BC Renal Agency

An agency of the Provincial Health Services Authority

10 YEARS 1997–2007

Best Practices in Hemodialysis Care:

Vascular Access Clinics

SEPTEMBER 26, 2007

TABLE OF CONTENTS

BC Renal Agency
An agency of the Provincial Health Services Authority
10 YEARS 1997–2007

EXECUTIVE SUMMARY

Vascular access is a significant problem for patients with end stage renal disease and contributes significantly to morbidity and mortality.

Of the three types of vascular accesses available for hemodialysis (HD), the arterial-venous fistula (AVF) has proven to be the best method with the fewest complications. This is supported by clinical practice guidelines published by the Canadian Society of Nephrology, the National Kidney Foundation (United States), and BC's Provincial Vascular Access Services Team (PVAST). Studies have shown that the number of "access events" is three to seven times lower for patients with AVFs than AVGs (arterial-venous grafts). A single-centre Canadian study (Calgary) concluded the cost of VA-related care was at least five times lower for patients with AVFs in comparison to those with AVGs or catheters.

Reported AVF rates for prevalence patients are 90% in Italy, 84% in Germany, 82% in Spain, 77% in France, and 67% in the UK. Rates in the United States are 31% [1] and a three-year National Vascular Access Improvement Initiative ("Fistula First") is currently underway to address this issue. Rates in Canada (including BC) are higher than in the US, but significantly lower than in many of the European countries, suggesting opportunities for improvement are possible.

The literature cites several system problems that contribute to low rates of AVF use. The literature also cites several recommendations for reducing these system problems. Underlying these recommendations is the need for an integrated, multidisciplinary VA program/service.

Components of an integrated, multidisciplinary VA program/service include:

- VA clinic(s) (subject of this paper)
- VA nurse(s). The FTE requirement for a VA nurse will depend upon the number and complexity of patients in the program, the number of other VA-related support positions, and the geographic spread of activities within the program.
- Renal medical director.
- Nephrologist(s) designated by the renal medical director as having a lead role to move VA-related practices forward.
- Regular VA rounds to review patients with complex access issues and to develop "access" care plans.

- Forum/committee to regularly review system-related VA issues and make improvements (nephrologist, radiologist, surgeon, VA nurse, and possibly the OR manager).
- "Protected" OR and radiology time for VA.
- Formalized mechanisms to work with CKD clinics to proactively identify patients and initiate education early.
- Database which enables comparisons between centres/Health Authorities (HAs) and longitudinally for each centre.

VA clinics provide a central location for multidisciplinary VA teams to practice and develop expertise, to receive and prioritize referrals for new VA creations and/or follow-up of problem accesses, to implement policies, protocols, and patient education programs promoting the use of AVFs, and to collect and analyze VA outcome-related data (especially that on non-AVF access placements and AVF and AVG failures). Access to an interventional radiologist for discussion of complex cases and participation in protocol development is an important component of the clinic.

In BC, VA clinics currently exist at St Paul's Hospital, Vancouver General Hospital, and Prince George Hospital. They do not support any of the other nine in-centre hemodialysis (HD) centres in BC. The Provincial Vascular Access Team (PVAST) recommends that VA clinics be established to support all HD centres (i.e. one VA clinic for each centre or one clinic supporting multiple centres).

This paper uses information from the literature and from current BC experience with VA clinics to estimate the volumes and resource requirements for establishing a VA clinic for a sample HD centre serving 200 HD patients with an AVF/AVG prevalence rate of 70%. *See Table 1, page 3.*

Also included in the paper are detailed criteria for referrals to a VA clinic, goals and expected outcomes of care, and an algorithm of patient flow.

Forms and patient teaching pamphlets to support the operation of a VA clinic are available under a separate cover.

Table 1: Estimated Volumes and Resources to Serve 200 HD Patients (AVF/AVG Prevalence Rate: 70%)

RESOURCE	ESTIMATE
VA clinic visit volumes	260 – 400 visits per year
VA clinic hours	2.5 – 3.5 hours per week (46 weeks per year)
VA clinic staffing	• VA nurse: 6 hours per week • Vascular surgeon: 4 hours each per week • Nephrologist specializing in VA: 4 hours per week • VA clinic clerk: 15 hours per week
Space	1 appropriately equipped consultation room (e.g., in the renal outpatient clinic)
Equipment	• Access to hospital computer (x-rays, charts, PROMIS) • Portable ultrasound machine, preferably with Doppler capability • Doppler • Stethoscope and portable blood pressure machine • Tourniquet (penrose drain tubing 1 inch in diameter)
Supplies	• Patient charts • Dressing supplies
Access to radiology	• 240 – 410 tests/procedures per year (5 – 9 procedures per week) • Includes tests/procedures arising from VA clinic plus broader VA program/service
Access to operating room time	• 55 – 110 procedures per year (1 – 3 procedures per week) and 80 – 165 hours of OR time (2 – 4 hours per week) • Includes procedures arising from VA clinic plus broader VA program/service
Access to inpatient/surgical day care beds	Not quantified but noted as a required resource

1.0 PURPOSE OF PAPER

The purpose of this paper is to define vascular access (VA) clinics, describe their rationale, and outline best practices in the operation of VA clinics.

