

Effects of Hospitalization events before hemodialysis on Mortality in Dialysis Patients

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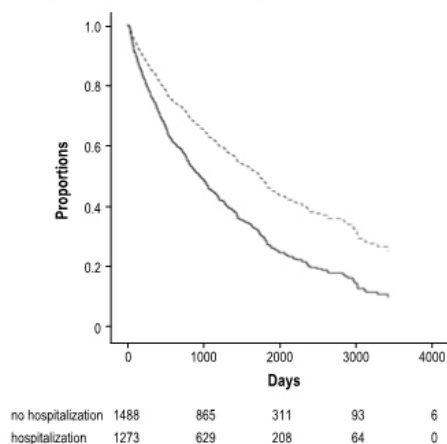
Background/Aims: Hospitalization of the elderly causes fragility, which increases subsequent hospitalization and mortality rates. In this study, we investigated whether dialysis in patients with a history of hospitalization before dialysis affects the mortality rate of dialysis patients.

Methods: We studied 2765 patients who visited hemodialysis clinics in 17 teaching hospitals, and analyzed the association of mortality with demographic factors, co-morbidity, laboratory findings, and drug. The HR was calculated through survival analysis to see if hospitalization increases the mortality rate of dialysis patients.

Results: 8.0% (n=222) of the subjects experienced hospitalization of 1 month or longer within 1 year of starting dialysis. There was no gender difference between the two groups, and the hospitalized group was older, and many patients started dialysis using a catheter. The prevalence of CVA, HTN, dementia, heart failure and atrial fibrillation was higher. Additionally this group showed higher plt and BUN and lower iPTH, Cr, alb ALP, and total cholesterol. Also, this group used less RAAS CCB antiplt agent. In multivariate analysis controlling for age, sex, access type, dementia, malignancy, ischemic heart disease, cerebrovascular accident, heart failure, atrial fibrillation, liver cirrhosis, fracture, ejection fraction, coronary artery disease, lymphocyte, platelet, BUN, Cr, albumin, phosphorus, total cholesterol, RAS blockade, B-blocker, Calcium channel blocker, warfarin, hyperlipidemia drugs, Calcium-based phosphate binder, sevelamer, anti-depressant, and dementia medication, the HR of group receiving dialysis with a history of admission was 1.686 [1.162, 2.447].

Conclusions: Patients with a history of hospitalization for more than one month before dialysis had a high overall mortality, therefore attention and intensive care are needed for this population.

