Kidney Transplant

Policy Number: 7.03.01  Last Review: 8/2019
Origination: 8/2001  Next Review: 8/2020

Policy
Blue Cross and Blue Shield of Kansas City (Blue KC) will provide coverage for a kidney transplant when it is determined to be medically necessary because the criteria shown below are met.

When Policy Topic is covered
Kidney transplants with either a living or cadaver donor are considered medically necessary for carefully selected candidates with end-stage renal disease.

Etiologies of end-stage renal disease include, but are not limited to any of the following conditions associated with end-stage renal disease:

- Obstructive and reflux uropathy unspecified
- Systemic lupus erythematosus unspecified
- Systemic lupus erythematosus
- Polyarteritis nodosa and related conditions
- Wegner’s granulomatosis
- Acute kidney failure with acute cortical necrosis
- Allergic purpura (includes Henoch-Schönlein purpura)
- Hemolytic-uremic syndrome
- Acute kidney failure with tubular necrosis
- Hypertensive chronic kidney disease with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
- Renal sclerosis NOS
- Ischemia and infarction of kidney (includes renal artery occlusion)
- Embolism and thrombosis of renal vein
- Chronic tubule-interstitial nephritis unspecified
- Unspecified nephritic syndrome unspecified code range (includes focal glomerulosclerosis, glomerulonephritis and nephritis)
- Chronic nephritic syndrome code range
- Recurrent and persistent hematuria with other morphologic changes (includes IgA nephropathy)
- Hypersensitivity angiitis (includes antiglomerular basement membrane [anti-GBM] disease)
Poisoning by adverse effect of and underdosing of other primarily systemic and hematologic agents code range
Polycystic kidney disease code range
Medullary cystic kidney
Disorders of calcium metabolism code range (includes nephrocalcinosis)
Gout due to renal impairment code range
Amyloidosis code range
Fabry (-Anderson) disease
Disorders of glycoprotein metabolism code range
Disorders of ornithine metabolism
Other specified disorders of carbohydrate metabolism
Unspecified disorders of carbohydrate metabolism
Other congenital malformations of the kidney code range Q61.9 Cystic kidney disease unspecified
Renal agenesis and other defects code range
Malignant neoplasm of kidney, except renal pelvis (includes renal cell carcinoma and Wilms tumor)
Multiple myeloma remission code range
Tuberous sclerosis
Injury of kidney code range

Kidney retransplant after a failed primary kidney transplant may be considered medically necessary in patients who meet criteria for kidney transplantation.

When Policy Topic is not covered
Kidney transplant is considered investigational in all other situations.

Considerations
Kidney transplants should be considered for coverage under the Transplant Benefit:

Potential contraindications to solid organ transplant (subject to the judgment of the transplant center):
1. Known current malignancy, including metastatic cancer
2. Recent malignancy with high risk of recurrence
3. History of cancer with a moderate risk of recurrence
4. Systemic disease that could be exacerbated by immunosuppression
5. Untreated systemic infection making immunosuppression unsafe, including chronic infection
6. Other irreversible end-stage disease not attributed to kidney disease
7. Psychosocial conditions or chemical dependency affecting ability to adhere to therapy

HIV-positive patients who meet the following criteria, as stated in the 2001 guidelines of the American Society of Transplantation, could be considered candidates for kidney transplantation:
- CD4 count >200 cells per cubic millimeter for >6 months
- HIV-1 RNA undetectable
- On stable anti-retroviral therapy >3 months
- No other complications from AIDS (e.g., opportunistic infection, including aspergillus, tuberculosis, coccidiosis mycosis, resistant fungal infections, Kaposi’s sarcoma, or other neoplasm), and
- Meeting all other criteria for transplantation.

Indications for renal transplant include a creatinine level of greater than 8 mg/dL, or greater than 6 mg/dL in symptomatic diabetic patients. However, consideration for listing for renal transplant may start well before the creatinine level reaches this point, based on the anticipated time that a patient may spend on the waiting list.

**Transplant Benefit**

Transplant requests are generally reviewed by the Plan medical director or his or her designee. Only those patients accepted for transplantation by an approved transplantation center and actively listed for transplant should be considered for precertification or prior approval. Guidelines should be followed for transplant network or consortiums, if applicable.

Kidney transplants should be considered for coverage under the transplant benefit.

