Home monitoring by pulse oximetry of primary care patients with COVID-19 - a pilot randomised controlled trial

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Home monitoring by pulse oximetry of primary care patients with COVID-19 - a pilot randomised controlled trial

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Abstract

Background

During the course of the pandemic, home or remote monitoring of COVID-19 patients with pulse oximetry took off, but evidence on its use is scarce.

Aim

To assess the feasibility of home monitoring by pulse oximetry of patients aged ≥40 years with cardiovascular comorbidity and moderate-severe COVID-19.

Design and Setting

A primary care-based, open, randomised controlled pilot trial with nested process evaluation.

Method

From December 2020 to June 2021, eligible patients presenting to one of 14 participating Dutch general practices were randomly allocated to regular measurement of peripheral oxygen saturation (at least 3 SpO2 measurements/day for 14 days) with a validated pulse oximeter or usual care.

Results

All 41 participants (21 intervention, 20 usual care) completed the 45-day follow-up period. Overall, the intervention group performed 97.6% of protocolised measurements; median daily measurement/participant: 2.7 (interquartile range 1-4). Hypoxemia (SpO2<94%) was reported in ten participants (in 52 measurements). Of those, six consulted the general practitioner as instructed. Participants reported a high feeling of safety (0-100 visual analogue scale): 71.8 intervention vs. 59.8 control (p=0.09). Primary care consultations were similar across groups: 50 intervention vs. 51 control. Ten participants visited the emergency department (7 intervention vs. 3 control) of which six were hospitalised (5 intervention vs. 1 control). No participants were admitted to the ICU or died during follow-up.

Conclusions

Home monitoring of moderate-severe COVID-19 patients by pulse oximetry appeared feasible; adherence was high, patients reported a high feeling of safety, while the number of primary care consultations remained similar to usual care.

Keywords COVID-19, Pulse Oximetry, Hypoxemia, General Practice
How this fits in
During the course of the pandemic, home or remote monitoring of COVID-19 patients by pulse oximetry took off. However, studies on its use are scarce. Our pilot randomised controlled trial showed that home monitoring of moderate-severe COVID-19 patients with a validated pulse oximeter is feasible; adherence was high, patients reported a high feeling of safety, while the number of primary care consultations remained similar to usual care. We believe these pragmatic findings form an important building block for safe implementation of pulse oximetry as a home monitoring tool in primary care.
Introduction

A pulse oximeter is a small, easy-to-operate, non-invasive tool to measure the peripheral oxygen saturation (SpO2). Its use took off as a home or remote monitoring tool for COVID-19 patients during the pandemic. Indeed, in COVID-19, hypoxemia is a marked phenomenon in the disease trajectory of clinical deterioration mandating intensified treatment. Yet, patients may have hypoxemia without clinical perceptible symptoms (‘happy hypoxemia’). Given the key biological role of oxygen saturation and the detrimental effects of hypoxemia, regular SpO2 measurements seem to hold promise. In particular for COVID-19 patients who are at-risk for complications such as those with cardiovascular comorbidity.(1-5) Timely detection of hypoxemia could facilitate prompt referral for intensified treatment and thereby improve prognosis.(6-9) However, studies on its feasibility, effectiveness, safety and patients’ perceptions are scarce, especially in at-risk patients.(10, 11) A recent large trial among patients with suspected or confirmed COVID-19 found no difference in the number of days alive and out the hospital between patients who received home monitoring with pulse oximetry and home monitoring without pulse oximetry. (12) However, this trial predominantly included patients with mild symptoms with only 84 of 1217 participants with COVID-19 being hospitalised during follow-up. It is particularly important to study the use of pulse oximetry in primary care patients with COVID-19 who are at risk for complications as no intervention comes without potential ‘side-effects’; for home monitoring of SpO2, that is, the use of the pulse oximeter itself or the behavior of the end-user. First of all, most pulse oximeters used in the open population are consumables with a CE mark but without approval for medical use by FDA/ISO standards. The latter requires an adequate test against direct arterial oxygen saturation measurements in the range 70-100% with less than 3% difference.(13, 14) The widely used consumables fall short for the detection of (severe) hypoxemia.(15) This may lead to a false sense of security in both patients and physicians and, importantly, may leave clinical deterioration unnoticed. On the other hand, one could argue that regular checks of SpO2 levels may induce anxiety and consequently results in overuse of health care facilities by patients.

