Hemodialysis Session Length Has a Dose Relationship With Hazard Rates of Cause-Specific Hospitalization and Mortality

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April 14, 2014
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Introduction

- Prior research has shown that reduced hemodialysis session length is associated with increased mortality and morbidity.¹,²

- Little is known about its association with cause-specific events.


Objective

To estimate the association between duration of hemodialysis and rates of cardiovascular events and death.
Methods

- **Sources:**
  - Electronic medical records (01 Jan 2007–31 Dec 2008) of patients incident to in-center hemodialysis at a large dialysis organization
  - United States Renal Data Systems (USRDS) claims data

- Patients were those who remained on in-center hemodialysis for ≥ 181 days and had Medicare or Medicaid as their primary insurer
Methods

- **Exposure Assessment Period:** Dialysis session length assessed over dialysis days 91-180

- **Dialysis session length categories were:**
  - ≤ 179 minutes
  - 180-194 minutes
  - 195-209 minutes
  - 210-224 minutes
  - 225-239 minutes
  - ≥ 240 minutes
Outcomes

- All-cause mortality
- Cardiovascular mortality
- Myocardial infarction
- Hospitalization for heart failure and/or fluid overload
- Post-dialysis fluid-related hospitalization
- Composite endpoint for hospitalization from heart failure/fluid overload or cardiovascular mortality
- Atrial fibrillation
Results

- $N = 39,497$ patients
- All-cause mortality and cardiovascular mortality were greatest for patients receiving sessions of mean length $< 180$ min
- All-cause mortality was lowest for those receiving mean sessions $\geq 240$ min
Results

- A dose effect was observed with
  - Heart failure/fluid overload composite
  - Hospitalization for heart failure
  - Hospitalization for myocardial infarction

- Significant associations were not measured with
  - Post-dialysis fluid-related hospitalizations
  - Atrial fibrillation
All-Cause Mortality

<table>
<thead>
<tr>
<th>Number patients affected</th>
<th>% patients affected</th>
<th>Incidence rate per 100 patient-years (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,646</td>
<td>19.2</td>
<td>14.2 (13.8-14.6)</td>
</tr>
</tbody>
</table>
Cardiovascular Mortality

<table>
<thead>
<tr>
<th>Number patients affected</th>
<th>% patients affected</th>
<th>Incidence rate per 100 patient-years (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,976</td>
<td>7.5</td>
<td>5.6 (5.4-5.8)</td>
</tr>
</tbody>
</table>

Adjusted Hazard Ratio

- ≤179 min
- 180-194 min
- 195-209 min
- 210-224 min
- 225-239 min
- ≥240 min
Myocardial Infarction Risk

<table>
<thead>
<tr>
<th>Number patients affected</th>
<th>% patients affected</th>
<th>Incidence rate per 100 patient-years (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,396</td>
<td>6.0</td>
<td>6.0 (5.7-6.2)</td>
</tr>
</tbody>
</table>

**Adjusted Hazard Ratio**

- ≤179 min
- 180-194 min
- 195-209 min
- 210-224 min
- 225-239 min
- ≥240 min
Heart Failure Risk

<table>
<thead>
<tr>
<th>Number patients affected</th>
<th>% patients affected</th>
<th>Incidence rate per 100 patient-years (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8,896</td>
<td>22.4</td>
<td>24.4 (23.9-24.9)</td>
</tr>
</tbody>
</table>

![Adjusted Hazard Ratio](image-url)
Post-Dialysis Complications

<table>
<thead>
<tr>
<th>Number patients affected</th>
<th>% patients affected</th>
<th>Incidence rate per 100 patient-years (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>751</td>
<td>1.9</td>
<td>1.9 (1.8-2.0)</td>
</tr>
</tbody>
</table>

Adjusted Hazard Ratio

- ≤179 min
- 180-194 min
- 195-209 min
- 210-224 min
- 225-239 min
- ≥240 min
Composite Endpoint

<table>
<thead>
<tr>
<th>Number patients affected</th>
<th>% patients affected</th>
<th>Incidence rate per 100 patient-years (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,805</td>
<td>27.2</td>
<td>27.8 (27.3-28.4)</td>
</tr>
</tbody>
</table>
Atrial Fibrillation Risk

<table>
<thead>
<tr>
<th>Number patients affected</th>
<th>% patients affected</th>
<th>Incidence rate per 100 patient-years (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,789</td>
<td>7.0</td>
<td>7.0 (6.7-7.2)</td>
</tr>
</tbody>
</table>

Adjusted Hazard Ratio

- ≤179 min
- 180-194 min
- 195-209 min
- 210-224 min
- 225-239 min
- ≥240 min
Conclusion

- These findings represent additional evidence that in the context of thrice-weekly in-center hemodialysis, longer treatments are associated with improved patient health and survival.

- Randomized trials are needed to test causality.
Questions and Answers