Clinical Policy Title: Kidney transplants

Clinical Policy Number: 13.02.01

Effective Date: January 1, 2016
Initial Review Date: November 18, 2015
Most Recent Review Date: November 16, 2016
Next Review Date: November 2017

Related policies:

CP# 04.02.05   Heart transplants
CP# 07.02.07   Lung transplants
CP# 08.02.05   Liver transplants
CP# 08.02.06   Pancreas transplants

ABOUT THIS POLICY: Keystone First has developed clinical policies to assist with making coverage determinations. Keystone First’s clinical policies are based on guidelines from established industry sources, such as the Centers for Medicare & Medicaid Services (CMS), state regulatory agencies, the American Medical Association (AMA), medical specialty professional societies, and peer-reviewed professional literature. These clinical policies along with other sources, such as plan benefits and state and federal laws and regulatory requirements, including any state- or plan-specific definition of “medically necessary,” and the specific facts of the particular situation are considered by Keystone First when making coverage determinations. In the event of conflict between this clinical policy and plan benefits and/or state or federal laws and/or regulatory requirements, the plan benefits and/or state and federal laws and/or regulatory requirements shall control. Keystone First’s clinical policies are for informational purposes only and not intended as medical advice or to direct treatment. Physicians and other health care providers are solely responsible for the treatment decisions for their patients. Keystone First’s clinical policies are reflective of evidence-based medicine at the time of review. As medical science evolves, Keystone First will update its clinical policies as necessary. Keystone First’s clinical policies are not guarantees of payment.

Coverage policy

- Keystone First considers the use of kidney allograft transplantation (kidney transplant) with either a living or cadaver donor to be clinically proven and, therefore, medically necessary for carefully selected candidates with end-stage renal disease (ESRD) who meet medical necessity criteria.
- Keystone First considers the use of kidney re-transplantation to be clinically proven and, therefore, medically necessary for patients who meet medical necessity criteria for a kidney transplant.
- Keystone First considers the use of multi-organ transplant (i.e., kidney with lung, heart, liver, or pancreas) to be clinically proven and, therefore, medically necessary for patients who meet the medical necessity criteria for each organ.
<table>
<thead>
<tr>
<th>✅</th>
<th>Medical necessity criteria (All of the following criteria must be met)</th>
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<tbody>
<tr>
<td></td>
<td>Patient has one of the following:</td>
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<td></td>
<td>- ESRD defined as either:</td>
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<td></td>
<td>- Chronic renal failure (CRF) with a glomerular filtration rate (GFR) &lt; 20 mL/min/1.73 m².</td>
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<td></td>
<td>- CRF on dialysis.</td>
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<td>- Patient has severe CRF defined as a creatinine clearance &lt; 30 ml/min with anticipated progression to ESRD within next 12 months (pre-emptive transplantation).</td>
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<td>No prohibitive oncological risk:</td>
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<td></td>
<td>- Absence of malignancy (except for non-melanomatous skin cancers).</td>
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<td></td>
<td>- Completely resected malignancy, or absence of risk determined upon individual case review.</td>
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<td>- Adequately treated malignancy with no substantial likelihood of recurrence with acceptable future risks.</td>
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<td></td>
<td>No prohibitive risk of systemic infection as evidenced by serology demonstrating either:</td>
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<td>- Absence of acute systemic infection.</td>
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<td>- Adequate response to current treatment of acute systemic infection.</td>
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<td></td>
<td>- Adequate control of chronic systemic infection (e.g., cytomegalovirus, Epstein-Barr virus, varicella zoster virus, hepatitis B virus (HBV) and hepatitis C virus (HCV), and human immunodeficiency virus [HIV]).</td>
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<td>Members with HIV infection must meet all of the following criteria:</td>
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<td>- CD4 count greater than 200 cells/mm³ for longer than six months.</td>
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<td>- A sustained virologic response (undetectable plasma HIV RNA) on a stable antiretroviral treatment regimen that will not be compromised by immunosuppressive therapy.</td>
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<td>- On stable anti-retroviral therapy longer than three months.</td>
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<tr>
<td></td>
<td>- No other HIV-related complications (e.g., active opportunistic infection, including aspergillus, tuberculosis, coccidioidomycosis, resistant fungal infections, or Kaposi’s sarcoma or other neoplasm).</td>
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<td>- Meeting all other criteria for pancreas or pancreas-kidney transplantation.</td>
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<td>No prohibitive cardiovascular risk.</td>
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<td>No prohibitive pulmonary risk.</td>
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<tr>
<td></td>
<td>No prohibitive hepatic risk as evidenced by normal serum transaminases and total bilirubin and negative hepatitis serologies:</td>
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<td></td>
<td>- For HBV- or HCV-positive members, hepatic ultrasound, alpha-fetoprotein, and possible hepatic biopsy, should be obtained.</td>
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<td></td>
<td>- In HCV-positive members without cirrhosis, antiviral therapy may be offered to suppress viral replication before transplantation.</td>
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<tr>
<td></td>
<td>No prohibitive gastrointestinal risk.</td>
</tr>
<tr>
<td></td>
<td>No prohibitive genitourinary risk.</td>
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</tbody>
</table>
Medical necessity criteria
(All of the following criteria must be met)

