Patient Demographics, Outcomes & Three-month follow-up of Critically Ill Confirmed or Suspected COVID-19 Patients


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Coronavirus disease 2019 (COVID-19) resulted in a surge in hospital admissions and presented numerous new challenges to healthcare systems globally.[1] In a CN article last year, we shared experiences from the Royal Stoke University Hospital (RSUH) on the dietetic management of COVID-19 patients in the intensive care unit (ICU).[2] This article aims to give an overview of the demographics and outcomes of patients that were admitted to the RSUH ICU during the first wave between March and June 2020.

Introduction

COVID-19 is primarily an infectious respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Symptoms are variable and widespread and may vary from mild shortness of breath to multi-organ failure and death.[3] The reduction in lung function may result in endotracheal intubation to maintain satisfactory blood oxygen levels, requiring admission to the ITU for monitoring. The potential side-effects of prolonged ITU stays are well documented. These include loss of muscle mass and function resulting in prolonged hospital stays and rehabilitation, all reducing patient quality of life.[4] Nutritional assessment and treatment are well documented to be essential in reducing the effects of sarcopenia.[5] The preparations made by the dietetic team at RSUH are previously documented.[2] The dietetic team commenced data collection across a variety of patient factors to enhance our understanding of those patients admitted. A three-month follow up of these patients also took place via phone call to assess on-going symptoms.

Methods & definitions

Approval for data collection was granted by the Trust Audit Quality Team and Information Governance Team. Ethical approval was not sought as there were to be no deviation in standard dietetic care based on presentation. Data was collected retrospectively by both authors from the electronic ICU medical note keeping. All data recorded was counter-checked by the author who had not originally reported data. Data was collated in a purpose designed password encrypted Excel spread sheet. Patient demographics, including gender, age, ethnicity, comorbidities, smoking status, ICU admission body weight, height and body mass index (BMI), were recorded. Where there were instances of missing weights or height, patients GPs were contacted to obtain this information as per standard practice. When a weight was still not found, the weight used by the dietitian assessing the patient was recorded.

All patients aged >18 years who were admitted to an ICU bed at any stage during their admission with a confirmed COVID-19 result, or were treated as positive irrespective of swab result, were eligible for inclusion in data collection. The decision to not exclude patients based on swab results was due to the reported low reliability of swab results,[6] minimising the risk of excluding potentially eligible candidates. A positive swab result at any stage during admission would classify a participant as a COVID-19 positive patient, irrespective if this was obtained whilst an ICU patient or not. Total numbers of COVID-19 swabs were collected, as well as the date of the first positive test. This included any swabs performed pre- or post-positive result. In circumstances where a patient had a positive swab result followed by a negative, and then a further positive, only the date of the first positive was recorded.

Dietetic input was also reviewed. The date of first ICU dietetic review was noted. Some participants were reviewed on wards prior to ICU admission, however this was not recorded. This was the same for dietetic intervention and aim. Length of stay prior to dietetic review was calculated to the nearest day. Dietetic intervention was deemed as the most intrusive feeding route used. For example, when patients were originally seen and recommended the use of oral nutritional supplements and were then reviewed to have a nasogastric (NG) tube placed, only the use of the NG tube was recorded as dietetic intervention.

The number of reviews was the number of times a patient was reviewed by a dietitian whilst still an ICU patient. Where feeding tubes were inserted, their removal date was recorded. From this, feeding tube length of stay was recorded to the nearest day.

A primary treatment option for patients with COVID-19 is proning, with the aim to improve oxygenation status. Proning may result in enteral feeding complications with regards to tolerance and increased gastric residual volumes; however, the data is mixed. The use of proning (be that self-imposed or not) was recorded. To minimise feed intolerance, patients may be prescribed pro-kinetics. The use of pro-kinetics was recorded with the aim of establishing if there were any gut motility issues. Also, any changes in feed were recorded and the reason for this.

