Publication Brief


Vanderbilt University Medical Center, Dialysis Clinics, Inc., and Renal Care Group, Inc.

BACKGROUND
Vascular access morbidity results in poor patient outcomes and accounts for a significant proportion (estimated at 25%) of total annual Medicare end-stage renal disease (ESRD) expenditures.

OBJECTIVE
To compare the clinical outcomes and financial impact of access blood flow monitoring with the Transonic Hemodialysis Monitor to detect access malfunction by investigating the effect of vascular access blood flow monitoring (VABFM) on thrombosis-related events, compared to the those of dynamic venous pressure monitoring (DVPM), and no monitoring for vascular access stenosis.

STUDY
Access-related information for 132 chronic hemodialysis patients was collected by three patient-care technicians over a three-phase study (Phase I, eleven months no monitoring, Phase II, twelve months DVPM, Phase III, ten months VABFM). During Phase II of the study, dynamic venous pressure at a pump flow of 200 mL/min in the first five minutes of dialysis was monitored. In Phase III, VABFM followed the protocol shown on the next side. When VABFM and DVPM indicated potential vascular access failure, the patient was referred for a fistulogram, with percutaneous angioplasty (PTA) or surgery following within one week.

RESULTS
The graft thrombosis rate decreased from 0.71 in Phase I, to 0.67 in Phase II, to 0.16 per patient per year in Phase III. PTA procedures increased from 0.09, to 0.32, to 0.54 per patient per year, in Phases I, II, and III, respectively. Hospital days related to vascular access morbidity decreased from 1.8 in Phase I, to 1.6 in Phase II, and 0.4 per patient per year in Phase III. Missed dialysis treatments also fell from 0.98 in Phase I, to 0.86 in Phase II, to 0.26 per patient per year in Phase III. Similarly, catheter use declined from 0.29 placements in Phase I, to 0.17 placements in Phase II, to 0.07 placements per patient per year in Phase III.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Graft Thrombosis</th>
<th>PTA Procedures</th>
<th>Hospital days</th>
<th>Missed Dialysis treatments</th>
<th>Catheter Use</th>
<th>Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. No Monitoring</td>
<td>0.71</td>
<td>0.09</td>
<td>1.8</td>
<td>0.98</td>
<td>0.29</td>
<td>Phase III (Transonic): 49% less than Phase I (no monitoring); 54% less than Phase II (dynamic VP).</td>
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<tr>
<td>II. Dynamic Venous Pressure</td>
<td>0.67</td>
<td>0.32</td>
<td>1.6</td>
<td>0.86</td>
<td>0.17</td>
<td></td>
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<tr>
<td>III. Transonic® HD Surveillance</td>
<td>0.16</td>
<td>0.54</td>
<td>0.4</td>
<td>0.26</td>
<td>0.07</td>
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</tr>
</tbody>
</table>

Graft thrombosis, PTA, Access-related Hospital days, Missed dialysis treatments and catheter use rates are per patient/per year.

COST SAVINGS
As a result of reduced vascular access morbidity, related costs fell 49% from Phase I with no monitoring to Phase III with VABFM and were 54% less in Phase III than in Phase II, effecting a total savings of $158,550.

CONCLUSION
“Vascular access blood flow monitoring along with preventative interventions should be the standard of care in chronic hemodialysis patients.”

REFERENCE
Transonic Systems Inc. is a global manufacturer of innovative biomedical measurement equipment. Founded in 1983, Transonic sells “gold standard” transit-time ultrasound flowmeters and monitors for surgical, hemodialysis, pediatric critical care, perfusion, interventional radiology and research applications. In addition, Transonic provides pressure and pressure volume systems, laser Doppler flowmeters and telemetry systems.