Effective Health Care

Vascular Access for End Stage Renal Disease (ESRD) and Hemodialysis (HD) in Elderly

Results of Topic Selection Process & Next Steps

The nominator, Kaiser Permanente (KP), is interested in sharing the information with KP physicians (vascular surgeons, nephrologists) to provide high quality care that is safe and effective in elderly hemodialysis patients.

Because limited original research addresses the nomination, a new review is not feasible at this time. No further activity on this nomination will be undertaken by the Effective Health Care (EHC) Program.

Topic Brief

Topic Number and Name: Vascular Access for Hemodialysis in Elderly

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Conflict of Interest: None of the investigators have any affiliations or financial involvement that conflicts with the material presented in this report.

Background

There are three different types of vascular access (VA) used for hemodialysis (HD). Two types of vascular access (VA) designed for long-term use are the arteriovenous fistula (AVF) and the AV graft (AVG). A third type of vascular access, central venous catheter (CVC) is commonly used for temporary/short-term use[1]

However, elderly patients with end-stage renal disease (ESRD) present unique challenges when selecting the optimal vascular access modality for dialysis. [2]Although guidelines and initiatives (KDOQI -Kidney Disease Outcomes Quality Initiative and The Fistula First Initiative) recommend placement of an AVF as the vascular access of choice due to superior outcomes, AVF might not always be appropriate for elderly patients.[3] Important considerations are life expectancy, complications from each vascular access type, patient preference, and the overall quality of life of the patient.

> Arterial-Venous Fistula (AVF): Artery and vein are connected surgically in arm, or leg. It is the preferred VA of all the types of HD since it can function for years and less likely to become infected or clotted. But its maturation may be delayed or failed.
> Arterial-Venous Graft (AVG): It functions similarly to an AV fistula but a surgically placed small tube connects vein and artery when veins are not appropriate for fistula. However, it does not last as long as AV fistula and risk of clotting is higher.

Central venous catheter (CVC): A flexible catheter that is placed in a central vein. It can be quickly placed and used immediately. However, it may damage veins and cause catheter infection and clotting. It is not usually intended to be a permanent or long term VA for HD.

Nominator and Stakeholder Engagement

The nominator is interested in using a rigorous systematic review process to share the information with its physicians (vascular surgeons, nephrologists) to provide high quality care that is safe and effective in elderly hemodialysis patients. The nominator would like to know the effectiveness and harms of different types of vascular access for hemodialysis in adults 70 years and older. Though the nominating organization has completed a rapid review on the topic, they would like a more in-depth comprehensive analysis developed by the EPC program.

Key Questions and PICOs

The key questions for this nomination are:

1. What is the comparative effectiveness and harms of different types of vascular access for hemodialysis in adults 70 years and older?
    a. In subgroups of older adults (e.g., age, sex, race, comorbidities) what are the adverse effects and comparative adverse effects of different types of vascular access for hemodialysis?

To define the inclusion criteria for the key questions, we specify the population, interventions, comparators, outcomes, timing, setting (PICOTS) of interest (Table 1).

Table 1. Key Questions and PICOTS

Key Question	
Population	Adults 70 years and older with ESRD requiring hemodialysis
Interventions	Vascular access for hemodialysis (Arteriovenous fistula, Arteriovenous graft, or Catheter)
Comparators	Vascular access for hemodialysis (Arteriovenous fistula, Arteriovenous graft, or Catheter)
Outcomes	Patency Infection Mortality
Timing	Any
Setting	Any

Abbreviations: End Stage Renal Disease (ESRD)

Methods

We assessed nomination Vascular Access for End Stage Renal Disease (ESRD) and Hemodialysis (HD) in Elderly, for priority for a systematic review or other AHRQ EHC report with a hierarchical process using established selection criteria. Assessment of each criteria determined the need to evaluate the next one. See Appendix A for detailed description of the criteria.

1. Determine the *appropriateness* of the nominated topic for inclusion in the EHC program.
2. Establish the overall *importance* of a potential topic as representing a health or healthcare issue in the United States.
3. Determine the *desirability of new evidence review* by examining whether a new systematic review or other AHRQ product would be duplicative.
4. Assess the *potential impact* a new systematic review or other AHRQ product.