Due to respiratory compromise, patients were frequently ventilated to achieve satisfactory gas exchange. Ventilation via endotracheal tubes and tracheostomies were recorded to capture length of time on ventilation. Patients who had an endotracheal tube (ETT) and a failed extubation lasting <24 hours were classified as a single period of intubation. Total ventilation length was defined as time spent with an ETT or time spent with ETT and tracheostomy. Due to the potential swallow deficit intubation can cause, speech and language dietary modification textures on discharge were also reported. These were reported according to the International Dysphagia Diet Standardisation Initiative (IDDSI) descriptors.

Discharge destination from ICU and date of discharge from hospital were reported to calculate a patient's ICU length of stay and total hospital length of stay.

Follow up took place via telephone at a minimum of 90 days post ICU discharge. A Likert scale of 0-5 was used (5 being patients 'normal' and 0 being a total loss) to assess patient reported appetite, anosmia, ageusia, fatigue and mobility during their illness and on date of follow up. Data collection additionally included hospital readmission, patient reported weight, and any ongoing cough or swallowing difficulties. Patients were asked to report any other changes in their condition since their acute illness. Patients were attempted to be contacted a maximum of three times unless a call back was requested on the third attempt. After each attempted contact, a minimum of five days would be left before attempting to contact again. If no contact was achieved on third attempt, they were deemed lost to follow up. All patients discharged to ward, or home, were eligible for follow up. Patients transferred to other ICU centres and did not transfer back to the ICU at RSUH were not contacted. Those who were incarcerated, did not speak English as a first language, or had cognitive impairment and unable to engage in assessment during their admission at their baseline were excluded.

Results

Between March and June 2020 there were 379 ITU admissions at RSUH. All were screened for appropriateness for data collection. Of these, 117 patients were identified for data collection with demographics shown in **Table 1**.

Table 1: Patient admission characteristics

	All	Male	Female
Gender			
	117 (100%)	86 (73.50%)	31 (26.50%)
Age			
	57.86 (± 11.70)	58.58 (± 10.65)	55.81 (±14.23)
Top 3 comorbidities			
1	HTN = 56 (47.86%)	HTN = 45 (52.33%)	HTN = 11 (35.48%)
2	T2DM = 27 (23.08%)	T2DM = 21 (24.42%)	Asthma = 9 (29.03%)
3	Asthma = 18 (15.38%)	Cancer = 13 (15.12%)	T2DM = 6 (19.35%)
Average no.	2.19 (± 1.64)	2.06 (± 1.54)	2.55 (± 1.88)
Ethnicity			
African	1 (0.85%)	1 (0.85%)	0 (0.00%)
Caribbean	1 (0.85%)	1 (0.85%)	0 (0.00%)
Indian	2 (1.71%)	2 (1.71%)	0 (0.00%)
Other Asian background	1 (0.85%)	0 (0.00%)	1 (0.85%)
Other mixed background	1 (0.85%)	0 (0.00%)	1 (0.85%)
Unknown	14 (11.97%)	10 (8.55%)	4 (3.42%)
White & Asian	1 (0.85%)	1 (0.85%)	0 (0.00%)
White, British	95 (81.20%)	70 (59.83%)	25 (21.37%)
White, Irish	1 (0.85%)	1 (0.85%)	0 (0.00%)
Current smoker			
	6 (5.13%)	4 (4.65%)	2 (6.45%)
Admission anthropometry			
Height	1.73 (± 0.10)	1.77 (± 0.07)	1.62 (± 0.08)
Weight	94.07 (± 22.42)	95 (± 20.79)	91.51 (± 26.63)
BMI	31.47 (± 7.5)	31.94 (± 7.69)	30.16 (± 6.88)
BMI 18.5-24.9	24 (20.51%)	20 (23.26%)	4 (12.90%)
BMI 25-29.9	33 (28.21%)	25 (29.07%)	8 (25.81%)
BMI >30	60 (51.28%)	41 (47.67%)	19 (61.29%)
Admission route			
A+E	62 (52.99%)	47 (54.65%)	15 (48.39%)
ICU Transfer	4 (3.42%)	2 (2.33%)	2 (6.45%)
Ward	51 (43.59%)	37 (43.02%)	14 (45.16%)
LOS pre-ICU admission	1.76 (± 4.49)	1.62 (± 4.54)	2.16 (± 4.41)

Key: HTN = hypertension; T2DM = type 2 diabetes mellitus; BMI = body mass index; A+E = accident & emergency; ICU = intensive care unit; LOS = length of stay.

