**National Quality Forum—Evidence (subcriterion 1a)**

**Measure Number** (*if previously endorsed*)**:** 2594

**Measure Title**: Optimal ESRD Starts

**IF the measure is a component in a composite performance measure, provide the title of the Composite Measure here:** Click here to enter composite measure #/ title

**Date of Submission**: 2/26/2015

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| **Instructions**  *For composite performance measures:*  *A separate evidence form is required for each component measure unless several components were studied together.*  *If a component measure is submitted as an individual performance measure, attach the evidence form to the individual measure submission.*   * Respond to all questions as instructed with answers immediately following the question. All information needed to demonstrate meeting the evidence subcriterion (1a) must be in this form. An appendix of *supplemental* materials may be submitted, but there is no guarantee it will be reviewed. * If you are unable to check a box, please highlight or shade the box for your response. * Maximum of 10 pages (*incudes questions/instructions*; minimum font size 11 pt; do not change margins). ***Contact NQF staff if more pages are needed.*** Because this review includes multiple clinical practice guidelines as well as systematic medical evidence review, we exceeded 10 pages. This was discussed with and approved by NQF consultant Sarah Sampsel on a phone call with other NQF staff. * Contact NQF staff regarding questions. Check for resources at [Submitting Standards webpage](http://www.qualityforum.org/Measuring_Performance/Submitting_Standards.aspx). |

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| **Note: The information provided in this form is intended to aid the Steering Committee and other stakeholders in understanding to what degree the evidence for this measure meets NQF’s evaluation criteria.**   1a. Evidence to Support the Measure Focus The measure focus is evidence-based, demonstrated as follows:   * Health outcome: [**3**](#Note3) a rationale supports the relationship of the health outcome to processes or structures of care. Applies to patient-reported outcomes (PRO), including health-related quality of life/functional status, symptom/symptom burden, experience with care, health-related behavior. * Intermediate clinical outcome: a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4)that the measured intermediate clinical outcome leads to a desired health outcome. * Process: [**5**](#Note5) a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4) that the measured process leads to a desired health outcome. * Structure: a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4) that the measured structure leads to a desired health outcome. * Efficiency: [**6**](#Note6) evidence not required for the resource use component.   **Notes**  **3.** Generally, rare event outcomes do not provide adequate information for improvement or discrimination; however, serious reportable events that are compared to zero are appropriate outcomes for public reporting and quality improvement.  **4.** The preferred systems for grading the evidence are the U.S. Preventive Services Task Force (USPSTF) [grading definitions](http://www.uspreventiveservicestaskforce.org/uspstf/grades.htm) and [methods](http://www.uspreventiveservicestaskforce.org/methods.htm), or Grading of Recommendations, Assessment, Development and Evaluation [(GRADE) guidelines](http://www.gradeworkinggroup.org/publications/index.htm).  **5.** Clinical care processes typically include multiple steps: assess → identify problem/potential problem → choose/plan intervention (with patient input) → provide intervention → evaluate impact on health status. If the measure focus is one step in such a multistep process, the step with the strongest evidence for the link to the desired outcome should be selected as the focus of measurement. Note: A measure focused only on collecting PROM data is not a PRO-PM.  **6.** Measures of efficiency combine the concepts of resource use and quality (see NQF’s [Measurement Framework: Evaluating Efficiency Across Episodes of Care](http://www.qualityforum.org/Publications/2010/01/Measurement_Framework__Evaluating_Efficiency_Across_Patient-Focused_Episodes_of_Care.aspx); [AQA Principles of Efficiency Measures](http://www.aqaalliance.org/files/PrinciplesofEfficiencyMeasurementApril2006.doc)). |

**1a.1.This is a measure of**: (*should be consistent with type of measure entered in De.1*)

Outcome

Health outcome: Click here to name the health outcome

Patient-reported outcome (PRO): Click here to name the PRO

*PROs include HRQoL/functional status, symptom/symptom burden, experience with care, health-related behaviors*

Intermediate clinical outcome (*e.g., lab value*): Click here to name the intermediate outcome

Process: Optimal ESRD Starts

Structure: Click here to name the structure

Other: Click here to name what is being measured

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**HEALTH OUTCOME/PRO PERFORMANCE MEASURE**  *If not a health outcome or PRO, skip to* [*1a.3*](#Section1a3)

**1a.2.** **Briefly state or diagram the path between the health outcome (or PRO) and the healthcare structures, processes, interventions, or services that influence it.**

Not applicable, process measure.

**1a.2.1.** **State the rationale supporting the relationship between the health outcome (or PRO) to at least one healthcare structure, process, intervention, or service (*i.e., influence on outcome/PRO*).**

Not applicable, process measure.

*Note: For health outcome/PRO performance measures, no further information is required; however, you may provide evidence for any of the structures, processes, interventions, or service identified above.*

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**intermediate outcome, PROCESS, or STRUCTURE PERFORMANCE measure**

**1a.3.****Briefly state or diagram the path between structure, process, intermediate outcome, and health outcomes**. Include all the steps between the measure focus and the health outcome.

The processes of patient education, planning for dialysis and transplant, and care coordination before End Stage Renal Disease (ESRD) lead to Optimal ESRD Starts with improved patient outcomes (mortality, CV events, quality of life, hospital and cost). Patients prepared for ESRD generally do not require hospitalization or the use of hemodialysis catheters, associated with high rates of BSI, to initiate dialysis.