We therefore conducted an primary care-based, open, randomised controlled pilot trial to assess the feasibility of a trial of home monitoring by pulse oximetry of patients aged ≥40 years with cardiovascular comorbidity and moderate-severe COVID-19 as compared to usual care.
Methods

Trial design

Between December 2020 and June 2021, we conducted an open-label, individually randomised (1:1) controlled pilot trial with nested process evaluation in Dutch primary care.

Participants

Patients aged ≥40 years with cardiovascular comorbidity who presented to the general practitioner (GP) with moderate-to-severe COVID-19 symptoms. The latter was defined as at least three days a body temperature ≥37.5°C and either (i) new onset of symptoms of respiratory tract infection, and/or (ii) a feeling of shortness of breath, and/or (iii) sudden exhaustion. Patients in whom it was considered necessary to closely follow up according to the GP. Patients requiring hospital admission, those with known severe anaemia (pulse oximetry can be inaccurate and SpO2 overestimated in this situation), inadequate mastery of Dutch language, unwilling to sign informed consent or adhere to study procedures were excluded. Patients in whom it was considered necessary to closely follow up according to the GP. Patients requiring hospital admission, those with known severe anaemia (pulse oximetry can be inaccurate and SpO2 overestimated in this situation), inadequate mastery of Dutch language, unwilling to sign informed consent or adhere to study procedures were excluded. A specific cut-off value for severe anaemia was not defined in the exclusion criteria. In practice, a patient with severe anaemia would render transfusion or hospital admission.

GPs from 14 participating general practices in the vicinity of Utrecht informed potentially eligible participants about the study verbally and via a patient information letter. Those who were interested, and were tested positive for COVID-19, were asked consent to share their contact details with the University Medical Center (UMC) Utrecht research team for eligibility screening. Eligible patients who expressed interest in trial participation were visited at home under safe circumstances with COVID-19 protection to obtain full written informed consent. Next, the study physician accessed a trial randomisation website for concealed study treatment assignment via a computer-generated sequence list developed by an independent data manager, i.e. home monitoring by pulse oximetry or usual care. The study physician informed the GP about the randomisation result.

Intervention

All participants in the intervention group received an FDA approved pulse oximeter (Nonin 3230 from Nonin Medical Inc, Plymouth, USA); together with verbal, written and visual instructions to measure their SpO2 levels in rest three times a day for 14 consecutive days. If SpO2 was below 94%, participants were instructed to perform an additional measurement after five minutes of rest. In case of persisting hypoxemia, participants were instructed to contact their GP. In case participants felt unwell or experienced worsening in clinical condition, they were also instructed to contact their GP, irrespective of SpO2 levels.

Prior to distribution, all pulse oximeters were registered, checked and released by the department of Medical Technology and Clinical Physics of the UMC Utrecht.
Data collection

At baseline, a short interviewer-administered questionnaire was completed including demographic data and the 12-item WHODAS 2.0, a generic assessment instrument developed by the WHO to measure health and disability (scale 0 = no disability to 48 = high disability).(22) Intervention group patients recorded their oxygen saturation in a paper diary three times a day for 14 days. After 14 days, participants reported their overall feeling of safety over the previous two weeks on a 0 (completely unsafe) to 100 (completely safe) visual analogue scale by phone. At the end of the 45-day follow-up period, participants completed the 12-item WHODAS 2.0 again and those in the control group were asked by phone if they had used a pulse oximeter at home after study enrollment. Health care utilisation was captured by retrieving patients’ primary care electronic health record data.