The majority of patients were male (73.50%). Women on average were younger (55.81 ±14.23) than their male counterparts (58.58 ±10.65), with an average age across both genders of 57.86. This was likely impacted as the female cohort was considerably smaller than the male, and the youngest patient in the study was a 20-year-old female. Of the 117, 92 patients returned a positive nasopharyngeal swab.

The majority were White, British (81.20%). Findings were similar when looking at individual gender groups, with 81.4% of males and 80.65% females being White, British. Research to date has reported the Black, Asian and Minority Ethnic group to be at higher risk for contraction of COVID-19.[7] Due to the single-centre nature of this study, ethnicity and risk cannot be commented on. According to the latest census of demographics, 86.43% of Stoke-on-Trent identified as White, British[8] and data may simply be a representation of the local demographic as opposed to any ethnicity-related risk.

Participants on average had two comorbidities. The three most frequently encountered co-morbidities were hypertension (47.86%), type 2 diabetes mellitus (23.08%) and asthma (15.38%). These findings were similar within the female group; however, the male cohort had lower rates of asthma, but higher rates of cancer of all types. The majority were obese (51.28%). When looking at genders, a higher percentage of obese women (61.29%) were admitted than obese males (47.67%). This could be an effect of having a smaller number of females admitted or may be suggestive that males carry a higher risk irrespective of weight. Only six (5.13%) patients were reported to be active smokers.

ICU admissions were most frequently from A+E (52.99%). A small number were transferred from other ICUs due to capacity issues (3.42%), whilst the remainder were admitted from the ward (43.59%).

Intervention

Dietetic intervention is displayed in **Figure 1**. Of those admitted, 102 (87.18%) had a dietetic review, averaging 3.61 (±3.42) dietetic reviews during their ICU admission. The 15 patients not reviewed were either inappropriate to review, died prior to review, or were admitted and discharged from ICU over a weekend and were reviewed at ward level. Four (3.42%) patients had sufficient intake to remain on oral diet alone, 26 (22.22%) were commenced on oral nutritional supplements, 70 required nasogastric tube feeding (59.83%), with one (0.85%) patient progressing to nasojejunal feeding. The remaining patient was radiologically inserted gastrostomy (RIG) fed prior to admission and continued to be RIG fed during their admission.

Weight change is displayed in **Figure 2**. This indicates weight remained stable during ICU admission. This data should be interpreted with caution, as it was unclear if patients were being regularly weighed or if data was simply updated in the electronic record keeping system.

Proning has been encouraged in COVID-19 treatment to improve lung expansion and blood oxygenation. Proning has been thought to increase risk of gastric content aspiration, despite their being little published evidence to support this.[9] Sixty (51.28%) patients were proned at least once during their ICU stay. There were 32 incidences of feed changes, however only 4 (12.50%) were documented to be due to feed tolerance issues, most commonly being due to diarrhoea. Twelve (37.50%) feed changes were due to increasing oral intake, six (18.75%) changes due to increased nutritional needs as a result of changing from catabolism to anabolism, eight (25%) due to renal compromise and two (6.25%) as a result of changes in sedatives.

Length of ventilation is displayed in **Figure 3**. Seventy-four (63.25%) patients were intubated with an average intubation period of 9.42 (±5.69 days). Twenty-six (22.22%) of these patients progressed to requiring a tracheostomy to allow for a prolonged respiratory wean. Tracheostomies were in place for 15.15 (±8.29 days), with total length of ventilation averaging 14.74 (±11.62) days.

There were four discharge destinations from ICU:

- 71 (60.68%) patients were discharged to a ward
- 41 (35.04%) died
- 3 (2.56%) were moved to another ICU
- 2 (1.71%) were discharged directly home.

Discharges directly home are uncommon and in these circumstances were due to prolonged waits for ward beds on the ICU to the point they were well enough to go home.

