

Evaluation of symptoms, radiological findings, laboratory data and outcome in COVID-19 patients with chronic kidney disease at Tehran, Iran

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Abstract

Background: Chronic kidney disease (CKD) patients are a large population and of significant importance. Except for having an underlying disease, they have some other risk factors, for example, old age, impaired immune function, and other comorbidities that make them more susceptible to the new SARS-CoV2 infection.

Methods: As data on CKD patients with *SARS-CoV-2 Infection* is limited, we decided to carry out a cross-sectional study at Labbafinezhad Hospital on 78 CKD patients with approved COVID-19 infection either on dialysis or not. We have also incorporated CKD patients with kidney transplant history.

Results: The mean age of the patients was 64.04 years, including 53 women and 25 men. Among all symptoms, dyspnea (19.2%) was the most prevalent one. Laboratory data analysis shows an increase in LDH, Creatinine, and ESR and CRP levels. The most common finding on chest CT-Scan was bilateral ground-glass opacity detected in 31 (86.1%) patients, followed by pleural effusion (12.8%) and atelectasis (19%). Among included patients, 53 (74.6%) had hypoxia (o₂ saturation 94% and lower), 47 (81%) had tachypnea (respiratory rate over 16) and 9 (23.1%) had some reduction in the level of consciousness (GCS lower than 15).

Conclusion: Due to the important effect of underlying medical conditions on the outcome of COVID-19 patients, evaluation of clinical manifestations, radiologic findings, laboratory data, and outcome of COVID-19 patients with chronic kidney disease is important to establish a perspective for physicians to manage CKD patients.

Background

Currently, one of the most critical issues that the whole world is dealing with is the recent pandemic, called novel coronavirus disease (COVID-19). Coronaviruses were first discovered in the 1930s in chickens and they have been identified as human pathogens since the 1960s [1]. Recently a novel strain of coronavirus called SARS-CoV-2 spread throughout Wuhan, a city in China, in December 2019 [2, 3]. Since then, it has spread around the world and infected over 14 million people, and caused around 600 thousand deaths, until 20 July [4].

One of the major risk factors regarding susceptibility and mortality rate is the presence of an underlying medical condition [5]. These comorbidities have not been completely discovered, though some have been identified. From which, hypertension, diabetes, cardiovascular disorders, and chronic obstructive pulmonary disease (COPD) have been proven to have a profound impact on the patients' outcome [6, 7]. Chronic kidney disease (CKD) causes abnormal kidney function and also a progressive decline in glomerular filtration rate (GFR) [8]. Chronic kidney disease is a prevalent medical condition that is mostly accompanied by other comorbidities. In 2017, there were approximately 697.5 million cases of CKD all around the world [9].

Because most of the CKD patients are old and have other underlying medical conditions, they are more susceptible to COVID-19. The pathophysiology of CKD greatly involves a reduction in the number of functional nephrons, and in consequence, GFR decreases. The adaptive responses to the reduction in nephron number are mediated by vasoactive hormones, cytokines, and growth factors [8]. On the other hand, COVID-19 can lead to cytokine storm, Angiotensin II pathway activation, dysregulation of complement, hypercoagulation, and microangiopathy [10]. Based on previous studies, CKD on its own is a great risk factor for severe COVID-19 [11]. Not only CKD patients are more often admitted to ICU, but also mortality rate of CKD patients is higher [12]. About symptoms, the most prevalent were respectively, cough, dyspnea, and fatigue. CRP and ferritin level has raised due to hyperinflammation state [13]; however, as far as we are concerned, researches concerning the importance of chronic kidney failure have not been sufficiently conducted, despite a large number of patients.

In this study, we describe 78 patients' conditions at Labbafinezhad Hospital. Clinical manifestation, radiologic findings, laboratory data, and their outcome are reviewed to establish a perspective for physicians to manage patients with chronic kidney disease who are infected with COVID-19.