What is covered under the scope of the human organ transplant (HOT) benefit needs to be considered. Typically, the following are covered under the HOT benefit:

- hospitalization of the recipient and living donor for medically recognized transplants from a donor to a transplant recipient;
- evaluation tests requiring hospitalization to determine the suitability of both potential and actual donors, when such tests cannot be safely and effectively performed on an outpatient basis;
- hospital room, board, and general nursing in semi-private rooms;
- special care units, such as coronary and intensive care;
- hospital ancillary services;
- physicians’ services for surgery, technical assistance, administration of anesthetics, and medical care;
- acquisition, preparation, transportation, and storage of organ;
- diagnostic services;
- drugs that require a prescription by federal law.

Expenses incurred in the evaluation and procurement of organs and tissues are benefits when billed by the hospital. Included in these expenses may be specific charges for participation with registries for organ procurement, operating rooms, supplies, use of hospital equipment, and transportation of the tissue or organ to be evaluated.
Administration of products with a specific transplant benefit needs to be defined as to:

- when the benefit begins (at the time of admission for the transplant or once the patient is determined eligible for a transplant, which may include tests or office visits prior to transplant);
- when the benefit ends (at the time of discharge from the hospital or at the end of required follow-up, including the immunosuppressive drugs administered on an outpatient basis).

Coverage usually is not provided for:

- HOT services for which the cost is covered/funded by governmental, foundational, or charitable grants;
- organs sold rather than donated to the recipient;
- an artificial organ.

### Description of Procedure or Service

<table>
<thead>
<tr>
<th>Populations</th>
<th>Interventions</th>
<th>Comparators</th>
<th>Outcomes</th>
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<tr>
<td>Individuals:</td>
<td></td>
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<td>Relevant outcomes include:</td>
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<tr>
<td>With end-stage renal disease without contraindications to kidney transplant</td>
<td>Interventions of interest are:</td>
<td>Comparators of interest are:</td>
<td>Overall survival</td>
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<tr>
<td></td>
<td>• Kidney transplant from a living donor or deceased (cadaveric) donor</td>
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<td>• Dialysis</td>
<td>Treatment-related mortality</td>
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<tr>
<td></td>
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<td>Treatment-related morbidity</td>
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</table>

| Individuals: | Interventions of interest are: | Comparators of interest are: | Relevant outcomes include: |
| With a failed kidney transplant without contraindications to kidney transplant | • Kidney retransplant from a living donor or deceased (cadaveric) donor | • Medical management | Overall survival |
| | | • Dialysis | Morbid events |
| | | | Treatment-related mortality |
| | | | Treatment-related morbidity |

A kidney transplant involves the surgical removal of a kidney from a cadaver, living-related, or living-unrelated donor and transplantation into the recipient.

For individuals who have ESRD without contraindications to kidney transplant who receive a kidney transplant from a living donor or deceased (cadaveric) donor, the evidence includes registry data and case series. Relevant outcomes are overall survival, morbid events, and treatment-related mortality and morbidity. Data from large registries have demonstrated reasonably high survival rates after kidney transplant for appropriately selected patients and significantly higher survival rates for patients undergoing kidney transplant compared with those who remained on a waiting list. Kidney transplantation is contraindicated for patients in whom the procedure is expected to be futile due to comorbid disease or in whom posttransplantation care is expected to significantly worsen comorbid conditions.
The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have a failed kidney transplant without contraindications to kidney transplant who receive a kidney retransplant from a living donor or deceased (cadaveric) donor, the evidence includes registry data and case series. Relevant outcomes are overall survival, morbid events, and treatment-related mortality and morbidity. Data have demonstrated reasonably high survival rates after kidney retransplant (eg, 5-year survival rates ranging from 87% to 96%) for appropriately selected patients. Kidney retransplantation is contraindicated for patients in whom the procedure is expected to be futile due to comorbid disease or in whom posttransplantation care is expected to significantly worsen comorbid conditions. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

**Background**

**End-Stage Renal Disease**

End-stage renal disease (ESRD) refers to the inability of the kidneys to perform their functions (ie, filtering wastes and excess fluids from the blood). ESRD, which is life-threatening, is also known as stage 5 chronic renal failure and is defined as a glomerular filtration rate less than 15 mL/min/1.73 m².