<table>
<thead>
<tr>
<th>✓</th>
<th>Medical necessity criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No prohibitive psychosocial risk, such as uncontrolled or untreated psychiatric disorders, active alcohol or chemical dependency.</td>
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<tr>
<td></td>
<td>- The member (including pediatric and adult-dependent members) and his/her social support system are able to comply with the treatment regimen and the necessary follow-up.</td>
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</tbody>
</table>

Limitations:

- The following conditions are not contraindications to kidney transplant, but their presence requires secondary medical review by the Chief Medical Officer and referral to the appropriate specialist to determine if the benefits of transplantation outweigh the risks, unless the member has already been approved by a Transplant Center for a kidney transplant:
  - Obesity (body mass index [BMI] > 35 kg/m²).
  - Diabetes mellitus.
  - Cerebrovascular accident or transient ischemic attack within six months.
  - Anatomic anomaly that may preclude transplant.
  - Other organ system failure.
  - Active systemic lupus erythematosus (SLE) or vasculitis.
  - Patients over the age of 70.
  - High-dose systemic corticosteroid use (> 10mg prednisone/day or equivalent).

- Absolute contraindications to kidney transplant include, but are not limited to, the following:
  - Active drug use and alcohol dependence.
  - Demonstrated patient noncompliance, which places the organ at risk by not adhering to medical recommendations (e.g., failure to comply with prescribed drug regimens).
  - Metastatic cancer.
  - Ongoing or recurring infections that are not effectively treated.
  - Serious cardiac or other ongoing insufficiencies that create an inability to tolerate transplant surgery.
  - Serious conditions that are unlikely to be improved by transplantation as life expectancy can be finitely measured.
  - Potential complications from immunosuppressive medications that are unacceptable to the patient.
  - Stage 3 HIV (Acquired immune deficiency syndrome [AIDS] diagnosis based on Centers for Disease Control and Prevention (CDC) definition of CD4 count less than 200 cells/mm³)
  - Irreversible end-organ diseases (e.g., heart, hepatic, or pulmonary), unless the patient is to undergo dual-organ transplantation (e.g., kidney-heart or kidney-liver).
Kidney transplant is not medically necessary for organs sold rather than donated to a recipient.

Xenotransplantation of a solid organ (e.g., porcine xenografts) is not medically necessary, because its safety or effectiveness has not been established.

Routine native nephrectomy is not medically necessary, except in cases of recurrent upper urinary tract infections, when the underlying kidney disease predisposes to enhanced cancer risk in the urogenital tract, or in patients with severe, recurrent symptomatic complications (bleeding, infection, or stones) associated with autosomal polycystic kidney disease (ADPKD). It may be appropriate to perform a unilateral nephrectomy of asymptomatic ADPKD kidneys if the surgeon concludes space for the transplant kidney is insufficient.

Kidney transplant is not medically necessary for persons with reversible kidney disease.

All other uses of kidney transplant are not medically necessary.

For Medicare members only:

ESRD facilities must be certified by Medicare and are required to comply with the conditions for coverage set forth in 42 CFR Part 494.

