# Code status documentation at admission in COVID-19 patients: a descriptive cohort study

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# Code status documentation at admission in COVID-19 patients: a descriptive cohort study

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## ABSTRACT

**Objectives** The COVID-19 pandemic pressurised healthcare with increased shortage of care. This resulted in an increase of awareness for code status documentation (ie, whether limitations to specific life-sustaining treatments are in place), both in the medical field and in public media. However, it is unknown whether the increased awareness changed the prevalence and content of code status documentation for COVID-19 patients. We aim to describe differences in code status documentation between infectious patients before the pandemic and COVID-19 patients.

**Setting** University Medical Centre of Utrecht, a tertiary care teaching academic hospital in the Netherlands.

**Participants** A total of 1715 patients were included, 129 in the COVID-19 cohort (a cohort of COVID-19 patients, admitted from March 2020 to June 2020) and 1586 in the pre-COVID-19 cohort (a cohort of patients with (suspected) infections admitted between September 2016 to September 2018).

**Primary and secondary outcome measures** We described frequency of code status documentation, frequency of discussion of this code status with patient and/or family, and content of code status.

**Results** Frequencies of code status documentation (69.8% vs 72.7%, respectively) and discussion (75.6% vs 73.3%, respectively) were similar in both cohorts. More patients in the COVID-19 cohort than in the before COVID-19 cohort had any treatment limitation as opposed to full code (40% vs 25%). Within the treatment limitations, 'no intensive care admission' (81% vs 51%) and 'no intubation' (69% vs 40%) were more frequently documented in the COVID-19 cohort. A smaller difference was seen in 'other limitation' (17% vs 9%), while 'no resuscitation' (96% vs 92%) was comparable between both periods.

**Conclusion** We observed no difference in the frequency of code status documentation or discussion in COVID-19 patients opposed to a pre-COVID-19 cohort. However, treatment limitations were more prevalent in patients with COVID-19, especially 'no intubation' and 'no intensive care admission'.

## Strengths and limitations of this study

- The effect of the pandemic on code status discussion and documentation is largely unknown. This is the first study to compare code status documentation of patients admitted with COVID-19 and patients before the COVID-19 pandemic in the Netherlands. Results can be useful for improving code status documentation and discussion.
- This study had few missing values, improving the accuracy and reliability of our results.
- Due to differences between the cohorts, statistical comparison was not appropriate and results are therefore descriptive.

## INTRODUCTION

Code status discussions are crucial to ensure future healthcare decisions are aligned to a patient's wishes. In a code status, it can be documented whether there are limitations to specific life-sustaining treatments or not. Code status discussion has shown to reduce length of stay in the intensive care unit (ICU), ICU readmission rates and costs of healthcare, without impacting patient satisfaction.[1–3] Discussing code status in time is essential to prevent unnecessary or undesirable care in acute settings.[1 3] Therefore, it is recommended in the Netherlands to discuss code status with every patient on admission. This can be documented in the electronic health record (EHR).

In March 2020, the COVID-19 pandemic reached in the Netherlands, putting tremendous pressure on patient care and hospital capacity, especially on the ICU.[4–6] We received signals from the professional field that code status documentation and discussion increased as a result of the awareness to the possible shortage of care, inside and outside the ICU,[7–9] and attention that was raised to the considerable risks and disadvantages of long-term intubation and ICU admission after infection with COVID-19.[7–11] This increased awareness was not only in the medical world, also in the media there was

a lot of attention for disadvantages of intubation and ICU admission, which might have stimulated patients to broach the topic when the physician did not. Conversely, a well-known argument not to discuss code status is lack of time.[12–15] Hence, code status documentation could be negatively affected by the pandemic as workload for clinicians rapidly increased along with the psychological burden.[16–18]Unequivocal code status documentation is of utmost importance to prevent undesirable treatment, especially in a pandemic setting with high pressure on healthcare resources. Therefore, we aimed to describe how this pandemic has impacted the occurrence of code status documentation and discussion. In this study, we describe code status documentation, discussion and frequency of treatment limitations documented in two cohorts: patients admitted with COVID-19 during the first wave of the pandemic, and a previous cohort of patients admitted with (suspected) infection. The results might help us to guide future practice regarding code status discussion.

