



Vascular Access Selection in Older Hemodialysis Patients: Rethinking "Fistula First"

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Bottom line up front: For decades every hemodialysis patient heard the same instruction — get a fistula. The evidence behind that rule was entirely observational, and a large share of the apparent fistula survival benefit turns out to be the healthy patient, not the access. The **ACCESS-HD** pilot trial — the first randomized comparison of a catheter strategy against a fistula strategy in older starters — could not even recruit enough patients to run, because a plurality of older patients did not want a fistula. This handout distills why reflexive "Fistula First" does not fit the older, catheter-dependent starter, and how to place the decision inside shared decision-making.

Learning Objectives

By the end of this module, students will be able to:

1. Explain why vascular access selection is a different problem in the older patient starting hemodialysis than in a young, fit starter.
2. Compare the arteriovenous fistula, arteriovenous graft, and tunneled catheter across time-to-use, maturation/failure, infection, patency, and best-fit patient.
3. Describe real-world fistula maturation rates and reintervention burden using the Hemodialysis Fistula Maturation (HFM) Study numbers.
4. Explain how selection bias inflates the observed fistula survival advantage, using the "failed fistula attempt" comparison group.
5. Summarize what the ACCESS-HD pilot trial did and did not establish.
6. Apply the KDOQI ESKD Life-Plan framework and the "right access, right patient, right time, right reason" principle to an access decision.
7. Recognize the high-output cardiac caveat of a fistula in an older patient with a failing

heart.

Section 1: Why Access Choice Is Different in the Older Starter

Vascular access is the lifeline of hemodialysis, and it is also one of the largest single drivers of morbidity, hospitalization, and cost in the dialysis population. Three options exist: the autogenous **arteriovenous fistula (AVF)**, the prosthetic **arteriovenous graft (AVG)**, and the tunneled **central venous catheter (CVC)**. For a fit 50-year-old with years of expected survival and good vessels, the fistula is close to unarguable. The calculus bends, sometimes sharply, once the patient is 75, frail, multimorbid, and already dialyzing through a catheter.

Four forces reshape the decision in the older patient:

- **Competing mortality.** Many older starters die of cardiovascular disease, infection, or dialysis withdrawal long before an access has time to pay back its up-front cost.
- **Maturation failure.** Fistulas in older patients fail to mature at high rates, and a fistula that never matures leaves the patient on the very catheter you were trying to avoid.
- **A short time horizon.** The infection and patency advantages of a fistula accrue on the back end. If survival is measured in months, the patient may never reach the payoff.
- **Patient preference.** Older patients, when actually asked, frequently prefer to keep the catheter they already have.

Clinical Pearl: The question is never "fistula or catheter?" in the abstract. It is "does *this* patient live long enough, with vessels good enough, to convert the front-loaded cost of a fistula into a back-loaded benefit?" That reframing is the entire topic.

Section 2: The Three Options — Fistula, Graft, and Catheter

A patient-centered decision still requires knowing the honest trade-offs of each access.

FEATURE	FISTULA (AVF)	GRAFT (AVG)	TUNNELED CATHETER (CVC)
Time to usability	Months (median approximately 115 days)	approximately 2–4 weeks (early-cannulation grafts sooner)	Immediate
Primary / maturation failure	High, especially in older patients	Lower — grafts "mature" reliably	Not applicable
Infection risk	Lowest once working	Intermediate	Highest
Patency / reintervention	Good once mature, but frequent maintenance	Frequent thrombosis and reintervention	Dysfunction, tPA, exchange
Cardiac effect	High-output flow can burden a failing heart	Similar high-flow concern	None
Best-fit patient	Long expected survival, good vessels	Needs permanent access but poor veins / faster timeline	Short horizon, bridging, strong preference, exhausted sites

The Maturation Reality

The NIH **Hemodialysis Fistula Maturation (HFM) Study** (Huber 2021) is the cleanest prospective look at what really happens after a fistula is created. Among patients with kidney failure, unassisted AVF maturation was:

TIME AFTER CREATION	UNASSISTED MATURATION
3 months	29%
6 months	67%
12 months	76%

Median time to maturation was **115 days**. Over one-third of fistulas needed an intervention *before* they matured, and **47.5% of matured fistulas required further intervention** to maintain patency. A fistula is not a "place it and forget it" access — it is a program of procedures.

Clinical Pearl: During the months a fistula is maturing, the older patient is still dialyzing through a catheter. Attempting a fistula does not remove the catheter — it often adds a surgery on top of it and keeps the line until the fistula works, if it ever does.

Section 3: How "Fistula First" Became Doctrine — and Its Confounding Problem

The fistula's reputation was earned honestly, at first. Early work established that catheters carry the heaviest burden of access-related morbidity — bacteremia, thrombosis, central stenosis, and repeated intervention. Registry and cohort data then layered on a striking survival gap, and guidelines followed.