**Treatment**

Dialysis is an artificial replacement for some kidney functions. Dialysis is used as a supportive measure in patients who do not want kidney transplants or who are not transplant candidates; it can also be used as a temporary measure in patients awaiting a kidney transplant.

Kidney transplant, using kidneys from deceased or living donors, is an accepted treatment of ESRD. Based on data from the Organ Procurement and Transplantation Network, in 2017, over 10,300 kidney transplants were performed in the United States. Since 1988, the cumulative number of kidney transplants is over 435,500. Of the cumulative total, 66% of the kidneys came from deceased donors and 34% from living donors.

Combined kidney and pancreas transplants and management of acute rejection of kidney transplant using either intravenous immunoglobulin or plasmapheresis are discussed in separate evidence reviews.

**Regulatory Status**

A kidney transplant is a surgical procedure and, as such, is not subject to regulation by the U.S. Food and Drug Administration.

The U.S. Food and Drug Administration regulates human cells and tissues intended for implantation, transplantation, or infusion through the Center for Biologics Evaluation and Research, under Code of Federal Regulation title 21, parts 1270 and 1271. Kidney transplants are included in these regulations.
Rationale

This evidence review was created in December 1995 and has been updated regularly with searches of the MEDLINE database. The most recent literature update was performed through June 21, 2018.

Evidence reviews assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function—including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent one or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. Randomized controlled trials are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

Kidney Transplant

Clinical Context and Test Purpose

The purpose of a kidney transplant in patients who have end-stage renal disease (ESRD) without contraindications to a kidney transplant is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does a kidney transplantation improve the net health outcome in individuals with ESRD without contraindications to kidney transplant?

The following PICOTS were used to select literature to inform this review.

Patients

The relevant population of interest is individuals with end ESRD without contraindications to a kidney transplant.

Interventions

The therapy being considered is kidney transplant from a living or cadaveric donor.
Comparators
The following therapies and practices are currently being used to make decisions about managing ESRD: medical management, including dialysis and medications to control symptoms.

Outcomes
The general outcomes of interest are overall survival, elimination of the need for dialysis, and treatment-related adverse events (eg, immunosuppression, graft failure, surgical complications, infections). See the Potential Contraindications section for detailed discussion.

Timing
Short-term follow-up ranges from immediate postsurgery to 30 days posttransplantation; lifelong follow-up (out to 10 years or more given current survival data) is necessary due to ongoing immunosuppression and risk of graft failure.

Setting
Kidney transplantation is provided in a hospital setting by specialized staff who are equipped to perform the surgical procedure and manage postsurgical intensive care.

Registry Studies
According to data analysis from the Organ Procurement and Transplantation Network (OPTN), between 2008 and 2015, the 1-year survival of patients undergoing an initial kidney transplant was 97.0% (95% confidence interval [CI], 96.8% to 97.1%). Five-year survival was 85.8% (95% CI, 85.5% to 86.1%).

Krishnan et al (2015) published a study of 17,681 patients in a U.K. transplant database who received a kidney transplant or were on a list to receive a kidney transplant. Authors found significantly higher 1- and 5-year survival rates in patients who underwent a kidney transplant than in those who remained on dialysis (exact survival rates not reported).

Transplants Stratified by Donor Source
The United Network for Organ Sharing proposed an Expanded Criteria Donor (ECD) approach in 2002 to include brain-dead donors over 60 years or between 50 and 59 years old with 2 or more of the following criteria: serum creatinine level greater than 1.5 mg/dL, death caused by cerebrovascular accident, or history of high blood pressure.

Querard et al (2016) conducted a systematic review and meta-analysis of studies comparing survival outcomes with ECD vs Standard Criteria Donor (SCD) kidney transplant recipients. Reviewers identified 32 publications, 5 of which adjusted for potential confounding factors. A pooled analysis of 2 studies reporting higher rates of patient-graft failure for ECD kidney recipients found a significantly higher adjusted hazard ratio (HR) for patient-graft survival (HR=1.68; 95% CI; 1.32 to
2.12. Meta-analyses were not conducted for patient survival outcomes; however, 1 study (N=189) found a higher but nonsignificant difference in patient survival with ECD than with SCD (HR=1.97; 95% CI, 0.99 to 3.91) and another (N=13,833) found a significantly increased risk of death with ECD than with SCD (HR=1.25; 95% CI, 1.12 to 1.40).