2.0 WHAT IS A VASCULAR ACCESS CLINIC?

A VA clinic offers a central location for a team specializing in VA creation and follow-up of VA problems to assess patients and plan access-related care. The team coordinates VA-related care centrally and consults with interventional radiologists and other professionals/diagnostic services as required.

At a minimum, the clinic team consists of a surgeon and VA nurse. In larger centres, a nephrologist with a special interest in VA is also recommended to augment the clinic team and facilitate follow-up with attending nephrologists. Access to an interventional radiologist for discussion of complex cases and participation in protocol development is an important component.

While initial assessments for new creations and problem accesses are best conducted in a clinic session with the full interdisciplinary team present, follow-up assessments of new creations and/or post interventions for problem accesses may be appropriately seen during VA "nurse only" clinic sessions.

3.0 CRITERIA FOR REFERRALS TO VASCULAR ACCESS CLINICS

Recommended criteria for VA clinic referrals include:

1. Patients without an access who are anticipated to require HD within the next 4 – 12 months (GFR <25 ml/min and change in GFR >5 ml/min/year). Includes patients with failing transplant grafts and patients on peritoneal dialysis with plans to convert to HD.
2. Patients who require replacement or revision of an existing access.[2] Patients may be established HD patients, or pre-HD patients with post-creation complications or poorly maturing accesses.
3. Patients with active but non-urgent[3] AVF or AVG problems who have been reviewed by a nephrologist and/or VA coordinator but still require a detailed assessment of signs and symptoms such as:
   - Absolute access flows of < 500 ml/min in AVFs or < 650ml/min in AVGs
   - Decrease in access flow of > 20% from baseline

- Inability to achieve a blood pump speed on dialysis of ≥ 300 ml/min by week three of initiating HD or >350 ml/min for established HD (in two consecutive runs) due to high machine venous pressures or low arterial pressures during HD
- Difficulty with cannulation and/or excessive bleeding post HD otherwise unexplained
- Pathogenic changes in the access site (e.g., infection, pseudo-aneurysm or aneurysm)
- Arm or facial swelling

4. Patients with unutilized AVFs or AVGs which are planned for activation within 4 – 6 weeks.
5. Patients with AVFs or AVGs which have not been utilized in the past year and with no definitive timeline to activate.

4.0 RATIONALE FOR VASCULAR ACCESS CLINIC

4.1 Literature Review

Vascular access is a major problem for patients with end stage renal disease and contributes significantly to morbidity and mortality. VA problems contribute to reduced quality of life and increased frequency of hospitalization for patients during VA creation and repair, and for management of related complications.

Of the three types of vascular accesses available for hemodialysis (HD), the arterial-venous fistula (AVF) is the best method with the least complications. This is supported by clinical practice guidelines published by the Canadian Society of Nephrology,[4] the National Kidney Foundation,[5] and BC's Provincial Vascular Access Services Team (PVAST).[6] Compared to catheters and arterial venous grafts (AVGs), AVFs show significantly lower rates of complication (such as infection and clotting), longer periods of patency, fewer hospitalizations, reduced patient morbidity, and significantly lower costs.[7, 8, 9] Studies have shown that the number of "access events" is three to seven times lower for patients with AVFs than AVGs, contributing to a lower cost of care.[10] A study using Medicare billings to estimate costs of care reported that first- and second-year costs were lower for HD patients with AVFs ($68,002 US in year one and $46,689 US in year two) when compared to patients with AVGs ($75,611 US in year one and $54,555 US in year two) or catheters ($86,927 US in year one and $57,178 US in year two).[11] Similarly, a single-centre Canadian study (Calgary) concluded the cost of VA-related care was at least five times lower for patients with AVFs in comparison to those with AVGs or catheters.

Reported AVF rates for prevalence patients are 90% in Italy, 84% in Germany, 82% in Spain, 77% in France, and 67% in the UK.[12] Rates in the United States are 31%[13] and a three-year National Vascular Access Improvement Initiative ("Fistula First") is currently underway to address this issue. Rates in Canada (including BC) are higher than in the US, but significantly lower than in many of the European countries, suggesting opportunities for improvement are possible.

