

# Technical and Clinical Barriers to Implementing an Optimal Case Mix of Vascular Access

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# Barriers(*clinical*) to achieving optimal case mix for VA in 2011

## ✓ Patients

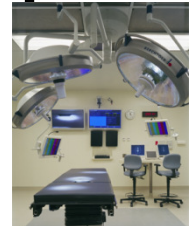
- Case mix effects
- Delay in decision making
- **Preferences, Values, Beliefs and Perceptions**

## ✓ Health Care Provider

- Late referral
- Variation in patient eligibility criteria
- Surgical skills
- Cannulation skills

## ✓ Environment

- Resource limitation
  - Access to Nephrologists, Surgeons, Radiologists
  - OR, Radiology time
- Lack of standardized process of care
- Culture of VA in dialysis
  - Influence of guidelines
- Prediction of the future
  - Timing of referrals for VA



# Patient Variables do influence type of access used

## OR for CVC Versus Permanent Access Use at Hemodialysis Start

Patient factors		
Female sex	1.95 (1.22-3.11) <sup>e</sup>	← Gender
Age (/10-y increase)	0.99 (0.87-1.12)	
Current smoking	0.70 (0.45-1.09)	
Racial origin		
White	1.00 (reference)	
Aboriginal/Maori/Pacific Islander	3.11 (2.35-4.13) <sup>d</sup>	← Race
Asian	1.53 (0.72-3.22)	
Other/unknown	2.76 (1.34-5.68) <sup>e</sup>	
Cause of ESKD		
Diabetes mellitus	1.00 (reference)	← Comorbidity
Glomerulonephritis	0.44 (0.31-0.61) <sup>d</sup>	
Hypertension/vascular	0.34 (0.10-1.22)	
Adult PKD	0.17 (0.04-0.69) <sup>f</sup>	
Other/unknown	0.85 (0.44-1.66)	

# High Failure to Mature Rates and ↑ procedure rates influence the appropriate choice of access for each patient

Reason for loss	Age <65	Age ≥65	P value	
Thrombosis/stenosis	34 (55.7%)	25 (43.9%)	0.71	
Failure to mature	21 (34.4%)	28 (49.%)	0.05	DAC >60%
Radiocephalic	11	16	0.02	
Brachiocephalic	8	9	0.80	
Brachiobasilic	1	3	0.19	
Other	1	0	N/A	

**Table IV. Procedure to treat arteriovenous fistula failure**

Procedure	Group A (≥65)	Group B (<65)	P
Fistuloplasty	26	16	.09
Thrombectomy	15	8	.34
Surgical revision <sup>a</sup>	11	7	.27
Total	52	31	.01

<sup>a</sup>Includes repeat anastomosis, transposition/superficialization, and ligation of tributaries.