The most rigorous synthesis is Ravani and colleagues' 2013 systematic review of 62 cohort studies comprising 586,337 participants. The pooled meta-analysis showed the risk gradient ran catheter > graft > fistula across the hard outcomes:

COMPARISON	OUTCOME	RISK RATIO (95% CI)
Catheter vs. fistula	All-cause mortality	1.53 (1.41–1.67)
Catheter vs. fistula	Fatal infection	2.12 (1.79–2.52)

COMPARISON	OUTCOME	RISK RATIO (95% CI)
Catheter vs. fistula	Cardiovascular events	1.38 (1.24–1.54)
Catheter vs. graft	All-cause mortality	1.38 (1.25–1.52)
Graft vs. fistula	All-cause mortality	1.18 (1.09–1.27)

These are large associations, and they drove a generation of practice.

Read the authors' own caveat: Ravani et al. graded the risk of bias in the underlying studies as **high, especially selection bias**. The association is real; the *causal* interpretation is where it breaks down.

The Confounding Problem: The Fistula Gets a Healthy Patient

Sicker patients are less likely to receive, or successfully mature, a fistula. They crash onto dialysis, they have poor vessels, they have limited life expectancy — and they end up on catheters. So when we compare catheter patients to fistula patients, we are partly comparing sicker people to healthier people and attributing the difference to a piece of hardware. Three studies dismantle the causal reading:

Brown 2017 analyzed a Medicare cohort of 115,425 incident hemodialysis patients aged 67 and older. The fistula-first group had the expected mortality advantage (HR 0.50). But the decisive comparison is the group that *attempted* a fistula, had it fail, and started dialysis on a catheter anyway — dialyzing through a catheter, exactly like the reference group — yet they still had lower mortality (HR 0.66):

GROUP	6-MO MORTALITY	12-MO	24-MO
Fistula-first	9%	17%	31%
Catheter after failed fistula attempt	15%	25%	42%
Catheter-first (reference)	32%	46%	62%

Patients who merely *qualified* for a fistula attempt did better even when they never got a working fistula. The authors concluded that patient factors account for **about two-thirds** of the apparent fistula survival benefit — the access is doing about one-third; the patient is doing the rest.

Quinn 2017 attacked the same question from the cause-of-death angle in 2,300 Canadian incident patients, with two investigators independently adjudicating every death. If catheters kill through line sepsis and endocarditis, access-related deaths should be common. They were not: only **approximately 2% of all deaths (14 of 617) were access-related**. The authors concluded the excess mortality in catheter patients "does not appear to be due to direct, access-related complications," but rather residual confounding and selection bias.

Lyu 2021 used a target-trial-emulation framework on 19,867 elderly patients with an **instrumental-variable analysis** (the surgeon's proclivity to create a fistula as the instrument — a design that addresses *unmeasured* confounding). Standard weighting still showed an early fistula advantage, but the instrumental-variable analysis found **no association** between access type and mortality, sepsis, or hospitalization.

Clinical Pearl — the confounding tell: When a "failed fistula attempt" group that dialyzes through a catheter still beats the catheter-first group, the benefit cannot be living in the fistula. It is living in whatever made those patients candidates in the first place. That is the single most useful mental model to carry into an access conversation.

Section 4: ACCESS-HD — The Trial That Tried to Answer It

Everything above is observational. The obvious fix is a randomized trial, and that is exactly what Quinn, Ravani, and colleagues attempted in **ACCESS-HD** (Comparing Catheters to Fistulas in Older Patients Starting Hemodialysis), a parallel-arm pilot RCT across 12 centers (9 Canadian, 3 Australian), 2014–2021. Older patients who had started hemodialysis on a catheter and were judged fistula-eligible were randomized 1:1 to a **fistula attempt** or **continued tunneled catheter**.

The primary endpoint was feasibility, not a clinical outcome. This is the interpretive key.

Two co-primary feasibility targets were set:

FEASIBILITY ENDPOINT	TARGET	RESULT
Eligible patients consenting to randomization	≥ 25%	25% (67/268) — barely met
Fistula arm getting an attempt ≤ 90 days	≥ 80%	71% (24/34) — not met

Of 268 eligible patients, **201 declined** and only 67 were randomized. **The most robust, least-biased finding is why patients said no.** Among those who declined, **37% preferred to keep their catheter**, 23% preferred a fistula, and 17% did not want to join a study. Patient preference — not surgical capacity — was the dominant barrier to running the trial at all.

Clinical Secondary Outcomes (Hypothesis-Generating)

The clinical signals are secondary, underpowered (n=67), and carry no adjustment for multiple testing. Read them as directional, not definitive.

OUTCOME	CATHETER ARM	FISTULA ARM	DIRECTION
Mortality (median f/u 29 mo)	6 (18%)	8 (24%)	Not significant
Access-related death	0	1 (line sepsis + endocarditis)	Occurred in <i>fistula</i> arm
Access-related procedures	0.72 / patient-yr	2.23 / patient-yr	Favors catheter
Hospitalizations	Fewer	More	Favors catheter
Bacteremia	Lower	Higher (mostly catheter-related)	Favors catheter
tPA (thrombolytic) use	Higher	Lower	Favors fistula

Almost every signal tilted toward the catheter arm. The one outcome favoring the fistula strategy was thrombolytic use, and the mechanism is transparent: catheters clot, so catheter patients needed more tPA.