Material And Methods

Study design

With IRB approval, in this single-center, cross-sectional study, we reviewed 78 patients who were admitted to Labbafinezhad Hospital in Tehran from March 2, 2020, to May 9, 2020. This center is one of the major hospitals in Tehran, Iran, dealing with COVID-19 patients. Most of the patients had been screened due to the presence of clinical presentations attributable to COVID-19 including cough, fever, fatigue, myalgia, chest pain, dyspnea, other upper respiratory symptoms, and gastrointestinal symptoms. A few patients were asymptomatic, and their contraction was discovered accidentally. Diagnosis of COVID-19 patients was based on the WHO interim guidance, a confirmed COVID-19 patient defined as an individual with a positive reverse transcriptase-polymerase chain reaction (RT-PCR) result or a patient with common COVID-19 symptoms and a computed tomography scan (CT-scan) compatible to COVID-19 pattern confirmed by experts [14]. Patients divided into 4 subgroups: 1) patients not on dialysis 2) patients on maintenance dialysis 3) patients underwent dialysis following COVID-19 and 4) patients with a history of a kidney transplant

The written informed consent form was obtained from all patients by the Ethics Commission of the hospital.

The study was approved by the ethical committee of Shahid Beheshti University of Medical Sciences (IR.SBMU.REC.1399.018) and all methods were performed in accordance with the relevant guidelines and regulations.

Data collection

We reviewed clinical charts, nursing records, laboratory findings, and radiologic reports, and other medical records for all CKD patients with confirmed COVID-19 infection. Clinical presentations, laboratory data, radiological findings, and outcomes data were extracted by using data collection forms from documented medical records. Baseline information collected upon admission includes ID number, age, sex, history of a kidney transplant, underlying comorbidities, drug history, history of dialysis, presence of end-stage renal disease (ESRD) symptoms, laboratory data, vital signs, chest radiographic findings, and COVID-19 RT-PCR test. Mentioning that, laboratory tests were performed again, before discharge. It included complete blood count (CBC), erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), albumin, ferritin, fibrinogen, troponin, lactate dehydrogenase (LDH), blood urea nitrogen (BUN), creatinine, alanine aminotransferase (ALT), aspartate aminotransferase (AST), creatine phosphokinase (CPK), and direct and indirect bilirubin.

Virology Studies

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was examined with RT-PCR for most of the patients. First, an oropharyngeal swab was used to collect samples from patients. Then, it was put into a 150 µL viral preservation solution. After total RNA extraction, reverse transcriptase-polymerase chain reaction (RT-PCR) was carried out to detect SARS-CoV-2. Detection of at least one of the specific genes, ORF1ab gene (nCoVORF1ab) or the N gene (nCoV-NP), was considered as a positive test result. Some patients admitted with RT-PCR results from outside of the hospital.

Criteria for Quarantine Release and Discharge

The criteria for quarantine release and discharge consist of clinical improvement of symptoms and possessing normal and stable oxygen saturation (SpO₂).

Statistical Analysis

The collected data were summarized as descriptive profiles by using mean, median, standard deviation, and variance. The percentage, mean, median, standard deviation of patients was calculated within different groups for specific variables. Independent t-test, paired t-test, and chi-square were used to compare the clinical features of patients with COVID-19. A P. value of less than 0.05 was considered as indicating statistical significance. All the statistical analyses were performed by the Statistical Package for Social Sciences (SPSS Inc., Chicago, Illinois, USA) version 26.0.

Results

Of the 78 patients studied, 53 (68.8%) were female. The average age of patients was 64.04 years (32-96). Among the included patients, 33 (43.4%) were not on dialysis, 29 (38.2%) were on maintenance dialysis, and 11 (14.5%) underwent dialysis following COVID-19. Twenty (28.2%) patients had a history of a kidney transplant. Among the included patients 4 (5.2%) and 6 (7.8%) patients had a medical history of diabetes and hypertension. Fifteen (19.5%) patients had both diabetes and hypertension. In addition to these two underlying diseases, 17 (22.1%) patients also had cardiac diseases. Meanwhile, 8 (10.3%) patients had no history of comorbidities. Among all participants, 36 (47.4%) patients stayed alive, and 40 (52.6%) has died. The most common symptom was dyspnea (19.2%), followed by gastrointestinal symptoms (11.5%) (Table 1).