4  
1  
1

# Influence of Patient Mix

*“Our CVC rate is high  
because...”*

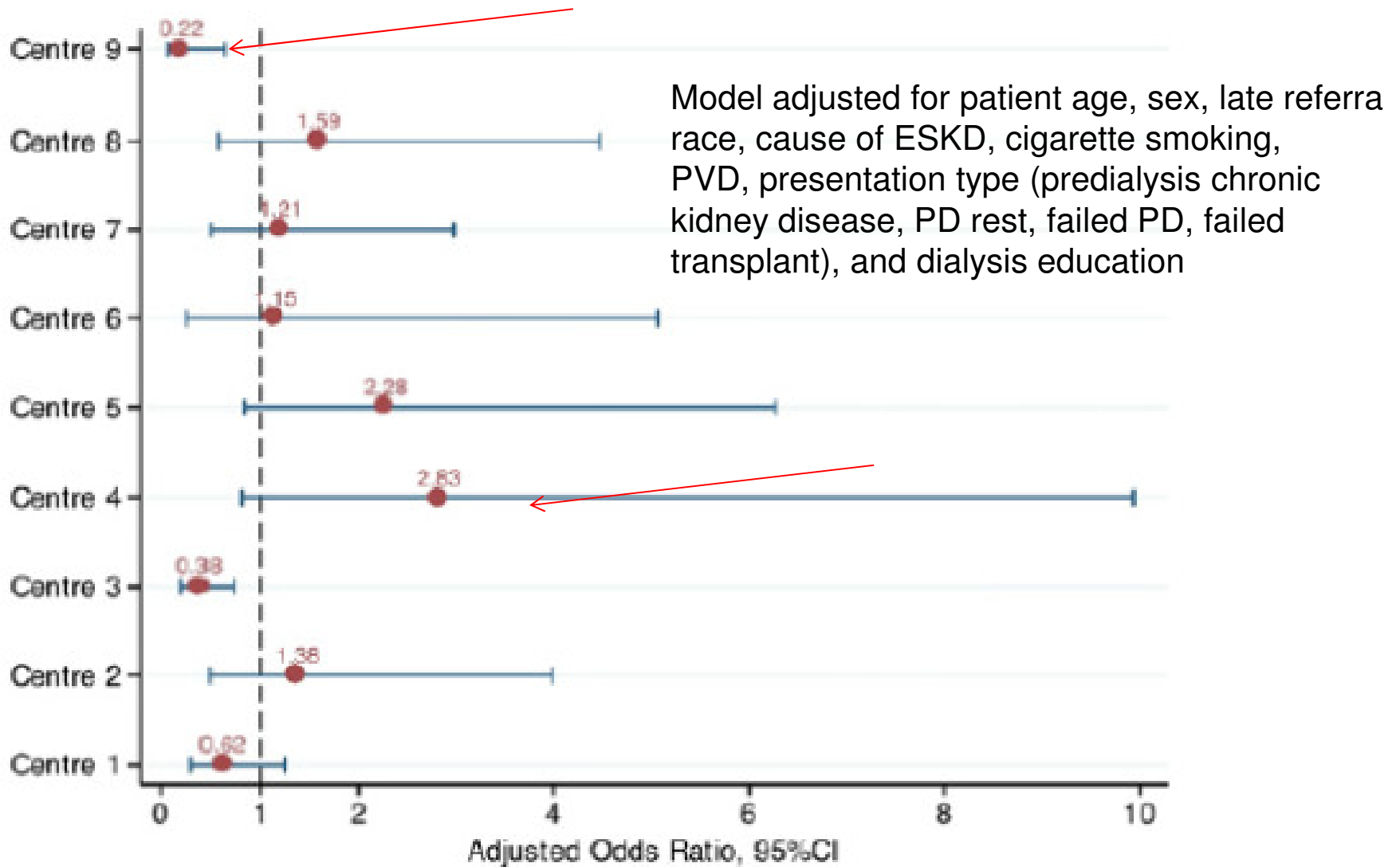
**My patients are sicker...**

**My patients are older**

**I have more late referrals**

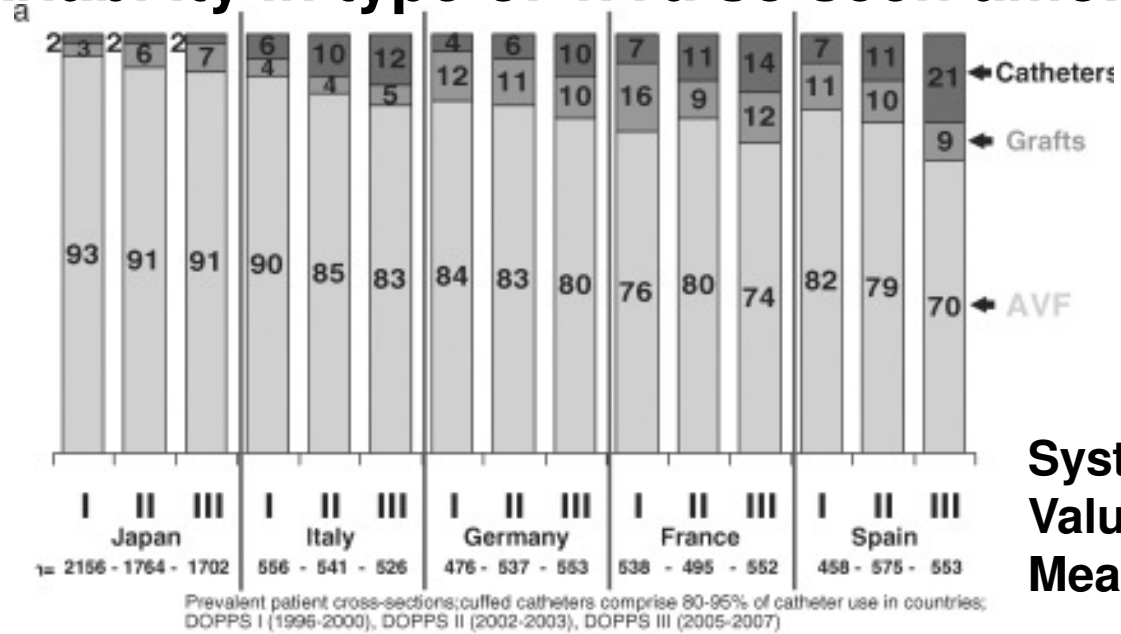
**My patients are more challenging**

# Variability of Catheter Use is not only determined by patient characteristics

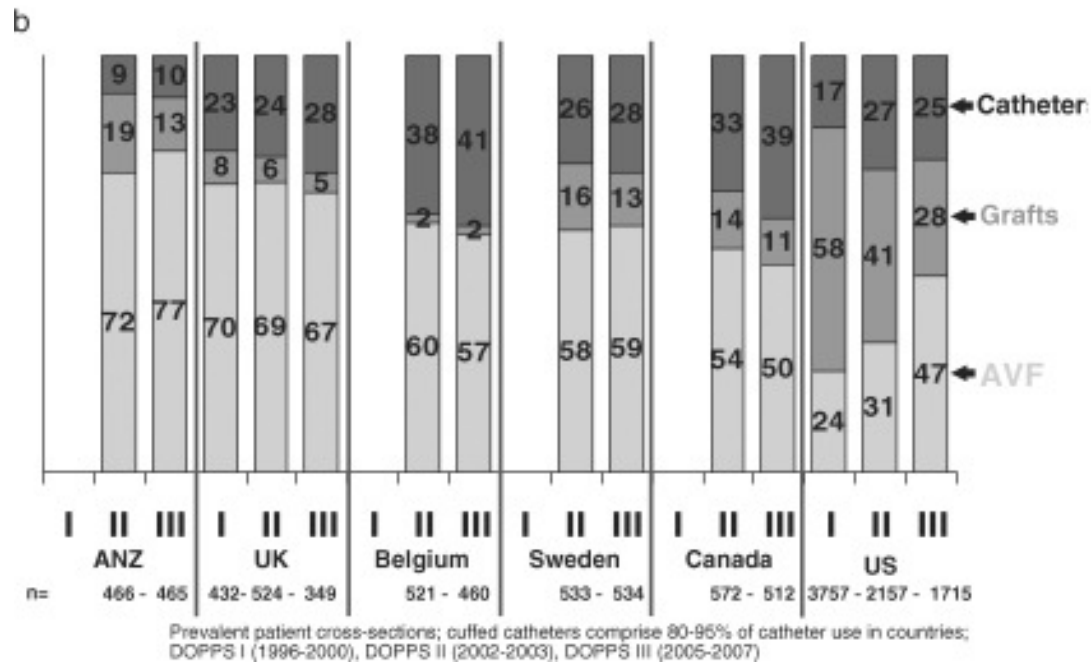


The *adjusted* Odds of starting with a CVC by center compared to cohort mean

# This variability in type of VA also seen among countries



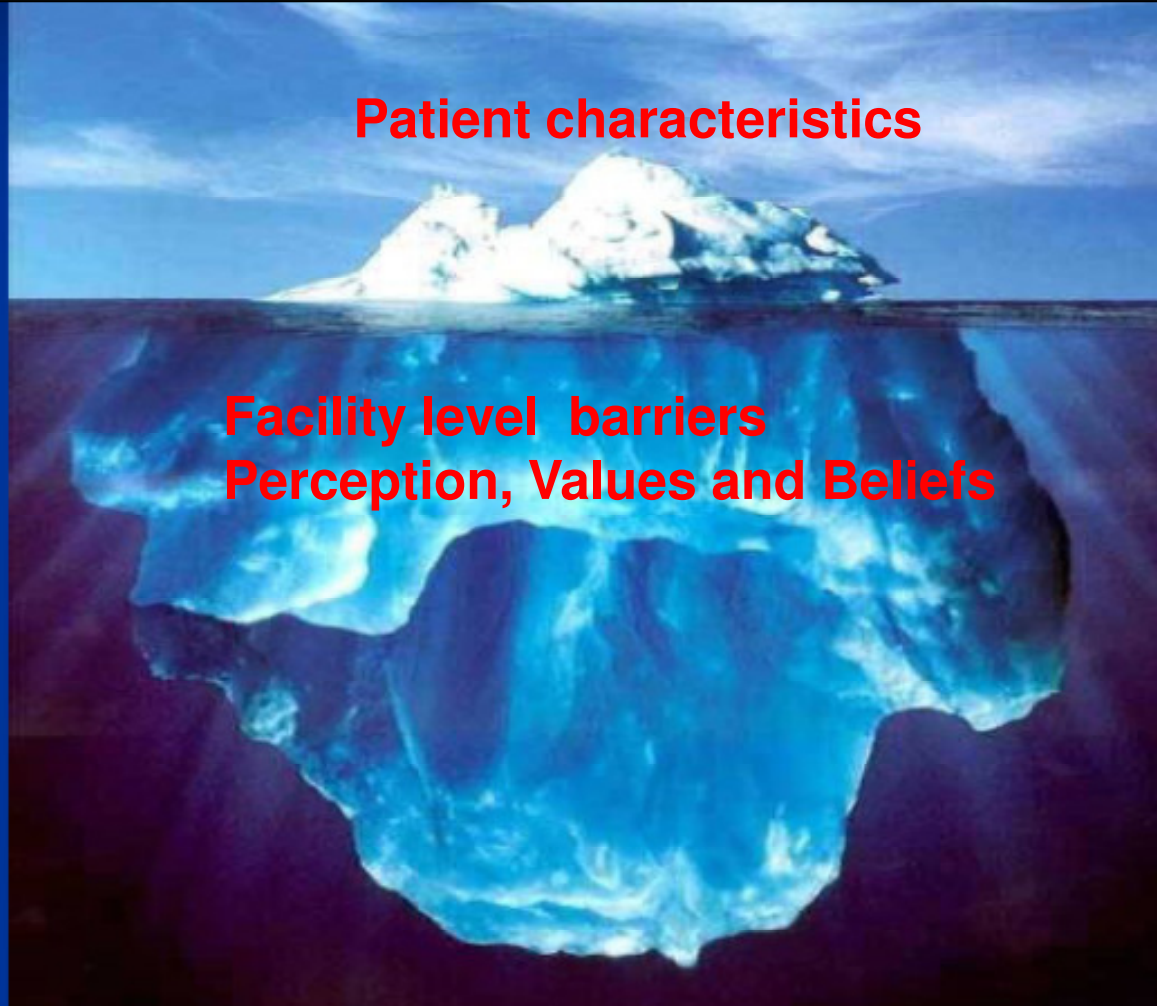
**Systems effect**  
**Value effect**  
**Measurement effect**



## Barriers to Achieving Appropriate Access

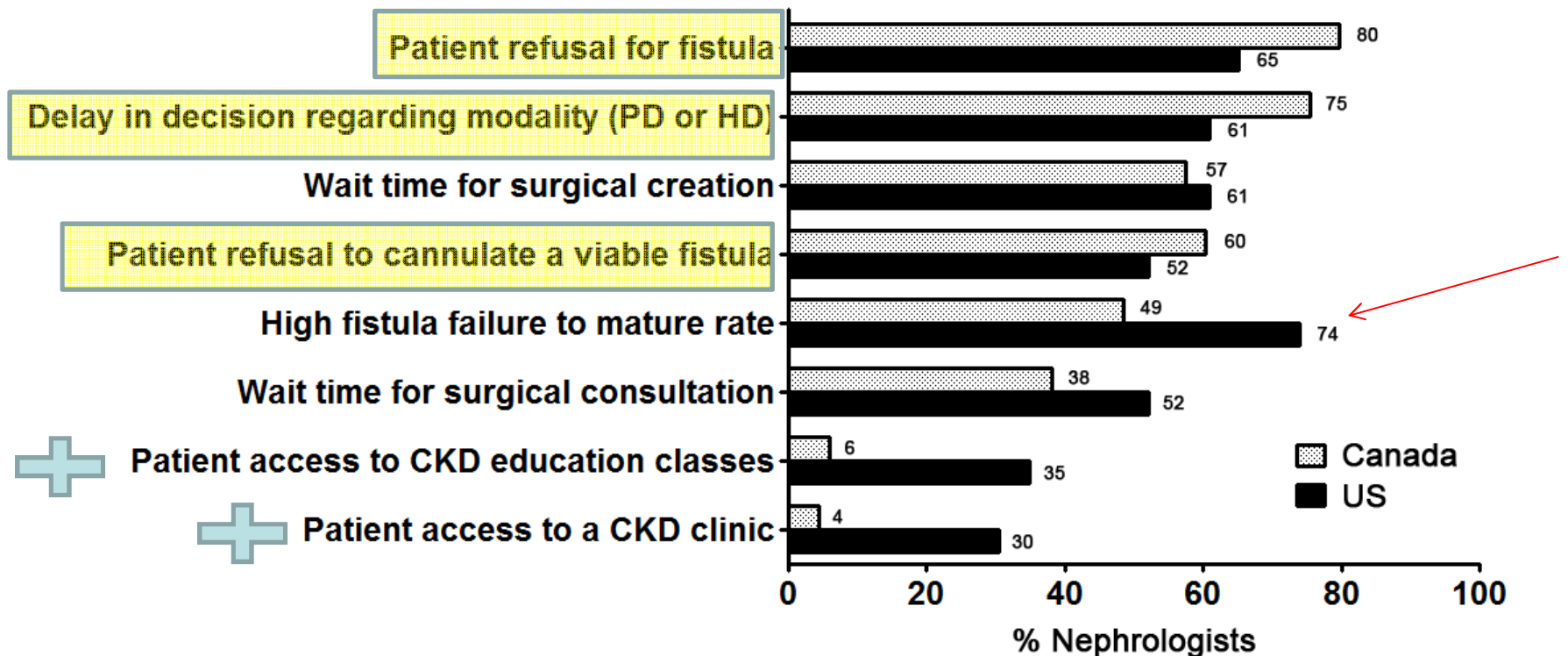
**Patient characteristics**

**Facility level barriers  
Perception, Values and Beliefs**





# Patient preference was found to be a barrier for optimal VA : survey of Nephrologists in Canada /US



**Although we have CKD clinics and provide education  
Patients are not making or refusing “optimal access”**

# CKD patient education is important ...must ensure knowledge transfer

- Patients who scored 20 % higher on post education test
- 25% more likely to use an AVF or AVG at initiation of dialysis compared with use of a catheter for dialysis access
- Stresses the need to ensure patients understand the information given



# And it is in a language they can understand...

## ¿QUE ES SU ACCESO-ABILIDAD?

por Michelle Ledeen, RN

¿Puede identificar la clase de acceso de diálisis que tiene?

¿Puede describir la dirección en que corre la sangre dentro de su acceso?

¿Puede nombrar las señas y síntomas de infección de su acceso?

¿Sabe a quien llamar si cree que tiene problemas con su acceso?

¿Qué es un ACCESO VASCULAR?



El acceso vascular es el lugar en su cuerpo donde se saca y regresa su sangre para el tratamiento de diálisis. Mientras la sangre está fuera de su cuerpo (menos de una taza a la vez), se pasa por el dializador (o riñón artificial) para limpiarla y quitarle los líquidos excesivos. El acceso vascular necesita ser suficiente grueso para permitir que corra la sangre rápidamente para lograr un buen tratamiento de diálisis en el tiempo más corto posible.

Hay tres clases de accesos de diálisis:

- la fistula
- el injerto
- el catéter

La FISTULA arterio-venosa es una comunicación entre una arteria (el vaso que saca la sangre a FUERA del corazón) y una vena (el vaso que regresa la sangre a DENTRO del corazón). Esta comunicación se hace por una cirugía que conecta una vena y una arteria que ya estaban cercanas en su cuerpo. La presión arterial causa que la vena se haga más grande con el tiempo, lo cual resulta en una vena que se presta para las agujas de diálisis. La fistula queda debajo de la piel y requiere entre 6 y 8 semanas después de la cirugía para "madurar" y ser usada. Esta clase de acceso requiere más tiempo para madurar pero dura más y da menos problemas. ¡Vale la pena esperar! Estar preparado y tener un plan de tratamiento antes de iniciar diálisis es importante para el éxito de la fistula como su primer acceso. Las fistulas se pueden hacer después de iniciar diálisis pero siempre requieren tiempo para madurar.



Después de la cirugía hay ejercicios para madurar y desarrollar la fistula. Apretar una pelota de goma con la mano del acceso entre 20 y 30 veces, varias veces al día ayudará. Su cirujano o equipo de diálisis le pueden recomendar otros ejercicios y cuidado. Pídale información por escrito sobre el cuidado del acceso.

## ¡Mucho Cuidado!

El Cuidado de su Fistula Después de la Cirugía

Ahora tiene lo que se llama una A-V fistula en su brazo. Una de sus venas se ha conectado con una arteria, lo cual permite que la sangre de la arteria corra por las venas debajo del cuero del brazo. Se espera que la vena se haga suficiente grande para usarse en diálisis. Entre más grande la vena, más fácil será remover la gran cantidad de sangre para limpiar los impurezas. De vez en cuando el staff hablarán de su fistula como su "acceso." Para que su fistula sane bien, ¡necesitamos su ayuda!

Su tarea será:



Observar . . . . .

- Tendrá una pequeña cicatriz (en la muñeca o cerca del codo) con puntadas que tendrán que sacarse dentro de como 10 días. Favor de hacer otra cita o "appointment" para sacarle las puntadas.
- Es normal que le salga un poco de sangre de la cortada por un día o días. Si acaso continúa por más tiempo, o le sale tanta sangre que un vendaje grande no puede absorber todo la sangre, llame al cirujano.



Ataque . . . . .

- Tendrá un poco de hinchazón y dolor en el area de su fistula por unos pocos días. Esto se le debe quitar después de unos días. Por lo general, el doctor le recetará una medicina para el dolor.
- Ataque su fistula cuatro veces al día. Debe sentir una vibración sobre la fistula. Esto indica que la sangre está corriendo bien através de su acceso. Sería bueno que le pida a la enfermera que le enseñe como hacer esto antes de que regrese a su hogar.

Para el dolor puede tomar \_\_\_\_\_

Para la hinchazón eleve el brazo del acceso sobre dos almudacos para que su brazo esté al nivel de su hombro o más alto.