• Figure 1. Survival analysis



| * Table 1. Demographic information and medical history of patients according to Nursing facility residency | | | | |
|--|-----------------------------|-------------------------|---------|--|
| Variables | No hospitalization (n=2041) | Hospitalization (n=222) | P value | |
| Age, year, mean±SD | 77.51 ± 6.47 | 76.76 ± 6.58 | 0.088 | |
| Sex, male, n (%) | 1195 (58.5%) | 122 (55.0%) | 0.197 | |
| Weight, kg, mean±SD | 58.19 ± 11.87 | 57.57 ± 10.27 | 0.122 | |
| Primary etiology, n (%) | | | | |
| CKD | 1211 (59.3%) | 89 (40.1%) | | |
| DM | 307 (15.0%) | 13 (5.9%) | | |
| Heart vascular | 619 (30.3%) | 40 (18.0%) | <0.001 | |
| Other | 410 (20.0%) | 80 (36.0%) | | |
| PKD | 18 (0.9%) | 0 (0.0%) | | |
| Access when starting dialysis, n (%) | | | | |
| Catheter | 3056 (81.1%) | 160 (72.5%) | 0.018 | |
| AVF | 69 (3.4%) | 4 (1.8%) | | |
| AVG | 351 (15.5%) | 58 (26.1%) | | |
| Access at maintenance, n (%) | | | | |
| Catheter | 69 (3.4%) | 14 (6.3%) | <0.001 | |
| AVF | 659 (31.7%) | 36 (16.2%) | | |
| AVG | 1608 (77.9%) | 87 (39.2%) | | |
| Dementia | 103 (5.0%) | 10 (4.5%) | 0.588 | |
| Malignancy, n (%) | | | | |
| No | 2151 (104.7%) | 176 (79.2%) | | |
| Yes | 328 (16.0%) | 46 (20.8%) | 0.103 | |
| at treatment | 58 (2.8%) | 3 (1.4%) | | |
| at conservative care | 24 (1.2%) | 3 (1.4%) | | |
| Lymphoma, n (%) | 22 (1.1%) | 2 (0.9%) | 0.667 | |
| Ischemic heart disease, n (%) | 837 (40.5%) | 82 (37.4%) | 0.423 | |
| Postoperative coronary artery disease (noting past or confirmed by angiography), n (%) | 103 (5.0%) | 17 (7.7%) | 0.472 | |
| Cerebrovascular disease, yes, n (%) | 305 (15.0%) | 31 (14.0%) | 0.908 | |
| Heart failure, n (%) | 443 (21.7%) | 49 (22.1%) | 0.221 | |
| Atrial fibrillation, n (%) | 284 (13.9%) | 27 (12.2%) | 0.218 | |
| Dysrhythm, n (%) | 1407 (68.5%) | 123 (55.4%) | 0.001 | |
| Hypertension, n (%) | 2222 (108.4%) | 260 (117.1%) | <0.001 | |
| Liver cirrhosis, n (%) | 77 (3.8%) | 10 (4.5%) | 0.227 | |
| Rheumatic disease, n (%) | 228 (11.2%) | 11 (5.0%) | 0.094 | |
| Fractures before hemodialysis, n (%) | | | | |
| no history of fracture | 2168 (105.7%) | 169 (76.1%) | | |
| Hip fracture within 1 year | 94 (4.6%) | 11 (5.0%) | 0.572 | |
| Vertebral compression fracture within 1 year | 33 (1.6%) | 3 (1.4%) | | |
| Other fracture within 1 year | 10 (0.5%) | 0 (0.0%) | | |
| * Table 2. Ejection fraction and laboratory findings of patients according to hospitalization | | | | |
| Variables | No hospitalization | Hospitalization | P value | |
| Ejection fraction, %, mean±SD | 58.33 ± 11.20 | 57.83 ± 11.45 | 0.138 | |
| WBC, count, mean±SD | 8302.81 ± 19434.15 | 8934.71 ± 19961.77 | 0.267 | |
| Neutrophil count, count, mean±SD | 7232.2 ± 12,230 | 7339.2 ± 18,171 | 0.284 | |
| Lymphocyte count, count, mean±SD | 1659 ± 823 | 1432 ± 1272 | 0.074 | |
| PLT, count, mean±SD | 8,31 ± 2,17 | 9,26 ± 1,78 | 0.029 | |
| pH count, count, mean±SD | 171042.41 ± 93313.69 | 188303.67 ± 105603.85 | 0.084 | |
| iPTH, pg/mL, mean±SD | 194.95 ± 193.71 | 193.42 ± 198.76 | 0.908 | |
| BUN, mg/dL, mean±SD | 75.30 ± 24.58 | 84.35 ± 35.84 | 0.007 | |
| Cr, mg/dL, mean±SD | 5.78 ± 13.72 | 5.86 ± 5.38 | 0.928 | |
| Albumin, g/dL, mean±SD | 3.36 ± 0.40 | 3.19 ± 0.52 | <0.001 | |
| ALP, U/L, mean±SD | 158.19 ± 138.39 | 192.81 ± 158.82 | 0.001 | |
| Phosphorus, mg/dL, mean±SD | 4.65 ± 1.47 | 5.15 ± 1.57 | 0.145 | |
| Total Cholesterol, mg/dL, mean±SD | 143.93 ± 48.55 | 156.54 ± 54.77 | 0.011 | |