Outcomes

The primary outcome was feasibility of a trial of home monitoring by pulse oximetry defined as successful inclusion of approximately 50 participants within 6 months who were willing to i) be randomised and ii) adhere to study procedures.

Secondary outcomes included quantitative data about the use of pulse oximetry in practice (see process evaluation), patient-reported feeling of safety over the first two weeks, disability free survival after 45 days as determined by % change in 12-item WHODAS 2.0 sum score from baseline to 45 days: number of GP consultations, number of emergency department visits, hospital and/or ICU admissions, number of days alive at home, and all-cause mortality.

Process evaluation

In a process evaluation alongside the trial, we examined how the intervention was used in practice in terms of fidelity (intervention carried out as planned), dose (intervention was used as long and frequently as planned), adjustments (whether made to the intervention and why) and reach (whether the intended audience has been reached).(23) For this, we used data on health care utilization in both groups, and data from the paper diary in the intervention group.

Sample size considerations

A formal sample size calculation was not performed for this feasibility pilot trial. We initially aimed to randomise approximately 50 participants, a number deemed to be sufficient to assess the feasibility of the trial.
Statistical analysis

All analyses were performed according to the intention-to-treat principle. Baseline characteristics were presented descriptively. For between-group comparisons, we used crude analysis with chi-square test or Fisher’s exact test, Mann-Whitney U or independent samples t-test where appropriate. A two-tailed p-value of <0.05 was considered statistically significant. All data were analysed using SPSS version 26.0, Chicago, IL, USA.

Results

Between November 2020 and June 2021, 60 patients were screened for participation by the GP, of those, 41 patients were eligible and randomized. 21 were assigned to the intervention and 20 to the control group (Figure 1). All participants were tested positive for SARS-CoV-2 with PCR prior to inclusion.

Follow-up data were fully captured, except for the 45-day WHODAS 2.0 questionnaire which was not completed by one participant in the intervention arm.

Figure 1. Flowchart study participants

Participants’ mean age was 64.2 (SD 10.8) years, and 56.1% were male (61.9% in the intervention group, 50.0% in the control group). Hypertension was the most common cardiovascular comorbidity (68.3%) followed by hypercholesterolemia (57.5%). Except for sex, baseline characteristics did not substantially differ across groups (Table 1).

Table 1 Baseline characteristics of study participants

Use of the intervention

All participants from the intervention group used the pulse oximeter and a total of 727 SpO2 readings were reported; median daily measurements/ patient: 2.7 (interquartile range 1-4). Overall, the intervention group performed 97.6% of protocolised measurements (adherence to measurements). Hypoxemia (SpO2 level <94%) was measured 52 times in ten participants. Of these, six contacted their GP as instructed (adherence to contacting the GP: 60%). Figure 2 gives an overview of SpO2 readings of the intervention group in the first 7 days. The readings of participants who needed hospital admission are presented until hospitalisation. No adjustments to the study protocol were (needed to be) made during the study.

In the usual care group, 8 participants (40%) reported to have used a pulse oximeter in the 14 days following randomisation.
Figure 2 SpO2 readings first 7 days of the 21 intervention group participants

Feeling of safety
After 14 days, participants reported a high feeling of safety: 71.8 (SD 19.1, range 30-100) in the intervention group vs. 59.8 (SD 24.5, range 10-100) in the control group; *p*=0.09. When including only the 35 non-hospitalised participants in the analysis, the feeling of safety was 73.8 (SD 17.8) vs. 57.6 (SD 23.3), respectively (*p*=0.03). When including only the 10 participants who attended the ED and/or where hospitalised (n=6) in the analysis, the feeling of safety in the intervention group was 68.3 (SD20.7) vs. 63.3 (SD 32.1) in the control group (*p*=0.85).