The chart below is also in this pdf for improved readability



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**1a.3.1.** **What is the source of the systematic review of the body of evidence that supports the performance measure?**

Clinical Practice Guideline recommendation – ***complete sections*** [***1a.4***](#Section1a4)***, and*** [***1a.7***](#Section1a7)

US Preventive Services Task Force Recommendation – ***complete sections*** [***1a.5***](#Section1a5) ***and*** [***1a.7***](#Section1a7)

Other systematic review and grading of the body of evidence (*e.g., Cochrane Collaboration, AHRQ Evidence Practice Center*) – ***complete sections*** [***1a.6***](#Section1a6) ***and*** [***1a.7***](#Section1a7)

Other – ***complete section*** [***1a.8***](#Section1a8)

*Please complete the sections indicated above for the source of evidence. You may skip the sections that do not apply.*

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**1a.4. CLINICAL PRACTICE GUIDELINE RECOMMENDATION**

**Section A: CPGs Addressing Optimal Vascular Access**

1. **KDOQI Guidelines 2006 Update – Vascular Access**

**1a.4.1.** **Guideline citation** (*including date*) and **URL for guideline** (*if available online*):

2006 Updates Clinical Practice Guidelines and Recommendations KDOQI (National Kidney Foundation)

<http://www.kidney.org/sites/default/files/docs/12-50-0210_jag_dcp_guidelines-va_oct06_sectionc_ofc.pdf>

**1a.4.2.** **Identify guideline recommendation number and/or page number** and **quote verbatim, the specific guideline recommendation**.

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1.1 Patients with a glomerular filtration rate (GFR) less than 30 mL/min/1.73 m2 (CKD stage 4) should be educated on all modalities of kidney replacement therapy (KRT) options, including transplantation, so that timely referral can be made for the appropriate modality and placement of a permanent dialysis access, if necessary. (A)

1.3 Patients should have a functional permanent access at the initiation of dialysis therapy.

1.3.1 A fistula should be placed at least 6 months before the anticipated start of HD treatments. This timing allows for access evaluation and additional time for revision to ensure a working fistula is available at initiation of dialysis therapy. (B)

1.3.2 A graft should, in most cases, be placed at least 3 to 6 weeks before the anticipated start of HD therapy. Some newer graft materials may be cannulated immediately after placement. (B)

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2.1.3 Avoid if possible: Long-term catheters. (B)

**1a.4.3.** **Grade assigned to the quoted recommendation with definition of the grade:** A & B as noted above

*Rating the Strength of Recommendations*

After literature review, the experts decided which recommendations were supported by evidence and which were supported by consensus of Work Group opinion. Evidence based guideline recommendations were graded as strong (A) or moderate (B). Recommendations based on weak evidence (C) and/or consensus of expert opinion were labeled as Clinical Practice Recommendations (CPRs). An “A” rating indicates “it is strongly recommended that clinicians routinely follow the guideline for eligible patients. There is strong evidence that the practice improves health outcomes, and benefits substantially outweigh harm.” The “B” rating indicates “it is recommended that clinicians routinely follow the guideline for eligible patients. There is moderately strong evidence that the practice improves health outcomes.” A “CPR” rating indicates “it is recommended that clinicians consider following the guideline for eligible patients. This recommendation is predominantly based on consensus of opinions of the Work Group and reviewers that the practice might improve health outcomes.”

**1a.4.4. Provide all other grades and associated definitions for recommendations in the grading system.** (*Note: If separate grades for the strength of the evidence, report them in section 1a.7.*)

Included in 1a.4.3.

**1a.4.5. Citation and URL for methodology for grading recommendations** (*if different from 1a.4.1*)**:**

Same as 1a.4.1.

**1a.4.6. If guideline is evidence-based (rather than expert opinion), are the details of the quantity, quality, and consistency of the body of evidence available (e.g., evidence tables)?**

Yes **→ *complete section*** [***1a.7***](#Section1a7)

No **→ *report on another systematic review of the evidence in sections*** [***1a.6***](#Section1a6) ***and*** [***1a.7***](#Section1a7) (See Ravani)***; if another review does not exist, provide what is known from the guideline review of evidence in*** [***1a.7***](#Section1a7)

1. **UK Renal Association**

**1a.4. CLINICAL PRACTICE GUIDELINE RECOMMENDATION**

**1a.4.1.** **Guideline citation** (*including date*) and **URL for guideline** (*if available online*):

VASCULAR ACCESS FOR HAEMODIALYSIS

UK Renal Association

5th Edition, 2008-2011

[http://www.renal.org/guidelines/modules/vascular-access-for-haemodialysis#sthash.Kh3h0syY.dpbs](http://www.renal.org/guidelines/modules/vascular-access-for-haemodialysis%23sthash.Kh3h0syY.dpbs)

**1a.4.2.** **Identify guideline recommendation number and/or page number** and **quote verbatim, the specific guideline recommendation**.

**1. Preferred type of vascular access (Guidelines 1.1 – 1.3)**

**Guideline 1.1 – Incident patient vascular access**

We recommend that any individual who commences haemodialysis should do so with an arteriovenous fistula as first choice, an arteriovenous graft as second choice, a tunneled venous catheter as third choice and a non-tunneled catheter as an option of necessity. (1B)

**5. Prevention of catheter related infections**

**Guideline 5.1 – Minimise the use of venous catheters**

We recommend that venous catheters should be employed as a method of last resort for longer term vascular access to reduce the overall risk of infectious complications in haemodialysis patients. (1B)

**1a.4.3.** **Grade assigned to the quoted recommendation with definition of the grade:** 1B

The modified GRADE system has been adopted by the Renal Association Clinical Practice Guidelines Committee and has been used to grade the recommendations in all of the modules in the 5th edition of the Renal Association guidelines. It explicitly describes both the strength of the recommendations and the quality of the underlying evidence, with the aim of maximising applicability to standard clinical practice (1-4). The modified GRADE system grades level of expert recommendation as “strong” (Grade 1) or “weak” (Grade 2) according to balance of benefits, risk, burden and cost. The quality or level of evidence is assessed as “high” (Grade A), “moderate” (Grade B), “low” (Grade C) or “very low” (D) depending on factors such as study design, directness of evidence and consistency of results (1-4).