Si no siente la vibración si acaso no siente la vibración en su brazo, puede ser que su fistula se ha coagulado. Llame al cirujano inmediatamente a: \_\_\_\_\_

(continúa)



**Las fistulas son el acceso vascular preferido para el tratamiento de hemodiálisis.**

**Hay pocas complicaciones con el uso de las fistulas.**

**La incidencia de infecciones es menor en las fistulas.**

**Son menos las hospitalizaciones relacionadas a problemas con las fistulas.**

**Las fistulas son más duraderas.**

**Las fistulas son nuestras amigas.**

**¡Fistulas PRIMERO!**



National Vascular Access Improvement Initiative, 2003 - 2006

# Cognitive Impairment is Common in Patients on Dialysis

Dialysis Y/N  
End of Life Y/N  
VA Y/N

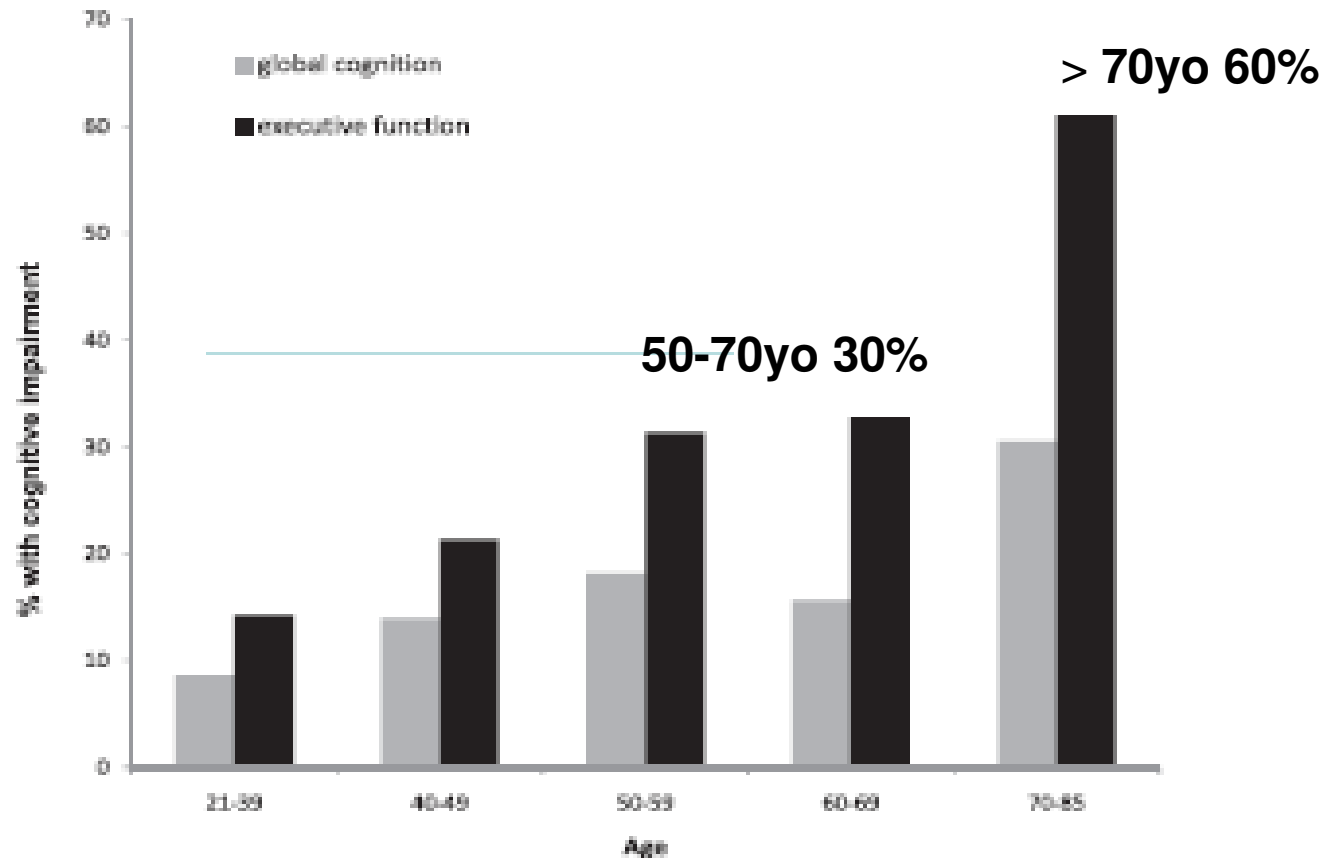
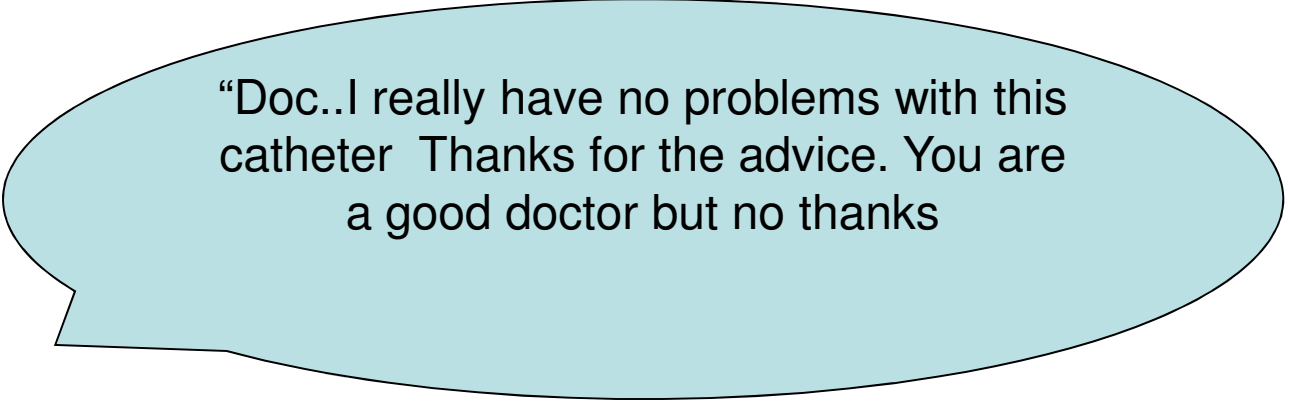


Figure 3. Prevalence of cognitive impairment by decade of age. Note that global cognitive impairment was defined as a score <80 on the 3MS and impaired executive function was defined as a score  $\geq 300$  seconds on the Trails B test.

# Patient Choice

25-42% of “eligible” patients refuse



“Doc..I really have no problems with this catheter Thanks for the advice. You are a good doctor but no thanks

# Why did eligible patients refuse a AVF/ AVG

- **Previous experience**

- Pain
- Bleeding
- Cannulation problems

- **Knowledge transfer**

- Lack of information
- Timing of information
- Lack of appreciation of risks of CVC
- Peer influence toward negative aspects of the AVF

- **Outlook on Life**

- Live day to day
- Maintaining status quo

*“Doc..I hate needles*

*The guy with the fistula stays 30min longer*

*The nurses do not know how to needele*

*I like the way things are now*

*I have had no problems with my line’*

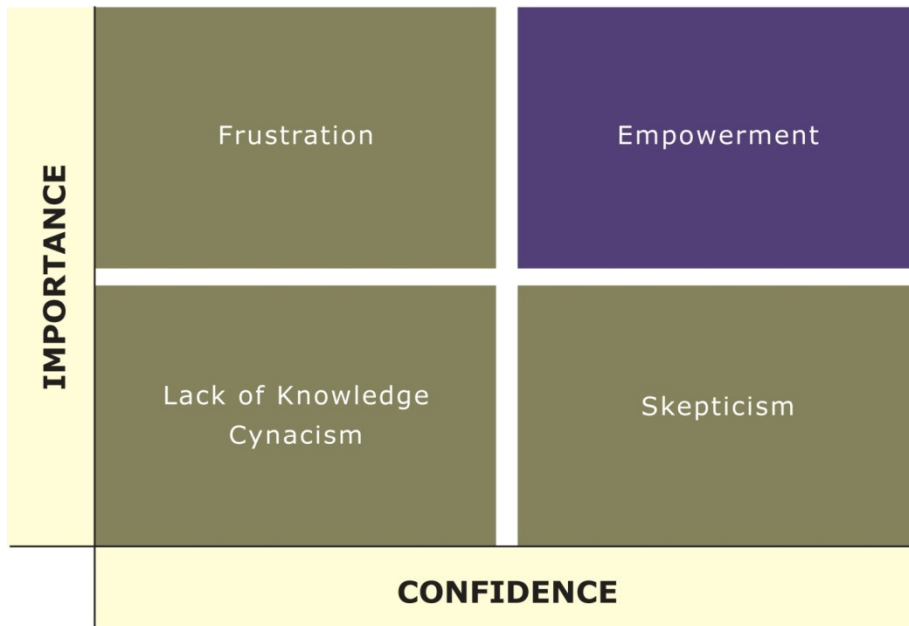
*I am living my life for today*

*Thanks but no thanks “*

# Patient perceptions ..or misperceptions as to why they were using a Catheter

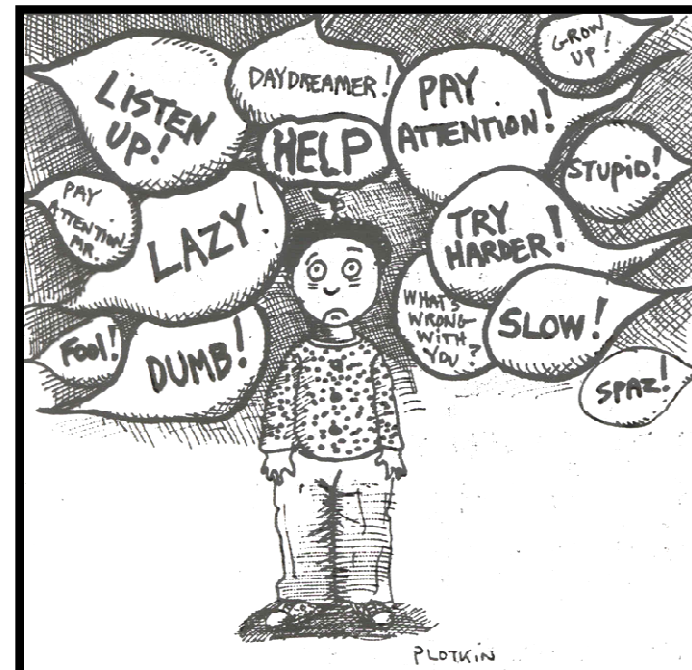
Reason (N responses)	Patient (n=155)	VAC (n=163)
Awaiting permanent access surgery	2.5%	13.5%
Waiting for access to mature	7.8%	12.2%
Worsen cardiac condition	2.5%	0%
Poor vessels or vasculitis	16.8%	3.6%
Exhausted access (not able - PD)	25.8%	4.9%
Temporary PD/ Too ill	0%	6.3%/9.0%
Steal syndrome	2.5%	3.7%
Needle shy/phobia	30.3%	22.7%
Cosmetic reasons	18.7%	13.5%
Other	30.3%	57.7%
<b>Just likes CVC</b>	<b>31.0%</b>	
<b>Surgical Fatigue</b>	<b>21.1%</b>	

# We need to develop skills in behavioral theory and decision making ....



Adapted from Keiler et al. *Journal of Clinical Outcome Management* 1997  
Miller WR et al. Guilford Press, 1991  
3-Minute Empowerment - Pfizer - Improve Efficiency - Support Behavioural Change

Telling people what to do makes it more likely they will want to do the opposite.