See Publication #100-02 Medicare Benefit Policy Manual Chapter 11 — End-Stage Renal Disease (ESRD).


Alternative covered services:

- Hemodialysis.
- Peritoneal dialysis.

Background

Chronic kidney disease (CKD) is a growing health problem in the United States. An estimated 20 million adults may have CKD at varying levels of severity (CDC, 2014). CKD includes conditions causing structural abnormalities of the kidney that can lead to decreased kidney function over a long time.

Diabetes, hypertension, and polycystic kidney disease are the most common causes of CKD. Other conditions include glomerulonephritis, inherited diseases such as polycystic kidney disease, congenital
kidney and urinary tract diseases, SLE and other diseases that affect the body's immune system, obstructions, and recurring urinary tract infections (CDC, 2014; Campbell, 2013).

CKD may lead to chronic kidney failure, also referred to as ESRD, requiring renal replacement therapy (RRT) for the individual to live. RRT includes hemodialysis, peritoneal dialysis and kidney transplant. Kidney transplant is often the treatment of choice, because patients receiving kidney transplant experience improved quality of life and survival compared with those receiving dialysis (Purnell, 2013). The main goal of kidney transplant is to improve the life expectancy and quality of life of patients with established ESRD. A kidney can come from a living relative, a living unrelated person, or a cadaver (CDC, 2014).

The most common causes of recurrent disease in kidney transplant recipients are primary focal segmental glomerulosclerosis, IgA nephropathy, mesangiocapillary glomerulonephritis type II, and diabetic nephropathy. Treatment of some recurrent kidney diseases may prevent or delay the onset of graft failure. In the event of subsequent renal graft failure, re-transplantation may be necessary (Collins, 2015).

Because the demand for kidney transplant exceeds the supply of kidney allografts, candidates for kidney transplant are put on a transplant waiting list and require dialysis until an organ is available. Potential candidates for the transplant waiting list must undergo careful evaluation due to the inherent risks and potential complications of surgery, immunosuppressive therapy, and concomitant disorders and conditions associated with kidney transplant (Collins, 2015).

**Regulatory status:**

The Health Resources Services Administration (HRSA) within the Department of Health and Human Services has oversight responsibility for the organ allocation system in the United States through the Organ Procurement and Transplantation Network (OPTN). The United Network for Organ Sharing administers the OPTN, to which transplant centers are required to report (OPTN, 2015a). The U.S. Food and Drug Administration (FDA) does not regulate the transplantation of human organs containing blood vessels, such as the kidney, liver, heart, lung, and pancreas (FDA, 2015).

**Searches**

Keystone First searched PubMed and the databases of:

- UK National Health Services Centre for Reviews and Dissemination.
- Agency for Healthcare Research and Quality’s National Guideline Clearinghouse and other evidence-based practice centers.
- The Centers for Medicare & Medicaid Services (CMS).

We conducted searches on September 9, 2015. Search terms were: “Renal Replacement Therapy,” [MeSH], "Renal Insufficiency, Chronic" [MeSH], and “Kidney Failure” [Mesh].
We included:

- **Systematic reviews**, which pool results from multiple studies to achieve larger sample sizes and
greater precision of effect estimation than in smaller primary studies. Systematic reviews use
predetermined transparent methods to minimize bias, effectively treating the review as a
scientific endeavor, and are thus rated highest in evidence-grading hierarchies.

- **Guidelines based on systematic reviews.**

- **Economic analyses**, such as cost-effectiveness, and benefit or utility studies (but not simple cost
studies), reporting both costs and outcomes — sometimes referred to as efficiency studies —
which also rank near the top of evidence hierarchies.

**Findings**

For this policy, we identified 12 systematic reviews, one economic analysis, one decision analysis, and
eight evidence-based guidelines. Kidney transplant is a safe, cost-effective, and accepted treatment for
appropriately selected individuals with ESRD of any age who are considered fit for major surgery and
chronic immunosuppression. Kidney transplant is not appropriate for patients in whom the procedure is
expected to be futile due to comorbid disease or in whom post-transplantation care is expected to
significantly worsen comorbid conditions. However, such predictions are difficult to make, imprecise,
and often supported by inadequate information.