Pestana (2017) published a retrospective, single-center analysis of kidney transplants performed between 1998 and 2015 at a hospital in Brazil. Of the 11,436 transplants analyzed, 31% (n=3614) were performed under SCD, while 14% (n=1618) were performed under ECD. The number of ECD recipients increased over time, from 29 transplants in 1998-2000 to 450 transplants from 2013-2014. Patient survival with ECD increased from 1998-2002 to 2011-2014 (from 79.7% to 89.2%, p<0.001); a similar increase was noted in patient survival with SCD over the same time periods (from 73.1% to 85.2%, p<0.001). The study was limited by reliance on limited registry data.

Several studies have reported on long-term outcomes in live kidney donors. The most appropriate control group to evaluate whether donors have increased risks of morbidity and mortality are individuals who meet the criteria for kidney donation but who did not undergo the procedure. These types of studies have provided mixed findings. For example, Segev et al (2010) found that donors had an increased mortality risk. The authors analyzed data from a national registry of 80,347 live donors in the United States who donated organs between April 1994 and March 2009 and compared their data with data from 9364 participants of the National Health and Nutrition Examination Survey (excluding those with contraindications to kidney donation). There were 25 deaths within 90 days of live kidney donation during the study period. Surgical mortality from live kidney donors was 3.1 per 10000 donors (95% CI, 2.0 to 4.6) and did not change over times, despite differences in practice and selection. Long-term risk of death was no higher for live donors than for age- and comorbidity-matched National Health and Nutrition Examination Survey III participants for all patients and also stratified by age, sex, and race.

Potential Contraindications to Kidney Transplant

HIV Infection
Patients infected with HIV may receive organs from HIV-positive donors under approved research protocols through the HIV Organ Policy Equity Act. As of November 2017, 6 hospitals performed 34 such transplants (23 kidney and 11 liver transplants), involving organs from 14 deceased donors. In a prospective, nonrandomized study, Muller et al (2015) noted that HIV-positive patients transplanted with kidneys from donors testing positive for HIV showed a 5-year survival rate of 74%. Researchers noted that the HIV infection remained well-controlled and the virus was undetectable in the blood after transplantation.

(2008-2011) had a significantly lower risk of death (HR=0.59; 95% CI, 0.39 to 0.90). The 5-year patient survival rate was 78.2% for patients transplanted in the early era and 85.8% for more recent transplants. In another study, Locke et al (2015) compared outcomes in 467 adult kidney transplant recipients with 4670 HIV-negative controls, matched on demographic characteristics. Compared with HIV-negative controls, survival among HIV-positive transplant recipients was similar at 5 years posttransplant (83.5% vs 86.2%, p=0.06). At 10 years, HIV-positive transplant recipients had a significantly lower survival rate (51.6%) than HIV-negative patients (72.1%; p<0.001). The lower 10-year survival rate was likely due to HIV and hepatitis C virus (HCV) coinfection; survival rates at 10 years in HIV-mono infected patients and HIV-negative patients were similar (88.7% vs 89.1%, p=0.50). Locke et al (2017) found significantly lower 5-year mortality rates in HIV-infected patients with ESRD who had kidney transplants compared with continued dialysis (adjusted relative risk [RR], 0.21; 95% CI, 0.10 to 0.42; p<0.001). In addition, Sawinski et al (2015) analyzed survival outcomes in patients infected with HIV, HCV, or HIV plus HCV. The analysis included 492 HIV-infected patients, 5605 HCV-infected patients, 147 coinfected patients, and 117,791 noninfected patients. In a multivariate analysis, compared with noninfected patients, HIV-infected patients did not have an increased risk of death (HR=0.90; 95% CI, 0.66 to 1.24). However, HCV infection (HR=1.44; 95% CI, 1.33 to 1.56) and HIV and HCV coinfection (HR=2.26; 95% CI, 1.45 to 3.52) were both significantly associated with an increased risk of death.

Current OPTN policy permits HIV-positive transplant candidates.