The literature cites several *system problems* that contribute to low rates of AVF use, including late referrals of pre-dialysis patients, lack of awareness about the medical criteria for AVF, poor communication between care providers about expectations regarding VA, lack of training for surgeons in successful AVF placement, and patient education about the benefits of AVFs leading them to choose catheters because of the less invasive surgical procedures required and to avoid needle "sticks."[14]

The literature cites several *recommendations* to reduce system problems, including early referrals of pre-dialysis patients, referral of VA procedures to surgeons with a demonstrated interest, skill, and level of experience, routine pre-operative venous and arterial mapping, education of patients regarding the advantages of AVFs and procedures to protect the vasculature of the arm, monitoring to ensure that AVFs are functioning properly and to detect problems (infection, stenosis) early, timely intervention to correct problems, and prospective tracking of outcomes with continuous improvement. Underpinning these recommendations is the need for an integrated, multidisciplinary VA program/service. Several examples exist in the literature demonstrating outcome improvements through such integrated, multidisciplinary VA programs/services – for example, higher proportions of AVFs, reductions in the frequency of access thrombosis, fewer complications of surgical access procedures, improved success of AVG thrombolytic procedures, more outpatient and fewer inpatient procedures, and lower costs.[15, 16, 17]

Components of an integrated, multidisciplinary VA program/service include:

- VA clinic(s) (subject of this paper)
- VA nurse(s). The FTE requirement for a VA nurse will depend upon the number and complexity of patients in the program, the number of other VA-related support positions, and the geographic spread of activities within the program.
- Renal medical director.
- Nephrologist(s) designated by the renal medical director as having a lead role to move VA-related practices forward.
- Regular VA rounds to review patients with complex access issues and to develop "access" care plans.
- Forum/committee to regularly review system-related VA issues and make improvements (nephrologist, radiologist, surgeon, VA nurse, and possibly the OR manager).
- "Protected" OR and radiology time for VA.
- Formalized mechanisms to work with CKD clinics to proactively identify patients and initiate education early.
- Database to enable comparisons between centres/HAs and longitudinally for each centre.

VA clinics provide a central location for a multidisciplinary VA team to practice and develop expertise, to receive and prioritize referrals for new creations and/or follow-up of problem accesses, to establish policies, protocols, and patient education programs that promote the use of AVFs, and to collect and analyze VA outcome-related data (especially that on non-AVF access placements and AVF and AVG failures). VA clinics centralize the coordination of VA

This paper addresses one of these components, specifically the establishment of a VA clinic. Such clinics support the practice of an integrated, multidisciplinary team, provide a forum for improved coordination and communication, and enable the implementation of many of the recommendations cited in the literature that reduce system problems.

care from multiple providers working on multiple sites to a single team of specialized care providers working at a single site (or at a limited number of sites).

In the United States, the concept of VA clinics has been taken one step further with the establishment of dedicated VA centres. VA centres incorporate the concept of VA clinics but also offer VA-related diagnostic imaging and interventional procedures (radiological and/or surgical). Centres may be free-standing or based in a hospital, but free-standing ones are noted as more common and more cost-effective. The first free-standing centre opened in 1997 in Baltimore, Maryland and several have opened since then. VA centres are led by interventional nephrologists, interventional radiologists or vascular surgeons in collaboration with a nephrology group. Data suggests that VA centres are associated with a higher incidence and prevalence AVF rates and lower VA-related hospitalizations and missed outpatient dialysis treatments.[18, 19]

4.2 Cross Canada Survey

Details on the programs surveyed and related clinics are avaialable under separate cover.

A cross-Canada telephone survey suggests that several HD centres operate multi-disciplinary VA clinics, three of which are in BC hospitals (St. Paul's, Vancouver General, and Prince George Regional). Examples at hospitals outside BC include Toronto General, London Health Sciences Centre, University Hospital (Edmonton), Grey Nuns (Edmonton), Royal Alex (Edmonton), and Red Deer.

5.0 GOALS OF VASCULAR ACCESS CLINIC CARE

5.1 Overall Goal

The goal of a VA clinic is to facilitate the timely creation, successful ongoing use, and increased longevity of native AVFs (first choice) and AVGs (second choice) for hemodialysis.

Successful ongoing use is defined as:

- Absolute access flows of >500 ml/min in AVFs and >650 ml/min in AVGs; AND
- Blood pump speeds of >300 ml/min by week three of initiating HD or >350 ml/min for established HD (in two consecutive runs); AND
- Readily cannulated by the majority of HD nurses.

5.2 Specific Goals and Outcomes

VA clinics provide care to renal patients in five areas:

1. Pre-operative VA patient assessment and referrals
2. Post-operative VA patient assessment and referrals
3. Follow-up of VA problems
4. VA patient readiness assessment
5. Patient education re care of their access