The level of GFR is the best measure of overall kidney function (National Kidney Foundation [NKF],
2002). While the NKF defines chronic kidney failure as a GFR less than 15 mL/min/1.73 m² or a patient
on dialysis, the OPTN requires a patient with a GFR less than or equal to 20 mL/min/1.73 m² to be placed
on their waiting list (NKF, 2002; OPTN, 2015b).

In some patients, kidney transplant may be combined with other transplanted organs; in this case,
individuals must meet selection criteria for each organ. Biopsy-confirmed high-grade hepatic fibrosis is a
contraindication to kidney transplant due to an increased risk of liver failure after transplantation
(Fabrizi, 2014; Infectious Diseases Society of America [IDSA], 2014; Kidney Disease: Improving Global
Outcomes Transplant Work Group [KDIGO], 2009).

Re-transplantation is an accepted and successful treatment for appropriately selected individuals with
graft failure usually caused by primary non-function, rejection, recurrent disease or immunosuppression
toxicity. In rare circumstances, re-transplantation may be contraindicated because of the very high risk
of recurrent disease (e.g., in recipients who have lost their first allograft early from recurrent disease)
(KDIGO, 2009). The OPTN defines immediate and permanent non-function of a transplanted kidney as
either (OPTN, 2015b):

- Kidney graft removal within the first 90 days of transplant documented by an operative
  report of the removal of the transplanted kidney.
Kidney graft failure within the first 90 days of transplant with documentation that the candidate is either on dialysis or has measured creatinine clearance or calculated GFR less than or equal to 20 mL/min/1.73 m² within 90 days after the candidate’s kidney transplant.

Only one guideline addressed the need for native nephrectomy in kidney transplant candidates (European Renal Best Practice [ERBP], 2013). They do not recommend routine native nephrectomy, except in cases of recurrent upper urinary tract infections, when the underlying kidney disease predisposes the patient to enhanced cancer risk in the urogenital tract, or in patients with severe, recurrent symptomatic complications (bleeding, infection, or stones) associated with ADPKD. It may be appropriate to perform a unilateral nephrectomy of asymptomatic ADPKD kidneys if the surgeon concludes space for the transplant kidney is insufficient.

**Clinical evaluation:**

A complete history and physical examination is performed to identify disorders that constitute a contraindication to transplantation and clinical, surgical, and psychological disorders that may affect outcomes. These include, but are not limited to, cardiovascular disease, gastrointestinal disorders, infectious diseases, urological disorders, malignancies, and the potential for non-adherence.

Relevant cardiovascular risk factors for kidney transplant recipients include diabetes mellitus, prior cardiovascular disease, more than one year on dialysis, left ventricular hypertrophy, age greater than 60 years, smoking, hypertension, and dyslipidemia. Age is not an absolute contraindication to kidney transplant, but, for persons age 60 or older, kidney transplant should be limited to those patients with a life expectancy that can ensure prolonged graft survival (i.e., without serious comorbidities).

Chronic viral infection, prior malignancy, and obesity (BMI greater than 30 kg/m²) are not absolute contraindications to kidney transplant, as outcomes after kidney transplant are usually better than outcomes for patients remaining on long-term dialysis. In children, intellectual disability and hemostatic defects are not absolute contraindications to transplantation.

Serologic confirmation, opportunistic conditions, comorbidities, current immune status, and virologic control with appropriate treatment or immunization must be considered for potential candidacy:

- **Active systemic infection** is a contraindication to kidney transplant.
- **Specific criteria for HIV-positive patients** include the following (IDSA, 2014):
  - CD4 count > 200 cells/mm³ for more than six months.
  - On stable antiretroviral therapy for more than three months.
  - A sustained virologic response (undetectable plasma HIV RNA) on a stable antiretroviral treatment regimen that will not be compromised by immunosuppressive therapy.
- No other HIV-related complications (e.g., opportunistic infection, including aspergillus, tuberculosis, coccidioimycosis, resistant fungal infections, or Kaposi’s sarcoma or other neoplasm).
- Meeting all other criteria for transplantation.
- Patients with decompensated liver disease are poor candidates for kidney transplant.