Importance of early decision making before starting dialysis

Power of patient to patient KT



# Influence of Health Care Providers On Optimal VA Case Mix



# Late Referral $\cong$ 30% of dialysis starts

## Strong effect on type of incident VA

$\cong$

Variable

OR (95% CI)

### Variables Associated With Incident Catheter Versus Permanent Access Use

#### Physician factors

First nephrology review < 3 mo before dialysis start (vs > 3 mo)

32.77 (8.66-123.97)<sup>d</sup>

First nephrology review < 12 mo before dialysis start (vs > 12 mo)

8.20 (5.92-11.36)<sup>d</sup>

Predialysis education (vs no education)

0.44 (0.27-0.71)<sup>e</sup>

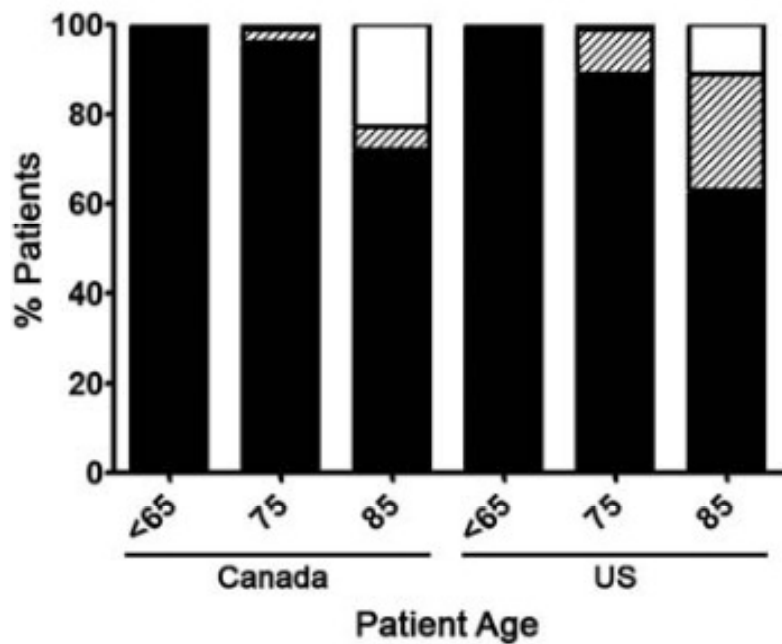
eGFR at AVF/AVG creation (/5-mL/min/1.73 m<sup>2</sup> increase)

0.22 (0.10-0.50)<sup>d</sup>

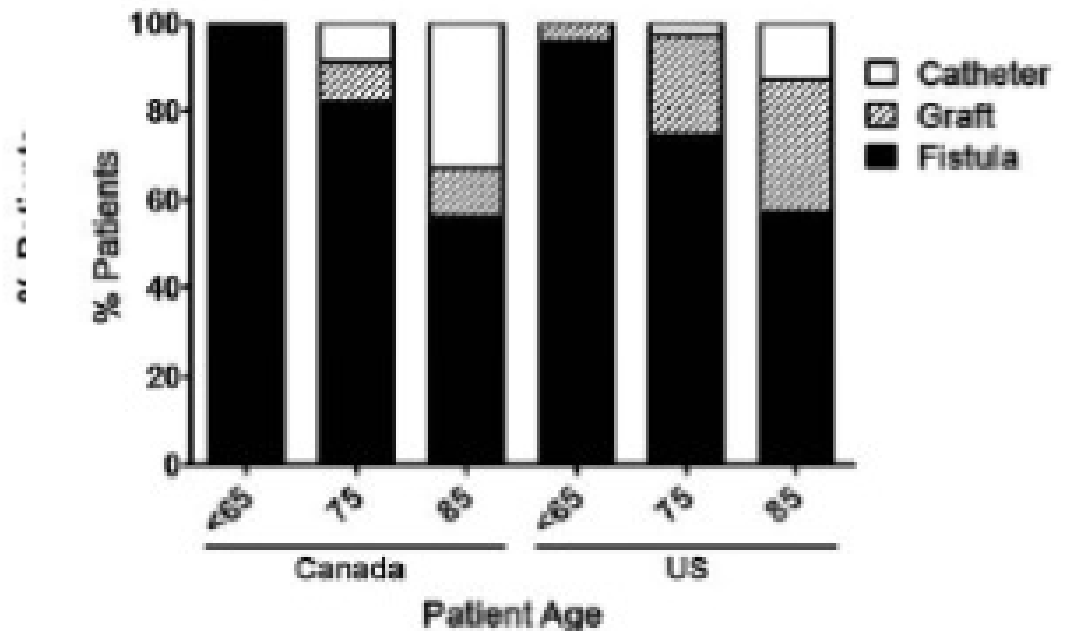
**Work with primary care provider toward early detection**  
**Urgent clinics with fast track for late starts**

# Marked Variability in choice of VA by Nephrologists

a) Minimal comorbidities (Patient A)

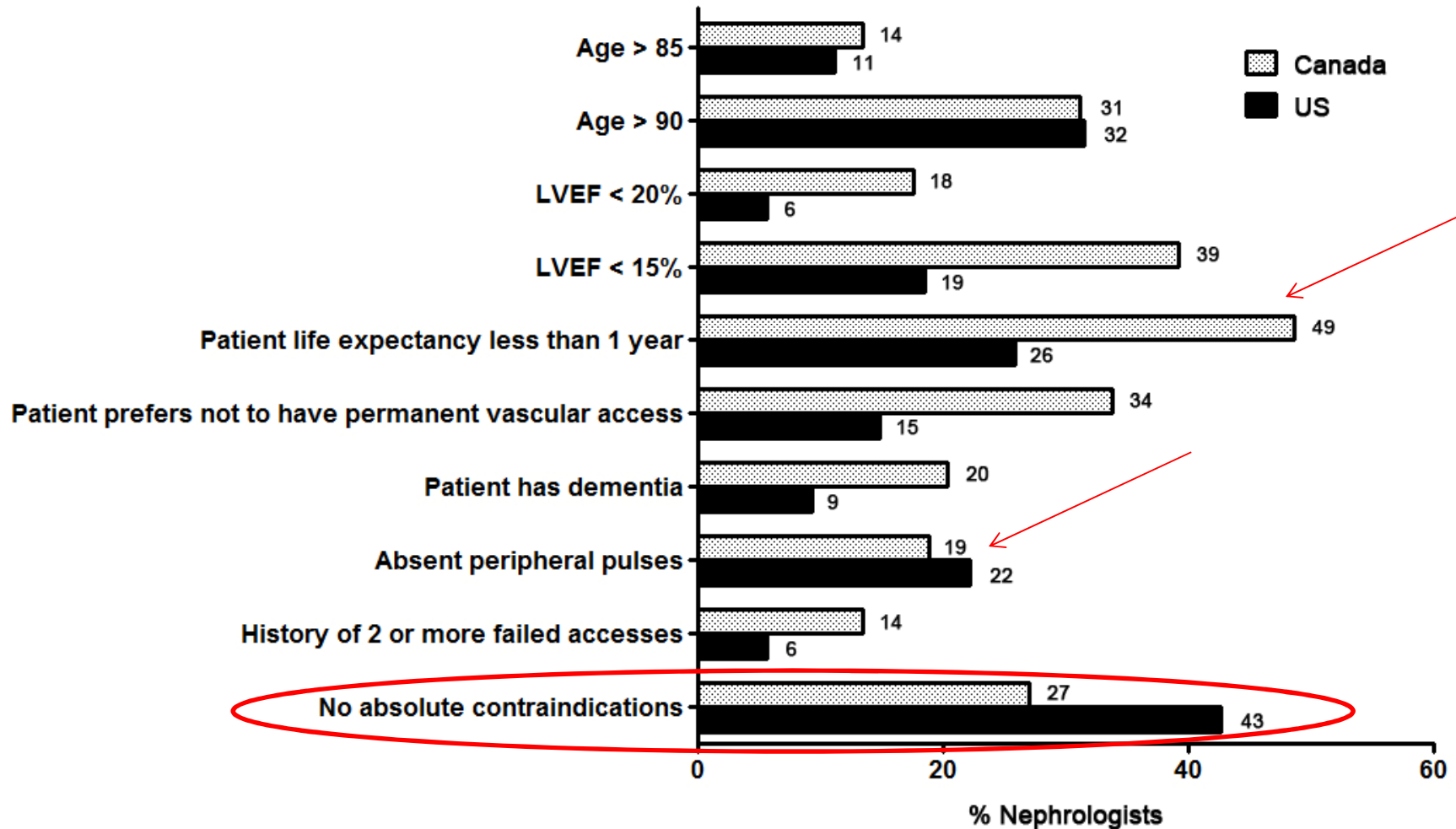


b) Multiple comorbidities (Patient B)



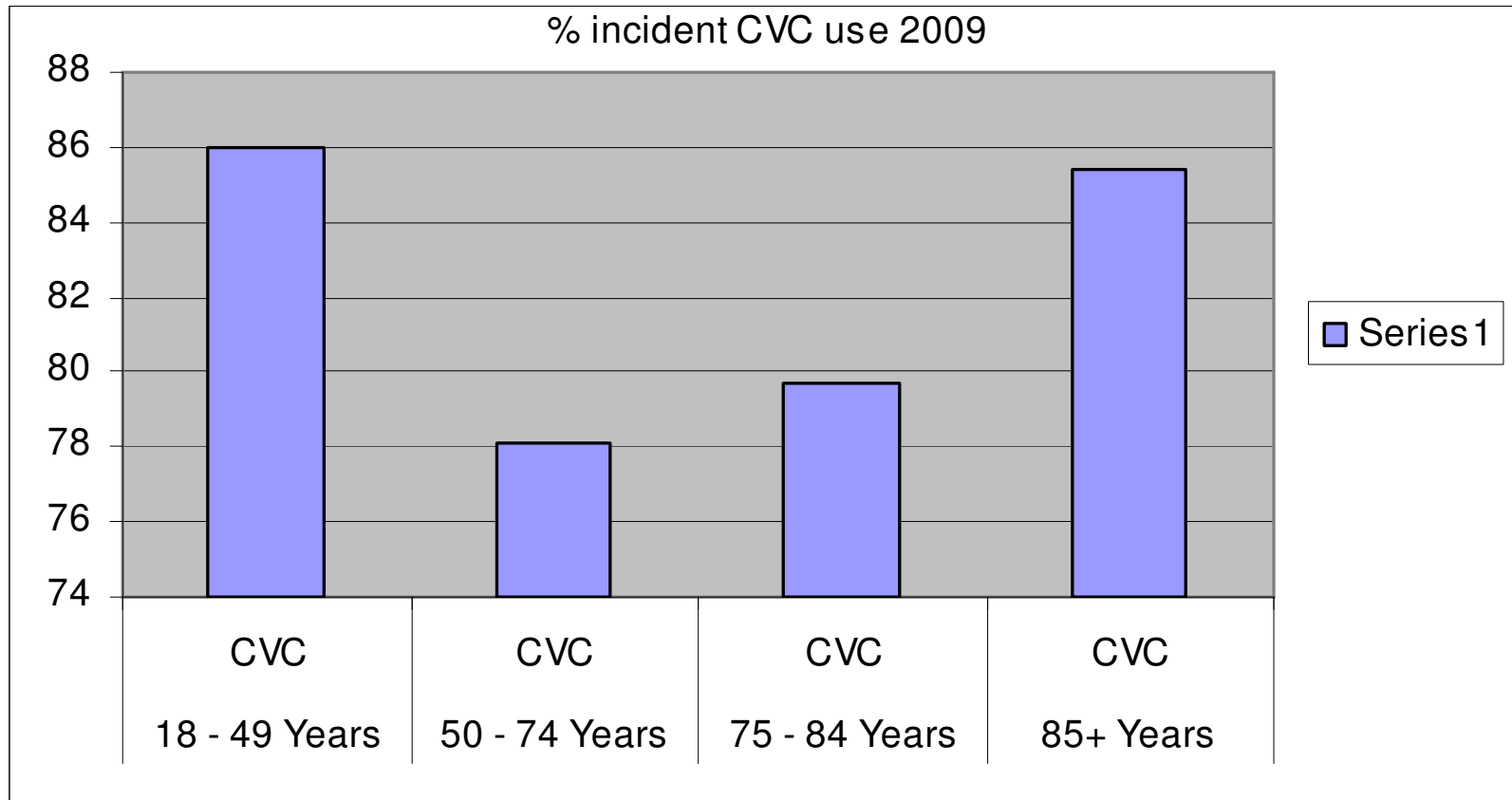
**Graft is the second choice access in the USA**  
**CVC is second choice in Canada**

# No consensus on who should NOT use a fistula



What are the absolute contraindications to AVF creation?