**1a.4.4. Provide all other grades and associated definitions for recommendations in the grading system.** (*Note: If separate grades for the strength of the evidence, report them in section 1a.7.*)

Included in 1a.4.3.

**1a.4.5. Citation and URL for methodology for grading recommendations** (*if different from 1a.4.1*)**:**

1. Atkins D, Best D, Briss PA et al. Grading quality of evidence and strength of recommendations. BMJ 2004; 328:1490

2. Jaeschke R, Guyatt GH, Dellinger P et al. Use of GRADE grid to reach decisions on clinical practice guidelines when consensus is elusive. BMJ 2008; 337:327-330

**1a.4.6. If guideline is evidence-based (rather than expert opinion), are the details of the quantity, quality, and consistency of the body of evidence available (e.g., evidence tables)?**

Yes **→ *complete section*** [***1a.7***](#Section1a7)

No **→ *report on another systematic review of the evidence in sections*** [***1a.6***](#Section1a6) ***and*** [***1a.7***](#Section1a7)( See Ravani)***; if another review does not exist, provide what is known from the guideline review of evidence in*** [***1a.7***](#Section1a7)

1. **Vascular Access Society**

**1a.4. CLINICAL PRACTICE GUIDELINE RECOMMENDATION**

**1a.4.1.** **Guideline citation** (*including date*) and **URL for guideline** (*if available online*):

Vascular Access Society Web Site (Guideline date not specified)

<http://www.vascularaccesssociety.com/guidelines.html>

**1a.4.2.** **Identify guideline recommendation number and/or page number** and **quote verbatim, the specific guideline recommendation**.

Guideline 3.2. Autogenous arteriovenous fistulae should be preferred over AV grafts and AV grafts should be preferred over catheters (Evidence level III).

**1a.4.3.** **Grade assigned to the quoted recommendation with definition of the grade:** III

Information on grading system not provided.

**1a.4.4. Provide all other grades and associated definitions for recommendations in the grading system.** (*Note: If separate grades for the strength of the evidence, report them in section 1a.7.*)

Information on grading system not provided.

**1a.4.5. Citation and URL for methodology for grading recommendations** (*if different from 1a.4.1*)**:**

Information on grading system not provided.

**1a.4.6. If guideline is evidence-based (rather than expert opinion), are the details of the quantity, quality, and consistency of the body of evidence available (e.g., evidence tables)?**

Yes **→ *complete section*** [***1a.7***](#Section1a7)

No **→ *report on another systematic review of the evidence in sections*** [***1a.6***](#Section1a6) ***and*** [***1a.7***](#Section1a7)( See Ravani)***; if another review does not exist, provide what is known from the guideline review of evidence in*** [***1a.7***](#Section1a7)

1. **Canadian Society of Nephrology**

**1a.4. CLINICAL PRACTICE GUIDELINE RECOMMENDATION**

**1a.4.1.** **Guideline citation** (*including date*) and **URL for guideline** (*if available online*):

1. J Am Soc Nephrol 17: S1–S27, 2006
2. *Evidence for these guidelines was based on this systematic review:* Mustafa RA, Zimmerman D, Rioux JP, Suri RS, Gangji A, Steele A, MacRae J, Pauly RP, Perkins DN, Chan CT, Copland M, Komenda P, McFarlane PA, Lindsay R, Pierratos A, Nesrallah GE. Vascular access for intensive maintenance hemodialysis: a systematic review for a Canadian Society of Nephrology clinical practice guideline. Am J Kidney Dis. 2013 Jul;62(1):112-31

<http://www.vascularaccesssociety.com/guidelines.html>

**1a.4.2.** **Identify guideline recommendation number and/or page number** and **quote verbatim, the specific guideline recommendation**.

**I. Planning for Vascular Access** *(Supports proactive planning for ESRD and the use of fistula over catheter)*

1. Each center should establish a dedicated team for vascular access. (Grade D, opinion)

2. Preserve arm veins suitable for placement of vascular access. Preservation should begin in patients with progressive kidney disease and an estimated GFR of less than 30 ml/min. (Grade D, opinion)

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

**II. Access Timing, Placement, and Maturation** *(Supports proactive planning for ESRD)*

1. Establish AV fistulae when the patient has an estimated GFR of 15 to 20 ml/min and progressive kidney disease. (Grade D, opinion)

**1a.4.3.** **Grade assigned to the quoted recommendation with definition of the grade:** C & D

The grading of the evidence supporting each recommendation is based upon the scheme developed by the Canadian Hypertension Education Program, citaion below.

**1a.4.4. Provide all other grades and associated definitions for recommendations in the grading system.** (*Note: If separate grades for the strength of the evidence, report them in section 1a.7.*)

The grading of the evidence supporting each recommendation is based upon the scheme developed by the Canadian Hypertension Education Program, citation below.