In patients with a prior malignancy, guidelines reflect the uncertainty in the evidence supporting the suitability of kidney transplant. The balance between mortality risk after kidney transplant and remaining on dialysis guides optimal timing of active wait-listing (Dudley, 2011; ERBP, 2013).

- Any active tumor is an absolute contraindication to transplantation.
- Patients with successfully treated cancer can be considered for kidney transplant taking into account the estimated risk of cancer relapse before wait-listing. In general, in situ or pre-malignant conditions require minimal or no waiting time, while for some other cancers a two- or five-year wait has been suggested on the basis of the reported recurrence rates and associated mortality risks.

The level of adherence to prescribed regimens affects transplantation outcomes (KDIGO, 2009). Pediatric populations are particularly vulnerable during the transition from pediatric to adult nephrology care. Psychosocial evaluation is needed to assess the candidate’s behavioral health status and social and family support, smoking status, and drug and alcohol use:

- Active drug use and alcohol dependence are contraindications to kidney transplant, and these persons should not be wait-listed.
- Active smoking is not an absolute contraindication to kidney transplant, but smoking cessation before and after transplantation should be encouraged.
- Past drug use and alcohol use are not absolute contraindications to kidney transplant.
- Patients with active non-dependent alcohol consumption are potentially at risk for additional complications after kidney transplant and should be encouraged to reduce or eliminate consumption prior to kidney transplant. There is a lack of consensus on whether abstinence (or what length of abstinence) should be a requirement prior to kidney transplant.

There is considerable effort underway to identify other biomarkers for predicting graft failure in kidney transplant candidates. At this time, the evidence is insufficient to support the use of testing for genetic polymorphisms and pre-transplantation soluble CD30 levels for predicting graft failure potential in kidney transplant.

Policy updates:

In 2016, we added one update of a previous systematic review (Hayes, 2016), one new systematic review and meta-analysis (Hill, 2015), and one new guideline (ERBP, 2015). The new information supports not excluding potential recipients from kidney transplant or simultaneous pancreas-kidney
(SPK) transplantation solely on the basis of obesity or diabetes status. Hill (2015) determined that patients with a BMI ≥ 30 kg/m² experienced a much higher likelihood of delayed graft function, only a slightly increased risk of graft loss, and similar survival compared to recipients with a normal BMI. Both kidney transplant and SPK transplantation improved survival in patients with type 1 diabetes and ESRD; the evidence supports kidney transplant but not SPK transplantation in patients with type 2 diabetes and ESRD (Hayes, 2016; ERBP, 2015).

These results confirm previous findings. However, as a risk factor for cardiovascular disease that may predispose the transplantation request to secondary review, diabetes mellitus was added to the policy limitations section.