Table 1. Clinical and demographic features of patients based on renal therapy

Variable	Total <i>n</i> =78	No Dialysis <i>n</i> =33	Maintenance Dialysis <i>n</i> =29	Recent Dialysis <i>n</i> =11	Kidney Transplant <i>n</i> =20
Age (range)	64 (32-96)	65.91 (32-90)	62 (32-85)	64.55 (38-96)	52 (32-71)
Sex (%)					
Female	53 (68.8)	25 (75.8)	12 (42.9)	2 (18.2)	5 (25)
Male	24 (31.2)	8 (24.2)	16 (57.1)	9 (81.8)	15 (75)
Outcome (%)					
Alive	36 (47.4)	18 (54.5)	15 (53.6)	2 (20)	9 (45)
Death	40 (52.6)	15 (45.5)	13 (46.4)	8 (80)	11 (55)
Rehospitalization (%)	4 (5.1)	1 (3)	2 (6.9)	0	1 (5)
Underlying disease (%)					
Diabetes	4 (5.2)	1 (3)	2 (7.1)	0	1 (5)
HTN	6 (7.8)	3 (9.1)	2 (7.1)	1 (9.1)	3 (15)
DM+HTN	15 (19.5)	7 (21.2)	7 (25)	1 (9.1)	3 (15)
DM+HTN+CD	17 (22.1)	9 (27.3)	6 (21.4)	2 (18.2)	3 (15)
None	8 (10.3)	2 (6.1)	3 (10.7)	1 (9.1)	5 (25)
Other diseases	28 (35.9)	11 (33.3)	9 (31)	3 (10.7)	5 (25)

DM: Diabetes mellitus; HTN: Hypertension; CD: Cardiac disease

Results show that in patients who are not on dialysis, there were significant and positive correlation between the level of albumin ($r=0.727$, $p<0.05$), troponin ($r=0.999$, $p<0.05$), LDH ($r=0.783$, $p<0.05$), creatinine ($r=0.645$, $p<0.01$) and platelet ($r=0.620$, $p<0.05$) at both admission and discharge. In patients who were on maintenance dialysis, the level of platelet ($r=0.528$, $p<0.05$) and creatinine ($r=0.445$, $p<0.05$) at admission and discharge were weakly and positively correlated. Also, there was a significant average difference between the level of ESR at admission and discharge ($t=1$, $p<0.01$) in this group. Results declare that in who underwent dialysis following COVID-19, the LDH level at admission has a greater amount (mean=478, SD=63.63) than the LDH level at discharge (mean=415, SD=40.30). There was a strong positive correlation with these two amounts ($r=1$, $p<0.01$); however, in kidney transplant patients, there was a significant positive relation between platelet ($r=0.741$, $p<0.05$) and troponin ($r=1$, $p<0.01$) levels at admission and discharge (Table 2).

CT-Scan showed bilateral ground-glass opacity in 31 (86.1%) patients. Besides, pleural effusion (12.8%) and atelectasis (19%) were the two most findings. Also, Table 3 depicts vital signs. Among included patients, 53 (74.6%) had hypoxia (o_2 saturation 94% and lower), 47 (81%) had tachypnea (respiratory rate over 16) and 9 (23.1%) had some reduction in the level of consciousness (Glasgow coma scale (GCS) lower than 15).

Discussion

To the best of our knowledge, to this date, our study is the largest cross-sectional research representing symptoms, laboratory, and radiologic findings and outcome of COVID-19 patients with CKD.

