



Patient Safety Indicator 10 (PSI 10) Postoperative Acute Kidney Injury Requiring Dialysis Rate July 2021 Hospital-Level Indicator Type of Score: Rate

Prepared by:

Agency for Healthcare Research and Quality

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DESCRIPTION

Postoperative acute kidney failure requiring dialysis per 1,000 elective surgical discharges for patients ages 18 years and older. Excludes cases with principal diagnosis of acute kidney failure; cases with secondary diagnosis of acute kidney failure present on admission; cases with secondary diagnosis of acute kidney failure and dialysis procedure before or on the same day as the first operating room procedure; cases with cardiac arrest, severe cardiac dysrhythmia, shock, chronic kidney disease stage 5 or end stage renal disease; cases with a principal diagnosis of urinary tract obstruction; cases with partial nephrectomy procedure on a solitary kidney; and obstetric cases.

[NOTE: The software provides the rate per hospital discharge. However, common practice reports the measure as per 1,000 discharges. The user must multiply the rate obtained from the software by 1,000 to report events per 1,000 hospital discharges.]

NUMERATOR

Discharges, among cases meeting the inclusion and exclusion rules for the denominator, with:

- any secondary ICD-10-CM diagnosis code for acute kidney failure (**PHYSIDB***) and any listed ICD-10-PCS procedure code for dialysis (**DIALYIP***)

DENOMINATOR

Elective surgical discharges (*Appendix E: SURGI2R*), for patients ages 18 years and older, with any listed ICD-10-PCS procedure code for an operating room procedure (*Appendix A: ORPROC*). Elective surgical discharges are defined by specific MS-DRG codes with admission type recorded as elective (ATYPE=3).

[Appendix A - Operating Room Procedure Codes](#)

[Appendix E - Surgical Discharge MS-DRGs](#)

DENOMINATOR EXCLUSIONS

Exclude cases:

- with a principal ICD-10-CM diagnosis code (or secondary diagnosis present on admission) for acute kidney failure (*PHYSIDB**)
- with any dialysis procedure (*DIALYIP**) that occurs before or on the same day as the first operating room procedure (*Appendix A: ORPROC*)
- with any dialysis access procedure (*DIALY2P**) that occurs before or on the same day as the first operating room procedure (*Appendix A: ORPROC*)
- with a principal ICD-10-CM diagnosis code (or secondary diagnosis present on admission) for cardiac arrest (*CARDIID**)
- with a principal ICD-10-CM diagnosis code (or secondary diagnosis present on admission) for severe cardiac dysrhythmia (*CARDRID**)
- with a principal ICD-10-CM diagnosis code (or secondary diagnosis present on admission) for shock (*SHOCKID**)
- with a principal ICD-10-CM diagnosis code (or secondary diagnosis present on admission) for chronic kidney disease stage 5 or end stage renal disease (*CRENLFD**)
- with a principal ICD-10-CM diagnosis code for urinary tract obstruction (*URINARYOBSID**)
- with any ICD-10-CM diagnosis present on admission of solitary kidney (*SOLKIDD**) and any ICD-10-PCS procedure code for partial nephrectomy (*PNEPHREP**)
- MDC 14 (pregnancy, childbirth and puerperium)
- MDC 15 (newborns and other neonates with conditions originating in perinatal period)
- with an ungroupable DRG (DRG=999)
- with missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), or principal diagnosis (DX1=missing)

* See below for code list

Acute kidney (renal) failure diagnosis codes: (PHYSIDB)

| | | | |
|------|---|------|---|
| N170 | Acute kidney failure with tubular necrosis | N179 | Acute kidney failure, Unspecified |
| N171 | Acute kidney failure with acute cortical necrosis | N19 | Unspecified kidney failure |
| N172 | Acute kidney failure with medullary necrosis | N990 | Postprocedural (acute) (chronic) kidney failure |
| N178 | Other acute kidney failure | | |

Dialysis access procedure codes: (DIALY2P)

