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Authors	Walsh, M.;O'Grady, M.;Sweeney, A. M.;Martin, L.;Kennedy, M.;Plant, Barry J.;Sadlier, C.;Henry, M.;Murphy, D. M.
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Supported Discharge for COVID-19

M. Walsh[1], M. O'Grady[2], A.M. Sweeney[1], L. Martin[2], M. Kennedy[1], B.J. Plant[1], C. Sadlier[3], M. Henry[1], D.M. Murphy[1]

1. Department of Respiratory Medicine, Cork University Hospital.
2. Physiotherapy Department, Cork University Hospital.
3. Department of Infectious Diseases, Cork University Hospital.

Abstract

Aims

Assessment of a supported discharge service for a cohort of patients admitted to Cork University Hospital with COVID-19 that were identified as being appropriate for remote patient monitoring.

Methods

Patients uploaded SpO2, subjective breathlessness scores, and temperature readings onto the PatientMpower application, and received a daily phone call from the physiotherapist. Readmission was triggered where appropriate. Patient satisfaction questionnaires were completed following service discharge.

Results

Over 12 weeks, 15 patients had a supported discharge. Readmission was triggered for 3 patients (20%). Compared to non-readmitted patient, readmitted patients had more abnormal SpO2 readings (9 (5.5-22.5) vs 1 (0-1), p= 0.022) and all 6 temperature spikes that occurred, but lower subjective breathlessness scores (3 (1-6) vs 4.25 (2-8), p = 0.003). Differences in mean abnormal SpO2% readings were not statistically significant.

Conclusion

A supported discharge service including remote monitoring and regular contact with healthcare professionals can facilitate safe, and timely discharges of select patient groups.

Introduction

COVID-19 is an illness caused by a novel coronavirus, Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2, 2019-nCoV). Hospitalisation rates currently range from 1% -18% depending on age and comorbidities, with an average length of inpatient stay of 11 days[1,2]. We implemented protocols to facilitate COVID-19 supported discharge, utilising remote patient monitoring and a virtual early supported discharge service to enable safe and timely discharges of COVID-19 patients and maximise hospital efficiency.

Methods

Over a 12-week period from May to July 2020, 28 patients admitted to Cork University Hospital (CUH) with Covid-19 were found to be suitable for a supported discharge, and fifteen of these expressed interest in taking part. Inclusion criteria included stable medical condition, and oxygen saturations (SpO_2) >92% on room air, while access to a smartphone was desirable. Training was given on using the Nonin 3230 Bluetooth® Smart-Pulse device to check SpO_2 4 times per day, which was uploaded together with an oral temperature reading and a subjective breathlessness score to the "PatientMpower for COVID -19" mobile application[3]. Data was reviewed by a respiratory physiotherapist who gave a daily wellbeing phone call for at least 14 days post discharge with advice such as active cycle of breathing and diaphragmatic breathing techniques. SpO2 readings ≤92%, temperature ≥38.3 °C and increasing breathlessness scores necessitated review, and the need for readmission was triggered following assessment by the primary medical team. Patient satisfaction questionnaires were completed upon service discharge. Data was collected in line with GDPR compliance and statistically analysed via IBM SPSS v26.

Results

The characteristics of the cohort and the relevant p-values are shown in *Table 1*. Three patients were readmitted by their respective medical teams. These patients accounted for 81.0% of the 58 abnormal SpO_2 readings that were found to be outside of the parameters accepted by this study, and 31.4% of the total 385 data reviews. The median length of initial hospitalisation was also higher in readmitted patients than those not readmitted at 31 (30.5-35) and 5.5 (3-16.5) days respectively.

The median number of abnormal SpO_2 readings was 9 (5.5-22.5) and 1 (0-1) in the re-admitted and non-readmitted patients respectively (Mood's median test, p = 0.022), while the differences in mean abnormal SpO2% readings were not found to be statistically significant (T-test, p = 0.76).

Only 7 patients (46.7%) entered a subjective breathlessness score. The mean breathlessness score of 4.25 (2-8) was higher in the non-readmitted patients than that of the readmitted patient at 3 (1-6), (T-test, p = 0.003). All of the reported temperature spikes occurred in readmitted patients (*n*=6).