Our study results indicate that in this study the most common symptom in all patients was dyspnea. Among all 43 patients with dyspnea, with or without other symptoms, 19 (44.18%) patients admitted to ICU, and 24 (55.81%) died at ward and ICU. Also, dyspnea was the most common symptom in all patients on dialysis too, who were on maintenance dialysis or underwent dialysis following COVID-19. A previous study including five patients on hemodialysis with COVID-19 revealed that diarrhea and non-respiratory symptoms were the most common symptoms [15]. Another case report similarly reported that nausea and vomiting were the first symptoms that COVID-19 patients who were on dialysis, showed [16]; however, in this study, the prevalence of gastrointestinal symptoms was only 11.5%. Also in patients with a history of a kidney transplant, 60% had dyspnea while the study of Akaline et al. declares that, the initial symptom in these patients was fever [17].

Despite MERS and SARS-CoV, and contrary to the previous COVID-19 studies, in which the number of infected men was higher than women, in this study there were more women (68.8%) than men (31.2%) [18-21]. Among females, 28 (52.8%) patients died while this number in males was 11 (44%). But according to the changes in sex hormone levels among female patients with end-stage renal disease, these differences can be justified [22].

Based on our study, 89.7% of patients had a history of underlying diseases. Most patients with severe conditions had diabetes, hypertension, and coronary diseases; which is aligned with the data that has been reported [21, 23]. Comorbidities in patients with kidney disease are risk factors for poor outcomes in COVID-19 [5]. As our study showed too that from 17 patients with diabetes, hypertension, and coronary disease, 10 patients had died.

This study declares that, even with the higher O₂ saturation (mean=91.2) and normal respiratory rate (mean=16.71) in patients who underwent dialysis following COVID-19, the mortality rate was 80%. While in patients without dialysis who had the lowest O₂ saturation (mean=86.73%) and the highest respiratory rate (mean=22.86), the mortality rate was only 45.5%.

In terms of laboratory data, the average level of creatinine in all patients was 4.37 mg/dl and between subgroups, patients on maintenance dialysis had the highest average creatinine level (5.74 mg/dl), contrary to the study of Ajaimy et al. which the median of creatinine in COVID-19 patients with kidney disease was 2mg/dl [23]. Also, the highest level of ESR (mean=60.45) and CRP (mean=48.36) were in these patients. Albumin levels decreased in all patients at the time of admission, especially in patients admitted to the ICU; however, since in patients with CKD, albumin levels are generally desired and there is no significant correlation between its level at the time of admission and discharge, and besides, the average albumin level in all subgroups is close to each other, so it cannot be said that there is a strong correlation between albumin levels and patient outcome [24]. It is worth mentioning that in our study the mean LDH level in all patients was 667.058 U/L while in previous studies, the mean LDH level in COVID-19 patients without kidney disease was 261 U/L and in patients with CKD was 264 U/L [13, 21]. On the other hand, in our study, the mean level of LDH in patients with a history of kidney transplantation at the time of admission was 815 U/L and at the time of discharge was 119.66 U/L, which is much higher than the amount reported in the same study (mean LDH level=336 U/L) [17]. Also in line with other studies, the LDH level was higher in patients who had been died and patients admitted to ICU which show the correlation between the high level of LDH and poor outcome of patients [25].

Taking the patients' CT-Scan into consideration, align with other studies, bilateral ground-glass opacity was the most radiological finding [21, 23].

As with any hospital-based study, this study has its limitations. Firstly, we encountered some missing data as there were incomplete patient's records. Second, as SARS-COV2 was detected in nasopharyngeal specimens, other pathogens for instance bacteria and fungus that can cause pneumonia was not investigated. Third, the evaluation of serum antibodies for COVID-19 (IgG and IgM) has not been carried out which might have some useful information regarding patients' outcomes. Fourth, hematologic tests have not been conducted to determine viremia and virus load as it can be an important factor which influences patients' outcome. Fifth, a few laboratory data were not available for some patients due to the design of the study. Finally, our explanation may be restricted because of the small sample size.