## METHODS

### Study context

This descriptive, retrospective study was conducted in the University Medical Centre of Utrecht (UMCU), a tertiary care teaching medical centre in the Netherlands. The UMCU has 1042 hospital beds, over 11 000 employees, and in 2019, a total of 29 000 admissions. All patient information is documented in the EHR. The EHR includes a form for code status. The quality standards of the Dutch association for Internal Medicine demand a code status is documented in every admitted patient.[19] To complete a code status form, mandatory questions are if and which treatment limitations are in place and whether this is discussed with the patient and/or family. Treatment limitations are divided in 'no resuscitation', 'no intubation', 'no ICU admission' and 'other limitation', the last one accompanied by a free form question for specification.

### Patient and public involvement statement

It was not applicable or possible to involve patients or the public in the design, or conduct, or reporting, or dissemination plans of our research.

### Study population

For this study, we combined data from two existing databases.[20] Data from COVID-19 patients were extracted from the COVPACH cohort, which consists of all patients >18 years old admitted to the UMCU through the emergency department (ED) or directly on the ward with a positive COVID-19 PCR test from March 2020 to June 2020. Patients immediately transferred from an ICU of another hospital to our ICU were excluded for our analysis. Patients transferred from the general ward or ED of another hospital to our general ward or ED were not excluded.

Data of patients admitted before COVID-19 were extracted from the SPACE cohort, which consists of patients above 18 years old with a suspected infection at the ED. The SPACE database has been described in more detail previously.[21] For the current analysis, we included only unique patients that were admitted in the hospital, defined as the first presentation with admission. Patients were admitted between September 2016 and September 2018.

For both databases, patients were offered a general opt-out for data collection, according to hospital policy. This option is taken by 1.7% of the patients.

### Data collection

#### Baseline characteristics

For both cohorts, age and gender were automatically extracted from the EHR along with the first measured clinical parameters necessary to calculate the Modified Early Warning Score (MEWS).[22] If the Glasgow Coma Scale was missing, the ED documentation was analysed for information on mental state and manually added accordingly. Manually extracted baseline characteristics were transfer from other hospital, living situation before admission, malignancy and dementia. The other comorbidities needed to calculate the updated Charlson Comorbidity Index (CCI) were also added manually.[23]

For the 'before COVID-19' (SPACE) cohort, type of infection was extracted manually and divided in five groups (respiratory, gastrointestinal, urinary tract, skin and other infections). Classification was based on the ED primary discharge diagnosis. For patients from the 'COVID-19' (COVPACH) cohort, type of infection was a COVID-19 infection.

#### Code status

The date of code status documentation, presence of any and which treatment limitations and discussion with patient or family were automatically extracted from the EHR. Code status documented on admission was defined as documentation entered in the EHR between 24 hours before and after the date of admission. Earlier or later documentation of code status was regarded as not documented on admission.

### Analysis

#### *Baseline characteristics*

Patient characteristics were described using counts and percentages for categorical variables and median with IQR for continuous variables.

#### *Code status*

We used descriptive statistics using counts and percentages. First, we described how many patients in both cohorts had a code status documented on admission. Within the documented code status, we compared whether these were discussed with patients and/or family or not, and the proportion of any treatment limitation as opposed to full code. Lastly, we described which treatment limitations were documented in case any treatment