The British HIV Association and the British Transplantation Society (2017) updated their guidelines on kidney transplantation in patients with HIV disease. These criteria may be extrapolated to other organs:

- Adherent with treatment, particularly antiretroviral therapy
- Cluster of differentiation 4 count greater than 100 cells/mL (ideally >200 cells/mL) for at least 3 months
- Undetectable HIV viremia (<50 HIV-1 RNA copies/mL) for at least 6 months
- No opportunistic infections for at least 6 months
- No history of progressive multifocal leukoencephalopathy, chronic intestinal cryptosporidiosis, or lymphoma.

**Hepatitis C Infection**

A meta-analysis by Fabrizi et al (2014) identified 18 observational studies comparing kidney transplant outcomes in patients with and without HCV infection. The studies included 133350 transplant recipients. In an adjusted analysis, the risk of all-cause mortality was significantly higher in HCV-positive vs HCV-negative patients (RR=1.85; 95% CI, 1.49 to 2.31). Risks were elevated in various study subgroups examined by investigators. When the analysis was limited to the 4 studies from the United States, the adjusted RR was 1.29 (95% CI, 1.15 to 1.44). In an analysis of 10 studies published since 2000, the RR
was 1.84 (95% CI, 1.45 to 2.34). An analysis of disease-specific mortality suggested that at least part of the increased risk in mortality among HCV-positive individuals must have been due to chronic liver disease. In a meta-analysis of 9 studies, the risk of liver disease-related mortality was considerably elevated in patients infected with HCV than in those uninfected (odds ratio, 11.6; 95% CI, 5.54 to 24.4).

In the analysis by Sawinski et al (2015), described above, HCV infection was associated with an increased risk of mortality in kidney transplant patients compared with noninfected patients.11

**Obesity**

Several studies have found that obese kidney transplant patients have improved outcomes compared with patients on a waiting list matched by body mass index (BMI). Study results on whether morbid obesity is associated with an increased risk of adverse events after kidney transplant are conflicting.

In an analysis of kidney transplant data from the U.K., Krishnan et al (2015) reported on BMI data were available for 13,536 patients.3 They devised several BMI categories (ie, <18.5 kg/m², 18.5 to <25 kg/m², 25 to <30 kg/m², 30 to <35 kg/m², and 35 to <40 kg/m²). For each BMI category, patient survival was significantly higher in those who underwent kidney transplants compared with those who remained on a waiting list. In a similar analysis of U.S. data, Gil et al (2013) noted that the risk of mortality at 1 year was significantly lower in patients who underwent transplantation than in those who remained on the waiting list for all BMI categories.15 For example, the risk was lower for patients with a BMI of at least 40 kg/m² who received organs from donors who met standard criteria (HR=0.52; 95 CI, 0.37 to 0.72) and for patients with BMI 35 to 39 kg/m² who received organs from SCD donors (HR=0.34; 95% CI, 0.26 to 0.46).

Pieloch et al (2014) retrospectively reviewed data from the OPTN database.16 The sample included 6055 morbidly obese patients (ie, BMI, 35-40 kg/m²) and 24,077 normal weight individuals who underwent kidney transplant between 2001 and 2006. After controlling for potentially confounding factors, the overall 3-year patient mortality did not differ significantly between obese and normal weight patients (HR=1.03; 05% CI, 0.96 to 1.12). Similar results were found for 3-year graft failure (HR=1.04; 95% CI, 0.98 to 1.11). In subgroup analyses, obese patients who were non-dialysis-dependent, nondiabetic, younger, receiving living donor transplants, and needing no assistance with daily living activities had significantly lower 3-year mortality rates than normal weight individuals. For example, the odds for mortality between nondiabetic obese and normal weight patients was 0.53 (95% CI, 0.44 to 0.63).

A multivariate analysis of the effect of obesity on transplant outcomes by Kwan et al (2016) included 191,091 patients from the Scientific Registry of Transplant Recipients database.17 Covariates in the analysis included age, sex, graft type, ethnicity, diabetes, peripheral vascular disease, dialysis time, and time period of
transplantation. Multivariate regression analysis indicated that obese patients had a significantly increased risk of adverse transplant outcomes including delayed graft function, urine protein, acute rejection, and graft failure \((p<0.001\) for all outcomes). The risk of adverse outcomes of obesity increased with increasing BMI (e.g., see Table 1), and was independent of the effect of diabetes.

