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Cohort of Haemodialysis Patients with COVID-19 in an Irish Nephrology Centre

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Abstract

Aims

COVID-19 has a mortality of 29-41% in haemodialysis (HD) patients, compared to 2% in the general population. In our HD centre, the largest nationally, we report a higher mortality rate of 50%, and aimed to determine underlying factors driving this.

Methods

In this retrospective observational study, we collected demographic and clinical data on our HD patients infected with COVID-19.

Results

20/296 HD patients were infected with sudden acute respiratory syndrome coronavirus 2 (SARS-CoV-2), 10 of whom died. These cases represent 20/87 (23%) of COVID-19 positive HD patients nationally and 37% of deaths (10/27). Non-survivors were more likely to present with upper respiratory tract symptoms. Underlying frailty was associated with increased mortality (RR=2, CI 0.57,7.03).

Discussion

Dialysis patients remain susceptible to fatal COVID-19 illness, so efforts need to be made to reduce its spread, including isolation measures, and separate COVID-19 teams.

Keywords

COVID-19; SARS-CoV-2; Haemodialysis; End-stage renal disease; Frailty

Introduction

SARS-CoV-2 was first identified in Wuhan, China in January 2020 and has spread globally, with a mortality of 2%[1]. Patients with end stage kidney disease (ESKD) on haemodialysis (HD) are particularly vulnerable for critical COVID-19 infections due to frequent attendances to medical facilities, dysregulated immune systems[2], and multiple comorbidities[3], in particular vascular risk factors[4].

To limit the spread of COVID-19 in HD patients, the Irish National Renal Office (NRO) published guidelines to control the outbreak on the 16/03/20[5]. As cases continued to rise, the NRO made further recommendations from the 07/04/20, including obtaining surgical masks for all HD patients[6].

Reported mortality rates among outpatient HD units internationally range from 29-41%[7-9]. We report a high mortality rate in our single centre experience, driven by an early nosocomial outbreak prior to implementing guidelines.

Methods

We conducted a retrospective observational study of all HD patients confirmed SARS-CoV-2 positive with a nasopharyngeal swab between the 18/03/20-15/05/20 in our HD centre and 2 satellite HD centres in Dublin, Ireland. Demographic and clinical characteristic data were collected. Descriptive statistics were conducted using Excel.

Patient characteristics were collected from the national renal database, eMed, and additional data was collected by review of the hospital online laboratory and chart system, PIPE.

Results

Between 18/03/20-15/05/20, 20/296 HD patients had symptoms suggestive of COVID-19 and were subsequently proven to be COVID-19 positive, of whom ten (50%) died. These numbers represent 20/87 (23%) of COVID-19 positive HD patients nationally and 37% of the deaths (10/27). Clinical characteristics are summarized in Table 1.

The nephrology ward suffered a COVID-19 outbreak in mid-March, which was responsible for ten of these twenty patients contracting COVID-19. An 11th patient contracted COVID-19 in another hospital. Amongst these eleven hospital-acquired cases, seven died and four recovered. One patient of the six community transmitted cases died. Two patients who contracted COVID-19 in a nursing home died.

Table 1: Clinical characteristics survivors vs. non-survivors of SARS-CoV-2 positive HD patients.

	Non-survivors (10 patients)	**Survivors** (10 patients)
Age (mean) *Standard Deviation (SD)* *Interquartile range (IQR)*	69.3 years [33-89] *16* *11*	68.6 years [42-91] *17.8* *29.5*
Gender *Male* *Female*	 8 (40%) 2 (10%)	 9 (45%) 1 (5%)

Setting		
Inpatient	9 (45%)	5 (25%)
Outpatient	1 (5%)	5 (25%)
Symptoms at presentation		
Shortness of breath	10 (50%)	3 (15%)
Fever	9 (45%)	8 (40%)
Cough	8 (40%)	7 (35%)
GI Upset	0 (0%)	4 (20%)
Confusion/Agitation	3 (15%)	0 (0%)
Headache	0 (0%)	2 (10%)
Malaise/pre-syncope	1 (5%)	1 (5%)
Treatment		
CPAP	1 (5%)	1 (5%)
Antibiotics	5 (25%)	5 (25%)
Antivirals	0 (0%)	0 (0%)
Dexamethasone	0 (0%)	0 (0%)
ICU admission	0 (0%)	0 (0%)
Mode of transmission		
Hospital acquired	7 (35%)	4 (20%)
Home	1 (5%)	5 (25%)
Nursing Home	2 (10%)	0 (0%)
Rehabilitation centre	0 (0%)	1 (5%)
HD vintage (months)		
Mean	34.1	46.1
Median	20	21.5
SD	*39*	*81*
IQR	*36.75*	*28*
Cause HD		
Diabetes Mellitus	5 (25%)	4 (20%)
Hypertension	1 (5%)	2 (10%)
Acute Tubular Necrosis	2 (10%)	1 (5%)
AD PCKD	0 (0%)	2 (10%)
Cardiorenal syndrome	1 (5%)	0 (0%)
Thrombotic Microangiopathy	1 (5%)	0 (0%)
Vascular	0 (0%)	1 (5%)
Dialysis access		
Line	10 (50%)	8 (40%)
AV Fistula	0 (0%)	2 (10%)
Comorbidities		
Heart Failure	7 (35%)	2 (10%)
Ischaemic heart disease	7 (35%)	4 (20%)
Hypertension	6 (30%)	7 (35%)
Diabetes Mellitus	6 (30%)	5 (25%)