Table 1 Characteristics of patients admitted before the COVID-19 pandemic and admitted with COVID-19

| | COVID-19 (N=129) | Before COVID-19 (N=1586) |
|---|---|---|
| Age (median (IQR)) | 66 (55–76) | 64 (52–72) |
| Male (N (%)) | 71 (55) | 873 (55) |
| Dementia (N (%)) | 6 (5) | 26 (2) |
| Malignancy (N (%)) | 12 (9) | 665 (42) |
| Charlson comorbidity index (median (IQR)) | 1 (0–2) | 2 (1–4) |
| Modified Early Warning Score (median (IQR)) | 3 (1–4) | 3 (1–4) |
| Housing situation (N (%)) | | |
| Own house | 118 (92) | 1484 (94) |
| Nursing home or long-term facility | 6 (5) | 88 (6) |
| Other/unknown | 5 (4) | 14 (1) |
| Transferred from other hospital (N (%)) | 32 (25) | 13 (1) |
| Type of infection (N(%)) | | |
| Respiratory | – | 555 (35) |
| Gastrointestinal | – | 240 (15) |
| Urinary tract | – | 285 (18) |
| Skin | – | 115 (7) |
| COVID-19 | 129 (100) | – |
| Other | – | 391 (25) |

IQR, interquartile range.

limitation was in place. As a COVID-19 infection often presents as respiratory infection, we hypothesised this could influence the types of treatment limitations. Therefore, we also described types of treatment limitations in only patients admitted with respiratory infections from the before COVID-19 cohort. Since the two existing cohorts are essentially different, no additional statistical analysis was performed.

## RESULTS

The COVPACH cohort consisted of 190 patients. Sixty-one patients were transferred from the ICU of another hospital to the ICU of our hospital, and therefore, excluded from our analysis. The SPACE cohort consisted of 3178 patient-visits at the ED, 2056 of which were followed by an admission. A total of 470 of these were recurrent visits/admissions and therefore excluded from our analysis. This resulted in a total of 1715 patients included for analysis, 129 patients from the COVID-19 (COVPACH) cohort and 1586 patients from the before COVID-19 (SPACE) cohort.

### Patient characteristics

Table 1 shows the patient characteristics in both groups.

All variables had <1% missing values, except for MEWS (12% missing values). Patients admitted with COVID-19 had a notably lower prevalence of malignancy (9% vs 42%) and more were transferred from another hospital (25% vs 1%). Additionally, patients with COVID-19 were slightly older, had more dementia, lower CCI scores and in more people housing situation was unknown. No difference was found for gender and MEWS score between both groups. The most prevalent type of infection of admitted patients in the SPACE cohort was respiratory (35%).

### Code status documentation and discussion

In 90 out of 129 patients (69.8%) in the COVID-19 cohort and in 1153 out of 1586 patients (72.7%) in the before COVID-19 cohort, a code status was documented. These documented code status were discussed in 75.6% (68/90) of the COVID-19 cohort and 73.3% (845/1153) of the before COVID-19 cohort.

### Code status content

Subsequently to comparing the documentation and discussion of code status, we compared the content of these code status in both patient groups on limitations or not and type of limitations. In the COVID-19 cohort, there was a higher frequency of any treatment limitation than in the before COVID-19 cohort (40% (36/90) vs 25% (283/1153) of patients with documented code status, respectively).

Figure 1 shows the types of limitations in patients with any limitation in both cohorts. Patients in the COVID-19 cohort had a higher frequency of 'no intubation' (81% vs 51%),'no ICU admission' (69% vs 40%) and, to a lesser extent, 'other limitation' (17% vs 9%) compared with patients in the before COVID-19 cohort. The frequency of 'no resuscitation' was comparable in both cohorts (96% vs 92%). The difference in limitations remained when comparing the COVID-19 patients with only patients with respiratory infections from the before COVID-19 cohort.