Details on specific VA clinic goals and outcomes are identified in Table 2

Table 2: Vascular Access Clinic Goals and Outcomes

TOPIC	CLINIC GOALS	CLINIC OUTCOMES
1 **Pre-operative VA Creation** Assessment and Referral Target timing of referrals to VA clinic: GFR <25 ml/min and change in GFR if >5 ml/min/year (4 – 12 months prior to HD start)	Provide pre-operative VA assessment and referral services for patients requiring HD. Assessment: • Assess suitability of superficial veins for AVFs/AVGs Referrals: • Coordinate pre-operative imaging, such as venous and/or arterial Doppler assessments and/or referrals for venography and angiography • Provide surgical consults for access creation	1 AVFs/AVGs are created and successfully used for 50% of new patients (incidence rate) and 80% of total (prevalence rate) patients.
2 Post-operative VA Creation Assessment and Referral	Provide post-operative assessment and referral services for patients with newly established accesses. Assessment: • Conduct 2 and 6 week post creation assessments[20] • Conduct 4 – 6 week assessment prior to start of HD Referrals: • If absent thrill or bruit at 2 weeks post-op: refer to surgeon • If access not appropriately maturing at 6 weeks: initiate radiological investigations and interventions • If access not adequate for cannulation 4 – 6 weeks prior to start of HD: initiate radiological investigations and interventions	2 AVF and AVG creations are completed within the timelines specified on the BCPRA Urgency of Surgical Waitlist document. 3 AVF and AVG post-creation follow-up is completed as per the timelines on the BCPRA Provincial Recommendations for VA.
3 Post-operative VA Creation	Provide assessment and coordination of follow-up services for problem accesses. Assessment of problems (see referral criteria for specific indications): Coordination of follow-up services for problem accesses: • Angiography (first choice unless otherwise directed by the radiologist or vascular surgeon) • Within two days or prior to next HD run for: (a) absolute access flow <300 ml/min; or (b) decrease in access flow of >50%; or (c) clinical indication (severe bleeding or unable to properly dialyze) • Within 1 – 2 weeks for most other cases • Urgent surgical revision of stenosed fistula/graft	4 Follow-up of problem accesses is completed as per the timelines on the BCPRA Urgency Criteria for Radiology and Urgency of Surgical Waitlist documents.
4, 5 Patient Access Readiness Assessment and Patient Education	In collaboration with CKD Clinics, provide VA-related patient education.[21] Patient education: • Pre-operative: VA options (and pros and cons) • Post-operative: • Care for, monitoring, and follow-up of access problems • VA investigation and interventions (radiological and surgical) • Pre- and post-operative: • Vein preservation and related strategies • Reporting complications of their access	5 Patients that attend VA clinics will understand basic pre and post-operative concepts, the importance of vein preservation, and their role in caring for their access.

6.0 ANTICIPATED VOLUMES

The literature offers limited help for estimating patient volumes. The best estimate is derived from the experience of existing BC clinics.

Based on the experience at St Paul's (SPH), Vancouver General (VGH), and Prince George Regional (PGRH) hospitals, the best estimate of VA clinic visit numbers is between 1.9 and 2.9 visits per AVF/AVG patient per year,[22] with average visit times of 20 minutes.[23] Estimates vary depending upon several variables, including patient populations, proportion of AVFs, AVGs, and catheters, patterns of practice, and geography. Details are shown on *Table 3*.

Table 3: Clinic Volumes at Existing BC Vascular Clinics

VA CLINICS	SPH	VGH	PGRH
Clinics per wk	1 multidisciplinary 1 nurse only (f/u)	1 multidisciplinary	1 multidisciplinary (q2wks)
Clinic hrs per wk	6 – 7 hrs/wk (total for 2 clinics per week)	2 hrs/wk (1 clinic per week)	1 – 1.5 hrs/wk (1 clinic q2wks, 2 – 3 hrs/clinic)
Pt visits per wk	16 – 18 pts/wk	8 – 12 pts/wk	6 pts/clinic (3 pts/wk)
Pt visits per yr (assumes clinics 46 wks per yr)	782 v/yr	460 v/yr	138 v/yr
HD pts	272 in-centre + 93 community/home HD = 365	180 in-centre + 100 community/home HD = 280	95 in-centre/ community/home HD = 95
Est pts with AVFs/AVGs	73% x 365 = 265	85% x 280 = 238	52% x 95= 50
Visits per AVF/AVG pt/yr	2.9 v/pt/yr	1.9 v/pt/yr	2.8 v/pt/yr
Avg time per visit	23 min/v	12 min/v	25 min/v

NOTE: Data obtained directly from SPH, VGH, and PGRH.

Using the estimates provided, an HD centre serving 200 HD patients with an AVF/AVG prevalence rate of 70% can expect between 260 and 400 visits per year and require 2.5 – 3.5 hours of VA clinic time per week (assuming the clinic operates 46 weeks per year).

Ideally, clinic assessments should be performed in VA clinics located on a site with an in-centre unit and full radiology and vascular surgery services. HAs with more than one in-centre site may require more than one VA clinic, particularly HAs that cover large geographic distances. Other considerations to reduce the travel requirements for patients include:

- Developing "first-line" access assessment expertise within community dialysis units (e.g. VA specialty nurse).
- Using telehealth for "first-line" access assessments.
- Implementing a travelling VA team to provide consultation and clinics around the province.

7.0 RESOURCES REQUIRED

The estimates provided below assume operation of a VA clinic 2.5 – 3.0 hours per week and 46 weeks per year. This size of clinic is based on supporting an HD centre serving 200 HD patients with an AVG/AVG prevalence rate of 70% (260 – 400 VA clinic visits per year). Resources can be prorated for larger or smaller clinics. The identified resources pertain to the VA clinic component, not to the broader requirements of a VA program/service.