5. Assess whether the *current state of the evidence* allows for a systematic review or other AHRQ product (feasibility).
6. Determine the *potential value* of a new systematic review or other AHRQ product.

Appropriateness and Importance
We assessed the nomination for appropriateness and importance.

Desirability of New Review/Duplication
We searched for high-quality, completed or in-process evidence reviews published in the last three years on the key questions of the nomination. See Appendix B for sources searched.

Impact of a New Evidence Review
The impact of a new evidence review was qualitatively assessed by analyzing the current standard of care, the existence of potential knowledge gaps, and practice variation. We considered whether it was possible for this review to influence the current state of practice through various dissemination pathways (practice recommendation, clinical guidelines, etc.).

Feasibility of New Evidence Review
We conducted a literature search in PubMed from December, 2013 to December 2018. See Appendix C for the PubMed search strategy and links to the ClinicalTrials.gov search.

We reviewed all identified titles and abstracts for inclusion and classified identified studies by key question and study design to assess the size and scope of a potential evidence review.

Value
We assessed the nomination for value. We considered whether or not the clinical, consumer, or policymaking context had the potential to respond with evidence-based change; and if a partner organization would use this evidence review to influence practice.

Results
See Appendix A for detailed assessments of all EPC selection criteria.

Appropriateness and Importance
This is an appropriate and important topic.

Desirability of New Review/Duplication
A new evidence review would not be duplicative of an existing evidence review. We identified two reviews related to this topic.

- Almasri et al. [4] this was not considered duplicative because the review only conducted a sub-analysis in elderly patients, and there was no statistical comparison.
- Kaiser Permanente researchers (in press) by mainly including observational cohort studies. This was a rapid review, and not a full systematic review.

See Table 2, Duplication column.

Impact of a New Evidence Review
A new systematic review may have unclear level of impact.

Feasibility of a New Evidence Review
The evidence base is small and a new evidence review will not be feasible due to lack of comparative effective trials.

We identified 18 studies, which were mostly retrospective non-comparative studies. They are unlikely to change what is already known about the risk of different outcomes among certain types of hemodialysis vascular access in elderly patients. Well-conducted comparative prospective studies are needed to assess outcomes of different dialysis accesses, especially in elderly patients that may experience different rates of outcomes.

We also identified 6 active and ongoing RCTs comparing VA types of elderly HD patients, these trials may be more likely to contribute the current limited evidence on the topic in the future.

See Table 2, Feasibility column.

Table 2. Key Questions and Results for Duplication and Feasibility

Key Question	Duplication (12/2015-12/2018)	Feasibility (12/2013-12/2018)
KQ 1: Comparative effectiveness and harms of different types of vascular access for hemodialysis in elderly	Total number of identified systematic reviews: # • AHRQ EPC: 0 • Cochrane: 0 • VA ESP: 0 • Kaiser Permanente: Recently completed RR • Other group: # 1[4]	Size/scope of review Relevant Studies Identified: # 18 • Cohort, retrospective: #15 [5-19] • Cohort, prospective: # 3 [20-22] Clinicaltrials.gov • Active, Recruiting: # 6

Abbreviations: AHRQ=Agency for Healthcare Research and Quality; KQ=Key Question

Summary of Findings

- Appropriateness and importance: The topic is both appropriate and important.
- Duplication: A new review would not be duplicative of an existing product
- Impact: A new systematic review has unclear impact potential.
- Feasibility: A new review is not feasible. The evidence base is likely small.

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Appendix A. Selection Criteria Assessment

