A1728 - Patient-reported Symptom Severity and Pulse Oximetry in the Covid-19 Remote Monitoring Programme in Ireland

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Rationale

Ireland experienced a wave of Covid-19 (SARS-CoV-2) infection starting in late February 2020 with 60,287 cases (1,267/100,000) by 31 October 2020.

patientMpower, an Irish digital healthcare company with previous experience of remote data capture in interstitial lung disease and lung transplantation, approached the Health Service Executive Digital Transformation team and external medical advisers with a design concept for a remote monitoring platform for Covid-19.

The goal of the remote monitoring platform was to free up in-hospital capacity by supporting early discharge of lower-risk patients with mild or moderate Covid-19 symptoms.

Methods

The remote monitoring platform consisted of a patient-facing app + pulse oximeter (Bluetooth-connected Nonin 3230 www.nonin.com) enabling patients to record symptoms (e.g. breathlessness, diarrhoea), symptom severity (rated on 10-point scale), temperature & oxygen saturation (SpO2). Criteria for remote monitoring included: Covid-19 symptoms, positive for SARS-CoV-2, young age, absence of serious concomitant conditions, need for continued observation post-discharge, access to smartphone/tablet and internet and a working email address. Eligible patients were sent an installation email by their treatment centre and supplied with a pulse oximeter. Instruction materials were made available as downloadable documents and as YouTube videos. (See Figure 1 for overview.) Patients received in-app prompts to report symptoms & pulse oximetry data 4 times/day (default times: 09:00, 13:00, 17:00 & 21:00). Patient-recorded data were viewed in real time by their treatment centre via a dedicated web-based monitoring portal. Patients and treatment centres received alert messages if SpO2 values (self-recorded) were below certain thresholds.

The remote monitoring platform was launched on 13 March 2020 (70 cases reported in Ireland by that date). See Figure 2 for patient view & Figure 3 for treatment centre view.

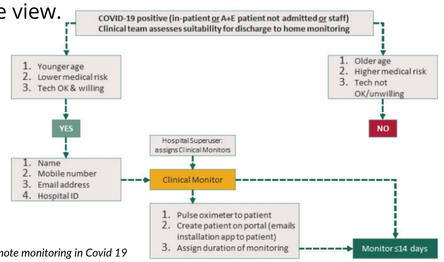


Figure 1: Schematic overview of remote monitoring in Covid 19

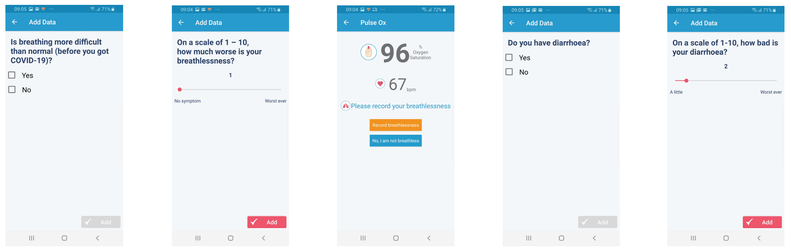


Figure 2: Example patient app screens

Figure 3: Example clinical centre view screens

Results

1,045 patients at 8 primary & 15 secondary care centres installed the remote monitoring application and entered data ≥once (by 31 October 2020). Median duration of monitoring was 13 days (interquartile range: 10-23). 11 patients were admitted to hospital & 12 previously hospitalized patients were readmitted.

993 patients (89%) gave in-app consent for use of their pseudonymised data for research. (See Table 1 for summary information). Symptoms and physiological markers of severity of infection varied considerably. (See Figure 4.)
871 patients reported breathlessness ≥once. 53/871 (6%) rated breathlessness severity as 6/10 (on a 10-point scale) and 23/871 (3%) rated severity as 8/10 ≥once.
300 patients reported diarrhoea ≥once. 24/300 (8%) rated severity as 6/10 and 6/300 (2%) rated severity as 8/10 ≥once.

907 patients provided ≥1 SpO2 reading. 733/907 (81%) reported SpO2 94-96%, 334/907 (37%) SpO2 92-93% and 265/907 (29%) SpO2 ≤ 91% ≥once during monitoring.

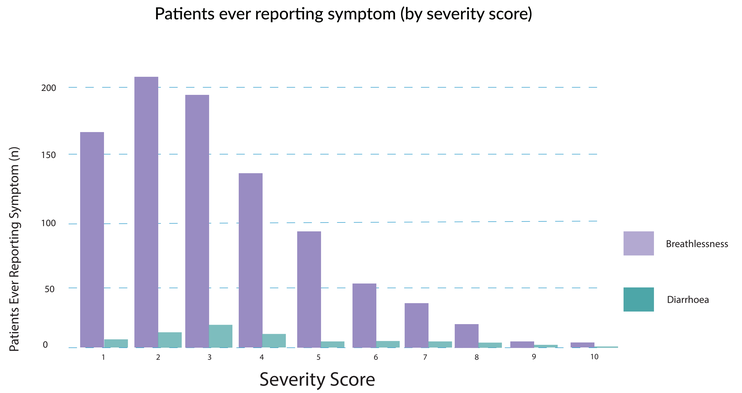
Discussion

Regular monitoring of oxygen saturation in Covid-19 is critical to follow up as "silent hypoxia" has been reported in these patients. Real-time review of patient-reported pulse oximetry and symptoms is a promising approach as it can support earlier discharge of patients from busy clinical settings while still providing medical oversight.

During use of the remote monitoring platform, patients regularly contribute objective and subjective data which may contribute to understanding the natural history of Covid-19 during the acute phase of the illness. The high proportion of patients in this sample (89%) who gave permission for use of their anonymised data in research is encouraging and has created a source of data which can be made available subject to appropriate governance safeguards.

	Patients [n (%)]
Total population	933 (100%)
Patients providing ≥1 SpO2 reading	907 (97%)
Patients reporting SpO2 94-96% ≥once	733 (78%)
Patients reporting SpO2 92-93% ≥once	334(36%)
Patients reporting SpO2 ≤91% ≥once	265 (28%)
Patients providing ≥1 dyspnoea score	871 (93%)
Patients reporting ≥1 incidence of diarrhoea	300 (32%)

Table 1: Summary



Conclusions

Remote monitoring (including pulse oximetry) of Covid-19 in appropriate patients can free up in-hospital capacity and provide data to support research. A high proportion of patients expressed a willingness for their data to be used in research.

This approach can support patient care and generate potentially valuable data for research into Covid-19.

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Acknowledgments | We are very grateful to the patients who gave consent for their data to be used to support research into Covid 19.

Conflict of Interest Statement
CE and EC are employees and shareholders of patientMpower Ltd. CO'S is a shareholder of patientMpower Ltd. RC has received speaking fees for webinars organised by patientMpower Ltd.