| | | | |
|---------|--|---------|--|
| 031509D | Bypass right axillary artery to upper arm vein with autologous venous tissue, open approach | 03170ZV | Bypass right brachial artery to superior vena cava, open approach |
| 031509F | Bypass right axillary artery to lower arm vein with autologous venous tissue, open approach | 03170ZW | Bypass right brachial artery to lower extremity vein, open approach |
| 031509V | Bypass right axillary artery to superior vena cava with autologous venous tissue, open approach | 031809D | Bypass left brachial artery to upper arm vein with autologous venous tissue, open approach |
| 031509W | Bypass right axillary artery to lower extremity vein with autologous venous tissue, open approach | 031809F | Bypass left brachial artery to lower arm vein with autologous venous tissue, open approach |
| 03150AD | Bypass right axillary artery to upper arm vein with autologous arterial tissue, open approach | 031809V | Bypass left brachial artery to superior vena cava with autologous venous tissue, open approach |
| 03150AF | Bypass right axillary artery to lower arm vein with autologous arterial tissue, open approach | 031809W | Bypass left brachial artery to lower extremity vein with autologous venous tissue, open approach |
| 03150AV | Bypass right axillary artery to superior vena cava with autologous arterial tissue, open approach | 03180AD | Bypass left brachial artery to upper arm vein with autologous arterial tissue, open approach |
| 03150AW | Bypass right axillary artery to lower extremity vein with autologous arterial tissue, open approach | 03180AF | Bypass left brachial artery to lower arm vein with autologous arterial tissue, open approach |
| 03150JD | Bypass right axillary artery to upper arm vein with synthetic substitute, open approach | 03180AV | Bypass left brachial artery to superior vena cava with autologous arterial tissue, open approach |
| 03150JF | Bypass right axillary artery to lower arm vein with synthetic substitute, open approach | 03180AW | Bypass left brachial artery to lower extremity vein with autologous arterial tissue, open approach |
| 03150JV | Bypass right axillary artery to superior vena cava with synthetic substitute, open approach | 03180JD | Bypass left brachial artery to upper arm vein with synthetic substitute, open approach |
| 03150JW | Bypass right axillary artery to lower extremity vein with synthetic substitute, open approach | 03180JF | Bypass left brachial artery to lower arm vein with synthetic substitute, open approach |
| 03150KD | Bypass right axillary artery to upper arm vein with nonautologous tissue substitute, open approach | 03180JV | Bypass left brachial artery to superior vena cava with synthetic substitute, open approach |
| 03150KF | Bypass right axillary artery to lower arm vein with nonautologous tissue substitute, open approach | 03180JW | Bypass left brachial artery to lower extremity vein with synthetic substitute, open approach |
| 03150KV | Bypass right axillary artery to superior vena cava with nonautologous tissue substitute, open approach | 03180KD | Bypass left brachial artery to upper arm vein with nonautologous tissue substitute, open approach |

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|---------|--|---------|---|
| 03150KW | Bypass right axillary artery to lower extremity vein with nonautologous tissue substitute, open approach | 03180KF | Bypass left brachial artery to lower arm vein with nonautologous tissue substitute, open approach |
| 03150ZD | Bypass right axillary artery to upper arm vein, open approach | 03180KV | Bypass left brachial artery to superior vena cava with nonautologous tissue substitute, open approach |
| 03150ZF | Bypass right axillary artery to lower arm vein, open approach | 03180KW | Bypass left brachial artery to lower extremity vein with nonautologous tissue substitute, open approach |
| 03150ZV | Bypass right axillary artery to superior vena cava, open approach | 03180ZD | Bypass left brachial artery to upper arm vein, open approach |
| 03150ZW | Bypass right axillary artery to lower extremity vein, open approach | 03180ZF | Bypass left brachial artery to lower arm vein, open approach |
| 031609D | Bypass left axillary artery to upper arm vein with autologous venous tissue, open approach | 03180ZV | Bypass left brachial artery to superior vena cava, open approach |
| 031609F | Bypass left axillary artery to lower arm vein with autologous venous tissue, open approach | 03180ZW | Bypass left brachial artery to lower extremity vein, open approach |
| 031609V | Bypass left axillary artery to superior vena cava with autologous venous tissue, open approach | 031909F | Bypass right ulnar artery to lower arm vein with autologous venous tissue, open approach |
| 031609W | Bypass left axillary artery to lower extremity vein with autologous venous tissue, open approach | 03190AF | Bypass right ulnar artery to lower arm vein with autologous arterial tissue, open approach |
| 03160AD | Bypass left axillary artery to upper arm vein with autologous arterial tissue, open approach | 03190JF | Bypass right ulnar artery to lower arm vein with synthetic substitute, open approach |
| 03160AF | Bypass left axillary artery to lower arm vein with autologous arterial tissue, open approach | 03190KF | Bypass right ulnar artery to lower arm vein with nonautologous tissue substitute, open approach |
| 03160AV | Bypass left axillary artery to superior vena cava with autologous arterial tissue, open approach | 03190ZF | Bypass right ulnar artery to lower arm vein, open approach |
| 03160AW | Bypass left axillary artery to lower extremity vein with autologous arterial tissue, open approach | 03193ZF | Bypass right ulnar artery to lower arm vein, percutaneous approach |
| 03160JD | Bypass left axillary artery to upper arm vein with synthetic substitute, open approach | 031A09F | Bypass left ulnar artery to lower arm vein with autologous venous tissue, open approach |
| 03160JF | Bypass left axillary artery to lower arm vein with synthetic substitute, open approach | 031A0AF | Bypass left ulnar artery to lower arm vein with autologous arterial tissue, open approach |
| 03160JV | Bypass left axillary artery to superior vena cava with synthetic substitute, open approach | 031A0JF | Bypass left ulnar artery to lower arm vein with synthetic substitute, open approach |