## DISCUSSION

To broaden our knowledge on code status decision-making in the impactful COVID-19 period, we described code status documentation, discussion and content of code status in a cohort of COVID-19 patients and a cohort of patients prior to the pandemic. Surprisingly, we found similar frequencies of code status documentation on admission in the COVID-19 and the before COVID-19 cohort (69.8% vs 72.7%, respectively). We had expected an increase given the raised attention to disadvantages of ICU admission and shortage of care during the pandemic.[4 5 24] Reassuringly, code status documentation did not decrease either, indicating the higher workload during COVID-19 did not reduce the attention to code status documentation. The equal frequency of discussion of code status in the COVID-19 cohort compared with the

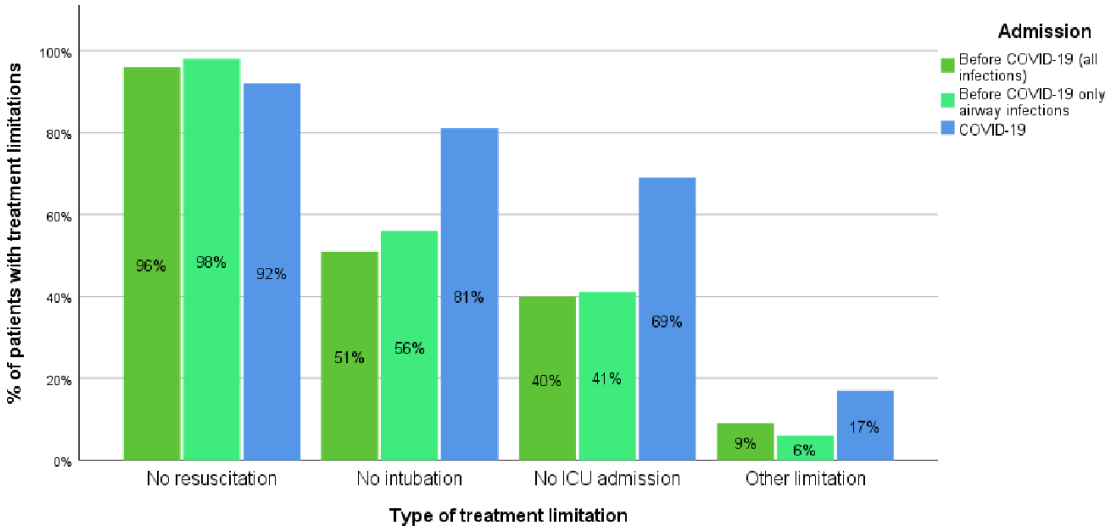


**Figure 1** Prevalence of types of limitations in patients with any limitation admitted before the COVID-19 pandemic and admitted with COVID-19. ICU, intensive care unit.

before COVID-19 cohort (75.6% and 73.3%, respectively, discussed of all documented code status) supports this as well.

COVID-19 appears to have led to a more limitation-directed approach: substantially more patients had treatment limitations during the COVID-19 pandemic (40% vs 24% of all documented code status). Both are relatively high compared with earlier research, which show treatment limitation frequencies ranging from 9% to 23%.[25–29] Since hospital type is known to influence code status documentation, the already high frequency before the COVID-19 pandemic seems appropriate given our academic tertiary centre patient population.[28 29] The increase of treatment limitations during the COVID-19 pandemic might even be underestimated, as patient characteristics known to increase do-not-resuscitate documentation (eg, malignancy and CCI) were lower during the COVID-19 pandemic, possibly as a result of the transfers from non-tertiary hospitals.[30] The distribution of limitations also shows an increased limitation-directed tendency: 'no intubation' and 'no ICU admission' were substantially more prevalent in COVID-19 patients than before the COVID-19 pandemic (81% vs 51% resp. 69% vs 40%).