**Summary of clinical evidence:**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Content, Methods, Recommendations</th>
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</table>
| ERBP (2015) Guideline: management of adults with diabetes mellitus and CKD stage 3b or higher (eGFR <45 mL/min) | **Key points:** For patients with type 1 diabetes and CKD stage 5:  
  - Guideline suggests living donation kidney transplant or SPK transplantation to improve survival of suitable patients (weak recommendation, low-quality evidence [2C]).  
  - Guideline suggests against islet transplantation after kidney transplant with the aim to improve survival (2C).  
  - Guideline suggests pancreas grafting to improve survival after kidney transplant (2C). For patients with type 2 diabetes and CKD stage 5:  
  - Guideline recommends against pancreas or SPK transplantation (strong recommendation, very low-quality evidence [1D]).  
  - Diabetes in itself should not be considered a contraindication to kidney transplant in patients who otherwise comply with inclusion and exclusion criteria for transplantation (strong recommendation, low-quality evidence [1C]). |
| Hayes (2013, updated 2016) SPK transplantation | **Key points:**  
  - Systematic review of 21 retrospective nonrandomized analyses and three prospective cohort studies, including large-scale analyses of the transplant registries (2000 – March 2015), sample size range 101 to 15,282 patients. 2016 update revealed no new information.  
  - Overall quality: moderate.  
  - SPK extends patient survival and kidney graft survival rates in type 1 diabetes patients with imminent or established ESRD; effects persist for many years after SPK relative to kidney transplant alone.  
  - Established ESRD (e.g., creatinine clearance < 30 mL per minute) and confirmed diabetic nephropathy on insulin are commonly accepted criteria for SPK.  
  - Evidence for SPK among type 2 diabetic patients is insufficient.  
  - Evidence for SPK relative to pancreas transplant alone and pancreas after kidney transplant was insufficient. |
| Choi (2015) kidney transplant threshold in patients with hepatitis C (HCV) | **Key points:**  
  - Decision analysis compared five-year patient survival, progression of liver fibrosis, cadaveric kidney transplant, and sustained viral response using three strategies for patients with HCV on hemodialysis.  
  - Kidney transplant was associated with improved five-year survival for patients with liver fibrosis stages 1 to 3, but not stage 4 (cirrhosis).  
  - Antiviral therapy improved survival in patients with stage 3 fibrosis, but not in stages 1 and 2.
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<tr>
<th>Citation</th>
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<tr>
<td><strong>Hill (2015)</strong>&lt;br&gt;Recipient obesity and outcomes after kidney transplant</td>
<td><strong>Key points:</strong>&lt;br&gt;• Systematic review and meta-analysis of 17 observational studies (138,081 patients).&lt;br&gt;• Overall quality: low with high risk of bias.&lt;br&gt;• Compared to kidney transplant recipients with a normal BMI, obese kidney transplant recipients have a much higher likelihood of delayed graft function (odds ratio 1.68, 95% confidence interval [CI] 1.39 to 2.03), only a slightly increased risk of graft loss (hazard ratio [HR] 1.06, 95% CI 1.01 to 1.12), and similar survival (HR 1.24, 95% CI 0.90 to 1.70).&lt;br&gt;• Potential recipients should not be excluded from kidney transplant solely on the basis of obesity, but should have careful optimization prior to surgery to minimize peri-operative morbidity and reduce the likelihood of additional graft injury.</td>
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<td><strong>Wang (2015)</strong>&lt;br&gt;Cochrane review&lt;br&gt;Cardiac testing for coronary artery disease in potential kidney transplant recipients</td>
<td><strong>Key points:</strong>&lt;br&gt;• Meta-analysis of 52 studies (7,401 participants) of myocardial perfusion scintigraphy (MPS), dobutamine stress echocardiography, or coronary angiography for predicting all-cause mortality, cardiovascular mortality, and major adverse cardiac events post-transplant.&lt;br&gt;• Noninvasive tests are as good as coronary angiography at predicting future adverse cardiovascular events in persons with advanced CRF. However, a substantial number of people with negative test results go on to experience adverse cardiac events.</td>
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<td><strong>Chung (2014)</strong>&lt;br&gt;Economic evaluation of kidney transplant</td>
<td><strong>Key points:</strong>&lt;br&gt;• Systematic review of 66 economic evaluations published from January 2000 – December 2011. Overall quality is high, but with high risk of publication bias.&lt;br&gt;• About 80% of the included studies reported highly favorable cost-effectiveness ratios, with the majority showing dominance against the comparator.</td>
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<td><strong>Fabrizi (2014)</strong>&lt;br&gt;HCV and survival after kidney transplant</td>
<td><strong>Key points:</strong>&lt;br&gt;• Systematic review of 18 observational studies (133,530 unique kidney transplant recipients).&lt;br&gt;• Living donor rate had a favorable influence on patient (P = 0.031) and graft survival (P = 0.01); diabetes mellitus had a detrimental role on patient survival (P = 0.001).&lt;br&gt;• HCV-positive patients after kidney transplant have an increased risk of mortality and graft loss. Mechanisms underlying this relationship are being studied.</td>
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<td><strong>Han (2014)</strong>&lt;br&gt;Association between CD28, CTLA-4, CD86, and PDCD1 gene polymorphisms and the incidence of allograft rejection susceptibility</td>
<td><strong>Key points:</strong>&lt;br&gt;• CD28 IVS3 +17T/C may increase risk of allograft rejection; potential association between CD86 +1057G/A variant and non-allograft rejection cases.&lt;br&gt;• Further studies needed to confirm findings.</td>
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</table>
| **Mansell (2014)**<br>Cardiovascular risk prediction models in kidney transplant recipients | **Key points:**<br>• Systematic review of seven longitudinal cohort studies: five investigated the Framingham risk score and three used a transplant-specific model. Sample sizes included 344 to 23,575 participants.<br>• The Framingham risk score underestimates cardiovascular events in kidney transplant recipients, but these studies have not been robust. A risk prediction model has been
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<tr>
<td>Ingsathit (2013)</td>
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Survival advantage of kidney transplant versus dialysis in patients with HCV | 
**Key points:**
- Systematic review and meta-analysis of nine studies (1,734 patients).
- Pooled risk ratio of death at five years = 2.19 (95% CI 1.50 to 3.20); significantly favored kidney transplant versus waiting list.
- HCV-infected patients who remain on dialysis are at higher risk of death compared with those who received kidney transplant. |
| Chen (2012) | 
Pretransplantation soluble CD30 level as a predictor of AR in kidney transplant | 
**Key points:**
- Meta-analysis of 12 studies (2,507 patients).
- Accuracy and predictive ability was poor. Prospective studies are needed. |
| Lv (2012) | 
Association between IL-6-174G/C polymorphism and acute rejection of renal allograft. | 
**Key points:**
- Meta-analysis of seven studies of donor high-producer genotype (G/G and G/C) of IL-6 -174G/C polymorphism and acute rejection of renal allograft and 13 studies of recipient IL-6 -174G/C polymorphism and acute rejection.
- No statistically significant findings. Well-designed studies with larger sample sizes are needed. |
| Hu (2011) | 
Association between donor or recipient TNF-A-308G/A polymorphism and acute rejection of renal allograft. | 
**Key points:**
- Meta-analyses of 38 studies (4,841 total patients). TNF2 allele positive genotype of donor or recipient was associated with increased risk of incidence of acute rejection of renal allograft. Recipient TNF2 allele positive genotype is also associated with increased risk of recurrence of acute rejection of renal allograft.
- Additional studies with large sample sizes and better study designs needed. |
| Medical Advisory Secretariat Ontario (2010) | 
Effectiveness of solid organ transplantation in persons with end stage organ failure and human immunodeficiency virus (HIV+) | 
**Key points:**
- Based on a pooled HIV+ cohort from four studies (285 patients), the risk of death after kidney transplant in an HIV+ cohort does not differ to that of an HIV cohort (HR 0.90; 95% CI: 0.36 – 2.23).
- Very low-quality evidence. |

