

MO183

TELEMEDICINE AS A MODALITY OF HEALTH CARE DELIVERY FOR PATIENTS WITH SEVERE CHRONIC KIDNEY DISEASE DURING COVID-19 PANDEMIC

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BACKGROUND AND AIMS: Telemedicine is a new modality of care delivery. Over the last months, it has been used to deliver health care to outpatients with chronic kidney disease (CKD) during COVID-19 pandemic. However, experience of telemedicine in patients with severe CKD is scarce and there are not reassuring data about its efficacy in improving patients' outcome. To evaluate the efficacy and the outcome profile of telemedicine in people with severe CKD, we reviewed all data of outpatients with severe kidney impairment who underwent nephrological evaluation during the first wave of this pandemic. In particular, outcomes of the ambulatory activity (urgent-start dialysis, late referral and modalities of dialysis initiation) were compared to 2019 ambulatory activity.

METHOD: Outpatients with severe chronic kidney disease included in the ambulatory program called "Pre-Dialysis Program" were enrolled in a retrospective study. We reviewed all electronic charts of patients who underwent nephrological follow-up from 9th March to June 21st, 2020 (15 weeks in total) at the University Hospital of Modena,

Italy. Extension of the observation period to 30th September 2020 allowed us to determine the long-term effects of telemedicine on the rate of urgent-start dialysis, late referral, and modalities of dialysis initiation.

RESULTS: During 15 weeks of follow-up, 186 nephrological visits were performed (Table) They were subdivided into telemedicine visits (56.5%) and in-person visits (43.5%). Overall, mean age of patients was 71.7 ± 13.1 years with a prevalence of male (60.2%). Patients who received telemedicine visits had a statistically significant lower sCr (3.7 ± 1.2 vs 4.5 ± 1.5 mg/dl; P=0.0001) and higher eGFR level (14.7 ± 6.02 vs 12.16 ± 5.8 ml/min; P=0.002) than patients followed in the ambulatory setting. A high prevalence of patients with CKD stage 5 was monitored by in-person visits (P=0.0001). Patients followed by telemedicine had a clinical profile including a lower weight (P=0.007) and better control of metabolic acidosis (P=0.039) than the counterpart. Changes in domiciliary therapy occurred more frequently in patients monitored in the ambulatory setting (P=0.036). Statistically significant differences were encountered in the prescription of diuretics (P=0.002), sodium bicarbonate (P=0.043), antihypertensive drugs (P=0.001) and uric acid-lowering agents (P=0.046). During the 15-week period in 2019, 214 visits were performed (+13% compared to 2020). The vast majority of these visits were conducted in the hospital setting (210 out of 214; 98.2%). The severity of CKD was similar between patients, without statistically significant difference in the rate of patients in CKD stage III (P=0.7), stage IV (0.388) and stage V (P=0.593).

Implementation of telemedicine to in-person visits during COVID-19 pandemic did not change the outcomes of patients. Short-term follow-up showed a similar rate in urgent-start dialysis (P=0.361), late referral (P=1), and HD (P=0.875) or PD initiation (P=0.661). Similar results were seen also at the end of the extended follow-up.

CONCLUSION: Implementation of telemedicine has been fundamental to maintain a high level of care in CKD patients during the COVID-19 pandemic. Telemedicine services in combination with in-person visits have contributed to the delivery of clinical monitoring in a group of patients with severe and progressive CKD. No differences have been identified in terms of rate of unplanned dialysis, late referral, and modality of dialysis initiation.

Variable, mean (SD)	All patients n. (%) 186 (100)	Telemedicine visit n. (%) 105 (56.5)	In-person visit n. (%) 81 (43.5)	P-value
Basal characteristics				
Age, years	71.7±13.1	72.4±13.1	70.8±13.1	0.39
(range)	38.3-95.2	38.3-95.2	38.4-94.3	
Males, n. (%)	112 (60.2)	59 (56.2)	53 (65.4)	0.228
Hemoglobin, g/l	12.2±10.83	13.1±13.8	10.9±2.3	0.225
Calcium	9.1±0.76	9.1±0.8	9.1±0.5	0.986
Sodium, mmol/l	138.0±14.78	138.2±15.4	137.6±14	0.890
Potassium, mmol/l	4.7±0.66	4.7±0.69	4.7±0.63	0.7
Base Excess	-3.1±4	-1.9±3.8	-5.1±3.7	0.039
PTH	177.3±125.2	187±140	156.4±86.3	0.301
Urea, mg/dl	144.6±46.8	139±48.7	152.6±43.2	0.125
Systolic blood pressure, mmHg	138.09±17.5	136.6±9.7	138.7±20.1	0.705
Diastolic blood pressure, mmHg	76.1±15.4	72.7±10.5	77.6±16.9	0.219
Heart rate	72.16±8.6	69.9±7	73.3±9.3	0.256
Weight (kg)	76.9±15.5	69.7±8.8	80.1±16.9	0.007
BMI	28.1±4.7	24.8±1.9	29.7±4.8	0.021
Low-protein diet	62 (33.3)	37 (35.2)	25 (30.9)	0.638
Kidney Function (KF)				
sCr, mg/dl	4.1±1.4	3.7±1.2	4.5±1.5	0.0001
eGFR, ml/min	13.6±5.8	14.7±6.02	12.16±5.8	0.002
CKD stage 3	4 (2.1)	3 (2.8)	1 (1.2)	0.422
CKD stage 4	54 (29.1)	36 (34.2)	18 (22.2)	0.072
CKD stage 5	128 (68.8)	66 (62.8)	62 (76.5)	0.0001
Stable KF	69 (37.1)	41 (39)	28 (34.6)	0.545
Improved KF	32 (17.2)	22 (21)	10 (12.3)	0.170
Declined KF	73 (39.2)	33 (31.4)	40 (49.4)	0.016
NA KF	12 (6.4)	9 (9.6)	3 (3.6)	0.235
Changes in drug prescription, mean (SD)				
N. of changes	1.27±1.15	1.12±1.08	1.48±1.21	0.036
Specific drug variation, n. (%)				
Iron supplements	25 (10.9)	14 (12.5)	11 (9.3)	0.961
Erythropoietin	30 (13)	13 (11.6)	17 (14.4)	0.114
Sodium Bicarbonate	22 (9.6)	8 (7.1)	14 (13.9)	0.043
Diuretic	28 (12.2)	9 (8)	19 (16.1)	0.002
Antihypertensive	27 (11.7)	7 (6.3)	20 (16.9)	0.001
Fluid intake	12 (5.2)	9 (8)	3 (2.5)	0.270
Phosphate binders	10 (4.3)	7 (6.3)	3 (2.5)	0.374
Vit. B12/folate	18 (7.8)	11 (9.8)	7 (5.9)	0.675
25(OH) Vit D	14 (6.1)	7 (6.3)	7 (5.9)	0.613
Calcitriol	30 (13)	22 (19.6)	8 (6.8)	0.81
Statin	4 (1.7)	2 (1.8)	2 (1.7)	0.452
Uric acid-lowering agents	6 (2.6)	1 (0.9)	5 (4.2)	0.046
Agents regulating blood K level	4 (1.7)	2 (1.8)	2 (1.7)	0.792