<table>
<thead>
<tr>
<th>Body Mass Index, kg/m²</th>
<th>Hazard Ratio</th>
<th>95% Confidence Interval</th>
<th>p</th>
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<tbody>
<tr>
<td>25 to 29.9</td>
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<td>0.416</td>
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<td>30 to 34.9</td>
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<td>1.065 to 1.145</td>
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<tr>
<td>35 to 39.9</td>
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<td>1.158 to 1.276</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>40+</td>
<td>1.248</td>
<td>1.156 to 1.348</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Type 2 Diabetes**
Lim et al (2017) evaluated all-cause mortality following kidney transplantation in patients with type 2 diabetes from the Australia and New Zealand Dialysis and Transplant Registry. Of 10,714 transplant recipients during the study period, 985 (9%) had type 2 diabetes. The 10-year unadjusted overall survival in patients with an intact graft was 53% for individuals who had diabetes compared with 83% for transplant recipients who did not. The adjusted HR for all-cause mortality in patients with diabetes was 1.60 (95% CI, 1.37 to 1.86; \(p<0.001\)), with the excess risk of death attributable to both cardiovascular disease and infection. Graft survival rates at 1, 5, and 10 years were 94%, 85%, and 70% in patients with diabetes compared with 95%, 89%, and 78% in transplant recipients without diabetes \((p<0.001\), respectively.

**Section Summary: Kidney Transplant**
A large number of kidney transplants have been performed worldwide. Available data have demonstrated reasonably high survival rates after kidney transplant for appropriately selected patients and significantly higher survival rates for patients undergoing kidney transplant compared with those who remained on a waiting list. HIV infection has not been found to increase the risk of adverse events after kidney transplantation. Obesity and type 2 diabetes may increase the risk of adverse outcomes, and some data have suggested that kidney transplant recipients with HCV have worse outcomes than those without hepatitis C infection; however, data have not shown that patients with these conditions do not benefit from kidney transplants.

**Kidney Retransplant**

**Clinical Context and Test Purpose**
The purpose of kidney retransplant in patients who have a failed kidney transplant without contraindications to another kidney transplant is to provide a treatment option that is an alternative to or an improvement on existing therapies.
The question addressed in this evidence review is: Does kidney retransplant improve net health outcomes in individuals with a failed kidney transplant who do not have contraindications to another kidney transplant?

The following PICOTS were used to select literature to inform this review.

**Patients**
The relevant population of interest is individuals with a failed kidney transplant without contraindications to another kidney transplant.

**Interventions**
The therapy being considered is kidney retransplant from a living or cadaveric donor.

**Comparators**
The following therapies and practices are currently being used to make decisions about managing patients whose kidney transplant has failed: medical management including dialysis, self-care, and medications, including dietary supplements and diuretics.

**Outcomes**
The general outcomes of interest are overall survival, elimination of the need for dialysis, and treatment-related adverse events (eg, immunosuppression, graft failure, surgical complications, infections). See the Potential Contraindications section for detailed discussion.

**Timing**
Short-term follow-up ranges from immediate postsurgery to 30 days posttransplantation; lifelong follow-up (out to 10 years or more given current survival data) is necessary due to ongoing immunosuppression and risk of graft failure.

**Setting**
Kidney transplantation is provided in a hospital setting by specialized staff who are equipped to perform the surgical procedure and manage postsurgical intensive care.

**Case Series**
Barocci et al (2009) in Italy reported on long-term survival after kidney retransplantation. There were 100 (0.8%) second transplants of 1302 kidney transplants performed at a single center between 1983 and 2007. Among the second kidney recipients, 1-, 5-, and 10-year patient survival rates were 100%, 96%, and 92%, respectively. Graft survival rates at 1, 5, and 10 years were 85%, 72%, and 53%, respectively.

**Registry Studies**
According to data analysis from the OPTN between 2008 and 2015, the 1-year survival rate of patients undergoing a repeat kidney transplant was 97.1% (95%
The 5-year patient survival rate after a repeat kidney transplant was 87.6% (95% CI, 86.8% to 88.4%).

**Children**

Gupta et al (2015) retrospectively analyzed OPTN data, focusing on patients who had an initial kidney transplant as children. A total of 2281 patients were identified who had their first transplant when they were younger than 18 years and a second kidney transplant at any age. In multivariate analysis, length of first graft survival and age at second graft were significantly associated with second graft survival. Specifically, the first graft survival time of more than 5 years was associated with better second graft survival. However, patients who were between 15 and 20 years old at second transplant were at increased risk of second kidney graft failure compared with patients in other age groups.