Disability score (WHODAS)
After 45 days, participants reported a decrease in disability as measured with WHODAS 2.0 compared to baseline: intervention vs. control: 53.2% vs. 65.7% (*p*=0.42). When including only the 35 non-hospitalised participants in the analysis, the decrease was 53.2% vs. 64.5%, respectively (*p*=0.52).
Scores on WHODAS 2.0 questionnaire are presented in Table 2.

Table 2. Disability score WHODAS 2.0

Health care utilization and health outcomes
Health care resource use and health outcomes during the 45-day follow-up period are presented in Table 3.

Table 3. Health care utilisation and other health-related secondary outcomes

In total, 31 participants had at least one contact with their GP after inclusion (intervention 71.4% vs. control group 80%, *p*=0.52). The number of primary care consultations was similar across groups: intervention 50 vs. control 51 times. Median time to first contact was 3.0 days (intervention 1.0 days vs. control 4.8 days, *p*=0.07).
During follow-up, ten patients visited the emergency department: seven intervention vs. three control; *p*=0.55. This led to hospitalisation of six participants (intervention n=5 vs. control =1; *p*=0.18) with a median length of stay of 5.0 days (intervention 3.0 days vs. control 7.0 days (n=1)). No participants were admitted to the ICU.
There was no significant difference in number of days alive at home between groups: intervention 42.4 days (SD 8.3) vs. control 44.7 days (SD 1.6), *p*=0.24. No participants died during the study.
Discussion

This pilot RCT showed that (a trial of) home monitoring of patients with cardiovascular comorbidity and moderate-severe COVID-19 with a validated pulse oximeter is feasible; patients were willing to participate, there was a high level of adherence to pulse oximetry measurements and no protocol changes were necessary. Patients reported a high feeling of safety which tended to be higher in those using a pulse oximeter, and using the pulse oximeter did not lead to an increase in primary consultations compared to usual care.

The hospitalisation rate in the intervention group was higher than in the control group, the median length of stay in hospital was shorter in the intervention group than in the control group. These differences must be interpreted with caution because it may be a chance finding given the small numbers. It could, however, be due to detection of ‘silent’ hypoxemia in the intervention arm which than was followed by adequate referral to the hospital.

Comparison with existing literature

In line with our findings, adherence to pulse oximetry use was high in previous observational studies among COVID-19 patients.(24, 25) Adherence was, however, much lower in a recent US-based RCT among 2,097 patients with suspected or confirmed COVID-19 in the community in which a lenient protocol as part of routine care was applied; only 77% of participants in the intervention group performed SpO2 measurement at least once during the study period. The authors found no differences in hospitalisation rates and mortality between confirmed COVID-19 patients in the intervention and control groups. We found that the number of ED visits (26.8%, n=11) and number of hospital admissions (14.6%, n=6) was more comparable to those observed in a 2020 prospective cohort study. Yet, our results were slightly higher which is possible because our study included a specific population with cardiovascular comorbidity. (26) We could not relate our results with a 2022 systematic review of pulse oximetry as remote patient monitoring tool, because the study could not identify clear evidence for the effect on health outcomes.

While it has been suggested by expert opinion that pulse oximetry could induce anxiety, we found the opposite. Patients reported they felt safe when using the pulse oximeter, which is comparable to a high feeling of safety as reported by patients in a 2020 case-control study (27).

In 45 days, the mean % decrease in disability score as measured with WHODAS 2.0 was 53.2% in intervention group and 65.7% in the control group. Although it is unsure which change can be regarded as clinically relevant, previous studies among patients with chronic diseases who underwent rehabilitation found much lower decreases; 20.5% in patients with internal conditions and 21.4% in patients with musculoskeletal conditions. The large decrease from baseline observed in our study is likely explained by the serious clinical impact of COVID-19, where participants at baseline scored a high score above the 95th percentile compared to the general population. This decreased to a
disability score somewhat above the 75th percentile at day 45 which indicates that COVID-19 patients have residual disabilities after their infection.(22)