7.1 Clinic Staffing (Numbers and Types)

- Vascular surgeon: 4 hours per week
- Nephrologist specializing in VA (if available): 4 hours per week
- Vascular access nurse: 6 hours per week
- Vascular access clinic clerk: 15 hours per week

Note: Estimates of time include clinic preparation and post-clinic follow-up time.

7.2 Space, Equipment, and Supplies

Space

- An appropriately equipped consultation room (e.g. in the renal outpatient clinic

Equipment

- Access to hospital computer (x-rays, charts, PROMIS)
- Portable ultrasound machine, preferably with Doppler capability
- Doppler
- Stethoscope and portable blood pressure machine
- Tourniquet (penrose drain tubing 1 inch in diameter)

Supplies

- Patient charts
- Dressing supplies

7.3 Access to Radiology

While access to timely radiological tests and interventions is required to support a VA clinic, such resources are also required to support the overall VA service. Required radiological services include:

AVF/AVG-Related Procedures

- VA mapping (Doppler ultrasound)
- Diagnostic venography
- Doppler ultrasound
- Diagnostic fistulogram
- Arteriogram for steal phenomenon
- Angioplasty
- Thrombolysis

Catheter-Related Procedures

- New permcath insertion
- Convert temporary line to permcath
- Linogram
- Venogram through dialysis catheter
- Stripping procedure
- Permcath change
- Thrombolysis

The number of radiology tests/procedures to support a VA clinic versus those supporting the overall VA program/service cannot be separated. The total number of radiological tests/procedures to support both functions, however, can be estimated by extrapolating the results of two reviews noted in the literature. It is important to note that estimates for individual VA programs can vary depending on several variables, including patient populations, proportion of AVFs, AVGs, and catheters, availability of radiological services, and geography.

The first study estimated the use of an average of 2.06 interventional procedures per patient per year (1.63 procedures per patient if the venograms only category is excluded; 427 procedures in 207 patients),[24] while the second estimated an average of 1.2 procedures per patient per year.[25] The first study identified 46% of procedures as "maturation procedures" (occurring within the first six months after initial AVF surgery) and 54% as "maintenance procedures" (occurring more than six months after AVF surgery). Four percent of procedures in the first study involved a surgical referral and 96% were radiologic (venograms, angioplasties, thrombectomies, and vein ligation).

The figures above are consistent with the Fraser Health experience where 805 radiology procedures were performed in 2005/06 on a base of 550 dialysis patients (i.e. an average of 1.5 procedures per patient per year). Of these procedures, 55% were fistulograms, fistuloplasties, or for thrombolysis and 45% were permcath insertions or linograms.

Using the estimates provided, an HD centre serving 200 HD patients could be expected to perform between 240 and 410 radiological tests/procedures per year. 26 While intuitively VA clinics should not increase or decrease the number of radiological tests/interventions performed, experience suggests that the improved coordination and responsiveness provided by VA clinics may increase the number of radiological tests/interventions in the short-term while reducing the number in the long-term. Experience also suggests that proactive monitoring and intervention may also increase the number of radiological procedures but will reduce the need for surgical procedures.

7.4 Access to Operating Rooms

Access to timely surgical resources is required to support a VA clinic and related VA programs/services, including surgical procedures for VA creation and follow-up of problem accesses. Similar to the numbers of radiology tests/procedures, the numbers of surgical procedures to support a VA clinic versus supporting the overall VA service cannot be separated. Total numbers of surgical procedures to support both functions, however, can be estimated by extrapolating information in the literature and from the experience of BC's three sites.

Regarding the estimated amount of OR time required for VA-related surgery, one study at Vancouver General Hospital (VGH) was noted in the literature. 27 This study reviewed data from 1989 to 1993 and estimated the average number of VA-related surgical procedures per patient as follows:

- AVFs: one procedure or 1.5 hours of OR time per year (n=89 patients)
- AVFs: two procedures or 3 hours of OR time per year (n=77 patients)

More recent data from VGH, St Paul's, and Royal Jubilee hospitals suggest this figure has since declined (most likely because more procedures are now done in radiology) and current averages fall between 0.6 and 0.8 procedures per AVF/AVG and approximately 1.1 – 1.5 hours of OR time per year per AVF/AVG. *See Table 4.*

Table 4: OR procedures and Hours per AFV/AVG

	SPH	VGH	RJH	FH
Vascular Access OR procedures	284	210	N/A	180
AVF/AVG OR procedures	206	153 (see note)	184	152
Avg. OR hours/ procedure	1.9	1.8	N/A	N/A
AVF/AVG OR procedures/AVF or AVG/patient/year	.8	.6	.7	.4
OR hours/AVF or AVG/patient/year	1.5	1.1	N/A	N/A
% emergent cases (SPH) or% unsched (VGH)	43%	33%	N/A	N/A

Notes on Table 4:

1. For SPH and VGH, or cases and hours are based on 2003/ 04 data from the respective or systems. For RJH, cases are based on 2005 data and for Fraser Health, cases are based on 2005/ 06 data, both extracted from local VA databases.