In total, 176 phone calls were made by the respiratory physiotherapists, with 13 and 9 direct communications made to the primary medical teams of readmitted patients and non-readmitted respectively.

Ten patients responded to a follow up questionnaire. All 10 respondents rated the receipt of a daily well-being call as the most helpful aspect of the service, and that they were happy with the level of support they received from the service while at home. Eight patients (80%) reported a preference for home monitoring and 9 patients (90%) found the mobile application and pulse oximeter easy to use.

	All cohort (n=15)	**Readmitted (n=3)**	**No readmission (n=12)**
Mean age	58 (42.5-62.5)	59 (52-61)	57.5 (38.25-62.5)
Male	12	3	9
Female	3	0	3
Median length of initial hospital stay	6 (3.5-18)	31 (30.5-35)	5.5 (3-16.5)
Median length of home monitoring	16 (12.5-32.5)	31 (30.5-35)	15 (11.75-20.5)
Median length of readmission stay	N/A	8 (1.75-16.75)	N/A
Median number of days from discharge to re-admission	N/A	8 (5-13.5)	N/A
Mean number of SpO2 inputs per day	4.6	4.6	4.6
Mean SpO2 outside of parameters (SpO2 %) (T-test, p = 0.76)	91.2 (80-92)	91.2 (80-92)	91.25 (89-92)
Total number of SpO2 inputs outside of parameters	58	47 (81.0%)	11 (19.0%)
Median number of SpO2 inputs outside of parameters (Mood's median test, p = 0.022)	1 (0-2)	9 (5.5-22.5)	1 (0-1)
Number of patients that made a breathlessness score entry	7	1	6
Total number of breathlessness score entries	288	61 (21.2%)	227 (78.8%)
Mean breathlessness score (Score range of 1-10) (T-test, p = 0.003)	4 (1-8)	3 (1-6)	4.25 (2-8)
Number of temperature spikes recorded (>38.3°C)	6	6	0

Table 1: Demographic information and clinical characteristics of the virtual monitoring

All data presented in *Table 1* is expressed as a mean value with ranges in parenthesis, a median with interquartile range in parenthesis or an absolute figure with a percentage of total in parenthesis. Abbreviations: SpO2 = Oxygen saturation, Mean breathlessness score = A higher score indicated a greater degree of breathlessness, a lower score indicated a lesser degree of breathlessness. Where applicable, p values are displayed where $p < 0.05$ is denoted as statistically significant

Discussion

The primary findings of this study were that patients with COVID-19 who required readmission had a greater number of abnormal SpO2 readings during virtual home monitoring than those who did not require readmission. The programme was received positively by the discharged patients and facilitated re-admission in those with clinical deterioration. In support of our findings a similar study remotely monitored oxygen saturations in patients with Covid-19 and concluded that their programme recognised "early recognition of acute deterioration" allowing for readmission where necessary[4], while other studies in severe asthma and pulmonary fibrosis have found a positive role for telemedicine in patient general well-being[5,6].

Interestingly mean breathlessness scores were higher in the non-readmitted patients which may be in keeping with the 'Happy Hypoxia' phenomenon in Covid-19 patients[7] and combined with the need to manually enter this score, explains why only 7 of the patients filled this section.

Although a number of older patients had difficulty accessing a smart phone this did not result in exclusion and was resolved by recording the patient's readings at the daily wellbeing phone call, however this may be an issue when replicating the programme in centres without these supports[8]. The decision against remote spirometry was made due to the potential for poor technique at home by a number of the patients.

This pilot study demonstrates the utility of the CUH COVID Supported Discharge Programme in addition to the positive patient feedback regarding this mode of care.

Declaration of Conflicts of Interest:
The authors have no conflicts of interest to declare. All co-authors have seen and agree with the contents of the manuscript and there is no financial interest to report. I certify that the submission is original work and is not under review at any other publication.

Corresponding Author:
Dr Desmond Murphy
Department of Respiratory Medicine,
Cork University Hospital.
Email: desmond.murphy@hse.ie

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