Selection Criteria	Assessment
1. Appropriateness	
1a. Does the nomination represent a health care drug, intervention, device, technology, or health care system/setting available (or soon to be available) in the U.S.?	Yes, this topic represents health care interventions available in the U.S
1b. Is the nomination a request for a systematic review?	Yes, this topic is a request for a systematic review.
1c. Is the focus on effectiveness or comparative effectiveness?	Yes, the focus in on comparative effectiveness
1d. Is the nomination focus supported by a logic model or biologic plausibility? Is it consistent or coherent with what is known about the topic?	Yes, it is biologically plausible and consistent with what is known about the topic.
2. Importance	
2a. Represents a significant disease burden; large proportion of the population	Yes, this topic represents a significant burden. The number of elderly patients (aged ≥75 years) with end-stage renal disease (ESRD) who require renal replacement therapy is rapidly increasing worldwide. Since 2000, the adjusted rate of incident dialysis in patients aged ≥75 years in the USA has increased by 12.2%; this group now represents the fastest growing segment of the ESRD population.
2b. Is of high public interest; affects health care decision making, outcomes, or costs for a large proportion of the US population or for a vulnerable population	Yes, this topic affects heath care decisions for a large proportion of the US elderly hemodialysis population.
2c. Represents important uncertainty for decision makers	Yes, this topic represents important uncertainty for decision makers.
2d. Incorporates issues around both clinical benefits and potential clinical harms	Yes, this nomination addresses both benefits and potential harms of vascular access interventions for elderly hemodialysis patients.
2e. Represents high costs due to common use, high unit costs, or high associated costs to consumers, to patients, to health care systems, or to payers	High cost to patients and health care systems and payers
3. Desirability of a New Evidence Review/Duplication	
3. Would not be redundant (i.e., the proposed topic is not already covered by available or soon-to-be available high-quality systematic review by AHRQ or others)	Yes. There is no completed or ongoing systematic review duplicative of the key question. Kaiser Permanente recently completed a rapid review on the topic in press.
4. Impact of a New Evidence Review	
4a. Is the standard of care unclear (guidelines not available or guidelines inconsistent, indicating an information gap that may be addressed by a new evidence review)?	Guidelines and initiatives recommend placement of an arterio-venous fistula (AVF) as the vascular access of choice due to superior outcomes. However, elderly patients with ESRD present unique challenges when selecting the optimal vascular access modality for hemodialysis and AVF might not always be appropriate for elderly patients.
4b. Is there practice variation (guideline inconsistent with current practice, indicating a potential implementation gap and not best addressed by a new evidence review)?	Yes, there is concern about whether guidelines apply the elderly population since vascular access planning in elderly is different from than in younger patients.
5. Primary Research	

5. Effectively utilizes existing research and knowledge by considering: - Adequacy (type and volume) of research for conducting a systematic review - Newly available evidence (particularly for updates or new technologies)	*The evidence base is limited, and a new review may not be feasible, Size/scope of review: We identified 18 cohort studies, 15 were retrospective from registries or claims databases; 3 were prospective cohorts without control group.* *ClinicalTrials.gov: We found 6 active ongoing trials relevant to the key question.*

Abbreviations: AHRQ=Agency for Healthcare Research and Quality; KQ=Key Question

Appendix B. Search for Evidence Reviews (Duplication)

Listed below are the sources searched, hierarchically
December, 2018

Primary Search
AHRQ: Evidence reports and technology assessments *Resource searched, no relevant reviews found.*
VA Products: PBM, and HSR&D (ESP) publications, and VA/DoD EBCPG Program *Resource searched, no relevant reviews found.*
Cochrane Systematic Reviews *Resource searched, no relevant reviews found.*
HTA (CRD database): Health Technology Assessments *Resource searched, no relevant reviews found.*
PubMed Health *PubMed Health, a portal for systematic reviews as well as consumer health information, was discontinued on October 31, 2018.*
Secondary Search
AHRQ Products in development *Resource searched, no relevant protocols found.*
VA Products in development *Resource searched, no relevant protocols found.*
Cochrane Protocols *Resource searched, no relevant protocols found.*
PROSPERO Database (international prospective register of systematic reviews and protocols) *Resource searched, no relevant protocols found.*
Tertiary Search
PubMed *"Vascular Access Devices"[Mesh] AND "Kidney Failure, Chronic"[Mesh] AND "Aged"[Mesh] 4 Reviews (Systematic or otherwise) found*

Appendix C. Search Strategy & Results (Feasibility)