2. Data on numbers of patients and estimated AVFs/AVGs obtained directly from SPH, VGH, RJH, and from FH.

Using the estimates provided, a HD centre serving 200 HD patients with a prevalence rate of 70% AVFs/AVGs (140 AVFs/AVGs, could be expected to perform about 55 – 110 surgical procedures per year (one – three procedures per week) and utilize 80 – 165 hours of OR time (two – four hours per week).

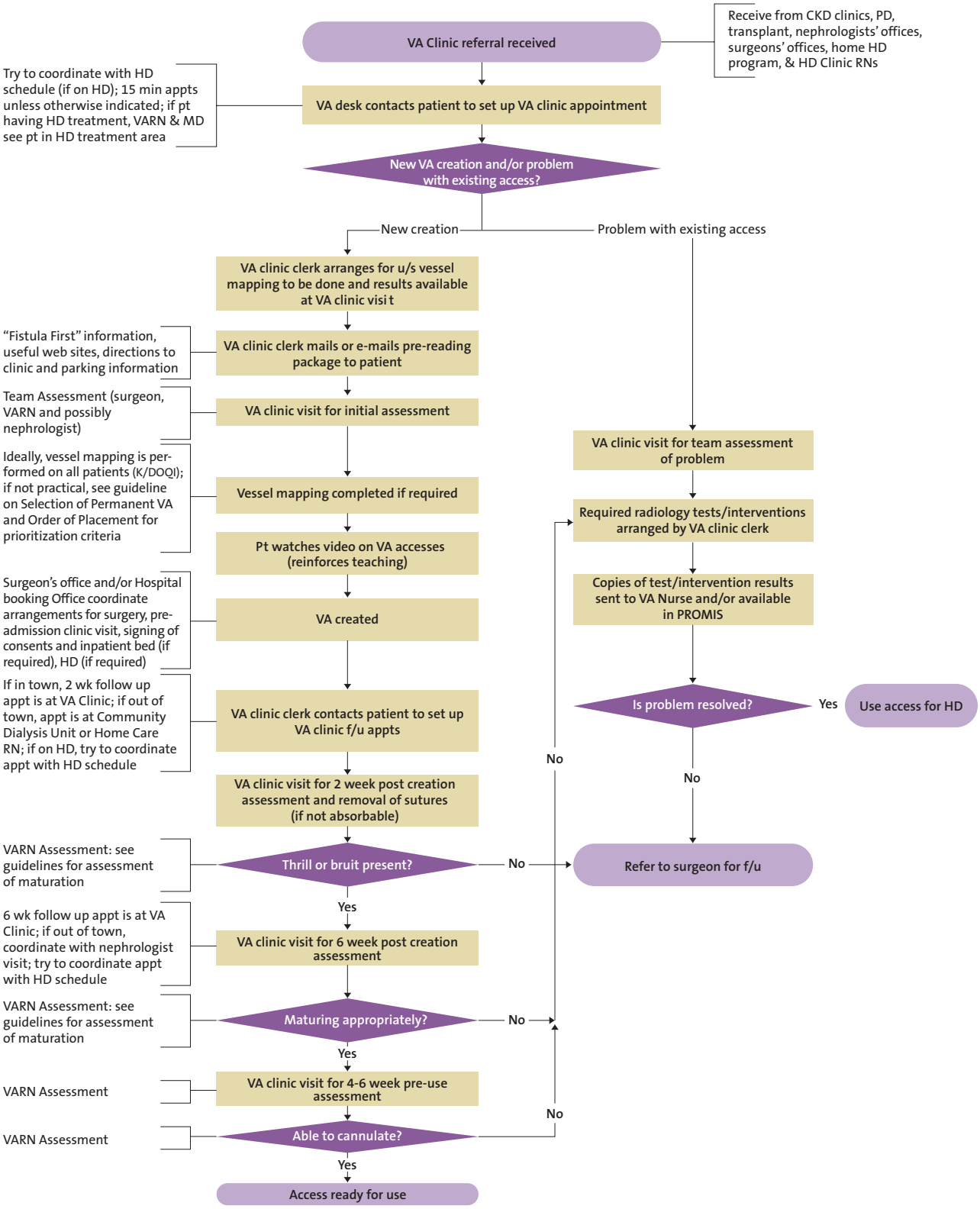
7.5 Access to Inpatient/Surgical Day Care Beds

While the majority of radiological and surgical VA-related tests/procedures can be done as surgical day care/outpatient procedures, a VA service requires access to inpatient beds for patients with a high potential for complications.

Regarding the estimated inpatient time required for access-related problems, only one study was noted in the literature (conducted at Vancouver General Hospital) with estimates based on data from 1989 to 1993. 28 As practice patterns have changed significantly since this time, these figures are likely no longer valid. Further, there are significant differences in practice across HAs as to whether patients having AVF/AVG creations/revisions are admitted or not (in some HAs, the majority of patients having AVF/AVG creations/revisions are admitted and discharged through surgical day care, while in others the majority are admitted for a 24-hour stay). There is no research on differences in outcomes or patient satisfaction with the two different care options.