Why the fistula arm still had catheter-related bacteremia: patients randomized to a fistula strategy **still had catheters during maturation**. You do not escape the catheter by attempting a fistula — you keep the line until the fistula works. That is why the fistula arm's bacteremia was predominantly catheter-related.

Clinical Pearl — what ACCESS-HD actually proves: Two things, both solid: (1) a definitive fistula-vs-catheter RCT is **not feasible** in the current climate, blocked by structural fistula incentives and strong patient preference; and (2) there is **no signal of harm** from a catheter strategy in older starters. It *cannot* prove catheters are superior — and does not claim to. Everything else is hypothesis-generating.

Section 5: The Patient-Centered Framework — the ESKD Life-Plan

The 2019 KDOQI guideline replaced the rigid Fistula-First slogan with the **End-Stage Kidney Disease (ESKD) Life-Plan** and the principle of "**the right access, in the right patient, at the right time, for the right reasons**." That is the framework to actually use.

The decision rests on three questions:

1. **What is the expected survival and trajectory?** A robust patient with years ahead earns the fistula's back-loaded benefit. A frail patient with a short horizon may never reach it.
2. **What are the vessels and the surgical timeline?** Poor veins push toward a graft; an urgent need with no mature options may mean a bridging catheter regardless.
3. **What does the patient actually want?** ACCESS-HD showed this is not a footnote — it is often the deciding factor, and more than a third of eligible older patients preferred their catheter.

Clinical Pearl — the high-output trap in the older heart: Do not forget the cardiac cost of a fistula. In an older patient with reduced ejection fraction or pulmonary hypertension, a high-flow upper-arm fistula can worsen high-output physiology. In that patient the "gold

standard" access can be the wrong one on hemodynamic grounds alone — another reason the hierarchy has to yield to the individual.

The honest position: in the robust older patient with good vessels and a long horizon, still favor a fistula — the infection and patency benefits are real if the patient lives to collect them. A graft is a legitimate middle path when veins are poor or the timeline is short. And when a frail older patient who prefers his line says so, ACCESS-HD says you are on solid ground honoring that. Access type matters less than access *fit*.

Practice Questions

1. A 78-year-old man started hemodialysis on a tunneled catheter three weeks ago. He is frail, has heart failure with reduced ejection fraction, and tells you he would rather keep his catheter. His nephrologist judges him fistula-eligible. What does the best available evidence support?

- A. Mandatory fistula creation — Fistula First applies to all eligible patients
- B. Honoring a catheter strategy is reasonable; there is no randomized evidence of harm, and preference is a legitimate deciding factor
- C. A PICC line as a compromise access
- D. Immediate graft placement regardless of preference

Correct Answer: B) Honoring a catheter strategy is reasonable *ACCESS-HD found no signal of harm from a catheter strategy in older starters, and patient preference was the dominant real-world driver — 37% of decliners preferred their catheter. In a frail patient with heart failure, the high-output physiology of a fistula adds cardiac risk. The decision belongs in the ESKD Life-Plan and shared decision-making, not a rigid hierarchy.*

2. In Brown's 2017 cohort, patients who attempted a fistula, had it fail, and started dialysis on a catheter still had lower mortality than patients who started catheter-first. What does this comparison most directly demonstrate?

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- A. Fistulas reduce mortality even when they never mature

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- B. Catheters directly cause most deaths in dialysis patients
- C. Much of the apparent fistula survival benefit is selection bias — the healthier patient, not the access
- D. Failed fistula attempts improve vessel health

Correct Answer: C) Much of the apparent fistula survival benefit is selection bias *Both groups dialyzed through a catheter, so the survival difference cannot be attributed to the access itself. It reflects whatever made those patients fistula candidates — better health and longer life expectancy. The authors estimated patient factors account for about two-thirds of the apparent benefit. Quinn 2017 reinforced this: only approximately 2% of deaths were access-related.*

3. The primary endpoint of the ACCESS-HD trial was:

- A. All-cause mortality at two years
- B. Catheter-related bacteremia rate
- C. Feasibility of conducting the trial (recruitment and timely fistula attempt)
- D. Access-related procedure count

Correct Answer: C) Feasibility of conducting the trial *ACCESS-HD was a pilot trial whose co-primary endpoints were feasibility targets: at least 25% of eligible patients consenting (met, barely, at 25%) and at least 80% of the fistula arm getting an attempt within 90 days (not met, at 71%). The clinical outcomes — mortality, bacteremia, procedures — were underpowered secondary endpoints. The trial's central finding is that a definitive RCT is not feasible, largely because patients prefer their catheters.*

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Created for PA/Medical Student Education — Last Updated: 2026-07-03. For clinical management decisions, consult current guidelines, institutional protocols, and attending nephrologists.

For the full, reference-verified deep dive, see the [mastery review: Vascular Access Selection in Older Patients](#).