Figure 1: Dietetic intervention

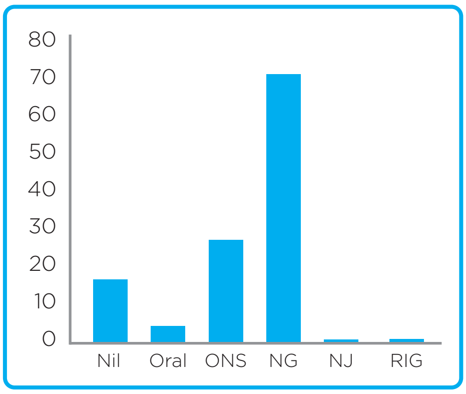


Figure 2: Weight change through ICU admission

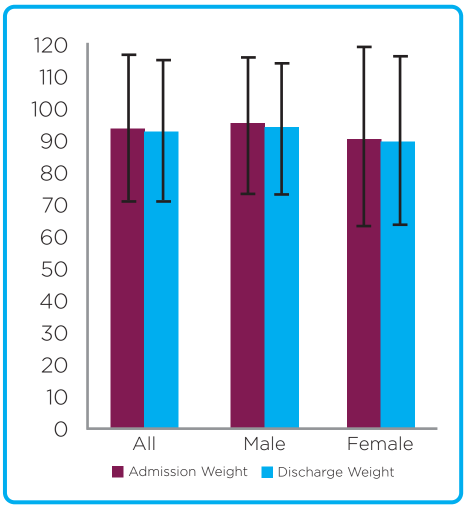
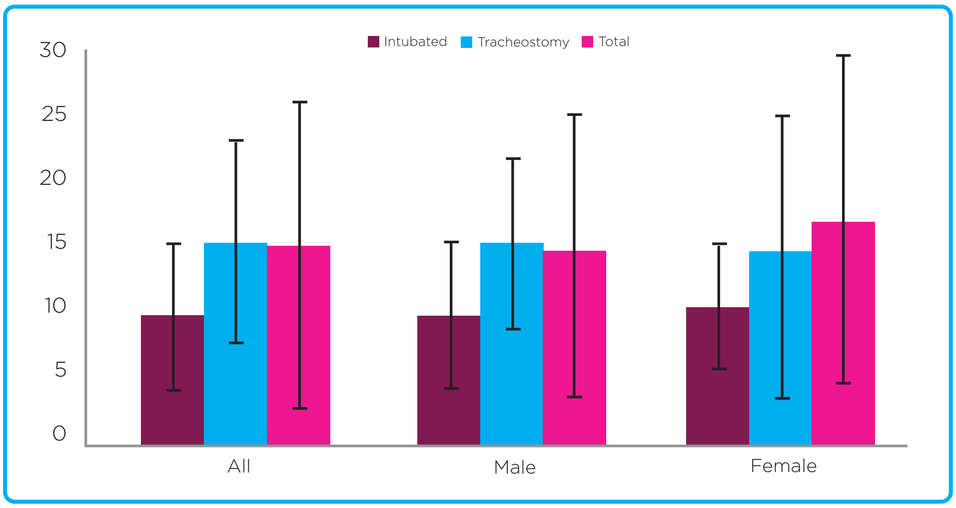


Figure 3: Length of mechanical ventilation



LOS is displayed in **Figure 5**. Average ICU LOS was 13.46 (±11.75) days. Post ICU stepdown, patients would spend a further 3.68 (±6.69) days on the ward, with a total hospital LOS of 18.90 (±17.16) days.

Three-month follow up

Of the 117 patients included in data collection, 66 (56.41%) were deemed eligible for follow up. Of these, 39 (33.33%) were successfully contacted for 3-month follow up post ICU discharge. Reasons for missing contact are displayed in **Table 2**.

Patients were contacted on average 113.33 (±17.12) days post ICU discharge. Delays in contact were mainly due to difficulty being able to contact patients and limited time capacity due to clinical demand during outbreak.

Of those contacted since hospital discharge, four (10.25%) had been readmitted to hospital, only one of which was reported to be non-COVID-19 related. A further patient reported to have been advised to be readmitted but had refused this.

Patients' weight was reported at 96.24 kg (±18.63 kg). From original hospital admission, this equated to a weight loss of 1.19 kg (±7.91 kg). However, since ICU discharge there was a weight gain of 1.60 kg (±7.50 kg). Average BMI remained in the obese category at 31.11 kg/m^2 (±6.15 kg/m^2).

