BIAS in studies of catheter-related mortality

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A randomized trial comparing arteriovenous fistulas and central venous catheters for vascular access in elderly hemodialysis patients

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ABSTRACT

BACKGROUND

Chronic kidney disease affects 13% of the adult population in North America and is a disease spectrum ranging from mild kidney impairment to kidney failure[1]. People with kidney failure suffer significant morbidity, have poor quality of life, and a high risk of mortality[2-6]. As a consequence, they are responsible for up to 7% of the health care expenditures in developed countries[7]. Over 80% of

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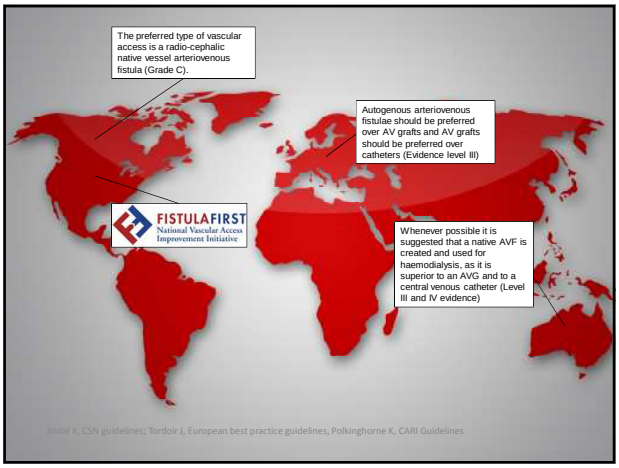
"The increased risk of mortality in patients treated with catheters is predominantly due to the fact that sicker patients are treated with catheters, rather than an effect of the catheter itself."

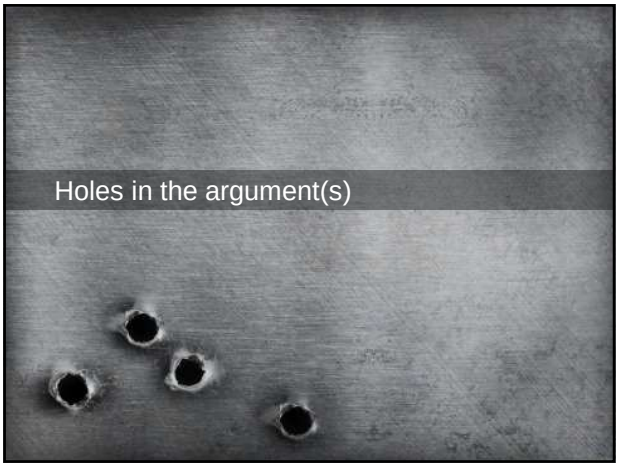
Current state

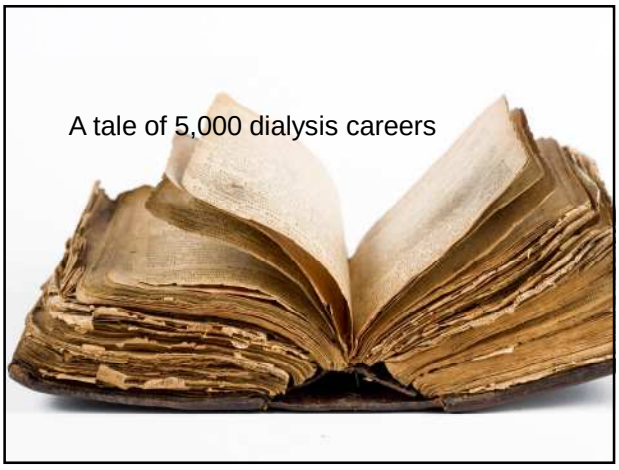
Holes in the arguments

What if we have it wrong?

(Current state)

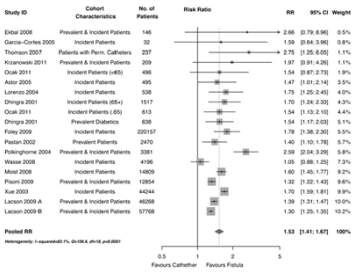

The preferred type of vascular access is a radio-cephalic native vessel arteriovenous fistula (Grade C).
Autogenous arteriovenous fistulae should be preferred over AV grafts and AV grafts should be preferred over catheters (Evidence level III)
FISTULAFIRST
National Vascular Access Improvement Initiative
Whenever possible it is suggested that a native AVF is created and used for haemodialysis, as it is superior to an AVG and to a central venous catheter (Level III and IV evidence)
Jindal K, CSN guidelines; Tordoir J, European best practice guidelines, Polkinghorne K, CARI Guidelines