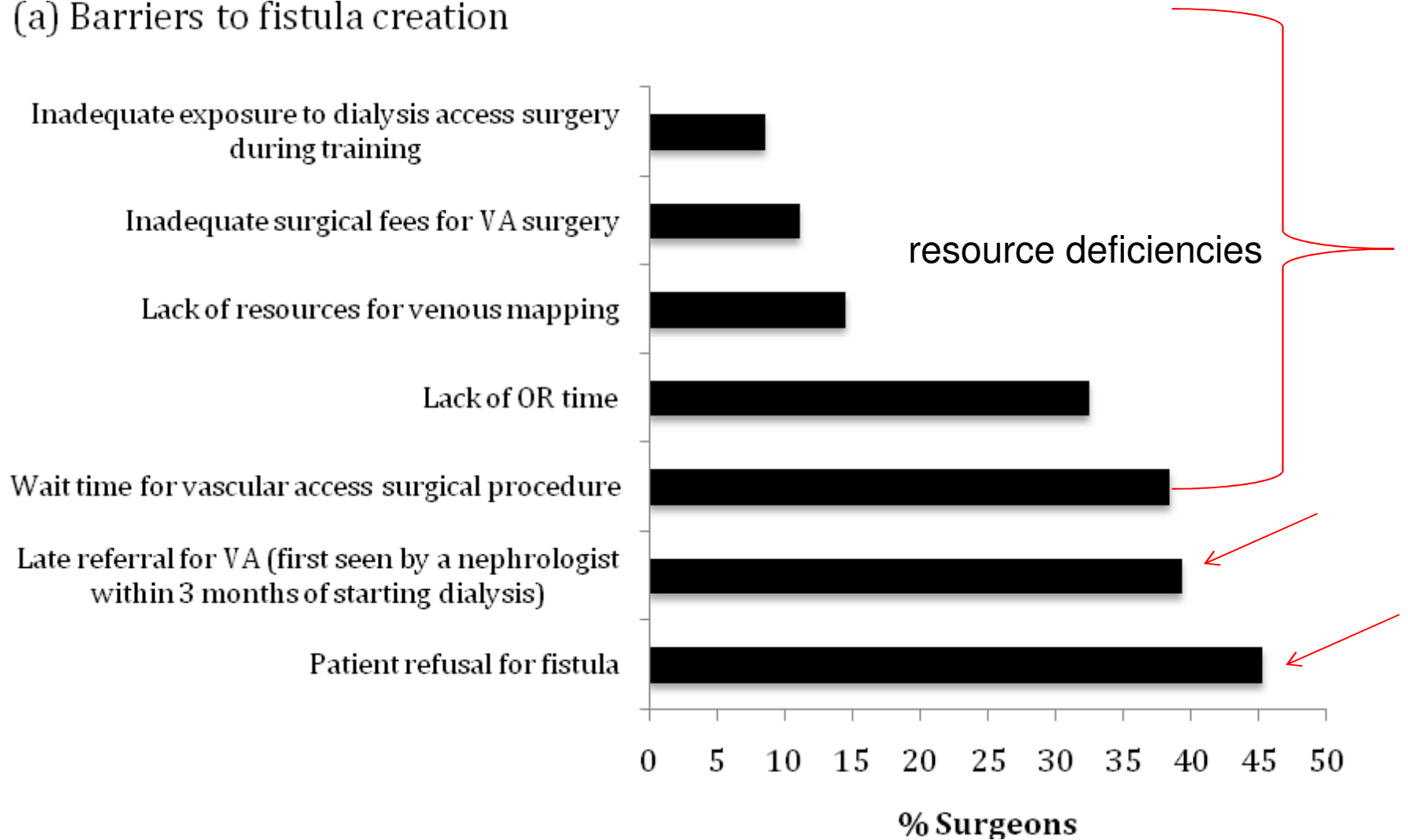
# Major disconnect between preference and reality



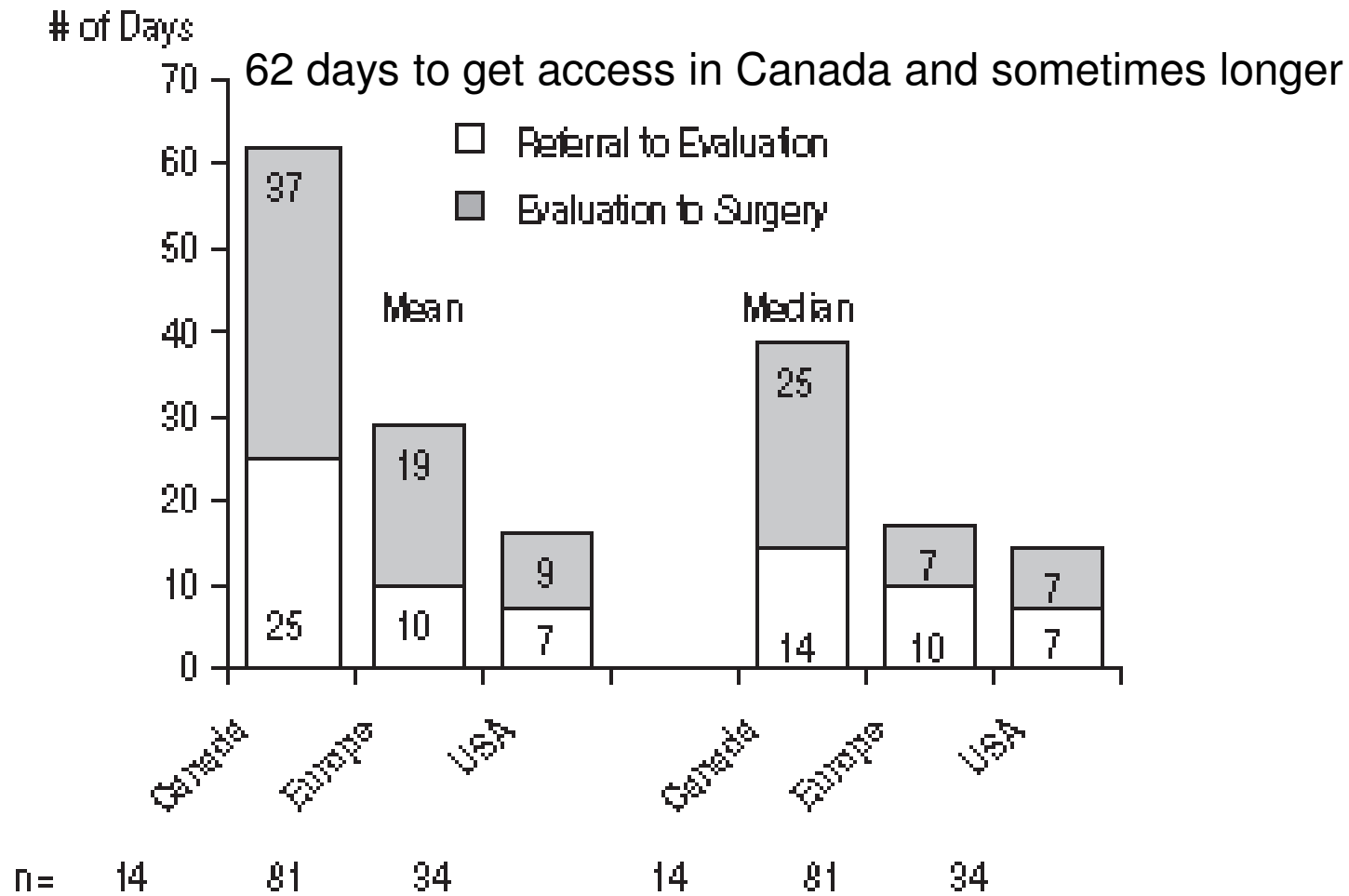
# Barriers to AVF creation

## Surgeons' perspective

(a) Barriers to fistula creation



# Surgical Wait times influence appropriate access



Per response from vascular access surgeon, 2003-2004; n = # of responses

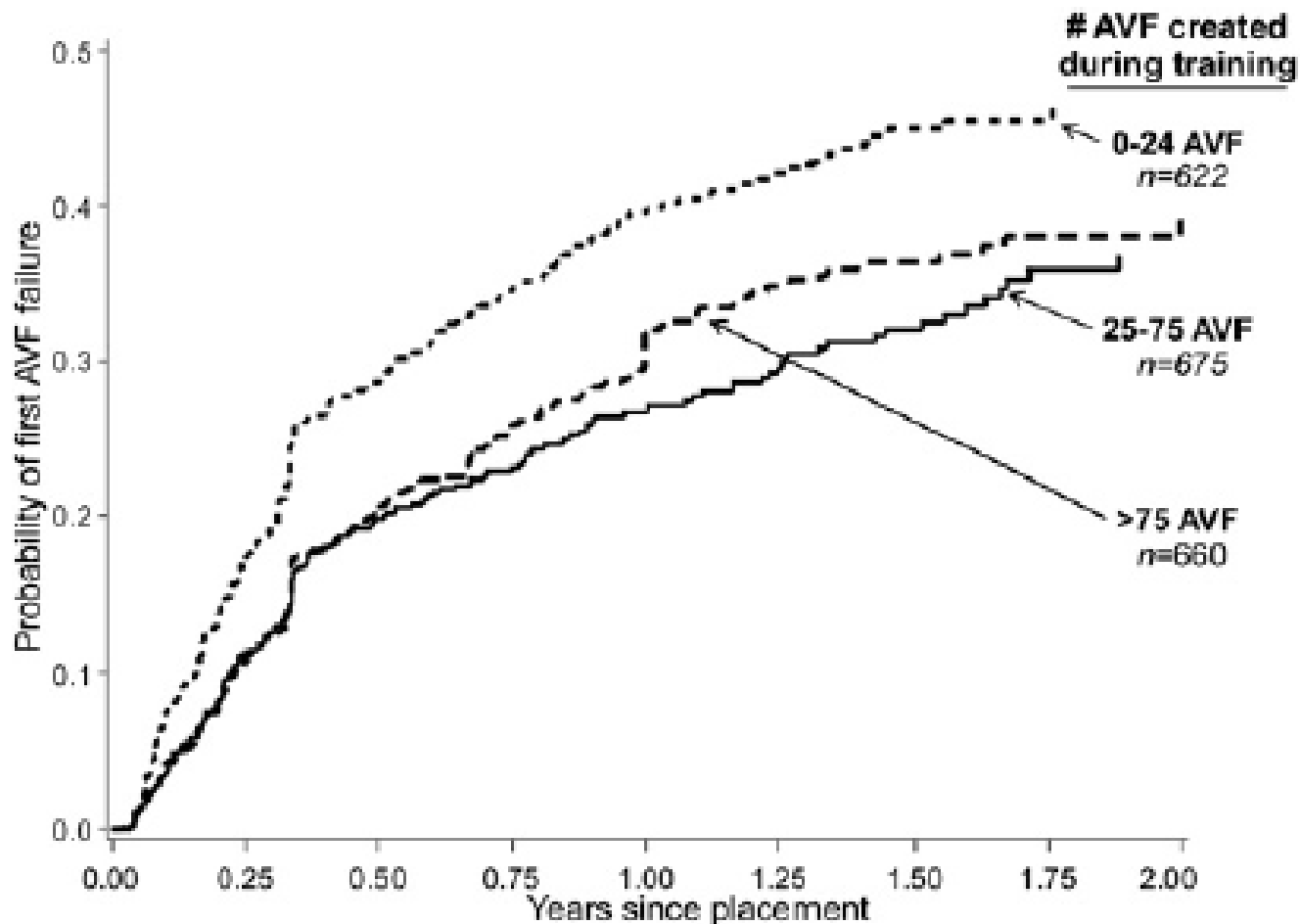
## Proposed Surgical Wait Times in Ontario