To our knowledge, only one other study thus far compared code status documentation before and during the COVID-19 pandemic, a single centre study by Coleman *et al* in the UK. In contrast to our study, they reported a substantially increased documentation of code status during the COVID-19 pandemic (from 20% before COVID-19% to 50% during COVID-19).[7] However, in their hospital, there was a change of policy at the start of the pandemic to expand code status documentation to all inpatients, which was already standardly instructed in our medical centre before the pandemic.[7] This is also reflected in our remarkably higher code status documentation even before the pandemic of 73%, as compared with 20% in their study population before the pandemic, presumably leaving less space for improvement. Earlier studies on non-mandatory code status documentation reported a wide range of documentations from 3% to 61%(1, 7–9). Furthermore, Coleman *et al* report more patients with full active treatment during the COVID-19 pandemic,[7] while we see more treatment limitations. However, the earlier mentioned increase in code status documentation in their study might have influenced the proportion of full code versus treatment limitations, thus no definite conclusion was drawn by Coleman *et al* about the precise influence of the pandemic on treatment limitations.[7]

To explore whether the increase in 'no intubation' and 'no ICU admission' was due to the nature of the COVID-19 disease, or other factors as increased awareness during the pandemic, we additionally compared the COVID-19 patients to only the patients with respiratory infections. Since similar differences were found when comparing COVID-19 patients to the patients with respiratory infections, we believe other factors during the pandemic than type of infection alone play a role in this increase. However, early reports of the risk during a COVID-19 infection on severe symptoms necessitating long intensive care admissions[10 11] might have led to more restrained physicians in COVID-19 infections. Other possible explanations are increased awareness in patients and physicians to the harms of intubation and ICU admission along with raised attention to ICU shortages.[7–9] Our study was not designed to differentiate between these explanations.

One of the major strengths of this study is the unique comparison between code status documentation of patients admitted with COVID-19 and patients before the COVID-19 pandemic. To our knowledge, only Coleman *et al* analysed this before.[7] Another strength is the few missing values (all <1% except for the MEWS scores, in which it was 12%), improving the accuracy and reliability of our results.

There are some limitations to our study, the primary being that we cannot distillate what caused the differences we found: the type of infection (COVID-19), factors associated with being in a worldwide pandemic (shortage of care, awareness in physicians, awareness in patients) or differences in the patients. We chose to use two existing databases, to be able to have results as early as possible to guide practice in the developing pandemic. Our goal was to describe code status documentation during COVID-19, rather than calculate an effect size. Because we compared two existing cohorts that were essentially different, we used descriptive statistics instead of performing statistical tests for significance.

Another potential limitation is that we could not assess the quality of the code status. In our opinion, discussing the code status with the patient is of utmost importance for its quality; this was done equally in the cohorts. Code status in COVID-19 patients contained more often limitations, what could suggest code status is considered more thoughtful (one could say it is easier to check the box 'full code' than a treatment limitation). However, measuring the actual quality of the code status (discussion) is difficult and was not possible with our data.

Next to this, we did not know if patients had former documented code status before admission, which could influence code status documentation.[29] However, this effect applied to both cohorts and we regarded an important difference in predocumented code status between both periods unlikely.

We believe our results are an important first step to understand the how the COVID-19 pandemic impacted code status documentation, discussion and content. Future research should focus on further distinguishing what might explain the increase in limitations and especially 'no intubation' and 'no ICU admission'. This might also help us how to improve code status documentation and discussion.

## CONCLUSION AND RECOMMENDATION

We have seen that frequency of code status documentation or discussion did not differ between patients with infections prior to the pandemic and COVID-19 patients. Yet, in COVID-19 patients treatment limitations were more prevalent and within these limitations, 'no intubation' and 'no ICU admission' were more often reported. This suggest a more limitation-directed approach during the COVID-19 pandemic. Our results support the notion that the COVID-19 pandemic influenced code status, although more extensive research is needed to verify these changes and to determine what causes this effect.

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**Competing interests** None declared.

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**Patient consent for publication** Not applicable.

**Ethics approval** This study was performed in line with the principles of the Declaration of Helsinki. Ethical review for both the COVPACH and SPACE cohort was waived by the Medical Ethical Committee of the UMCU (MEC 16-594 and MEC 20-284).

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**Data availability statement** Data are available in a public, open access repository. The dataset generated and analysed during the current study is available at https://doi.org/10.34894/JXPDU9.



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