• Table 3. Medication of patients according to hospitalization

| Variables | No hospitalization | Hospitalization | P value |
|---------------------------------------|--------------------|-----------------|---------|
| RAAS blockade, n (%) | 1296 (63.5%) | 87 (39.2%) | 0.001 |
| Beta blocker, n (%) | 267 (13.1%) | 34 (15.3%) | 0.819 |
| Calcium channel blocker, n (%) | 1488 (73.4%) | 101 (45.5%) | 0.001 |
| Alpha blocker, n (%) | 287 (14.1%) | 18 (8.1%) | 0.117 |
| Diuretics, n (%) | 1478 (72.4%) | 128 (57.2%) | 0.001 |
| Statins, n (%) | 981 (47.6%) | 77 (34.2%) | 0.001 |
| Antiplatelet agent, n (%) | 1311 (63.7%) | 84 (37.4%) | 0.001 |
| Warfarin, n (%) | 86 (4.2%) | 12 (5.4%) | 0.233 |
| Calcium based phosphate binder, n (%) | 989 (47.5%) | 18 (8.1%) | <0.001 |
| Sevelamer, n (%) | 84 (4.1%) | 9 (4.0%) | 0.767 |
| Lactulose, n (%) | 78 (3.8%) | 1 (0.4%) | 0.001 |
| Depressive drug, n (%) | 284 (13.9%) | 13 (5.9%) | 0.001 |
| Dementia drug, n (%) | 134 (6.6%) | 13 (5.9%) | 0.211 |

• Table 4. Multivariate Cox regression model of hospitalization

| Variables | HR (95% CI) | P value |
|--|----------------------|---------|
| Follow-up time | | |
| Hospitalization history more than 1 month | 1.686 (1.162, 2.447) | 0.006 |
| Age at dialysis | 1.026 (1.019, 1.034) | <0.001 |
| Sex | 0.823 (0.694, 1.002) | 0.039 |
| Access when starting dialysis | | |
| Catheter | | 0.004 |
| AVF | 0.875 (0.520, 1.438) | 0.507 |
| AVG | 0.987 (0.743, 1.314) | 0.168 |
| Dementia | 1.049 (0.673, 1.638) | 0.832 |
| Malignancy | 1.028 (0.759, 1.322) | 0.851 |
| Ischemic heart disease | 1.342 (1.013, 1.770) | 0.048 |
| Heart failure | 1.280 (0.865, 1.894) | 0.004 |
| Atrial fibrillation | 1.471 (1.033, 2.096) | 0.033 |
| Liver cirrhosis | 1.789 (1.075, 2.722) | 0.024 |
| Fractures | 1.343 (0.893, 1.995) | 0.002 |
| Coronary artery disease (significant stenosis ≥75% involving any artery) | 0.986 (0.638, 1.548) | 0.947 |
| Lymphocyte count (%) | 0.980 (0.970, 0.994) | 0.001 |
| Platelet (count) | 1.000 (1.000, 1.000) | 0.001 |
| iPTH (pg/mL) | 0.989 (0.990, 1.000) | 0.019 |
| BUN (mg/dL) | 0.987 (0.990, 1.000) | 0.138 |
| Cr (mg/dL) | 0.980 (0.977, 1.000) | 0.040 |
| Albumin (g/dL) | 0.816 (0.681, 0.979) | 0.028 |
| phosphorus | 0.977 (0.899, 1.062) | 0.583 |
| Total Cholesterol | 1.000 (0.999, 1.002) | 0.008 |
| RAAS blockade | 0.786 (0.647, 0.957) | 0.021 |
| Beta blocker | 0.680 (0.463, 1.004) | 0.045 |
| Calcium channel blocker | 0.787 (0.630, 0.980) | 0.027 |
| Statins | 0.780 (0.590, 0.998) | 0.001 |
| Warfarin | 0.853 (0.454, 1.677) | 0.579 |