**1a.4.5. Citation and URL for methodology for grading recommendations** (*if different from 1a.4.1*)**:**

Zarnke KB, Campbell NR, McAlister FA, Levine M: A novel process for updating recommendations for managing hypertension: Rationale and methods. *Can J Cardiol* 16: 1094–1102, 2000

**1a.4.6. If guideline is evidence-based (rather than expert opinion), are the details of the quantity, quality, and consistency of the body of evidence available (e.g., evidence tables)?**

Yes **→ *complete section*** [***1a.7***](#Section1a7)

No **→ *report on another systematic review of the evidence in sections*** [***1a.6***](#Section1a6) ***and*** [***1a.7***](#Section1a7) (see Ravani)***; if another review does not exist, provide what is known from the guideline review of evidence in*** [***1a.7***](#Section1a7)

**Section B: CPG Addressing Kidney Transplant versus Dialysis Outcomes**

**UK Renal Association**

**1a.4. CLINICAL PRACTICE GUIDELINE RECOMMENDATION**

**1a.4.1.** **Guideline citation** (*including date*) and **URL for guideline** (*if available online*):

Appears not to be published except on the Renal Association Web Site.

[http://www.renal.org/guidelines/modules/assessment-of-the-potential-kidney-transplant-recipient#sthash.HylZe11y.M0CFUKWt.dpbs](http://www.renal.org/guidelines/modules/assessment-of-the-potential-kidney-transplant-recipient" \l "sthash.HylZe11y.M0CFUKWt.dpbs)

**1a.4.2.** **Identify guideline recommendation number and/or page number** and **quote verbatim, the specific guideline recommendation**.

Guideline 1.1 – Tx : Access to renal transplantation

We recommend that kidney transplantation should be the renal replacement therapy of choice for patients with chronic kidney disease stage 5 who are considered fit for major surgery and for chronic immunosuppression. All patients predicted to have an increased life expectancy post-transplantation should be assessed for transplantation. Placement on the transplant waiting list will be limited by individual co-morbidity and prognosis. (1A)

Rationale

Patient’s survival following renal transplantation is better compared to age-matched individuals remaining on the transplant waiting list1. In a series of 46,164 patients on the transplant waiting list in the USA between 1991-97, mortality was 68% lower for transplant recipients than for those remaining on the transplant waiting list for >3 yrs follow-up. This resulted in a mean increase in projected survival of 10 years, maximised in the 20-39 year old age group, who were predicted to live 17 years longer than their counterparts remaining on the transplant waiting list. The increased survival benefit was seen in both sexes and was even more marked in diabetics. This analysis was confined to those patients admitted to the waiting list using the criteria for fitness for transplantation in use at the time of the study in the USA, and therefore cannot safely be extrapolated to higher risk potential transplant candidates. Although a smaller study from Scotland replicated these findings, a similar more recent analysis from the UK showed that patients over the age of 65 years did not experience any survival advantage compared with matched patients who were listed but not transplanted.

**1a.4.3.** **Grade assigned to the quoted recommendation with definition of the grade:**

GRADE level 1A – definition in citation below

**1a.4.4. Provide all other grades and associated definitions for recommendations in the grading system.** (*Note: If separate grades for the strength of the evidence, report them in section 1a.7.*)

See citation below

**1a.4.5. Citation and URL for methodology for grading recommendations** (*if different from 1a.4.1*)**:**

Guyatt GH, Oxman AD, Vist GE, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. BMJ 2008;336:924-926 - See more at: http://www.renal.org/guidelines/modules/assessment-of-the-potential-kidney-transplant-recipient#sthash.mPCgFWnA.dpuf

**1a.4.6. If guideline is evidence-based (rather than expert opinion), are the details of the quantity, quality, and consistency of the body of evidence available (e.g., evidence tables)?**

Yes **→ *complete section*** [***1a.7***](#Section1a7)

No **→ *report on another systematic review of the evidence in sections*** [***1a.6***](#Section1a6) ***and*** [***1a.7***](#Section1a7)(see Tonelli)***; if another review does not exist, provide what is known from the guideline review of evidence in*** [***1a.7***](#Section1a7)

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**1a.5.** **UNITED STATES PREVENTIVE SERVICES TASK FORCE RECOMMENDATION**

**1a.5.1.** **Recommendation citation** (*including date*) and **URL for recommendation** (*if available online*):

There are no USPST recommendations regarding the initiation of renal replacement therapy.

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**1a.6. OTHER SYSTEMATIC REVIEW OF THE BODY OF EVIDENCE**

**Section A. Hemodialysis via a hemodialysis catheter has worse outcomes than hemodialysis by arteriovenous fistula or arteriovenous graft**

**1a.6.1.** **Citation** (*including date*) and **URL** (*if available online*):

Evidence indicates increased mortality and morbidity when starting hemodialysis with a catheter. A recent systematic review indicates persons using catheters for hemodialysis tend to have the highest risks for death, infections, cardiovascular events, and hospitalization compared with other vascular access types.

Ravani P, Palmer SC, Oliver MJ, Quinn RR, MacRae JM, Tai DJ, Pannu NI, Thomas C, Hemmelgarn BR, Craig JC, Manns B, Tonelli M, Strippoli GF, James MT. Associations between hemodialysis access type and clinical outcomes: a systematic review. J Am Soc Nephrol. 2013 Feb;24(3):465-73. doi: 10.1681/ASN.2012070643. Epub 2013 Feb 21. Review. PubMed PMID: 23431075; PubMed Central PMCID: PMC3582202.

Note: There is an earlier systematic review (Mustafa) which included twenty studies compared to Ravani with 62. There is considerable overlap in the studies utilized by both.