Holes in the argument(s)

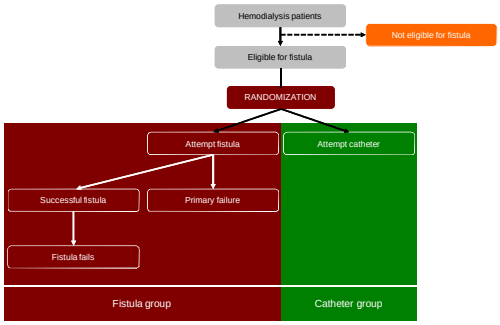

A tale of 5,000 dialysis careers

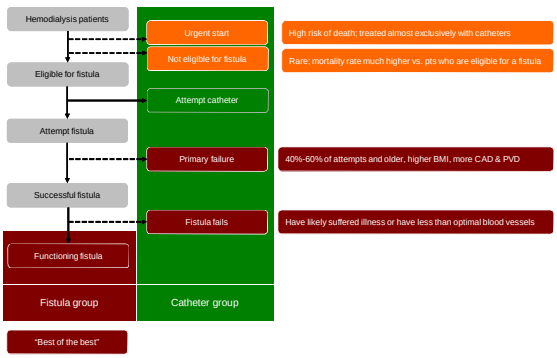
CLINICAL EPIDEMIOLOGY www.jasn.org

Associations between Hemodialysis Access Type and Clinical Outcomes: A Systematic Review



Ravani P, et al. JASN 2013 24 (3):465-473.





Quinn & Ravani, NDT 2013 epub ahead of print

Are catheters killing people?

or…..

Are sick people treated with catheters?

50% increase in mortality

POPULATION: 100 incident HD patients followed for 1 year
= 100 x 365 = 36,500 catheter days

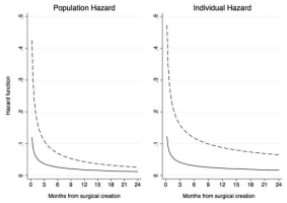
Risk of bacteremia: 0.5 per 1000 catheter days (q 5.6 years)
= Expect 18 episodes of bacteremia

Assume 3-5% are fatal
= .05 x 18 = 0.9 deaths ~1 death per year in 100 patients

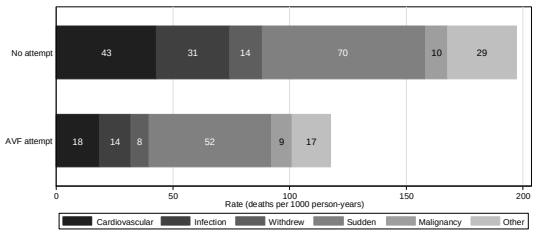
Annual mortality rate 15-20% in first year of dialysis
= Expect 15-20 deaths

Let's do the math…

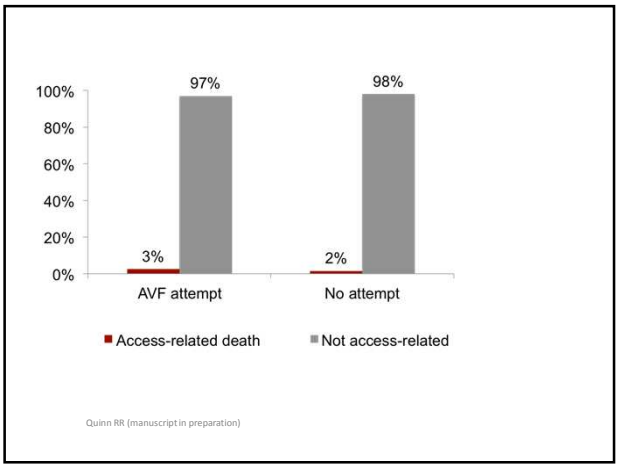
Mortality increases with exposure to an HD catheter?