<u>Priority</u>	<u>Case Descriptions</u>	<u>Target Wait</u>
1	<b><u>Immediate -emergency surgery required</u></b> Life threatening bleeding from access Anticipated aneurysm rupture Severe limb threatening ischemia from steal syndrome Sepsis related to access with systemic complications Thrombosis of graft/ fistula	Within 24 hrs
2	<b><u>Urgent</u></b>  Rapidly failing access and/or inadequate dialysis due to failing access (radiology intervention not possible or failed )	Within 2 weeks
3.	<b><u>Semi-Urgent</u></b> Maturation failure requiring revision <b>Access creation for patient on hemodialysis</b> or Expected hemodialysis start within 6 months	Within 4 weeks
4.	<b><u>Elective</u></b>  Hemodialysis start expected > 6mo Minimal risk of morbidity incurred by waiting	Within 26 weeks



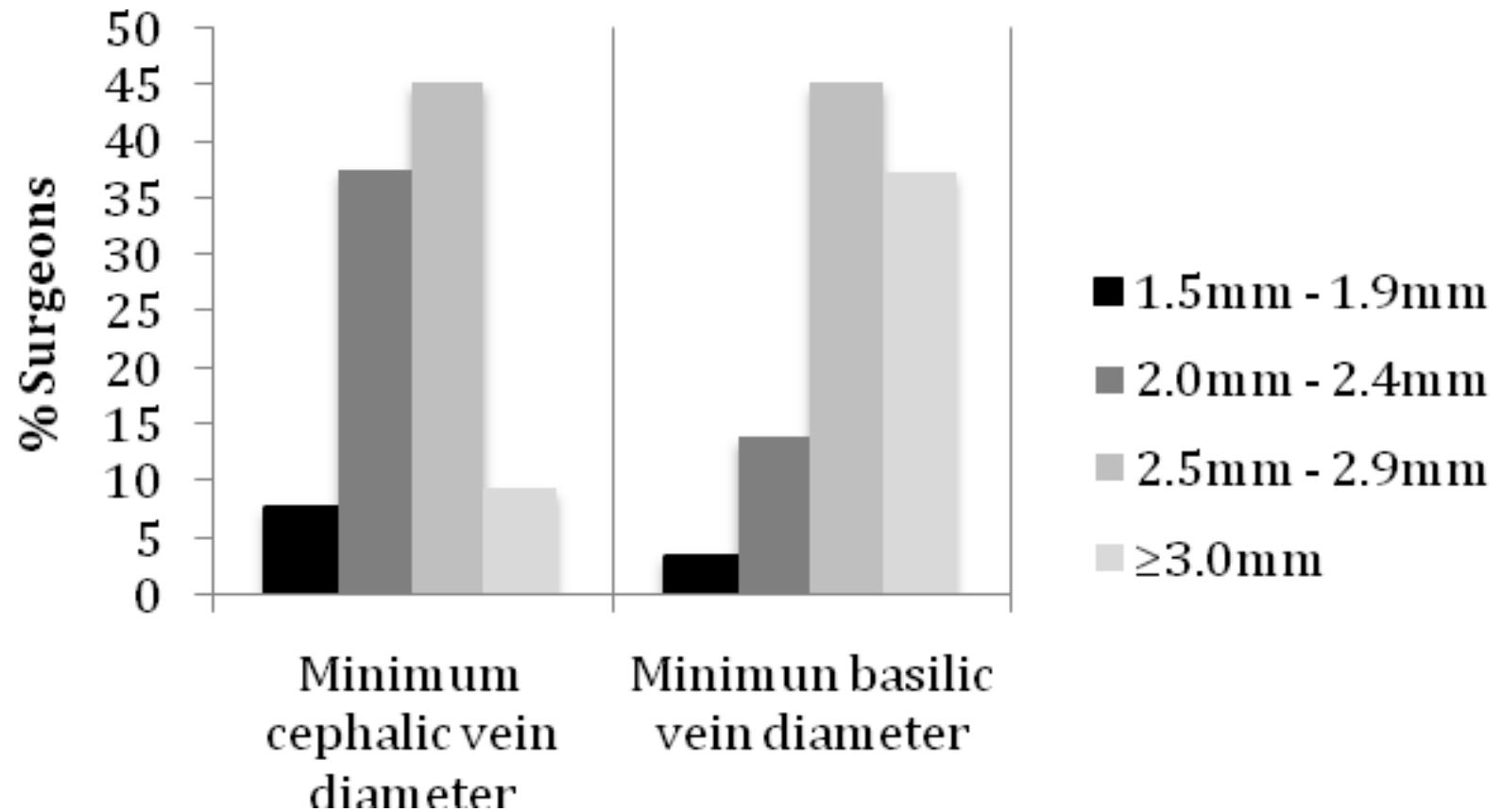
# Experience of the surgeon influences achieving optimal access

44 x risk of failure if < 25 AVFs in training



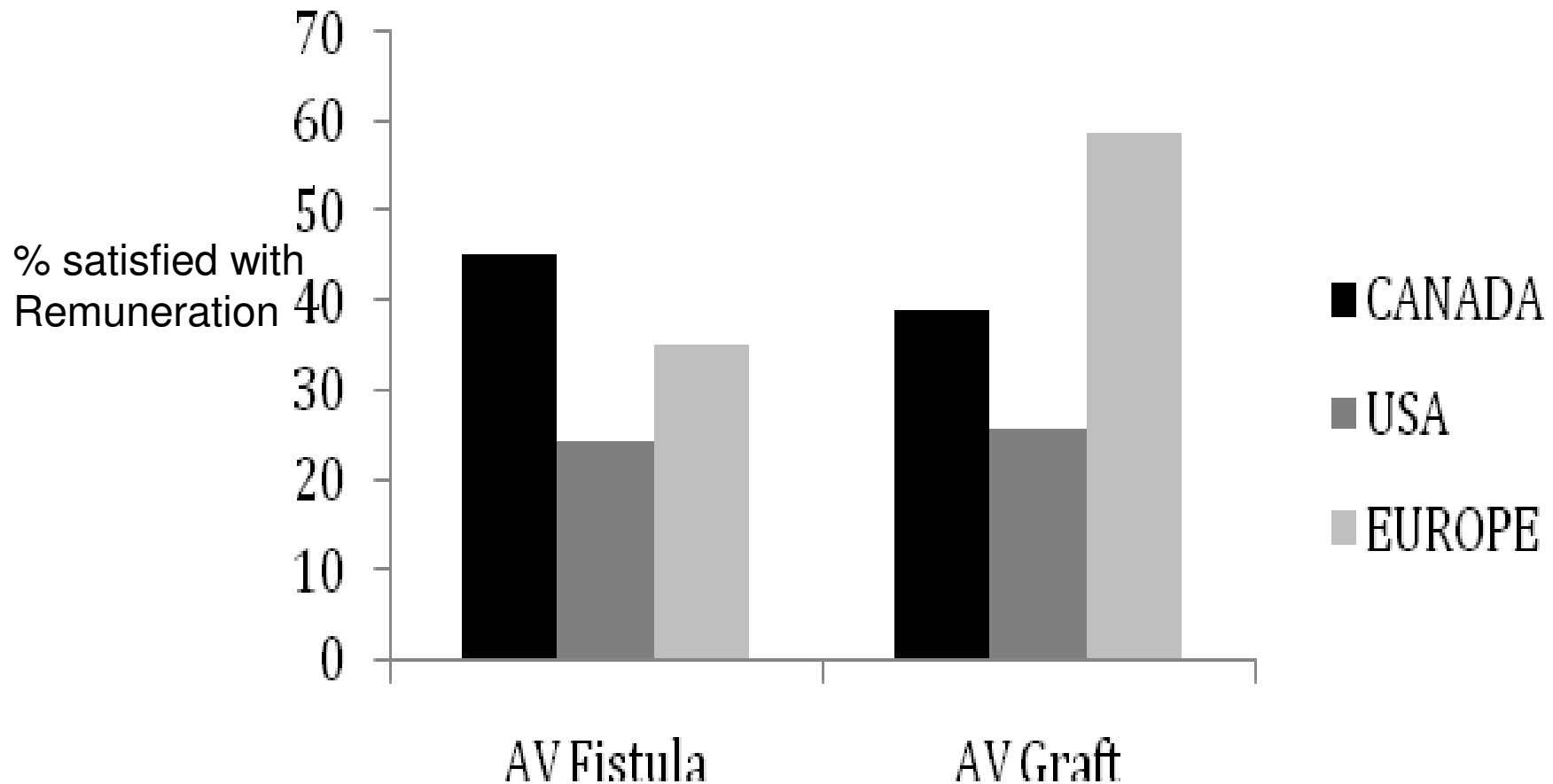
Time to primary fistula (arteriovenous fistula [AVF]) failure in hemodialysis patients for tertiles of the number of AVFs created by the facility's primary surgeon during surgical training.).

# Variation in size of vein eligible for AVF creation



**Minimum diameter of cephalic vein and of basilic vein that would be acceptable for the creation of an AVF**

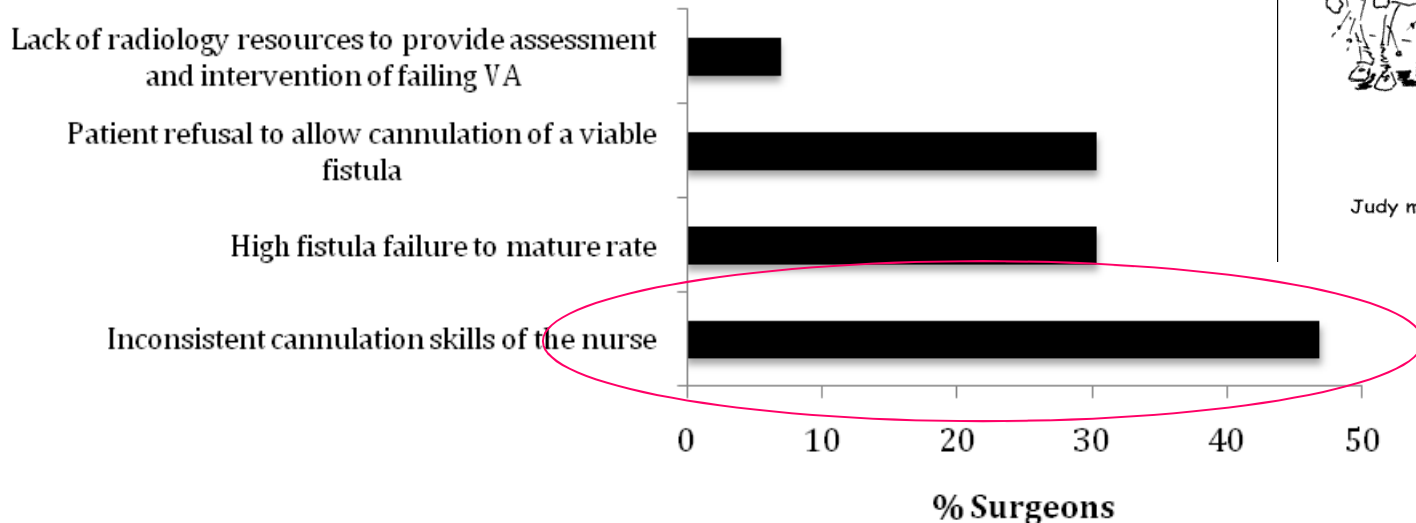
# Does Remuneration Influence type of VA?