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|---------|---|---------|--|
| 03160JW | Bypass left axillary artery to lower extremity vein with synthetic substitute, open approach | 031A0KF | Bypass left ulnar artery to lower arm vein with nonautologous tissue substitute, open approach |
| 03160KD | Bypass left axillary artery to upper arm vein with nonautologous tissue substitute, open approach | 031A0ZF | Bypass left ulnar artery to lower arm vein, open approach |
| 03160KF | Bypass left axillary artery to lower arm vein with nonautologous tissue substitute, open approach | 031A3ZF | Bypass left ulnar artery to lower arm vein, percutaneous approach |
| 03160KV | Bypass left axillary artery to superior vena cava with nonautologous tissue substitute, open approach | 031B09F | Bypass right radial artery to lower arm vein with autologous venous tissue, open approach |
| 03160KW | Bypass left axillary artery to lower extremity vein with nonautologous tissue substitute, open approach | 031B0AF | Bypass right radial artery to lower arm vein with autologous arterial tissue, open approach |
| 03160ZD | Bypass left axillary artery to upper arm vein, open approach | 031B0JF | Bypass right radial artery to lower arm vein with synthetic substitute, open approach |
| 03160ZF | Bypass left axillary artery to lower arm vein, open approach | 031B0KF | Bypass right radial artery to lower arm vein with nonautologous tissue substitute, open approach |
| 03160ZV | Bypass left axillary artery to superior vena cava, open approach | 031B0ZF | Bypass right radial artery to lower arm vein, open approach |
| 03160ZW | Bypass left axillary artery to lower extremity vein, open approach | 031B3ZF | Bypass right radial artery to lower arm vein, percutaneous approach |
| 031709D | Bypass right brachial artery to upper arm vein with autologous venous tissue, open approach | 031C09F | Bypass left radial artery to lower arm vein with autologous venous tissue, open approach |
| 031709F | Bypass right brachial artery to lower arm vein with autologous venous tissue, open approach | 031C0AF | Bypass left radial artery to lower arm vein with autologous arterial tissue, open approach |
| 031709V | Bypass right brachial artery to superior vena cava with autologous venous tissue, open approach | 031C0JF | Bypass left radial artery to lower arm vein with synthetic substitute, open approach |
| 031709W | Bypass right brachial artery to lower extremity vein with autologous venous tissue, open approach | 031C0KF | Bypass left radial artery to lower arm vein with nonautologous tissue substitute, open approach |
| 03170AD | Bypass right brachial artery to upper arm vein with autologous arterial tissue, open approach | 031C0ZF | Bypass left radial artery to lower arm vein, open approach |
| 03170AF | Bypass right brachial artery to lower arm vein with autologous arterial tissue, open approach | 031C3ZF | Bypass left radial artery to lower arm vein, percutaneous approach |
| 03170AV | Bypass right brachial artery to superior vena cava with autologous arterial tissue, open approach | 041K09S | Bypass right femoral artery to lower extremity vein with autologous venous tissue, open approach |

| | | | |
|---------|--|---------|---|
| 03170AW | Bypass right brachial artery to lower extremity vein with autologous arterial tissue, open approach | 041K0AS | Bypass right femoral artery to lower extremity vein with autologous arterial tissue, open approach |
| 03170JD | Bypass right brachial artery to upper arm vein with synthetic substitute, open approach | 041K0JS | Bypass right femoral artery to lower extremity vein with synthetic substitute, open approach |
| 03170JF | Bypass right brachial artery to lower arm vein with synthetic substitute, open approach | 041K0KS | Bypass right femoral artery to lower extremity vein with nonautologous tissue substitute, open approach |
| 03170JV | Bypass right brachial artery to superior vena cava with synthetic substitute, open approach | 041K0ZS | Bypass right femoral artery to lower extremity vein, open approach |
| 03170JW | Bypass right brachial artery to lower extremity vein with synthetic substitute, open approach | 041K3JS | Bypass right femoral artery to lower extremity vein with synthetic substitute, percutaneous approach |
| 03170KD | Bypass right brachial artery to upper arm vein with nonautologous tissue substitute, open approach | 041L09S | Bypass left femoral artery to lower extremity vein with autologous venous tissue, open approach |
| 03170KF | Bypass right brachial artery to lower arm vein with nonautologous tissue substitute, open approach | 041L0AS | Bypass left femoral artery to lower extremity vein with autologous arterial tissue, open approach |
| 03170KV | Bypass right brachial artery to superior vena cava with nonautologous tissue substitute, open approach | 041L0JS | Bypass left femoral artery to lower extremity vein with synthetic substitute, open approach |
| 03170KW | Bypass right brachial artery to lower extremity vein with nonautologous tissue substitute, open approach | 041L0KS | Bypass left femoral artery to lower extremity vein with nonautologous tissue substitute, open approach |
| 03170ZD | Bypass right brachial artery to upper arm vein, open approach | 041L0ZS | Bypass left femoral artery to lower extremity vein, open approach |
| 03170ZF | Bypass right brachial artery to lower arm vein, open approach | 041L3JS | Bypass left femoral artery to lower extremity vein with synthetic substitute, percutaneous approach |