Feasibility	
MEDLINE(PubMed) searched on: December 4, 2018	
Concept	Search String
Chronic Kidney Failure	(("Kidney Failure, Chronic"[Mesh]) OR "chronic kidney failure"[Title/Abstract]) OR ESRD[Title/Abstract]
AND	
Vascular Access	("Vascular Access Devices"[Mesh]) OR "vascular access"[Title/Abstract]
AND	
>70 years	(elderly[Title/Abstract]) OR "Aged"[Mesh]
Limits: English/Last 5 Years	Filters activated: published in the last 5 years, English.
Total N=240	
SR N=4 https://www-ncbi-nlm-nih-gov.liboff.ohsu.edu/sites/myncbi/r.relevo.1/collections/57282023/public/	Systematic[sb]
RCT N=54 https://www-ncbi-nlm-nih-gov.liboff.ohsu.edu/sites/myncbi/r.relevo.1/collections/57282079/public/	(((((((groups[tiab])) OR (trial[tiab])) OR (randomly[tiab])) OR (drug therapy[sh])) OR (placebo[tiab])) OR (randomized[tiab])) OR (controlled clinical trial[pt])) OR (randomized controlled trial[pt])
Other N=182 https://www-ncbi-nlm-nih-gov.liboff.ohsu.edu/sites/myncbi/r.relevo.1/collections/57282115/public/	
clinicalTrials.gov 26 Studies found for: Recruiting, Active, not recruiting, Completed, Enrolling by invitation Studies | Kidney Failure | Vascular Access | 70 years | First posted on or after 12/04/2013 https://clinicaltrials.gov/ct2/results?cond=Kidney+Failure&term=&type=&rslt=&recrs=a&recrs=f&recrs=d&recrs=e&age_v=70&gndr=&intr=Vascular+Access&titles=&outc=&spons=&lead=&id=&cntry=&state=&city=&dist=&locn=&strd_s=&strd_e=&prcd_s=&prcd_e=&sfpd_s=12%2F04%2F2013&sfpd_e=&lupd_s=&lupd_e=&sort=	

ClinicalTrials.gov
Recruiting, Active, not recruiting, Completed, Enrolling by invitation Studies | Kidney Failure | Vascular Access | 70 years | First posted on or after 12/04/2013

1	Graft-first Versus Fistula-first in Older Patients With End-stage Kidney Disease NCT03545113	Active, recruiting	•Kidney Diseases	•Procedure: Upper arm arteriovenous graft surgery •Procedure: Upper arm arteriovenous fistula surgery	Study Design: •Allocation: Randomized •Intervention Model: Parallel Assignment •Masking: Single (Outcomes Assessor)
2	Graft-first Versus Fistula-first in Older Patients With End-stage Kidney Disease NCT03183245	Active, recruiting	•Renal Failure •End Stage Renal Disease •Hemodialysis •Vascular Access	•Biological: Human Acellular Vessel (HAV) •Procedure: Arteriovenous fistula (AVF)	Study Design: •Allocation: Randomized •Intervention Model: Parallel Assignment •Masking: None (Open Label) •Primary Purpose: Treatment
3	Hemodialysis in the Elderly (70yrs & Older) NCT03065972	Active, recruiting	•Kidney Disease •Kidney Failure •Chronic Kidney Disease	•Procedure: Surgical fistula creation from patient's anatomy •Device: Surgical Graft implant	Study Design: •Allocation: Randomized •Intervention Model: Parallel Assignment •Masking: None (Open Label) •Primary Purpose: Treatment
4	Comparison of AVF Versus AVG in Elderly Patients Starting Dialysis NCT02981706	Active, recruiting	•Chronic Kidney Disease •End stage Renal Disease	•Procedure: Arteriovenous Fistula (AVF) •Procedure: Arteriovenous Graft (AVG)	Study Design: •Allocation: Randomized •Intervention Model: Parallel Assignment •Masking: None (Open Label) •Primary Purpose: Treatment
5	ACCESS HD: Comparing Catheters to Fistulas in Elderly Patients Starting Hemodialysis NCT02675569	Active, recruiting	•End-stage Kidney Failure	•Procedure: Catheter •Procedure: Fistula	Study Design: •Allocation: Randomized •Intervention Model: Parallel Assignment •Masking: None (Open Label) •Primary Purpose: Treatment
6	Comparison of the Human	Active, not recruiting	•Renal Failure	•Biological: Human	Study Design:

	Acellular Vessel (HAV) With ePTFE Grafts as Conduits for Hemodialysis NCT02644941		•End Stage Renal Disease •Hemodialysis •Vascular Access	Acellular Vessel (HAV) •Device: ePTFE graft	•Allocation: Randomized •Intervention Model: Parallel Assignment •Masking: None (Open Label) •Primary Purpose: Treatment