**Potential Contraindications to Kidney Retransplant**

**HIV Infection**

Shelton et al (2017) evaluated outcomes in HIV-infected patients undergoing kidney retransplantation. In an adjusted survival analysis, HIV-infected retransplant patients had a significantly increased risk of death compared with HIV-negative patients (HR=3.11; 95% CI, 1.82 to 5.34). Other factors significantly associated with increased risk of death after kidney retransplantation included recipient infection with HCV (HR=1.77; 95% CI, 1.32 to 2.38) and grafts from older donors (HR=1.01; 95 CI, 1.00 to 1.02). The analysis included only 22 HIV-infected patients, which is too small to draw conclusions about the appropriateness of kidney retransplantation in HIV-infected individuals.

Other contraindications are discussed in the section on initial kidney transplants.

**Section Summary: Kidney Retransplant**

Data have demonstrated reasonably high survival rates after kidney retransplants for appropriately selected patients (eg, 5-year survival rates ranging from 87% to 96%).

**Summary of Evidence**

For individuals who have end-stage renal disease without contraindications to kidney transplant who receive a kidney transplant from a living donor or deceased (cadaveric) donor, the evidence includes registry data and case series. Relevant outcomes are overall survival, morbid events, and treatment-related mortality and morbidity. Data from large registries have demonstrated reasonably high survival rates after kidney transplant for appropriately selected patients and significantly higher survival rates for patients undergoing kidney transplant compared with those who remained on a waiting list. Kidney transplantation is contraindicated for patients in whom the procedure is expected to be futile due to comorbid disease or in whom posttransplantation care is expected to significantly worsen comorbid conditions. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.
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SUPPLEMENTAL INFORMATION

Practice Guidelines and Position Statements

American Society of Transplant Surgeons et al
The American Society of Transplant Surgeons, the American Society of Transplantation, the Association of Organ Procurement Organizations, and the United Network for Organ Sharing (2011) issued a joint position statement recommending modifications to the National Organ Transplant Act of 1984.22 The joint recommendation stated that the potential pool of organs from HIV-infected donors should be explored. With modern antiretroviral therapy, the use of these previously banned organs would open an additional pool of donors to HIV-infected recipients. The increased pool of donors has the potential to shorten waiting times for organs and decrease the number of waiting list deaths. The organs from HIV-infected deceased donors would be used for transplant only with patients already infected with HIV. In 2013, the HIV Organ Policy Equity Act permitting the use of this group of organ donors.

U.S. Preventive Services Task Force Recommendations
Not applicable.

Medicare National Coverage
The Medicare Benefit Policy Manual includes a chapter on end-stage renal disease.23 A section on identifying candidates for transplantation (140.1) states:

“After a patient is diagnosed as having ESRD [end-stage renal disease], the physician should determine if the patient is suitable for transplantation. If the patient is a suitable transplant candidate, a live donor transplant is considered first because of the high success rate in comparison to a cadaveric transplant. Whether one or multiple potential donors are available, the following sections provide a general description of the usual course of events in preparation for a live-donor transplant.”
Ongoing and Unpublished Clinical Trials
Some currently unpublished trials that might influence this review are listed in Table 2.

Table 2. Summary of Key Trials

<table>
<thead>
<tr>
<th>NCT No.</th>
<th>Trial Name</th>
<th>Planned Enrollment</th>
<th>Completion Date</th>
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<tr>
<td>Ongoing</td>
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<tr>
<td>NCT03500315</td>
<td>HOPE in Action Prospective Multicenter, Clinical Trial of Deceased HIVD+ Kidney Transplants for HIV+ Recipients</td>
<td>360</td>
<td>Aug 2022</td>
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</tbody>
</table>

NCT: national clinical trial.

