Introduction

Among patients with end-stage renal disease (ESRD), treatment with peritoneal dialysis (PD) is associated with better quality of life and clinical outcomes compared to in-center hemodialysis (ICHD).

However, some patients who initiate PD may later fail the modality and switch to ICHD.

Clinical and non-clinical factors may contribute to modality failure.

Targeted interventions that address such factors may enable retention of patients on PD.

Objective

To identify factors that are associated with greater risk of PD modality failure.

Methods

Study Data, Timeframe and Patients

All study data were derived from one deidentified patient electronic health records.

Excluded patients were adults (18 years old) who were either prevalent on PD or initiated PD between 01 January 2014 and 31 December 2016. Veterans Administration beneficiaries were excluded.

The index event was defined as the first of at least 3 consecutive non-training PD days.

Follow-up time began on the first day of the first full calendar month following index date and continued until the first of study end (31 July 2017, censoring, transplant, death, loss to follow-up, modality change (transition from PD to home hemodialysis), or modality failure transition from PD to ICHD).

Statistical Analysis

Analysis was conducted at the level of the patient-month,

- Variables were considered as of index, as of the month prior to the month under consideration, or the difference between two months prior minus one month prior, as appropriate.

- This was a time-to-event analysis. Cox regression models were each tested on a hierarchal back selection outcomes, followed by joint modeling where multiple potential risk factors were entered into the model simultaneously.

- All models were adjusted for age, sex, race, history of congestive heart failure or diabetes, number of months of historic data availability prior to index date, Charlson comorbidity index, composite heart failure, and amputation.

- All statistical analyses were adjusted for these factors.

Patient Case Mix

- Each of these factors was associated with at least a doubling of risk of modality failure: 1.23 (1.05, 1.46).

- Variables were considered as of index, as of the month prior to the month under consideration, or the difference between two months prior minus one month prior, as appropriate.

- No associations were observed between the age and modality failure (data not shown); these attributes were not considered further.

- Significant associations were observed between age, sex, race, number of months of historic data availability prior to index date, Charlson comorbidity index, composite heart failure, and amputation.

- All of the burden-related factors examined displayed associations with PD modality failure (Figure 1). Among fluid-related factors examined, body weight, body weight change, serum albumin, change in serum albumin, and Kt/V displayed significant associations with PD modality failure (Figure 1). - Drain-volume, loop diuretic use, icodextrin use, serum sodium, change in serum sodium, fluid-related, hospital admission, and membrane transport characteristics did not display significant associations with modality failure.

- No interactions were detected between albumin change in albumin or between Kt/V and treatment type. Membrane transport characteristics did not interact with drain-volume, serum albumin, change in serum albumin, weight, or albumin-related hospital did not interact with either use of loop diuretics or icodextrin-related

Results

Table 1: Patient Case Mix and Associations with Modality Failure

<table>
<thead>
<tr>
<th>Variables</th>
<th>Patients on PD n (%)</th>
<th>Patients on PD Mean ± SD (95% CI)</th>
<th>Adjusted Hazard Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>167,764 (54.6)</td>
<td>57.9 ± 12.6 (56.9, 59.1)</td>
<td>1.02 (1.01, 1.04)</td>
</tr>
<tr>
<td>Male, n (%)</td>
<td>32,073 (10.0)</td>
<td>57.1 ± 12.6 (56.1, 13.7)</td>
<td>0.99 (0.90, 1.10)</td>
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<tr>
<td>White</td>
<td>116,764 (36.8)</td>
<td>58.0 ± 12.6 (56.9, 59.1)</td>
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<td>Other/unknown/kinesis</td>
<td>28,414 (9.0)</td>
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Significant Association

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Significant Association

Figure 1: Association of Fluid-Related Factors with PD Modality Failure

Figure 2: Association of Burden-Related Factors with PD Modality Failure

Figure 3: Association of Peritonitis- and Facility-Related Factors with PD Modality Failure

Conclusions

- The factors with the most prominent associations with PD modality failure were the factors that are directly related to the modality change (all-cause and fluid-related), and the need for antibiotics and/or peritoneal fluid culture.

- Each of these factors was associated with at least a doubling of risk of modality failure.

Acknowledgments

- All of the burden-related factors examined displayed associations with PD modality failure. These were: treatment type (continuous ambulatory vs continuous cycling PD), dialyzer exchange volume, receipt of receiving sessions, or indication of the need for support during treatment, and the distance to the treatment center (Figure 2).

- Administration beneficiaries were excluded.

- The peritonitis-related factors examined, hospital admission, performance of a peritoneal culture, detection of gram-negative rods in the peritoneal fluid, and prescription of antibiotics were significantly associated with PD modality failure (Figure 3A). - Hospital admission for antibiotics, white blood cell count, and change in active blood cell count were not associated with PD modality failure.

- Both on the burden-related factors examined, namely the number of HD-days available at the facility, and the number of patients treated, were associated with PD-modality failure (Figure 3B).

Identification of Factors That Are Associated with Risk of Modality Failure Among Patients Treated with Peritoneal Dialysis

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