Atrial Fibrillation	5 (25%)	1 (5%)
Chronic lung pathology	3 (15%)	1 (5%)
Stroke	2 (10%)	1 (5%)
No. medications (mean)	15.6	11.8
SD	*5*	*3*
IQR	*5.25*	*3.5*
Clinical Frailty Score (CFS) (mean)	6.2 [4-8]	5.7 [3-8]
SD	*1*	*1.6*
IQR	*1*	*2*
Baseline mobility		
Independent	4 (20%)	6 (30%)
Wheelchair	2 (10%)	3 (15%)
Zimmerframe	1 (5%)	1 (5%)
Bedbound	2 (10%)	0 (0%)
Assistance of 1	1 (5%)	0 (0%)
No hospitalizations in last 12 months (mean)	4	2.2
SD	*1.8*	*1.1*
IQR	*1.75*	*2*

There was no difference in age between non-survivors and survivors (69.3 vs 68.6 years). Non-survivors were more likely to be have upper respiratory tract symptoms, including dyspnea (50% vs 15%) and cough (40% vs 35%), and had a shorter HD vintage (34.1 versus 46.1 months). The main predictor for mortality was underlying frailty, as indicated by the CFS (6.2 versus 5.7), number of hospitalizations in the preceding year (4 versus 2.2), baseline mobility, and number of medications (15.6 vs. 11.8). Seven patients had a CFS ≤5, two of whom died, and thirteen had a CFS>5, eight of whom died (relative risk (RR) 2, confidence interval (CI) 0.57,7.03)

Worse outcomes were associated with more profound lymphopenia ($0.7x10^9$/L versus $1.2x10^9$/L) and higher WCC ($7.4x10^9$/L versus $6.4x10^9$/L), and CRP (82 mg/L versus 53.4 mg/L) at presentation. Patients who died maintained a higher CRP at day 7 (200 mg/L versus 90.3 mg/L).

Prior to implementation of NRO-recommended guidelines on the 07/04/20, there were fifteen cases in our HD centre, compared to five after.

Discussion

In comparison to international data illustrating mortality rates between 29-41% in HD centres[7-9], we report a high mortality of 50%, largely driven by an early nosocomial outbreak and underlying frailty. COVID-19 HD cohorts with similar median ages[8,9] reported mortalities of 29-30.5%.

Changes made within our dialysis centre, guided by the NRO and previous recommendations[10], included temperature checks for patients and surgical masks for patients and health care workers; suspected cases received HD in isolated rooms, were swabbed for SARS-CoV-2 and reviewed by a renal physician; known SARS-CoV-2-positive patients were dialyzed in isolation rooms; all staff coming into contact with suspected or confirmed cases wore personal protective equipment; nephrology teams were divided into COVID-19 and non-COVID-19 teams; the nephrology ward was closed and decontaminated following the COVID-19 outbreak, then became a COVID-19 negative ward. Following implementation of these measures we observed a sustained decrease in the amount of new cases of COVID-19.

Interpretation of our data is limited by our small sample size, testing only symptomatic patients, meaning our numbers may not reflect the true incidence of COVID-19, and the likely natural decline in COVID-19 cases with national implementation of social distancing.

However, the significantly higher rate of mortality in our centre is difficult to ignore. Although guidelines exist for the prevention of COVID-19 in outpatient HD facilities, nosocomial transmission poses a serious potential risk for HD patients. We advocate early adoption of universal surgical mask protocols, isolation measures, separate inpatient COVID-19 teams and separate COVID-19 HD isolation facilities.

Declaration of Conflicts of Interest:
JH, VS and CM declare no financial or other conflicts of interest which may raise the question of bias in the work reported or conclusions, implications or opinions stated.

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