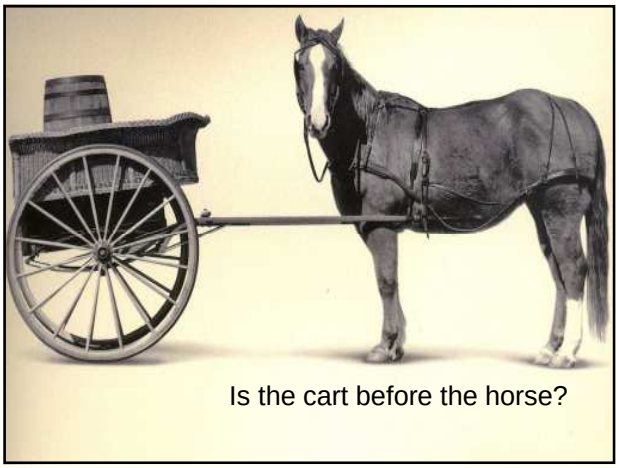
Ravani P, CJASN 2010 5:1243-1248



Quinn RR (manuscript in preparation)


100%
80%
60%
40%
20%
0%
97%
98%
3%
2%
AVF attempt
No attempt
Access-related death
Not access-related
Quinn RR (manuscript in preparation)


So what if we have it wrong?


Is the cart before the horse?

Normalization of hemoglobin

Dialysis adequacy

Early start dialysis

Statins for ESRD patients

At least we haven't been wrong before

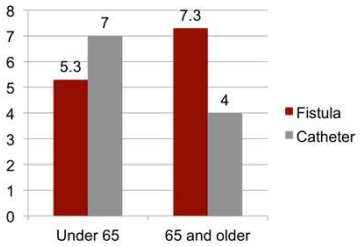
Age (yr)	Male			Female		
	Lower Comorbidity (*n*, %)[a]	Higher Comorbidity (*n*, %)[b]	Total (*n*, %)	Lower Comorbidity (*n*, %)[a]	Higher Comorbidity (*n*, %)[b]	Total (*n*, %)
18–54	204/234, 87.2	39/43, 90.7	243/277, 87.7	98/113, 86.7	12/17, 70.6	110/130, 84.6
55–64	148/174, 85.1	54/63, 85.7	202/237, 85.2	88/99, 88.9	23/26, 88.5	111/125, 88.8
65–74	208/246, 84.6	83/104, 79.8	291/350, 83.1	94/120, 78.3	43/49, 87.8	137/169, 81.1
75–84	174/239, 72.8	85/104, 81.7	259/343, 75.5	104/155, 67.1	35/50, 70.0	139/205, 67.8
≥85	31/48, 64.6	13/20, 65.0	44/68, 64.7	NR	NR	16/25, 64.0

We are not good at timing AVF placement

Oliver, CJASN 2012 7:466-471

"It's kind of embarrassing for a surgeon to do a procedure that fails 20%-30% of the time ….thankfully, you guys have low expectations"

Primary failure is common



Elderly patients don't like fistulas

Quinn, J Vasc Access 2008 9:122-128

"The increased risk of mortality in patients treated with catheters is predominantly due to the fact that sicker patients are treated with catheters, rather than an effect of the catheter itself."

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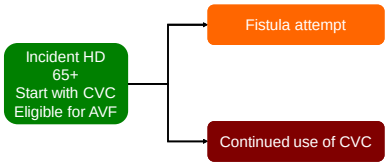
Dr. Matthew Oliver
David Ashford Foundation for Medical Research
MSI Foundation
AHRC at Li Ka Shing Knowledge Institute
ACCESS co-investigators

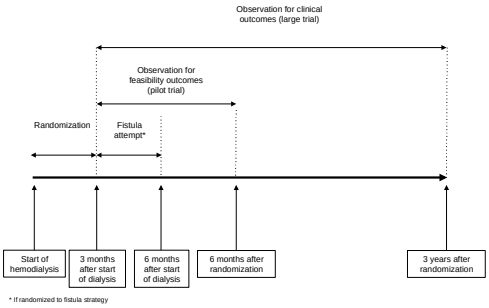
Acknowledgements

The ACCESS Trial

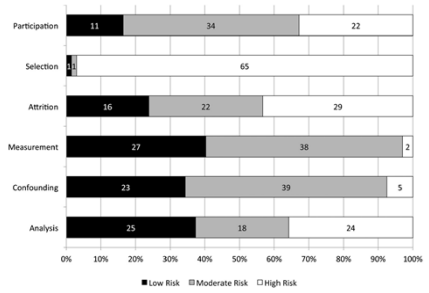
A randomized trial Comparing Catheters to fistulas in Elderly patients Starting dialysiS



Design of an RCT



Design of an RCT


Participation
11
34
22
Selection
1
1
65
Attrition
16
22
29
Measurement
27
38
2
Confounding
23
39
5
Analysis
25
18
24
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Low Risk
Moderate Risk
High Risk