**1a.6.2.** **Citation and** **URL for methodology for evidence review and grading** (*if different from 1a.6.1*)**:**

See 1a.7.2.

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**1a.7. FINDINGS FROM SYSTEMATIC REVIEW OF BODY OF THE EVIDENCE supporting the measure**

*If more than one systematic review of the evidence is identified above, you may choose to summarize the one (or more) for which the best information is available to provide a summary of the quantity, quality, and consistency of the body of evidence. Be sure to identify which review is the basis of the responses in this section and if more than one, provide a separate response for each review.*

**1a.7.1.** **What was the specific structure, treatment, intervention, service, or intermediate outcome addressed in the evidence review?**

Patients receiving hemodialysis treatments via arteriovenous fistula, arteriovenous graft or central venous catheters

The outcomes include survival, fatal or nonfatal infection, fatal or nonfatal cardiovascular events (myocardial infection, congestive heart failure and stroke) and all-cause hospitalization for catheter vs. other fistula, catheter versus graft and fistula versus graft.

**1a.7.2.** **Grade assigned for the quality of the quoted evidence with definition of the grade**:

The review did not assign a grade for the quality of the evidence. Ravani et al. evaluated the risk of bias in included studies, exploring domains of participation, selection, or attrition, exposure and outcome measurement, confounding, and analysis bias using previously validated methods. References for how Ravani et al. evaluated risk of bias included:

Hayden JA, Côté P, Bombardier C.: Evaluation of the quality of prognosis studies in systematic reviews. Ann Intern Med 144: 427–437, 2006. [PubMed: 16549855]

Busse J, Guyatt G.: An instrument for assessing risk of bias in cohort studies, 2012. Available at: <http://www.evidencepartners.com/resources/>

Ravani et al. used the I2 statistic to test for heterogeneity in risk estimates between studies. They performed additional prespecified subgroup and random effects univariate metaregression to explore heterogeneity between risk estimates in individual studies according to each of the following study-level covariates: age, sex, prevalence of diabetes, follow-up duration, sample size, publication year, inclusion of prevalent patients, definition of the exposure based on the vascular access at 3 months after dialysis initiation (as opposed to access at commencement of hemodialysis), outcome models built on time-varying access versus initial access, subtype of access within each comparison (temporary or tunneled catheters, proximal or distal fistulas, and bovine or synthetic graft), and risk of bias.

**1a.7.3. Provide all other grades and associated definitions for strength of the evidence in the grading system.**

See 1a.7.2. above

**1a.7.4.** **What is the time period covered by the body of evidence? (*provide the date range, e.g., 1990-2010*). Date range**: Click here to enter date range

Ravani et al. – 1985-9/2012

**QUANTITY AND QUALITY OF BODY OF EVIDENCE**

**1a.7.5.****How many and what type of study designs are included in the body of evidence**?

The review included 62 cohort studies comprising of 586,337 participants.

**1a.7.6.** **What is the overall quality of evidence across studies in the body of evidence**? (*discuss the certainty or confidence in the estimates of effect particularly in relation to study factors such as design flaws, imprecision due to small numbers, indirectness of studies to the measure focus or target population*)

The body of evidence consists of low quality studies due to the fact that the studies are mainly retrospective in nature, reporting of methods was incomplete, and studies were considered at high risk of selection bias. However, the direction of the risk for mortality (lower in fistula and graft users than catheter users) was highly consistent across existing studies. Despite marked study heterogeneity, the direction of association with mortality was consistent in 49 of 51 (96%) comparisons.

**ESTIMATES OF BENEFIT AND CONSISTENCY ACROSS STUDIES IN BODY OF EVIDENCE**

**1a.7.7.** **What are the estimates of benefit—magnitude and direction of effect on outcome(s) across studies in the body of evidence**? (*e.g., ranges of percentages or odds ratios for improvement/ decline across studies, results of meta-analysis, and statistical significance*)

Ravani et al. included 62 cohort studies comprising of 586,337 patients.

Catheter versus Fistula: Persons using catheters had increased risk of all-cause mortality (risk ratio [RR]=1.53, 95% confidence interval [95% CI]=1.41–1.67), fatal (RR=2.12, 95% CI=1.79–2.52) and nonfatal (RR=4.66, 95% CI=2.63–8.26) infection, major cardiovascular event (RR=1.38, 95% CI=1.24–1.54), and hospitalization (RR=1.68, 95% CI=1.33–2.12) compared with persons using fistulas.

Catheter versus Graft: Persons using catheters had increased risk of all-cause mortality (RR=1.38, 95% CI=1.25–1.52), fatal (RR=1.49, 95% CI=1.15– 1.93) and nonfatal (RR=2.78, 95% CI=1.80–4.29) infection, cardiovascular event (RR=1.26, 95% CI=1.11–1.43), and hospitalization (RR=1.51, 95% CI=1.30–1.75) compared with those individuals using grafts.

In absolute terms, catheter use is associated with 80–134 additional deaths per 1000 person-years compared with fistula use and 60–125 additional deaths per 1000 person-years compared with graft use. Graft use is associated with 18–54 additional deaths for every 1000 persons each year compared with fistula use.

The direction of the risk for mortality (lower in fistula and graft users than catheter users) was highly consistent across existing studies. Despite marked study heterogeneity, the direction of association with mortality was consistent in 49 of 51 (96%) comparisons.

**1a.7.8.** **What harms were studied and how do they affect the net benefit (benefits over harms)?**

While individual studies might address adverse events or harms, the meta-analysis does not provide summary information.