Differences in satisfaction of remuneration for AVF / AVG in Canada, USA and Europe

# Cannulation Skills as a Barrier to Optimal VA Use

(b) Barriers to fistula use



## The Perpetual Novice

*“limited opportunities to acquire the skill “*

*pace pressures that may impact on proper technique*

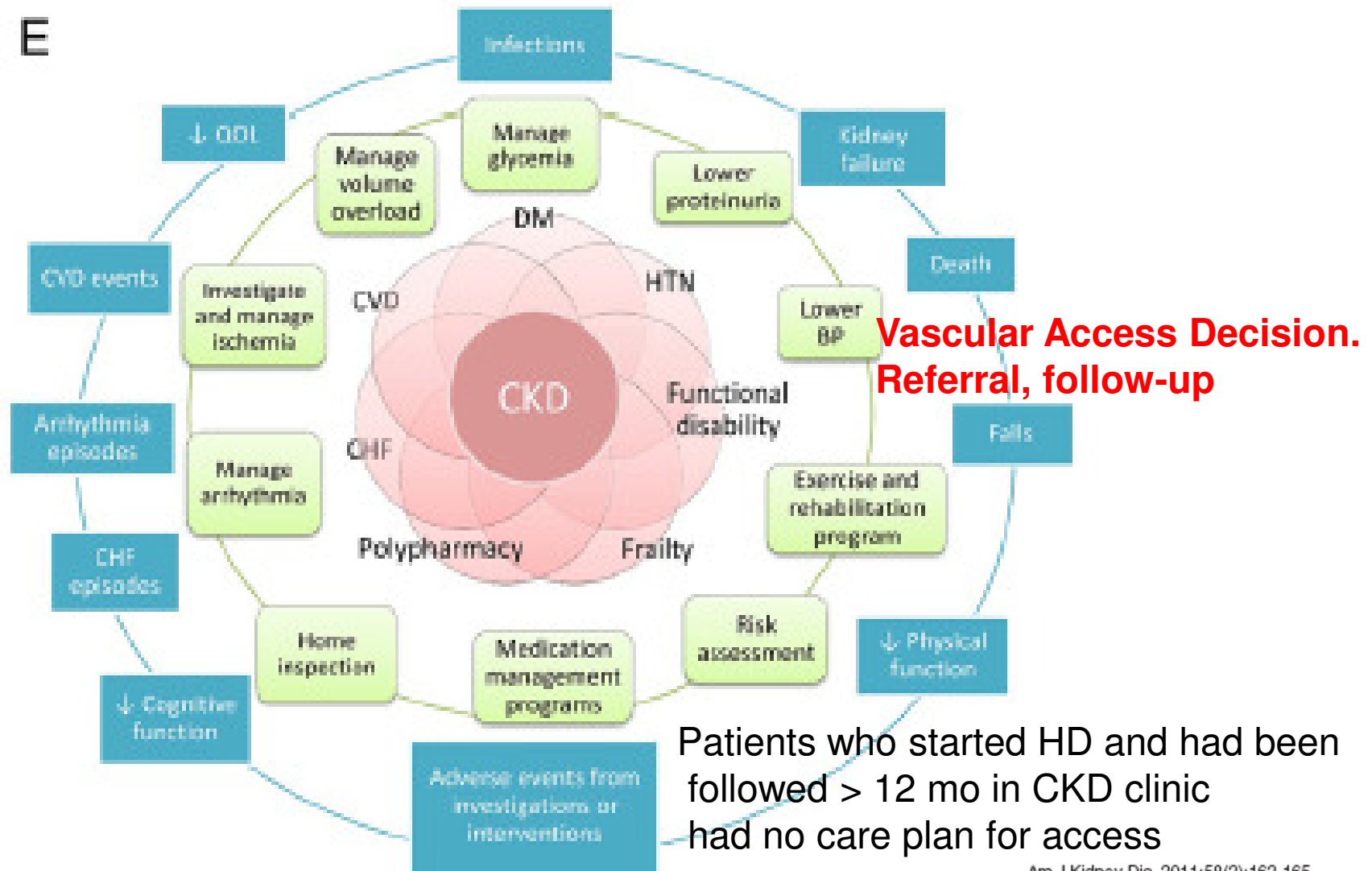
Tendency to avoid cannulation

Patient pressure to get on and off quickly .

Orientation needs to be standardized  
Expert providing orientation around cannulation  
Formal follow-up with each new HD nurse to identify ongoing learning needs

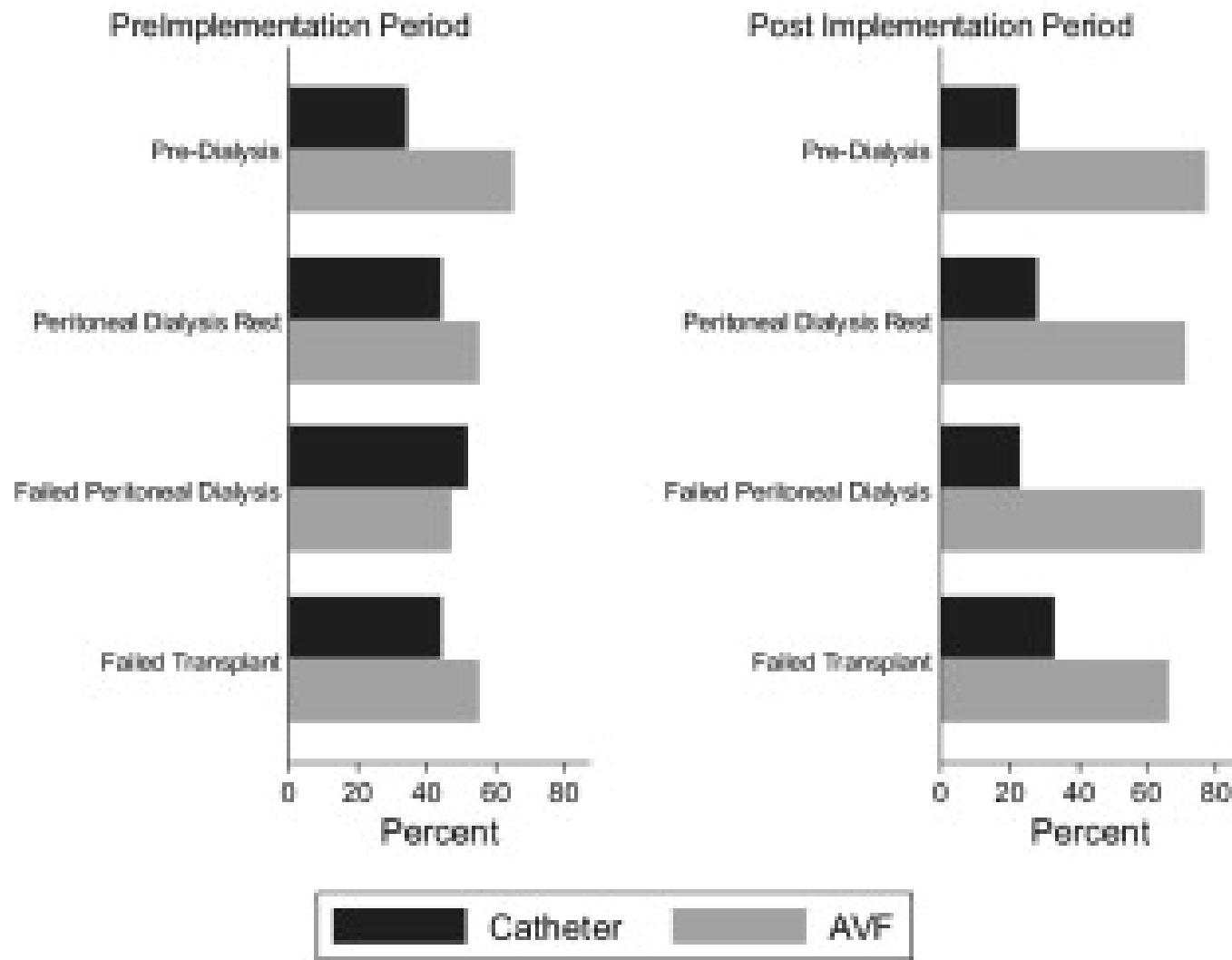
# Lack of Standardized Process of Care for VA

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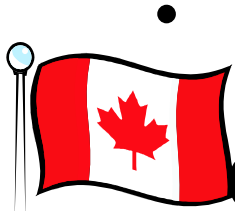


# VA Coordinator Improves appropriate use of access

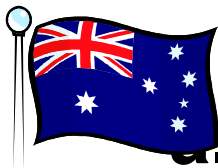
## Specific attention to VA care plan



# Have Guidelines been a barrier to Optimal Vascular Access



**CSN :The preferred type of vascular access is a radio-cephalic native vessel arteriovenous fistula. (Grade C)**

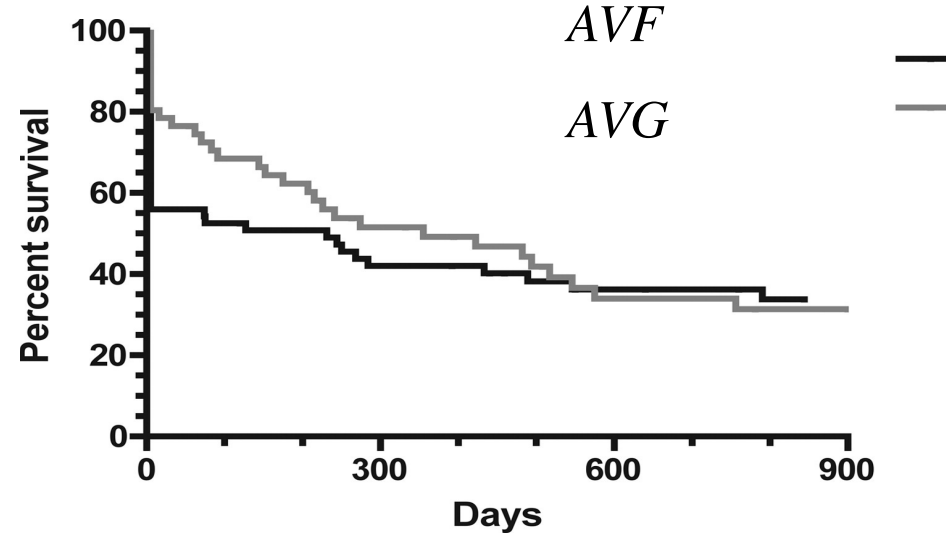
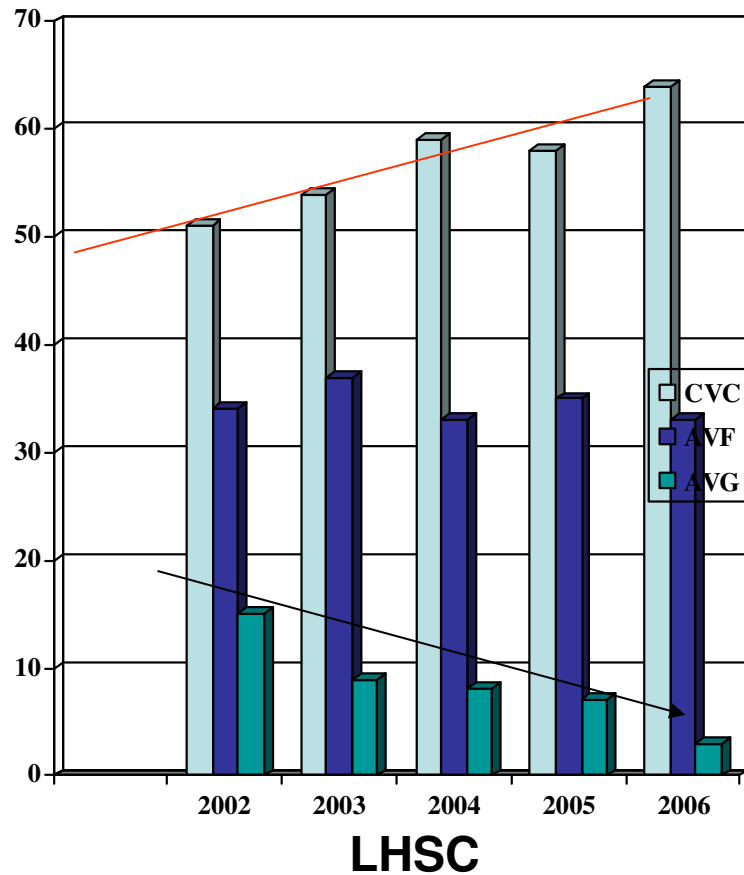