**Strengths and limitations**

We performed, to our knowledge, the first entirely primary care-based RCT to assess the feasibility of a trial of home monitoring by pulse oximetry of high-risk COVID-19 patients. Most of the eligible patients were willing to be randomised and adhere to study procedures. The lower than anticipated participation rate was partly due to a decline in SARS-CoV-2 prevalence in the Netherlands at the end of the study period, and a more widespread use of pulse oximetry by COVID-19 patients. In our study, 8/20 (40%) control participants used an ‘own’ pulse oximeter at least once during the study. This could have reduced the contrast between groups, meaning a possible reduction of effect. Overall in our pilot trial, the use of pulse oximetry tended to reduce anxiety and there was no hind of unsafe situations. A limitation is that we did not use an electronic real-time connection between pulse oximeter and medical assistance, so it is possible that detection of hypoxemia measurements was missed or delayed, even though we gave explicit instructions to patients when to contact the GP.

**Implications for practice**

Home monitoring by pulse oximetry is already recommended by the WHO as part of a COVID-care package, and incorporated in UK guidelines for breathless, unwell, or high risk COVID-19 patients.(28) We showed that home monitoring with a validated pulse oximeter tended to increase the feeling of safety of participants compared to usual care (in which 40% used a pulse oximeter). To enhance patient safety, it is important that validated pulse oximeters are used as remote monitoring tool.

**Conclusion**

Our pilot randomised controlled trial showed that home monitoring of moderate-severe COVID-19 patients with a validated pulse oximeter is feasible; adherence was high, patients reported a high feeling of safety, and the use of pulse oximetry did not result in an increase in primary care consultations compared to usual care. We believe these findings are an important building block for safe implementation of pulse oximetry as a home monitoring tool in primary care.
Additional information

Funding
This independent research was supported by the foundation ‘Hartstichting’ and foundation ‘Stoffels-Hornstra’, both residing in the Netherlands.

Ethical approval
The Medical Ethics Review Committee Utrecht reviewed and approved the trial protocol (20-638/D) and the trial has been registered at the Netherlands Trial Register, NL8954, https://www.trialregister.nl/trial/8954.

Competing interests
The authors have declared no competing interests.

Public and patient involvement
Patients of the Dutch GP ‘Patient and Family Advisory Council’ from the ZonMw institution in the Netherlands provided input in defining research questions, outcomes and data collection at the design stage of the study. This group consisted of middle-aged patients with chronic or oncologic disease and received structured care via a transmural care program, thus belonging to the COVID-19 risk group. Results will be shared with the involved patients.

Acknowledgements
The authors would like to thank all study participants and all employees of the participating primary care centers for their cooperation in this study.
Literature

Screened by GP (n=60) Between November 2020 and June 2021

Not eligible
- Only mild symptoms (n=3)
- Direct hospitalisation (n=4)
- No cardiovascular risk factor (n=1)
- Unable to participate (n=5)

Eligible for randomisation (n=47)

No study inclusion
- Unwilling to participate (n=3)
- Unknown (n=3)

Randomised (n=41)

Intervention (n=21)

Control (n=20)

Used study pulse oximeter after inclusion (n=21)

Used own pulse oximeter after inclusion (n=8)

Completed 14 day follow-up (n=21)

Completed 45 day follow-up (n=21)

Completed 45 day follow-up GP (n=20)

Included in Analysis (n=21)

Included in Analysis (n=20)