**UPDATE TO THE SYSTEMATIC REVIEW(S) OF THE BODY OF EVIDENCE**

**1a.7.9.** **If new studies have been conducted since the systematic review of the body of evidence, provide for each new study: 1) citation, 2) description, 3) results, 4) impact on conclusions of systematic review**.

An updated literature search did not reveal any large studies comparing outcomes for catheter versus other access types.

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**Section B.**

**A preemptive kidney transplant has better outcomes than starting hemodialysis with a hemodialysis catheter.**

This proposition has not been directly studied but is extremely likely given the following chain of evidence:

**A preemptive transplant provides equal or better outcomes than a kidney transplant after starting dialysis:**

Hazard ratio for 5 year graft loss: preemptive vs 1-3 years of dialysis before transplant: 0.75 p < 0.001 (USRDS, patients undergoing kidney transplant 2000-2006)

[Kasiske B,](https://www.clinicalkey.com/#!/search/Bertram L.%20Kasiske/%7B%22type%22:%22author%22%7D)  [Israni](https://www.clinicalkey.com/#!/search/Ajay K.%20Israni/%7B%22type%22:%22author%22%7D) A, Snyder J, [Skeans](https://www.clinicalkey.com/#!/search/Melissa A.%20Skeans/%7B%22type%22:%22author%22%7D) M, [Peng Y, Weinhandl E.](https://www.clinicalkey.com/#!/search/Yi%20Peng/%7B%22type%22:%22author%22%7D) A Simple Tool to Predict Outcomes After Kidney Transplant, AJKD, 2010-11-01Z, Volume 56, Issue 5, Pages 947-960.

and

**Kidney transplantation has better outcomes (mortality, CV events and quality of life) than dialysis** (*focus of this section*),

and

**Hemodialysis via a hemodialysis catheter has worse outcomes than hemodialysis by arteriovenous fistula or arteriovenous graft** *(Section A, above*).

Thus, a preemptive kidney transplant has better outcomes than starting hemodialysis via a hemodialysis catheter.

**1a.6.1.** **Citation** (*including date*) and **URL** (*if available online*):

Systematic review providing survival data, cardiovascular events and quality of life for kidney transplantation compared with dialysis:

Tonelli M, Wiebe N, Knoll G, Bello A, Browne S, Jadhav D, Klarenbach S, Gill J. Systematic review: kidney transplantation compared with dialysis in clinically relevant outcomes. Am J Transplant. 2011 Oct;11(10):2093-109. doi: 10.1111/j.1600-6143.2011.03686.x. Epub 2011 Aug 30. PubMed PMID: 21883901.

Meta-analyses providing quality of life data for kidney transplantation compared with dialysis:

Purnell TS, Auguste P, Crews DC, Lamprea-Montealegre J, Olufade T, Greer R, Ephraim P, Sheu J, Kostecki D, Powe NR, Rabb H, Jaar B, Boulware LE. Comparison of life participation activities among adults treated by hemodialysis, peritoneal dialysis, and kidney transplantation: a systematic review. Am J Kidney Dis. 2013 Nov;62(5):953-73. doi: 10.1053/j.ajkd.2013.03.022. Epub 2013 May 29. Review. PubMed PMID: 23725972; PubMed Central PMCID: PMC3809150.

Wyld M, Morton RL, Hayen A, Howard K, Webster AC. A systematic review and meta-analysis of utility-based quality of life in chronic kidney disease treatments. PLoS Med. 2012;9(9):e1001307. doi: 10.1371/journal.pmed.1001307. Epub 2012 Sep 11. Review. PubMed PMID: 22984353; PubMed Central PMCID: PMC3439392.

Landreneau K, Lee K, Landreneau MD. Quality of life in patients undergoing hemodialysis and renal transplantation--a meta-analytic review. Nephrol Nurs J. 2010 Jan-Feb;37(1):37-44. Review. PubMed PMID: 20333902.

**1a.6.2.** **Citation and** **URL for methodology for evidence review and grading** (*if different from 1a.6.1*)**:**

Methodology for each of the 4 meta-analyses discussed in the articles.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**1a.7. FINDINGS FROM SYSTEMATIC REVIEW OF BODY OF THE EVIDENCE supporting the measure**

*If more than one systematic review of the evidence is identified above, you may choose to summarize the one (or more) for which the best information is available to provide a summary of the quantity, quality, and consistency of the body of evidence. Be sure to identify which review is the basis of the responses in this section and if more than one, provide a separate response for each review.*

**1a.7.1.** **What was the specific structure, treatment, intervention, service, or intermediate outcome addressed in the evidence review?**

The outcomes include survival, cardiovascular events, and quality of life for kidney transplant vs. dialysis.

**1a.7.2.** **Grade assigned for the quality of the quoted evidence with definition of the grade**:

None of the meta-analyses or reviews assigned a grade for the quality of the evidence.

**1a.7.3. Provide all other grades and associated definitions for strength of the evidence in the grading system.**

None of the meta-analyses or reviews assigned a grade for the strength of the evidence.

**1a.7.4.** **What is the time period covered by the body of evidence? (*provide the date range, e.g., 1990-2010*). Date range**: Click here to enter date range

Tonelli et al. – up to 2/2010

Purnell et al. – 1/1980 to 4/2012

Wyld et al – up to 2/2010

Landreneau et al – up to 11/2007

**QUANTITY AND QUALITY OF BODY OF EVIDENCE**

**1a.7.5.****How many and what type of study designs are included in the body of evidence**? (*e.g., 3 randomized controlled trials and 1 observational study*)

Tonelli et al. – All eligible studies (N=110 with 1,922,300 patients) used a cohort design: 26% were prospective, 36% were based on registries with prospectively collected data, 2%were ambispective (both prospective and retrospective data collection), 18% were retrospective and 13% did not specify the relative timing of hypothesis generation and data collection. The risk of bias was assessed with the Downs and Black checklist.