While access to surgical day care and inpatient beds is necessary for VA-related procedures, specific requirements for numbers of beds could not be estimated.

Table 5: Vascular Accewss Clinic Flow Chart



9.0 REFERENCES

Allon, Michael et al. "A Multidisciplinary Approach to HD Access: Prospective Evaluation," International Society of Nephrology, *Kidney International,* vol 53, 1998, p.p., 473 – 479.

Allon, Robbin. "Increasing AVGs in HD Patients: Problems & Solutions," *Kidney International,* October, 2002, p.p., 1109-24.

Arnold, P et al. "VA Centres: An Innovative Approach for VA Care," Chapter 40, p.p., 333 – 340 in Gray, Richard and Sands, Jeffrey, editors, *Dialysis Access: A Multidisciplinary Approach,* 2002.

Beasley, Carol et al. "National Vascular Access Improvement Initiative," Institute for Healthcare Improvement, May 2003.

Canadian Society of Nephrology Guidelines. Chapter 3: "Vascular Access," *J Am Soc Nephrol* 17: S1–S27, 2006.

Eggers, P, Milam, R. "Trends in VA Procedures & Expenditures in Medicare's ESRD Program," Henry, ML, ed., VA for HD – VII, Chicago, WL Gore & Associates, 2001, p.p., 133 – 143.

"End Stage Renal Disease Clinical Performance Measures Project." *2001 & 2002 Annual Reports,* Department of Health and Human Services, Centers for Medicare & Medicaid Services, Baltimore, Maryland, December 2001.

Greenwood R, et al. "Vascular Access Use in Europe and the United States: Results from the DOPPS," *Kidney International,* 2002, vol 61, p.p., 305-316.

Jackson, Jerry & Litchfield, Terry. How a Dedicated VA Center Can Promote Increased Use of Fistulas, *Nephrology Nursing Journal,* March/April 2006, vol, 33, no 2, p.p., 189 – 196.

Manas, Derek. "The Access Clinic, Chapter 4" (name and date of text unknown), p.p., 67 – 86.

Mishler, R et al. "Dedicated Outpatient VA Centre Decreases Hospitalization and Missed Outpatient Treatments," *Kidney International,* 2006, vol, 69, p.p., 393 – 398.

National Kidney Foundation. "KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access. Guidelines 1 – 8," *Am J Kidney Dis* 48:S1-S322, 2006 (suppl 1).

Nguyen, Vo, Griffith, Chris, & Treat, Lynn. "A Multidisciplinary Team Approach to Increasing AVF Creation: A Community-based Nephrology Practice Experience," *Nephrology News & Issues,* June 2003, p.p., 54 – 57.

Reddan D, et. al. "National ESRD CPM Work Group: National Profile of Practice Patterns for Hemodialysis Vascular Access in the United States," *American Society of Nephrology,* Aug 2002, vol 13, no 8, p.p., 2117-24.

Pisoni, R et al. "VA Use in Europe and the US: Results from the DOPPS," *Kidney International* 2002, vol 61, no 1, p.p., 305 – 316.

Turnbull, Robert et al. "Primary VA for Chronic HD: A Comparison of AVG with PTFE Grafts," *Vascular Surgery,* vol 33, no 1, Jan/Feb 1999, p.p., 51 – 57 (study completed at Vancouver General Hospital).

US Department of Health and Human Services. "Healthy People 2010: Understanding and Improving Health." 2nd ed. Chapter 4: Chronic Kidney Disease Washington, DC: US Government Printing Office, November 2000.

Vassalotti, JA, Falk, A, Teodorescu, V, and Uribarri, J. "The Multidisciplinary Approach to HD VA at the Mount Sinai Hospital," *Mt Sinai Journal of Medicine,* Mar 2004; 71 (2): 94 – 102.

10.0 FOOTNOTES

1 End Stage Renal Disease Clinical Performance Measures Project. *2002 Annual Report,* Department of Health and Human Services, Centers for Medicare & Medicaid Services, Baltimore, Maryland, December 2002.

2 Timeline for referral of these patients to the VA clinic will depend upon the type of access (AVF or AVG) and OR waiting time at individual sites. The target timelines for establishment of an access is 3 – 4 months prior to intended use for AVFs and 3 – 6 weeks for AVGs.

3 *BCPRA Provincial Guidelines for VA for Patients with HD as Primary Modality* (2005) recommend that patients that have access flows of <300 ml/min and/or have experienced a decrease in access flow of >50% need to be seen within 2 days. Given the scheduling of VA clinics, patients in this grouping would be best routed directly to radiology and/or the surgeon and the VA nurse notified of the issue and follow-up.

4 Canadian Society of Nephrology Guidelines. "Chapter 3: Vascular Access," *J Am Soc Nephrol* 17: S1–S27, 2006.

5 National Kidney Foundation. "KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access. Guidelines 1 – 8," *Am J Kidney Dis* 48:S1-S322, 2006 (suppl 1).