In terms of self-reporting of symptoms, there was a clear loss of appetite, increased fatigue, and loss of mobility during illness. At follow up, however, these appeared significantly improved and were approaching patients' baseline. Common reported symptoms of loss of sense of smell and taste during illness appeared variable, with large standard deviations in both categories. Nineteen (48.72%) patients reported ongoing shortness of breath, whilst 6 (15.38%) reported an ongoing cough. Four (10.26%) patients reported ongoing swallowing difficulties.

Patients were additionally asked if they had noticed any other symptoms since being unwell with COVID-19 and there were several occurring themes. The most common theme was hair loss, with seven patients reporting this. Six patients reported some form of psychological issues since their discharge, including anxiety and depression, 'brain fog', and generally taking longer to process information than pre-COVID-19, to the stage it was affecting their working life. Five patients reported ongoing muscle pains, most commonly in the legs, with a feeling of general numbness being common. Interestingly, three patients reported they had a heightened sense of smell and taste, mainly being salt, since discharge.

Summary

Our results give a narrow view of the effect COVID-19, however, they suggest those at risk of contracting COVID-19 and requiring critical care admission are the obese and polymorbid. Those who are successfully discharged from the ICU and make it home, appear to have their symptoms resolved, with only a small number continuing to report symptoms. Our data is limited in that these are self-reported symptoms and are compared to the patient's self-described normal. Discrepancy between patients has been large, with some patients reporting feeling back to their normal but still struggling to manage a flight of stairs, whilst others reported difficulty and were managing to cycle for 20 km. Our data is also reliant on patient's recall of their symptoms, thus may not provide a truly accurate picture of health. Recent data has suggested some immunity from further symptom development post illness. Further assessment could include a prolonged follow-up period with set clear parameters of symptoms.[10] Expanding data collection to all those admitted to the hospital setting with COVID-19 could also provide us with a more accurate picture of recovery.

Figure 5: Length of stay

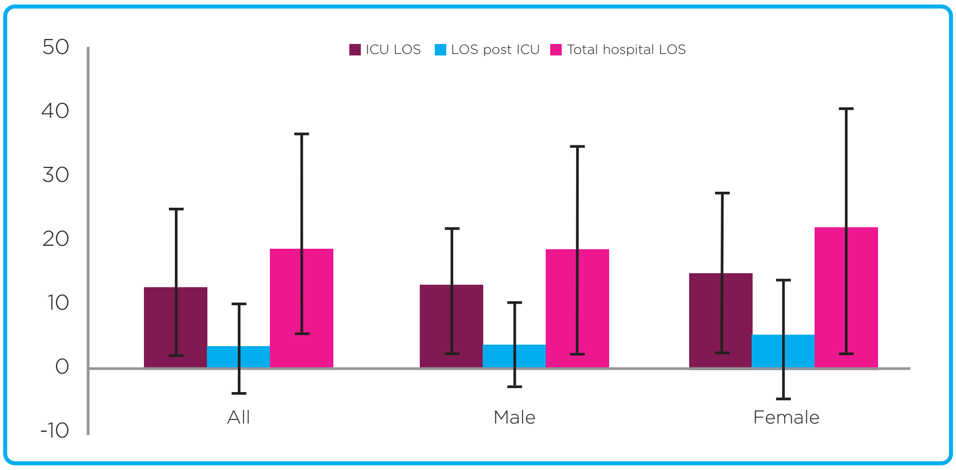


Table 2: Contactable patients for follow-up

	Number	Percentage
Died pre ICU discharge	41	35.04%
ICU transfer	3	2.56%
Died pre hospital discharge	1	0.85%
Died prior to follow up	2	1.71%
Incarcerated	2	1.71%
English not first language	1	0.85%
Cognitive impairment	1	0.85%
Contact not achieved on 3 attempts	27	23.08%
Contact achieved	39	33.33%

This article follows on from Phill and Sam's article on *'Nutritional Management of COVID-19 Patients in the Intensive Care Unit'*, which featured in CN last year (CN; 20(3): 39-41). The article can be accessed directly from: www.nutrition2me.com/resource-centre/covid-19-related-articles

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