Conclusion

In this single-center study of 78 hospitalized patients with a history of chronic kidney disease and with confirm of COVID-19 presentation, in Tehran, Iran presumed dyspnea was the most prevalent symptom, while LDH, Creatinine, and ESR and CRP levels increased in most patients. Also, the most common finding on chest CT-Scan was bilateral ground-glass opacity. A significant number of patients had hypoxia (O₂ sat 94% and lower) and tachypnea (respiratory rate over 16). Due to the number of deaths (52.6%) and ICU admissions (44.7%), it can be concluded that CKD is one of the important factors that can cause poor prognosis in COVID-19 patients. On account of the prevalence of chronic kidney disease (CKD) and its great companionship by other comorbidities, it is important to evaluate clinical manifestations, radiologic findings, laboratory data, and outcome of COVID-19 patients with CKD, to establish a perspective for physicians to manage patients.

Abbreviations

COVID-19: Coronavirus disease-2019; CKD: Chronic kidney disease; SARS-CoV-2: Severe respiratory syndrome coronavirus 2; COPD: Chronic obstructive pulmonary disease; GFR: Glomerular filtration rate; RT-PCR: reverse transcriptase-polymerase chain reaction; CT-scan: computed tomography scan; ESRD: end-stage renal disease; CBC: complete blood count; ESR: erythrocyte sedimentation rate; CRP: C-reactive protein; LDH: lactate dehydrogenase; BUN: blood urea nitrogen; ALT: creatinine, alanine aminotransferase; AST: aspartate aminotransferase; CPK: Creatine phosphokinase; SpO₂: oxygen saturation; DM: Diabetes mellitus; HTN: Hypertension; CD: Cardiac disease; Ad: Admission; Dis: Discharge; Alb=albumin; Trop=troponin; ICU=intensive care unit; Plt=platelet; ESR=erythrocyte sedimentation rate; CRP=C - reactive protein; GCS: Glasgow coma scale; GGO=ground glass opacity; Temp=temperature; RR=respiratory rate; O₂ sat= oxygen saturation; GCS=Glasgow coma scale; ICU=intensive care unit; IgG: Immunoglobulin G; IgM: Immunoglobulin M

Declarations

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Authors' contribution

Y.S.K., S.K.M. contributed to the acquisition of data, drafting the article, and interpretation of data. S.S. contributed to the conception and design and interpretation of data. S.T and D.Y contributed to the initiation of the research and interpretation of data. A.Z. and M.M.D. contributed to the analysis and interpretation of data. S.A. contributed to drafting the article and revising it critically for important intellectual content. All authors have read and approved the final version of the manuscript.

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Availability of data and materials

Data supporting the results reported in the article can be found by academic researches by sending an email to the corresponding author at dr.shsali@gmail.com.

Ethics approval and consent to participate

This research has been approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences with the approval code IR.SBMU.REC.1399.018. Written informed consent was obtained from all participants or their proxies.

Consent for publication

All participants or their proxies gave written consent for their personal or clinical details along with any identifying images to be published in this study.

Competing interests

The authors declare that they have no competing interests.