6 *BCPRA Provincial Guidelines for VA for Patients with HD as Primary Modality* (2005).

7 US Department of Health and Human Services. *Healthy People 2010: Understanding and Improving Health*. 2nd ed. Chapter 4: "Chronic Kidney Disease Washington, DC:" US Government Printing Office, November 2000.

8 "End Stage Renal Disease Clinical Performance Measures Project." *2001 Annual Report*, Department of Health and Human Services, Centers for Medicare & Medicaid Services, Baltimore, Maryland, December 2001.

9 Reddan D, et. al. National ESRD CPM Work Group: "National Profile of Practice Patterns for Hemodialysis Vascular Access in the United States," *American Society of Nephrology,* Aug 2002, vol 13, no 8, p.p., 2117–24.

10 Pisoni, R et al, VA Use in Europe and the US: Results from the DOPPS, *Kidney International* 2002, vol 61, no 1, p.p., 305 – 316.

11 Eggers, P, Milam, R. "Trends in VA Procedures & Expenditures in Medicare's ESRD Program," Henry, ML, ed., VA for HD – VII, Chicago, WL Gore & Associates, 2001, p.p., 133 – 143.

12 Greenwood R, et al, "Vascular Access Use in Europe and the United States: Results from the DOPPS." *Kidney International*, 2002, vol 61, p.p., 305-316.

13 "End Stage Renal Disease Clinical Performance Measures Project." *2002 Annual Report,* Department of Health and Human Services, Centers for Medicare & Medicaid Services, Baltimore, Maryland, December 2002.

14 Beasley, Carol et al, *National Vascular Access Improvement Initiative,* Institute for Healthcare Improvement, May 2003.

15 Nguyen, Vo, Griffith, Chris, & Treat, Lynn. "A Multidisciplinary Team Approach to Increasing AVF Creation: A Community-based Nephrology Practice Experience," *Nephrology News & Issues,* June 2003, p.p., 54 – 57.

16 Allon, Michael et al. "A Multidisciplinary Approach to HD Access: Prospective Evaluation," International Society of Nephrology, *Kidney International,* vol 53, 1998, p.p., 473 – 479.

17 Allon, Robbin. "Increasing AVGs in HD Patients: Problems & Solutions," *Kidney International,* October, 2002, p.p., 1109-24.

18 Mishler, R et al. "Dedicated Outpatient VA Centre Decreases Hospitalization and Missed Outpatient Treatments," *Kidney International,* 2006, vol, 69, p.p., 393 – 398.

19 Jackson, Jerry & Litchfield, Terry. "How a Dedicated VA Center Can Promote Increased Use of Fistulas," *Nephrology Nursing Journal,* March/April 2006, vol, 33, no 2, p.p., 189 – 196.

20 For out of town patients, arrangements for the 2- and 6-week post creation assessments and the 4 – 6 week assessment prior to the start of HD may be made with their respective local community dialysis centres.

21 Patients referred for access creation are expected to be in agreement with creation of an access prior to the referral being forwarded to the VA clinic.

22 The number of visits per AVF/AVG patient per year is used as a proxy to provide a relative estimate of VA clinic volumes. This proxy assumes that the higher the number of AVFs/AVGs, the larger the pre-dialysis and dialysis population, and therefore the higher the number of VA clinic visits. Estimated visits include those for pre-dialysis and dialysis patients.

23 If portable ultrasound is used for vessel mapping on a routine basis, average time per visit would be more than 20 minutes.

24 Jackson, Jerry & Litchfield, Terry. "How a Dedicated VA Center Can Promote Increased Use of Fistulas," *Nephrology Nursing Journal,* March/April 2006, vol, 33, no 2, p.p., 189 – 196.

25 Arnold, W. Perry et al, Gray, Richard, ed. "Dialysis Access: A Multidisciplinary Approach," Chapter 40, *VA Centres: An Innovative Approach for VA Care*, Aug 2002, p.p., 333 – 340.

26 Test/procedure is for a discrete test or procedure (e.g., fistulogram plus angioplasty would count as two procedures).

27 Turnbull, Robert et al. "Primary VA for Chronic HD: A Comparison of AVG with PTFE Grafts," *Vascular Surgery,* vol 33, no 1, Jan/Feb 1999, p.p., 51 – 57 (study completed at Vancouver General Hospital).333 – 340.

28 Turnbull, Robert et al. "Primary VA for Chronic HD: A Comparison of AVG with PTFE Grafts," *Vascular Surgery,* vol 33, no 1, Jan/Feb 1999, p.p., 51 – 57 (study completed at Vancouver General Hospital).

NOTES

BC Renal Agency

An agency of the Provincial Health Services Authority

10 YEARS 1997–2007

BC Provincial Renal Agency
Suite 700–1380 Burrard Street
Vancouver, BC V6Z 2H3
T 604.875.7340
F 604.875.7366
E bcpra@bcpra.ca
www.bcrenalagency.ca