**a. CARI A native fistula is superior to an artificial arteriovenous graft. (level B evidence)**



**KDOQI Options for fistula placement should be considered first**

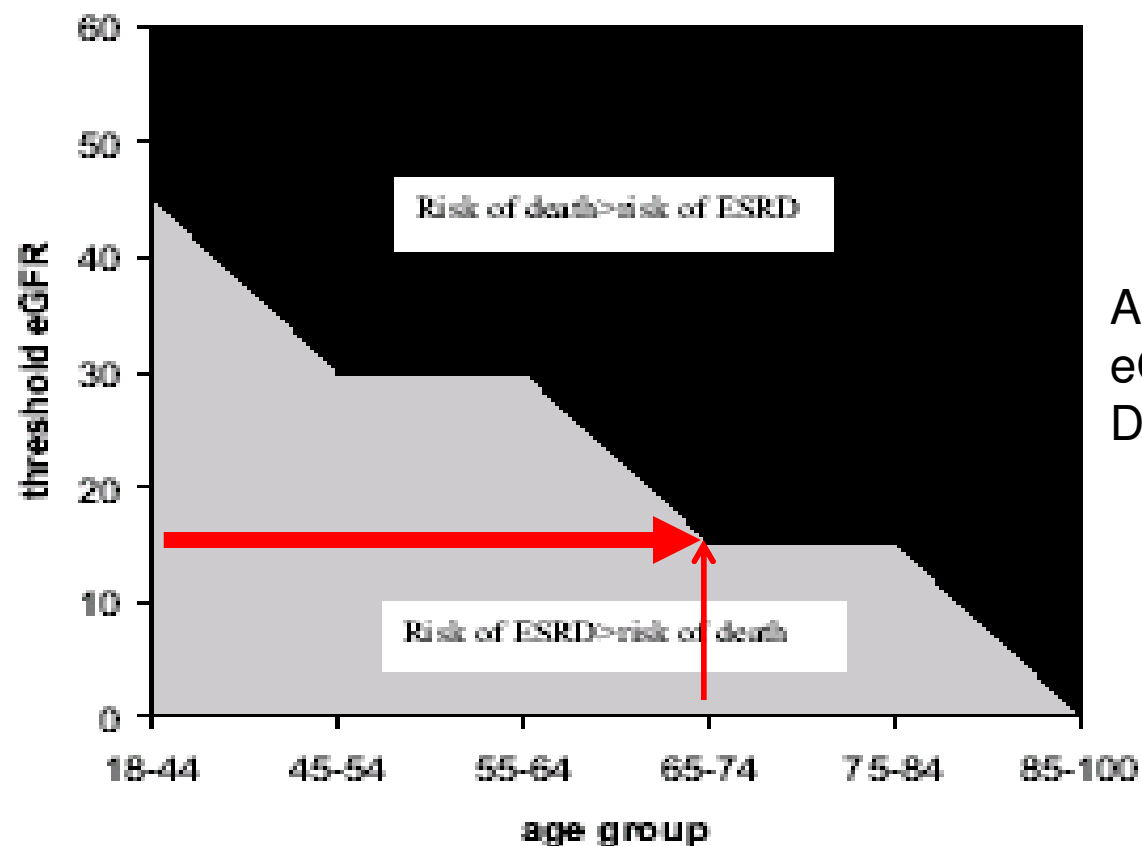
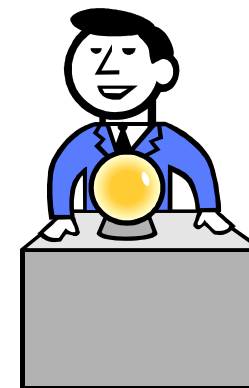
# AVF promotion and effect on grafts...did we loose a viable 2<sup>nd</sup> option?



Lee, T. et al. *J Am Soc Nephrol* 18:1936; 2007



Predicting the future  
.... who will get to dialysis  
.... When will they need dialysis



Age >65  
eGFR <15ml/min  
Death > ESRD

Figure 2. Baseline eGFR threshold below which risk for ESRD exceeded risk for death for each age group. *J Am Soc Nephrol* 18:2759-2765, 2007

# Higher eGFR at Time of Referral Influences the type of incident VA

Variable

OR (95% CI)

## Variables Associated With Incident Catheter Versus Permanent Access Use

Physician factors

First nephrology review <3 mo before dialysis start (vs >3 mo)

32.77 (8.66-123.97)<sup>d</sup>

First nephrology review <12 mo before dialysis start (vs >12 mo)

8.20 (5.92-11.36)<sup>d</sup>

Predialysis education (vs no education)

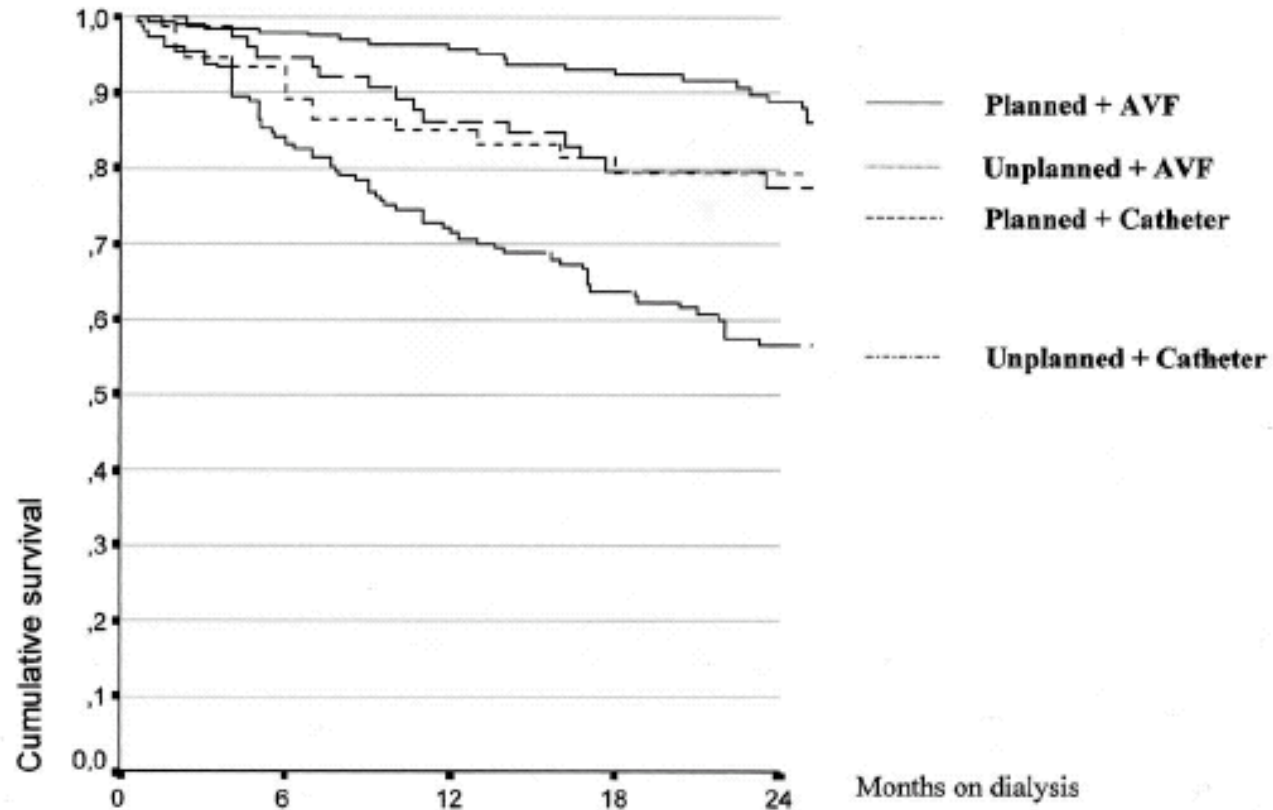
0.44 (0.27-0.71)<sup>e</sup>

eGFR at AVF/AVG creation (/5-mL/min/1.73 m<sup>2</sup> increase)

0.22 (0.10-0.50)<sup>d</sup>

**Higher eGFR at time of referral for VA associated with >> AVF use**

**Likely an interaction between late referral and CVCs  
so...not all catheters are created equal  
a planned catheter might not be so bad**



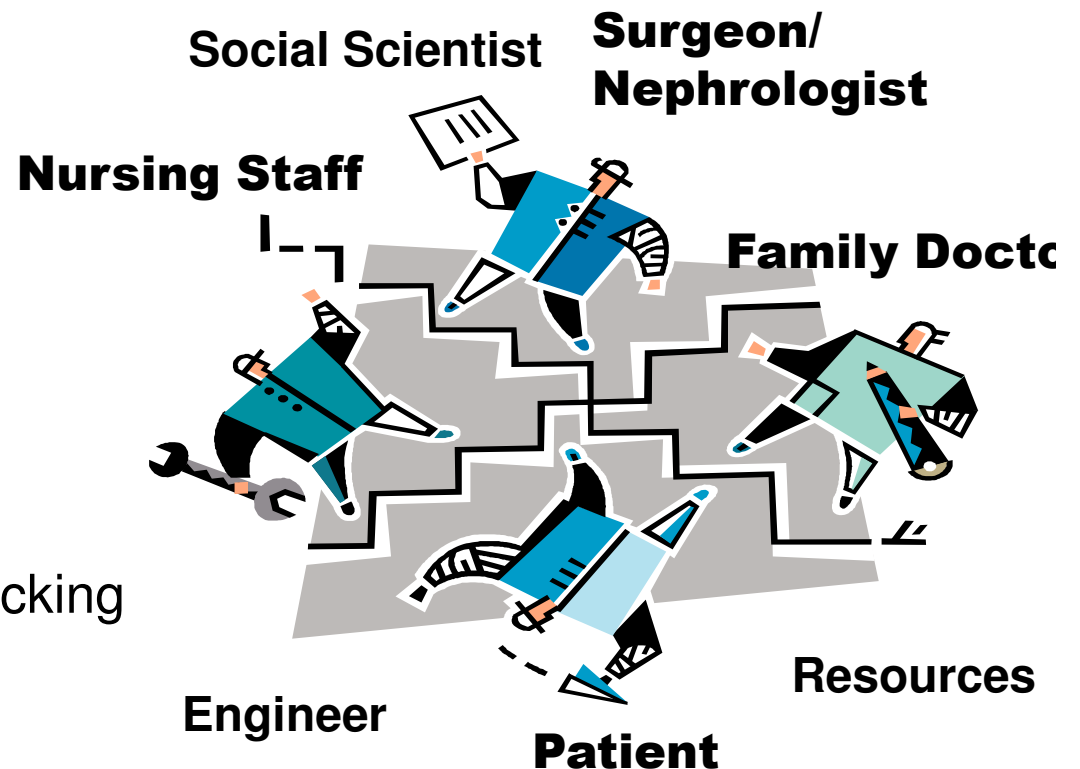
Planned + AVF	206	156	102
Planned + Catheter	75	55	31
Unplanned + AVF	78	57	40
Unplanned + Catheter	179	112	66

Fig 2. Kaplan-Meier survival curves in the 4 groups. Numbers at the bottom refer to patients entering each 12-month interval.

# Achieving Optimal Vascular Access Mix

## Team approach

- ✓ Understanding Patient choice
- ✓ Education that leads to KT
- ✓ Care pathways VA coordinator
- ✓ Centralized surgical wait list
- ✓ management
- ✓ Data management for patient tracking and VA outcomes



**We need individualized approach to vascular access**