Figure 1. Flowchart study participants
<table>
<thead>
<tr>
<th></th>
<th>Total (n=41)</th>
<th>Intervention (n=21)</th>
<th>Usual care (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age in years (SD)</td>
<td>64.2 (10.8)</td>
<td>63.2 (10.0)</td>
<td>65.3 (11.7)</td>
</tr>
<tr>
<td>Male sex, n (%)</td>
<td>23 (56.1%)</td>
<td>13 (61.9%)</td>
<td>10 (50.0%)</td>
</tr>
<tr>
<td>Mean BMI in kg/m² (SD) *</td>
<td>28.4 (4.5)</td>
<td>28.7 (4.5)</td>
<td>28.0 (4.7)</td>
</tr>
<tr>
<td>Obesity (BMI≥30 kg/m²)</td>
<td>9 (22.0%)</td>
<td>5 (23.8%)</td>
<td>4 (20%)</td>
</tr>
<tr>
<td>Hypertension, n (%)</td>
<td>28 (68.3%)</td>
<td>13 (61.9%)</td>
<td>15 (75.0%)</td>
</tr>
<tr>
<td>Smoking status, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>12 (29.3%)</td>
<td>4 (19.0%)</td>
<td>8 (40.0%)</td>
</tr>
<tr>
<td>Current or prior</td>
<td>11 (26.8%)</td>
<td>6 (28.6%)</td>
<td>5 (25.0%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>18 (43.9%)</td>
<td>11 (52.4%)</td>
<td>7 (35.0%)</td>
</tr>
<tr>
<td>Diabetes, n (%)</td>
<td>11 (26.8%)</td>
<td>6 (28.6%)</td>
<td>5 (25.0%)</td>
</tr>
<tr>
<td>Hypercholesterolaemia, n (%)</td>
<td>23 (57.5%)</td>
<td>13 (65.0%)</td>
<td>10 (50.0%)</td>
</tr>
<tr>
<td>Coronary artery disease, n (%)</td>
<td>6 (14.6%)</td>
<td>2 (9.5%)</td>
<td>4 (20.0%)</td>
</tr>
<tr>
<td>Chronic kidney disease (eGFR&lt;60 ml/min), n (%)</td>
<td>8 (19.5%)</td>
<td>5 (23.8%)</td>
<td>3 (15.0%)</td>
</tr>
<tr>
<td>Ischaemic or haemorrhagic stroke, n (%)</td>
<td>5 (12.2%)</td>
<td>4 (19.0%)</td>
<td>1 (5.0%)</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease, n (%) ‡</td>
<td>14 (34.1%)</td>
<td>6 (28.6%)</td>
<td>8 (40.0%)</td>
</tr>
<tr>
<td>Immunocompromised, n (%)</td>
<td>3 (7.3%)</td>
<td>1 (4.8%)</td>
<td>2 (10.0%)</td>
</tr>
<tr>
<td>Charles Comorbidity Index; modified, 8/17 items (SD) **</td>
<td>1.20 (1.14)</td>
<td>1.24 (1.22)</td>
<td>1.15 (1.09)</td>
</tr>
<tr>
<td>COVID-19 confirmed with PCR SARS-CoV-2-test, n (%)</td>
<td>40 (97.6%)</td>
<td>21 (100%)</td>
<td>19 (95.0%)</td>
</tr>
<tr>
<td>Median number of days with symptoms prior to inclusion (range)</td>
<td>7.0 (0-20)</td>
<td>7.0 (0-15)</td>
<td>6.5 (2-20)</td>
</tr>
</tbody>
</table>

* Missing n=12.
** Data of 8/17 items of the ICD-10 version of the CCI was used. Total score range 0-10.
† Including angina pectoris, myocardial infarction and heart failure.
‡ Including Asthma and COPD.
Abbreviation: BMI = Body Mass Index, eGFR = estimated glomerular filtration rate
Figure 2. SpO2 readings first 7 days of the 21 intervention group participants. Readings of participants who needed hospital admission are shown until hospitalisation.
<table>
<thead>
<tr>
<th></th>
<th>Total (n=41)</th>
<th>Intervention (n=21)</th>
<th>Usual care (n=20)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total 12-item WHODAS 2.0 score at baseline, mean (SD) §</td>
<td>19.2 (10.9)</td>
<td>19.7 (11.6)</td>
<td>18.8 (10.4)</td>
<td>0.73</td>
</tr>
<tr>
<td>Total 12-item WHODAS 2.0 score after 45 days, mean (SD) §</td>
<td>6.1 (6.9)</td>
<td>8.4 (8.4)</td>
<td>3.9 (4.1)</td>
<td>0.10</td>
</tr>
<tr>
<td>% decrease after 45 days (SD)</td>
<td>59.4 (48.1)</td>
<td>53.2 (39.4)</td>
<td>65.7 (55.7)</td>
<td>0.42</td>
</tr>
<tr>
<td>% decrease after 45 days in non-hospitalised participants (SD)</td>
<td>59.6 (50.2)</td>
<td>53.2 (41.0)</td>
<td>64.5 (57.0)</td>
<td>0.52</td>
</tr>
</tbody>
</table>

