A New Method for Vascular Access Life Table Analysis

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Access Surveillance Programs (ASPs) are designed to identify vascular access stenosis and enable intervention prior to thrombosis so that the longevity of the vascular access can be maximized while reducing its associated morbidity. Thrombosis rates may decline as much as 50-75% when an ASP is employed in combination with elective stenosis correction.

Measuring vascular access survival through a life table analysis can be a time-intensive process requiring the integration of multiple sources of data. We present a new method of deriving access survival data from dialysis treatment data (DTD) in the electronic medical record (EMR).

The Vasc-Alert ASP was initiated at Trude Weishaupt Memorial Dialysis Center (affiliated with New York Hospital Queens) in 2003. Vascular access survival rates from 6/1/04 – 5/31/05 (Period 1) were compared with vascular access survival rates from 1/1/09 – 12/31/09 (Period 2).

Two independent reviews of vascular access status were conducted. The records of Period 1 and 2 patients still actively undergoing maintenance hemodialysis at Trude Weishaupt Memorial Dialysis Center as of 2/18/14 were reviewed. Intervention history of Period 1 and 2 patients from access center records was also reviewed when available.

Vascular access lifespan was defined by the first and last recorded use in the DTD. A vascular access was only included if all of the following conditions were met:

1. The patient had at least 30 days of history on a catheter or different vascular access prior to the date of first usage.
2. The patient had at least 30 days on a catheter or a different vascular access after the date of last usage, or the DTD ended while the patient was still using the vascular access.

The vascular access was used at least six consecutive times within one month of the date of first use.

The vascular access was identified by location (forearm, upper arm, or thigh / groin) and side (left / right).

We initially identified 77 AV fistula accesses in the DTD which met inclusion criteria; however, this number was reduced to 58 after an additional audit of the data. Data on AV graft accesses was also collected but is not included in this analysis.

We found that the vascular access information from the DTD was confirmed 78% of the time. This percentage was consistent between the 2 periods, although it was possible to validate a much larger percentage of the period 2 accesses (23 of 32) compared to period 1 (8 of 26).

Survival data for the 51 AV fistulas, expressed in months, was submitted to a Kaplan-Meier survival analysis using MedCalc version 13.1.2.0. The analysis period was limited to 48 months.

The number of patients at risk in Period 1 ranged from 24 at start to 8 at 48 months, with survival = 53%. For Period 2, the number at risk ranged from 27 at start to 14 at 48 months, with survival = 89.8%. There was a significant difference in the survival curves (C² = 7.16, DF = 1, p=0.0079).

Our results show that the first and last dates of use recorded in the DTD provide a very good approximation of access survival data. The Kaplan-Meier analysis applied to this technique can be used as a tool to evaluate the success of an ASP or to compare different ASPs.

The results of the survival analysis suggest that an ASP in concert with a vascular access management program may extend the patency of fistulas.

To enhance the validity of DTD-derived vascular access survival data, additional adequately powered studies are warranted.

Validation of Access Data

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Results of Kaplan-Meier Survival Analysis

Fistula Survival at 48 Months

<table>
<thead>
<tr>
<th>Period</th>
<th>Starting Number</th>
<th>Failed vascular accesses (events)</th>
<th>Vascular accesses leaving study (&quot;censored&quot;)</th>
<th>Vascular accesses surviving at 48 months</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1</td>
<td>24</td>
<td>11 (45.83%)</td>
<td>5</td>
<td>6</td>
<td>53%</td>
</tr>
<tr>
<td>Period 2</td>
<td>27</td>
<td>2 (7.41%)</td>
<td>11</td>
<td>14</td>
<td>89.8%</td>
</tr>
<tr>
<td>Overall</td>
<td>51</td>
<td>13 (25.49%)</td>
<td>16</td>
<td>22</td>
<td>69.8%</td>
</tr>
</tbody>
</table>

Conclusions

Our results show that the first and last dates of use recorded in the DTD provide a very good approximation of access survival data. The Kaplan-Meier analysis applied to this technique can be used as a tool to evaluate the success of an ASP or to compare different ASPs.

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References