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Additional Tables

Table 2. Laboratory data in admission and discharge of COVID-19 patients

Variables	Alb			Trop			LDH			Cr		
	Ad	Dis	Pvalue	Ad	Dis	Pvalue	Ad	Dis	Pvalue	Ad	Dis	Pvalue
All	3.11	2.94	.494	1.147	.664	.673	15.18	14.28	.172	204.92	206.18	.502
<i>Ward</i> discharge	3.31	3.10		2.387	.019		16.73	20.77		203.82	245.71	
death	3.28	2.90		.084	.192		14.77	13.33		191.33	157.16	
<i>ICU</i> discharge	3.20	3.20		.310	.209		14.0	20.00		184.33	223.33	
death	2.84	2.83		.612	1.27		13.64	9.10		201.46	168.91	
No Dialysis	3.06	2.82	.215	2.02	1.66	.376	16.03	15.51	.252	206.03	205.33	.644
<i>Ward</i> discharge	3.27	3.23		4.22	-		17.62	22.25		202.40	219.63	
death	-	-		-	-		2.00	10.00		275.00	-	
<i>ICU</i> discharge	3.10	3.20		.075	.40		9.00	30.00		109.00	160.00	
death	2.74	2.55		.200	2.30		15.71	8.61		212.38	192.88	
Maintenance Dialysis	3.30	3.15	.787	.74	.103	.390	15.07	15.36	.013	204.57	229.69	.073
<i>Ward</i> discharge	3.48	3.10		.095	.019		15.81	21.00		192.45	286.77	
death	3.40	3.50		.079	.192		17.60	20.00		173.40	151.40	
<i>ICU</i> discharge	3.30	-		.428	.019		19.00	10.00		222.00	255.00	
death	2.94	3.10		1.77	.020		11.62	6.14		197.28	158.50	
Recent Dialysis	2.98	3.01	.629	.10	.457	-	13.72	13.30	.164	213.77	159.125	.205
<i>Ward</i> discharge	2.80	2.70		.10	-		15.50	18.00		326.00	-	
death	-	-		-	-		-	-		-	-	
<i>ICU</i> discharge	-	-		-	-		-	-		-	-	
death	2.98	3.02		.10	.457		12.50	12.37		198.00	153.57	
Kidney Transplant	3.10	3.00	.836	3.24	.042	.630	14.55	11.94	.396	182.29	188.91	.299
<i>Ward</i> discharge	3.35	3.90		8.41	.019		13.55	16.71		220.14	218.00	
death	3.10	2.30		.005	-		19.00	12.00		208.75	194.00	
<i>ICU</i> discharge	3.20	3.20		.31	.209		14.00	20.00		184.33	223.33	
death	2.85	2.95		.01	.066		13.28	7.14		120.50	157.80	

Ad: Admission; Dis: Discharge; Alb=albumin, Trop=troponin; LDH=lactate dehydrogenase; Cr=creatinine; ICU=intensive care unit;

Table 2. Laboratory data in admission and discharge of COVID-19 patients (Cont.)

Variables	Plt			ESR			CRP			
	Ad	Dis	P.value	Ad	Dis	P.value	Ad	Dis	P.value	
All	45.76	40.18	.137	667.05	639.13	.661	4.37	3.83	.713	
<i>Ward</i>	<i>discharge</i>	40.48	26.10	502.15	366.60		4.81	3.64		
	<i>death</i>	23.67	52.50	992.57	926.75		4.70	4.37		
<i>ICU</i>	<i>discharge</i>	26.33	65.00	310.66	451.33		2.35	2.92		
	<i>death</i>	58.77	53.50	761.19	709.63		3.80	3.70		
No Dialysis		42.29	27.33	.831	606.68	537.90	.592	2.75	2.95	.644
<i>Ward</i>	<i>discharge</i>	28.78	27.71		435.80	361.50		3.47	3.23	
	<i>death</i>	-	-					2.16	1.41	
<i>ICU</i>	<i>discharge</i>	38.00	-		386.00	491.00		2.31	1.39	
	<i>death</i>	64.78	26.00		782.09	663.33		1.99	2.88	
Maintenance Dialysis		48.36	47.77	.272	573.73	653.11	.500	5.74	4.44	.949
<i>Ward</i>	<i>discharge</i>	67.83	30.00		617.71	-		5.92	4.21	
	<i>death</i>	21.66	52.50		581.50	544.33		5.31	4.46	
<i>ICU</i>	<i>discharge</i>	20.50	65.00		273.00	431.50		2.37	3.68	
	<i>death</i>	49.76	46.00		618.20	845.50		6.07	4.65	
Recent Dialysis		38.12	60.33	.313	779.00	415.50	-	5.56	4.46	.491
<i>Ward</i>	<i>discharge</i>	40.00	10.00		433.00	387.00		9.24	4.50	
	<i>death</i>	-	-		-	-		-	-	
<i>ICU</i>	<i>discharge</i>	-	-		865.50	444.00		-	-	
	<i>death</i>	41.74	146.00		-	-		4.55	3.91	
Kidney Transplant		36.32	36.00	.586	815.00	1119.66	-	3.79	3.16	.742
<i>Ward</i>	<i>discharge</i>	35.81	35.75		425.66	469.00		4.12	3.16	
	<i>death</i>	29.70	-		1433.00	2074.00		2.78	3.26	
<i>ICU</i>	<i>discharge</i>	26.33	65.00		310.66	451.33		2.35	2.92	
	<i>death</i>	38.46	37.00		801.40	816.00		3.93	3.09	