REFERENCES


**Billing Coding/Physician Documentation Information**

**50300** Donor nephrectomy, with preparation and maintenance of allograft, from cadaver donor, unilateral or bilateral

**50320** Donor nephrectomy, open from living donor (excluding preparation and maintenance of allograft)

**50323** Backbench standard preparation of cadaver donor renal allograft prior to transplantation, including dissection and removal of perinephric fat, diaphragmatic and retroperitoneal attachments, excision of adrenal gland, and preparation of ureter(s), renal vein(s), and renal artery(s), ligating branches, as necessary

**50325** Backbench standard preparation of living donor renal allograft (open or laparoscopic) prior to transplantation, including dissection and removal of perinephric fat and preparation of ureter(s), renal vein(s), and renal artery(s), ligating branches, as necessary

**50327** Backbench reconstruction of cadaver or living donor renal allograft prior to transplantation; venous anastomosis, each

**50328** Backbench reconstruction of cadaver or living donor renal allograft prior to transplantation; arterial anastomosis, each

**50329** Backbench reconstruction of cadaver or living donor renal allograft prior to transplantation; ureteral anastomosis, each

**50340** Recipient nephrectomy (separate procedure)

**50360** Renal allotransplantation, implantation of graft; excluding donor and recipient nephrectomy

**50365** Renal allotransplantation, implantation of graft; with recipient nephrectomy

**50547** Laparoscopy, surgical; donor nephrectomy (including cold preservation), from living donor

**ICD-10 Codes**

**N18.1-** Chronic kidney disease (CKD) code range
N18.9 Other obstructive and reflux uropathy
N13.8 Obstructive and reflux uropathy unspecified
N13.9 Systemic lupus erythematosus unspecified
M32.0- Systemic lupus erythematosus
M32.8
M31.30, Wegner’s granulomatosis
M31.31
N17.1 Acute kidney failure with acute cortical necrosis
D69.0 Allergic purpura
D59.3 Hemolytic-uremic syndrome
N17.0 Acute kidney failure with tubular necrosis
N26.9 Renal sclerosis nos
N28.0 Ischemia and infarction of kidney
N11.9 Chronic tubule-interstitial nephritis unspecified
N05.0- Unspecified nephritic syndrome unspecified code range
N05.9
N03.0- Chronic nephritic syndrome code range
T45.8x1- Poisoning by adverse effect of and underdosing of other primarily
T45.8x6 systemic and hematologic agents code range
Q61.11- Polycystic kidney disease code range
Q61.3
Q61.5 Medullary cystic kidney
E83.50- Disorders of calcium metabolism code range
E83.59
M10.30- Gout due to renal impairment code range
M10.39
E85.0- Amyloidosis code range
E85.9
E77.0- Disorders of glycoprotein metabolism code range
E77.9
E72.4 Disorders of ornithine metabolism
E74.8 Other specified disorders of carbohydrate metabolism
E74.9 Unspecified disorders of carbohydrate metabolism
Q63.0- Other congenital malformations of the kidney code range
Q63.9
Q61.9 Cystic kidney disease unspecified
Q60.0- Renal agenesis and other defects code range
Q60.6
C90.00- Multiple myeloma remission code range
C90.02
Q85.1 Tuberous sclerosis
S37.00- Injury of kidney code range
S37.099

Additional Policy Key Words
Policy Implementation/Update Information

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>8/1/01</td>
<td>New policy.</td>
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<tr>
<td>8/1/02</td>
<td>No policy statement changes.</td>
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<tr>
<td>8/1/03</td>
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<tr>
<td>8/1/04</td>
<td>Policy statement revised to indicate medullary cystic disease as a medically necessary indication. Added HIV+ status as investigational.</td>
</tr>
<tr>
<td>8/1/05</td>
<td>Policy statement revised to remove HIV+ status as investigational.</td>
</tr>
<tr>
<td>4/1/06</td>
<td>Added general criteria to the Considerations section.</td>
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<td>8/1/06</td>
<td>No policy statement changes.</td>
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<td>8/1/10</td>
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<tr>
<td>8/1/11</td>
<td>Not medically necessary statement added specifying criteria indicating absolute contraindications to kidney transplantation.</td>
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<tr>
<td>8/1/12</td>
<td>No policy statement changes.</td>
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<tr>
<td>8/1/13</td>
<td>Contraindications combined (absolute and relative) and moved to Considerations section. Statement added that kidney retransplant after a failed primary kidney transplant may be considered medically necessary.</td>
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<tr>
<td>8/1/14</td>
<td>Statement added that kidney transplantation is considered investigational in all other situations, previously said it was not medically necessary.</td>
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<td>8/1/19</td>
<td>No policy statement changes.</td>
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