**References**

**Professional society guidelines/other:**


ERBP Clinical Practice Guideline on management of patients with diabetes and chronic kidney disease stage 3b or higher (eGFR <45 mL/min). *Nephrol Dial Transplant.* 2015; 30 Suppl 2: ii1 – 142.


**Peer-reviewed references:**


CMS NCDs:


LCDs:

No LCDs identified as of the writing of this policy.

Commonly submitted codes
Below are the most commonly submitted codes for the service(s)/item(s) subject to this policy. This is not an exhaustive list of codes. Providers are expected to consult the appropriate coding manuals and bill accordingly.

<table>
<thead>
<tr>
<th>CPT Code</th>
<th>Description</th>
<th>Comment</th>
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<tbody>
<tr>
<td>50360</td>
<td>Renal allotransplantation, implantation of graft; without recipient nephrectomy</td>
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<tr>
<td>50365</td>
<td>Renal allotransplantation, implantation of graft; with recipient nephrectomy</td>
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<tr>
<td>50380</td>
<td>Renal autotransplantation, reimplantation of kidney</td>
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<thead>
<tr>
<th>ICD-10 Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>I12.0</td>
<td>Hypertensive chronic kidney disease with stage 5 chronic kidney disease or end stage renal disease</td>
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<tr>
<td>I13.11</td>
<td>Hypertensive heart and chronic kidney disease without heart failure, with stage 5 chronic kidney disease, or end stage renal disease</td>
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<tr>
<td>I13.2</td>
<td>Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease</td>
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<tr>
<td>N18.5</td>
<td>Chronic kidney disease, stage 5</td>
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<tr>
<td>N18.6</td>
<td>End stage renal disease</td>
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<th>HCPCS Level II</th>
<th>Description</th>
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