Ad: Admission; Dis: Discharge; Plt=platelet; ESR=erythrocyte sedimentation rate; CRP=C - reactive protein; * indicator of significant correlation

Table 3. Radiologic findings and vital signs

Variables	CT (%)			Vital Signs				
	Unilateral ggo	Bilateral ggo	None	Temp	RR	O2sat	GCS	
All		2 (5.6)	31 (86.1)	3 (8.3)	36.9643	21.3966	87.8592	14.2308
<i>Ward</i>	<i>discharge</i>	1	14	2	36.9533	18.8696	90.1613	14.5625
	<i>death</i>		4	1	36.9714	20.4286	80.1250	14.0000
<i>ICU</i>	<i>discharge</i>		1		36.1500	21.0000	93.0000	15.0000
	<i>death</i>		11		37.0414	24.4167	86.8214	13.8333
No Dialysis		1 (7.7)	11 (84.6)	1 (7.7)	36.9000	22.8636	86.7333	14.2353
<i>Ward</i>	<i>discharge</i>	1		1	36.7133	20.0000	90.5625	14.3000
	<i>death</i>		9		37.2000	-	57.0000	-
<i>ICU</i>	<i>discharge</i>				36.3000	-	90.0000	15.0000
	<i>death</i>		2		37.1385	26.3000	83.8333	14.0000
Maintenance Dialysis		1 (6.7)	13 (86.6)	1 (6.7)	37.1167	21.6800	88.0000	14.3077
<i>Ward</i>	<i>discharge</i>		4		37.2500	17.8889	89.6154	15.0000
	<i>death</i>		2	1	36.7667	19.6000	83.0000	14.0000
<i>ICU</i>	<i>discharge</i>		1		36.0000	21.0000	96.0000	-
	<i>death</i>		6		37.2714	27.8750	86.0000	13.8333
Recent Dialysis			6 (83.3)	1 (16.7)	36.7545	16.7143	91.2000	14.0000
<i>Ward</i>	<i>discharge</i>		1	1	36.9000	17.0000	86.0000	15.0000
	<i>death</i>							
<i>ICU</i>	<i>discharge</i>							
	<i>death</i>		3		36.6875	16.4000	91.7500	13.6667
Kidney Transplant			11 (91.7)	1 (8.3)	36.9100	21.7143	87.1176	15.0000
<i>Ward</i>	<i>discharge</i>		5	1	36.9222	17.8571	93.0000	15.0000
	<i>death</i>		2		36.9500	15.0000	78.3333	-
<i>ICU</i>	<i>discharge</i>				36.1500	21.0000	93.0000	15.0000
	<i>death</i>		4		36.8714	29.8000	85.0000	15.0000

CT=computed tomography, Ggo=ground glass opacity, Temp=temperature, RR=respiratory rate, O₂ sat= oxygen saturation, GCS=Glasgow coma scale, ICU=intensive care unit

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [STROBEchecklistv4crosssectional.pdf](#)