§ Including rating 12 items on a five-point scale. Total score is computed by summarizing scores. Zero represents no difficulties, 48 represents most severe difficulties. Abbreviation: WHODAS = World Health Organization disability assessment score.
Table 3. Health care utilisation and other health-related secondary outcomes of the 41 participants divided in intervention and usual care group

<table>
<thead>
<tr>
<th></th>
<th>Total (n=41)</th>
<th>Intervention (n=21)</th>
<th>Usual care (n=20)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GP Contacts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of COVID-19 related GP contacts, total, n</td>
<td>101</td>
<td>50</td>
<td>51</td>
<td>0.550</td>
</tr>
<tr>
<td><em>Because of low oxygen saturation measurement, n (%)</em></td>
<td>15 (14.8%)</td>
<td>12 (24.0%)</td>
<td>3 (5.9%)</td>
<td>0.213</td>
</tr>
<tr>
<td>Patients with at least 1 GP contact after inclusion, n (%))</td>
<td>31 (75.6%)</td>
<td>15 (71.4%)</td>
<td>16 (80%)</td>
<td>0.523</td>
</tr>
<tr>
<td>Median GP contacts per patient during 45 days (range)</td>
<td>3.0 (1-12)</td>
<td>2.0 (1-12)</td>
<td>3.0 (1-8)</td>
<td>0.550</td>
</tr>
<tr>
<td><strong>Hospital visits and admission</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of ED visits, n (%)</td>
<td>11 (26.8%)</td>
<td>8 (28.1%)</td>
<td>3 (15.0%)</td>
<td>0.513</td>
</tr>
<tr>
<td>Patients admitted to hospital, n (%)</td>
<td>6 (14.6%)</td>
<td>5 (23.8%)</td>
<td>1 (5.0%)</td>
<td>0.184</td>
</tr>
<tr>
<td><em>Median length of stay in days (range)</em></td>
<td>5.0 (3-16)</td>
<td>3.0 (3-16)</td>
<td>7.0 (0.0)</td>
<td>n/a</td>
</tr>
<tr>
<td><em>Non-invasive oxygen treatment, n (%)</em></td>
<td>6 (100%)</td>
<td>5 (100%)</td>
<td>1 (100%)</td>
<td>0.180</td>
</tr>
<tr>
<td>ICU admissions, n (%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Secondary diagnosis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Bacterial superinfection, n (%)</em></td>
<td>10 (24.4%)</td>
<td>6 (28.6%)</td>
<td>4 (20.0%)</td>
<td>0.720</td>
</tr>
<tr>
<td><em>Pulmonary embolism, n (%)</em></td>
<td>1 (2.4%)</td>
<td>1 (4.8%)</td>
<td>0 (0.0%)</td>
<td>n/a</td>
</tr>
<tr>
<td>Treatment with dexamethasone, n (%)</td>
<td>7 (17.1%)</td>
<td>5 (23.8%)</td>
<td>2 (10.0%)</td>
<td>0.410</td>
</tr>
<tr>
<td><strong>Days alive at home, mean (SD)</strong></td>
<td>43.5 (6.1)</td>
<td>42.4 (8.3)</td>
<td>44.7 (1.6)</td>
<td>0.230</td>
</tr>
<tr>
<td>Deaths, n (%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Abbreviation: GP = general practitioner