | 4,385 (9.2%) | 218.9 (212.4 to 225.4) |
| Respiratory disease (all events) (n = 47,780) | 14,140 (29.6%) | 770.5 (757.8 to 783.3) | 2,585 (5.4%) | 129.1 (124.2 to 134.2) |
| Respiratory disease (new onset) (n = 28,335) | 6,085 (21.5%) | 538.9 (525.5 to 552.6) | 240 (0.8%) | 19.7 (17.3 to 22.4) |

Table notes: CI: confidence interval. Adverse events calculated from hospital episodes to 31 August 2020, and primary care records and deaths registration to 30 September 2020. COVID-19 cases were matched to controls on baseline demographic characteristics (age, sex, ethnicity, region, Index of Multiple Deprivation quintile, smoking status) and clinical histories (hypertension, major adverse cardiovascular event, respiratory disease, chronic kidney disease, chronic liver disease, diabetes, cancer).
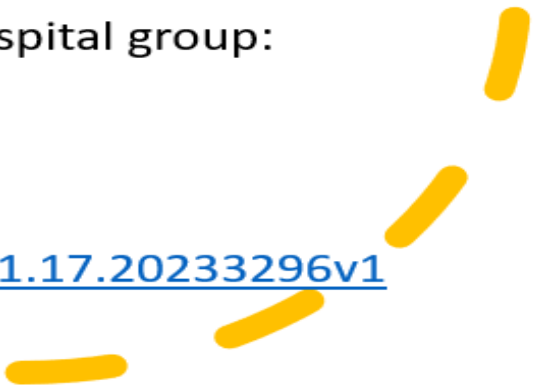
# The successes

| | U07.1 Confirmed Covid | U07.2 Suspected Covid | Grand Total |
|---|---|---|---|
| Number of Re-admissions within 7 days or less | 10 | 1 | 11 |
| Number of Re-Admissions within 30 days or less | 12 | 2 | 14 |
| Number of Re-Admissions within 90 days or less | 16 | 2 | 18 |
| **Total Number of Discharges** | **71** | **29** | **100** |
| % of Re-Admissions within 7 days or less | 14.1% | 3.4% | 11.0% |
| % of Re-Admissions within 30 days or less | 16.9% | 6.9% | 14.0% |
| % of Re-Admissions within 90 days or less | 22.5% | 6.9% | 18.0% |

**Wave2, LOS >0-<2 days**

| | U07.1 Confirmed Covid | U07.2 Suspected Covid | Grand Total |
|---|---|---|---|
| Number of Re-admissions within 7 days or less | 14 | 0 | 14 |
| Number of Re-Admissions within 30 days or less | 17 | 0 | 17 |
| Number of Re-Admissions within 90 days or less | 17 | 0 | 17 |
| **Total Number of Discharges** | **93** | **3** | **96** |
| % of Re-Admissions within 7 days or less | 15.1% | 0.0% | 14.6% |
| % of Re-Admissions within 30 days or less | 18.3% | 0.0% | 17.7% |
| % of Re-Admissions within 90 days or less | 18.3% | 0.0% | 17.7% |

## Successes...what a DGH team can do

- WHHT was the first site in the UK to establish a formal Covid Virtual ward (https://www.bmj.com/content/369/bmj.m2119

- The work from the CVH contributed to the safety analysis project undertaken by NHSE&I and NHSD/NHSX – contributing to the national pathway released by NHSE advising all CCG areas to run oximetry at home services https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/11/C0817-sop-covid-oximetry-@home-november-2020.pdf (November 12th 2020).

- WHHT was one of two sites in the UK to pilot the use of an ambulatory phone based app developed in collaboration with NHSX and Huma/Medopad (https://preprints.jmir.org/preprint/23190, https://www.thehtn.co.uk/2020/06/12/huma-supports-nhsx-remote-monitoring-trials/ ), which contributed to a 50% reduction in the amount of clinician time spent per patient.
- COVPRO- prognostic factors in Covid in a virtual hospital group: http://dx.doi.org/10.1136/bmjopen-2020-045356
- SOARS score-prognostication at the front door: http://dx.doi.org/10.1136/thoraxjnl-2020-216425
- Rapid Antibody tests https://www.medrxiv.org/content/10.1101/2020.11.17.20233296v1

- PREDICTCOVIDUK: COFUP in draft form

What does the future look like?

- Real time monitoring (continuous pulse, ECG, saturation, respiratory rate) – Masimo Patient Safety net

- Virtual speciality "In reach" in to the medical take/ ED / GP hubs

- COPD and Heart Failure Virtual Hospitals

- Regional collaboration

Any questions?

Thank you for joining