

Does testing frequency matter in surveillance of the vascular access?

The simple answer is YES!

During the process of choosing which vascular access surveillance program to utilize it is important that one compares *apples to apples* instead of *apples to oranges*. The frequency of the testing is what will have the greatest impact on your program, your staff, your patients, your outcomes, and your bottom line.

There are a number of methods to measure, track, and provide surveillance of a patient's access and one should not assume that they are all the same. The first step in the decision process is to decide what you are going to measure. Fundamentally there are two things to be measured; one is to measure flow the other is to measure pressure. As Dr. William Paulson* has stated these are really "two sides of the same coin". Both of these measurements have been well documented and debated regarding their success in identifying early dysfunction of the access due to stenosis.

A primary consideration in the decision process should include determining the testing frequency that is appropriate and recommended for the method that you are interested in utilizing. Guideline #4 of the K/DOQI 2006 Update-Vascular Access gives insight as to why frequency is important.

4.4 When to refer for evaluation (diagnosis) & treatment:

4.4.1 One should not respond to a single isolated abnormal value. With all techniques, prospective trend analysis of the test parameter has greater power to detect dysfunction than isolated values alone.
(A)

4.4.2 Persistent abnormalities in any of the monitoring or surveillance parameters should prompt referral for access imaging.
(A)

(Note: The 2006 K/DOQI Update includes Vasc-Alert (derived static pressure) as a preferred/acceptable surveillance method.)

It is important to think in terms of data driven processes, trend analysis, and measuring outcomes. A trend analysis provides the clinician a snapshot of change over time for a specific patient. Choosing a pressure method such as Vasc-Alert provides analysis of data from each treatment and a weekly report showing the numerical and graphical trending for the current week along with a 6 month graphical trend analysis. In one month's time each Vasc-Alert (pressure) patient could have up to 12 or 13 data points in their trending line. If that same patient was trended using the current monthly standard for flow surveillance, they would have just ONE data point, and it would take up to 3 months or more before you would have a visible trend line. With monthly trending it is often too late to prevent a clotting incident from occurring. In addition, instead of being proactive in patient access care, which is a goal of providing surveillance, your staff has to be reactive to emergent situations, which may lead to the patient being hospitalized and missed treatments.

Although the timeline for development of a thrombosis varies and is not fully understood, it is believed that once a stenosis reaches the level of being hemodynamically significant they can often progress quite rapidly into a thrombosis. Dr. William Paulson has provided us two studies showing the effects of the artery to vein diameter on the ability of VP and blood flow measurements to detect stenosis. In his study utilizing flow he found:

These results predict that if flow measurements are performed only monthly, critical stenosis can be reached and thrombosis may occur before the next flow measurement is taken. This helps to explain why monthly flow measurements often fail to warn of thrombosis. We concluded that during flow surveillance, measurements might need to be done "at least weekly" in order to detect stenosis before thrombosis occurs.

In his 2nd study utilizing Venous Pressure he found:

The conclusion was similar to the previous study in that a relatively narrow artery has a large impact on VP surveillance. Their model predicts that a relatively narrow artery obscures progressive stenosis until critical stenosis is reached. VP then rapidly increases and thrombosis occurs. It follows that VP shares the same challenge as flow when patients have relatively narrow arteries. However, this phenomenon is mitigated because it is relatively easy to obtain pressure readings with every treatment, thus increasing the ability to identify the increase in VP before thrombosis.

Dr. Paulson stated: “The major implication of these two studies is that the current standard of monthly or even twice monthly surveillance measurements is inadequate. Rather, very frequent measurements are necessary in order to avoid any delay in detecting rapid increases in VP or decreases in flow.”

K/DOQI Clinical Practice Recommendations for Guideline #4 addresses the issue that frequency is dependent on method used which supports what Dr. Paulson’s findings regarding flow have shown.

K/DOQI Clinical Practice Recommendations for Guideline 4:

4.2 Frequency of measurement is dependent on the method used:

4.2.1 It is not clear that access flow measurements performed at a monthly frequency provide sufficient data stability to make decisions. Until additional studies are performed to determine the optimal frequency, more frequent measurements are recommended.

All too often the impact of how the testing frequency will affect labor and material costs is not calculated or we see a tendency to compare *apples to oranges*. Besides understanding how testing frequency affects trend analysis the clinical management needs to also consider how testing frequency will impact labor and material costs. What will be required of staff? This is an area often overlooked in the decision process. If staff must perform a test on the patient then you must consider the following as part of your decision process and final costs comparisons:

- What staff members can perform the test on a patient?
- Is special training needed?
- How much time per patient does this test take to complete?
- What happens to the data once it is collected?
- What will be our testing frequency? Labor costs to perform the testing plus supply costs X frequency per month is an important calculation that you need to consider. If one were to provide bi-weekly or weekly surveillance as suggested by K/DOQI and supported in Dr Paulson’s articles what would your costs be?

Vasc-Alert analyzes data for each dialysis treatment and produces a weekly report for each qualified patient. Existing data is analyzed, so your staff does not need to perform a test on the patient. There is minimal labor costs depending upon the EMR that is or is not in place. If using an EMR that allows the data transfer to be automated, the only labor costs are the approximate 10 minutes per week that is necessary to download the patient reports. In comparison if one were to use a flow method such as indicator dilution (Twister lines, Transonic) it can take up to 20 minutes per patient to perform each test, additional time to document the results and then more time to track the trends. Add to that the cost of equipment, which includes disposables and/or machinery, as well as the supply inventory to be kept. Vasc-Alert does not require any purchase of equipment or disposables. Vasc-Alert is based on an annual subscription fee per patient - no cost variances from month to month, no wasted supplies, no inventory to keep!

A few final thoughts regarding choosing your surveillance method:

K/DOQI recommends and support that the components of a good access program include:

- ✓ can be routinely produced
- ✓ provides individual patient trending
- ✓ has a frequency of greater than monthly
- ✓ utilizes minimal staff hours
- ✓ can produce measurable outcomes

The Vasc-Alert Program offers your clinic not only the K/DOQI components of a good vascular access program, but may provide your clinic compliance, related to vascular access monitoring/outcomes as stated in the new CMS Conditions of Coverage released 04/15/08. You will find that Vasc-Alert is a simple, cost-effective tool which answers a complex situation of identifying vascular access dysfunction. Our web-based program can provide your clinicians with more time to focus on patient outcomes, and less time on collecting, tracking, and interpreting the data necessary to produce positive outcomes. Vasc-Alert is simply different!!!

References:

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Influence of Luminal Diameters on Flow Surveillance of Hemodialysis Grafts: Insights from a Mathematical Model John J. White,* Sunanda J. Ram,† Steven A. Jones,‡ Steve J. Schwab,* and William D. Paulson*- **CJASN ePress. Published on July 26, 2006 as doi: 0.2215/CJN.00580206**

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Mathematical Model Demonstrates Influence of Luminal Diameters on Venous Pressure Surveillance John J. White,* Steven A. Jones,† Sunanda J. Ram,‡ Steve J. Schwab,§ and William D. Paulson*- **CJASN ePress. Published on June 6, 2007 as doi: 10.2215/CJN.01070307**

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