Purnell et al. – Included 46 studies (6 prospective cohort, 38 cross-sectional, and 2 pre-post transplantation).

Wyld et al – Included 190 studies with over 56,000 patients. Cross-sectional studies accounted for 216 (66%) utilities, cohort studies accounted for 57 (17%), case-control studies accounted for 34 (10%), and randomised controlled trials accounted for 16 (5%).

Landreneau et al – Included 16 studies. There were no randomized studies, and most studies were either cross-sectional or pre/post-test designs.

**1a.7.6.** **What is the overall quality of evidence across studies in the body of evidence**? (*discuss the certainty or confidence in the estimates of effect particularly in relation to study factors such as design flaws, imprecision due to small numbers, indirectness of studies to the measure focus or target population*)

The body of evidence consists of low to moderate quality due to the fact that the studies are mainly retrospective in nature. However, the data does appear to be consistent in that transplant outcomes (survival, cardiovascular events, and quality of life) are equivalent or superior to dialysis.

**ESTIMATES OF BENEFIT AND CONSISTENCY ACROSS STUDIES IN BODY OF EVIDENCE**

**1a.7.7.** **What are the estimates of benefit—magnitude and direction of effect on outcome(s) across studies in the body of evidence**? (*e.g., ranges of percentages or odds ratios for improvement/ decline across studies, results of meta-analysis, and statistical significance*)

Tonelli et al. – Most studies found significantly lower mortality associated with transplantation, and the relative magnitude of the benefit seemed to increase over time (p < 0.001). Most studies also found that the risk of cardiovascular events was significantly reduced among transplant recipients. Quality of life was significantly and substantially better among transplant recipients.

**Survival**

Thirty-eight cohorts (23 studies; 904 610 participants) reported adjusted relative hazards, rates or odds for mortality during total follow-up after transplantation (maximum follow up ranged 6–19 years). Seventy-nine percent of these results significantly favored lower mortality in the transplantation groups (HR range 0.16–0.76) and 21% were nonsignificant (HR range 0.33–1.12). These studies also included perioperative deaths, and thus, demonstrate that the higher short-term risk of death associated with kidney transplantation is more than offset by the lower risk of mortality during subsequent follow up. In the subset of studies including only waitlisted participants (10 studies; 474 522 participants), 94% of comparisons significantly favored lower mortality for transplant recipients (15 of 16 comparisons; HR range 0.16–0.73).

**Cardiovascular Events**

In unadjusted analyses, four of six cohorts (four studies; 189 769 participants) found that transplantation significantly reduced the risk of myocardial infarction; two of five cohorts (three studies; 190 109 participants) found that transplantation significantly reduced the risk of stroke and two further studies found that transplantation significantly reduced the risk of heart failure (11 369 participants) and the incidence of ischemic heart disease (552 participants). Only two studies reported adjusted analyses for cardiac events. One (92 participants) found that transplantation from a deceased donor significantly reduced the rate of cardiac events by 76% (relative rate 0.24, 95% CI: 0.07–0.81) and the other found no association between transplantation and heart failure.

**Quality of Life**

In unadjusted analyses comparing QoL using the SF-36 between transplant recipients and dialysis patients, 47–100% of cohorts (depending on the domain considered), significantly favored the transplantation groups and none significantly favored the dialysis groups. Three cohorts (two studies; 497 participants) reported the adjusted association between transplantation and SF-36 scores as comparedwith dialysis. The vast majority of analyses significantly favored transplantation over hemodialysis.

Pernell et al. reported on a total of 22 studies evaluated life participation activities between patients receiving hemodialysis and patients with kidney transplants. The majority of comparisons demonstrated small to large differences in activities in patients with kidney transplants compared with patients receiving hemodialysis, with transplant recipients having better physical function (90%), freedom (100%), and work outcomes (100%). These results were consistent throughout the study period, across diverse populations, and among the subset of studies that performed appropriate adjustments for potential confounding factors.

Wyld et al. - The reference group in the model was kidney transplant patients with utility elicited via the time tradeoff instrument. The mean utility for this group was the highest, at 0.82 (95% CI: 0.74, 0.90), followed by the pre-treatment CKD group, 0.79 (95% CI: 0.70, 0.89), dialysis patients, 0.70 (95% CI: 0.62, 0.78), and conservative care patients, 0.62 (95% CI: 0.43, 0.82) (interaction p,0.001).

Landreneau et al. - The result indicates that the RT intervention across 9 studies was effective in improving quality of life at 0 to 24 months post-RT compared to HD. The summary effect size was 0.98 SD units. Since higher scores on general quality of life scales indicate better general quality of life, a positive effect size favors RT. Overall, patients who had RTs had better general quality of life than patients who were treated with HD, as seen by effect sizes greater than 0.58. With a summary effect size of 0.98, the two groups differ by almost one SD unit, indicating that the average person after RT has a better quality of life than 72% of those on HD.

**1a.7.8.** **What harms were studied and how do they affect the net benefit (benefits over harms)?**

While individual studies might address adverse events or harms, the meta-analysis does not provide summary information.

**UPDATE TO THE SYSTEMATIC REVIEW(S) OF THE BODY OF EVIDENCE**

**1a.7.9.** **If new studies have been conducted since the systematic review of the body of evidence, provide for each new study: 1) citation, 2) description, 3) results, 4) impact on conclusions of systematic review**.

Schold JD, Buccini LD, Goldfarb DA, Flechner SM, Poggio ED, Sehgal AR. Association between Kidney Transplant Center Performance and the Survival Benefit of Transplantation Versus Dialysis. Clin J Am Soc Nephrol. 2014 Oct 7;9(10):1773-80. doi: 10.2215/CJN.02380314. Epub 2014 Sep 18. PubMed PMID:

25237071; PubMed Central PMCID: PMC4186511.

Description: A retrospective cohort study of adults wait-listed for kidney transplantation in the United States from 2003 to 2010 using the Scientific Registry of Transplant Recipients was conducted. The primary aim was to investigate whether measured center performance modifies the survival benefit of transplantation versus dialysis.

Summary: Among 223,808 waitlisted patients, 59,199 and 32,764 patients received a deceased or living donor transplant, respectively. Median follow-up from listing was 43 months (25th percentile=25 months, 75th percentile=67 months), and there were 43,951 total patient deaths. Deceased donor transplantation was independently associated with lower mortality at each center performance level compared with remaining on the waiting list; adjusted hazard ratio was 0.24 (95% confidence interval, 0.21 to 0.27) among 11,972 patients listed at high-performing centers, adjusted hazard ratio was 0.32 (95% confidence interval, 0.31 to 0.33) among 203,797 patients listed at centers performing as expected, and adjusted hazard ratio was 0.40 (95% confidence interval, 0.35 to 0.45) among 8039 patients listed at low-performing centers.

Findings indicate that measured center performance modifies the survival benefit of kidney transplantation, but the benefit of transplantation remains highly significant even at centers with low measured quality. Policies that concurrently emphasize improved center performance with access to transplantation should be prioritized to improve ESRD population outcomes.

Impact on conclusion: Findings are consistent with earlier meta-analyses and reviews.

Bouaoun L, Villar E, Ecochard R, Couchoud C. Excess risk of death increases with time from first dialysis for patients on the waiting list: implications for renal allograft allocation policy. Nephron Clin Pract. 2013;124(1-2):99-105. doi: 10.1159/000355549. Epub 2013 Oct 26. PubMed PMID: 24192719.

Description: The study used data from the French Renal Epidemiology and Information Network Registry to quantify the risk of death among patients on the waiting list.

Summary: During 45,013 person-years of follow-up, 7,224 patients died, 5,956 (82%) more than expected relative to the general population. The excess risk of death increased by 45% per additional year on the waiting list (18%-79%), p = 0.0005). The excess death rate of wait-listed patients was 1.7 times (1.1-2.7) higher than that of patients with kidney transplantation during the study period.

Impact on conclusion: Findings are consistent with earlier meta-analyses and reviews.

Bisigniano L, López-Rivera A, Tagliafichi V, Fernández VJ, Soratti CA. Analysis of mortality while on waiting list for kidney transplant in adults in Argentina 2005-2009. Transplant Proc. 2012 Sep;44(7):2239-41. doi: 10.1016/j.transproceed.2012.07.128. PubMed PMID: 22974963.

Description: The study compares the survival of deceased donor transplant patients to patients on the waiting list in Argentina.

Summary:

We analyzed 1682 patients transplanted average age 48.14 + 13.48 years and 3647 patients on waiting lists average age 47.88 + 14.32 years. For patients transplanted 30-day survival was 99.8% at 1 year 96.2% and 5 years of 79.9%. For patients on the waiting list survival at 30 days was 99.7% at 1 year and 5 years 94.6% 66.6%. Chi-square was 42.77, P =<.0001. HR 0.64 (95% CI 0.56 to 0.73). Cox regression for patients on waiting lists HR 1.40 (95% CI 1.20 –1.63) P<=.0001. The time dependent Cox regression showed for patients transplanted at 30 days, <1 year >1 year showed HR 4.18 (95% CI 2.88–6.06) P<=.0001, HR 0.40 (95% CI 0.27 to 0.61) P<=.0001 and HR 0.19 (95% CI 1.12– 0.29) P <=.0001, respectively.

Survival, both at baseline and in the long term, is better in transplant patients as compared to patients on waiting list. In Cox time–dependant regression the risk of death during the first 30 days is 4 times higher in transplant patients. This reverses and at 1 year, transplant patients are 60% less likely to die, and after one year this probability is 81% lower (P =<.0001).

Impact on conclusion: Findings are consistent with earlier meta-analyses and reviews.

Kontodimopoulos N, Niakas D. An estimate of lifelong costs and QALYs in renal replacement therapy based on patients' life expectancy. Health Policy. 2008 Apr;86(1):85-96. Epub 2007 Nov 9. PubMed PMID: 17996975.

Description: To estimate lifelong costs and quality adjusted life years (QALYs) of hemodialysis (HD), peritoneal dialysis (PD) and renal transplantation (Tx) in Greece, based on individual patient life expectancy.

Summary: Estimated lifelong QALYs were 4.37 (HD), 3.94 (PD) and 16.11 (Tx) (P < 0.001). Annual HD and PD costs per patient were estimated at € 36,247 and € 30,719 respectively. For Tx, average 1st year, 3-year and lifelong (undiscounted) costs were € 31,714, € 43,275 and € 151,274 respectively.

Impact on conclusion: While the data does not translate directly to the U.S., this provides an estimate on the comparative cost benefit of transplant versus dialysis.