Dialysis procedure codes: (DIALYIP)

| | | | |
|---------|--|---------|---|
| 3E1M39Z | Irrigation of peritoneal cavity using dialysate, percutaneous approach | 5A1D70Z | Performance of urinary filtration, intermittent, less than 6 hours per day |
| 5A1D00Z | Performance of urinary filtration, single | 5A1D80Z | Performance of urinary filtration, prolonged intermittent, 6-18 hours per day |
| 5A1D60Z | Performance of urinary filtration, multiple | 5A1D90Z | Performance of urinary filtration, continuous, greater than 18 hours per day |

Cardiac arrest diagnosis codes: (CARDIID)

| | | | |
|------|--|------|-----------------------------------|
| I462 | Cardiac arrest due to underlying cardiac condition | I469 | Cardiac arrest, cause Unspecified |
| I468 | Cardiac arrest due to Other underlying condition | | |

Severe cardiac dysrhythmia diagnosis codes: (CARDRID)

| | | | |
|------|----------------------------------|-------|--------------------------|
| I442 | Atrioventricular block, complete | I4901 | Ventricular fibrillation |
| I470 | Re-Entry ventricular arrhythmia | I4902 | Ventricular flutter |
| I472 | Ventricular tachycardia | | |

Shock diagnosis codes: (SHOCKID)

| | | | |
|-------|--|---------|--|
| O0331 | Shock following incomplete spontaneous abortion | T782XXA | Anaphylactic shock, unspecified, initial encounter |
| O0381 | Shock following complete or Unspecified spontaneous abortion | T8051XA | Anaphylactic reaction due to administration of blood and blood products, initial encounter |
| O0481 | Shock following (induced) termination of pregnancy | T8052XA | Anaphylactic reaction due to vaccination, initial encounter |
| O0731 | Shock following failed attempted termination of pregnancy | T8059XA | Anaphylactic reaction due to Other serum, initial encounter |
| O083 | Shock following ectopic and molar pregnancy | T8110XA | Postprocedural shock unspecified, initial encounter |
| O751 | Shock during or following labor and delivery | T8111XA | Postprocedural cardiogenic shock, initial encounter |
| R570 | Cardiogenic shock | T8112XA | Postprocedural septic shock, initial encounter |
| R571 | Hypovolemic shock | T8119XA | Other postprocedural shock, initial encounter |
| R578 | Other shock | T882XXA | Shock due to anesthesia, initial encounter |
| R579 | Shock, Unspecified | T886XXA | Anaphylactic reaction due to adverse effect of correct drug or medicament properly administered, initial encounter |
| R6521 | Severe Sepsis with septic shock | | |

Chronic kidney disease stage 5 or end stage renal disease diagnosis codes: (CRENLFD)

| | | | |
|-------|--|------|---------------------------------|
| I120 | Hypertensive chronic kidney disease with stage 5 chronic kidney disease or end stage renal disease | N185 | Chronic kidney disease, stage 5 |
| I1311 | Hypertensive heart and chronic kidney disease without heart failure, with stage 5 chronic kidney disease, or end stage renal disease | N186 | End stage renal disease |
| I132 | Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease | | |

Urinary tract obstruction diagnosis codes: (URINARYOBSID)

| | | | |
|--------|--|--------|--|
| N13721 | Vesicoureteral-Reflux with reflux nephropathy without hydroureter, unilateral | N35814 | Other anterior urethral stricture, male |
| N13722 | Vesicoureteral-Reflux with reflux nephropathy without hydroureter, bilateral | N35816 | Other urethral stricture, male, overlapping sites |
| N13729 | Vesicoureteral-Reflux with reflux nephropathy without hydroureter, Unspecified | N35819 | Other urethral stricture, male, Unspecified site |
| N13731 | Vesicoureteral-Reflux with reflux nephropathy with hydroureter, unilateral | N3582 | Other urethral stricture, female |
| N13732 | Vesicoureteral-Reflux with reflux nephropathy with hydroureter, bilateral | N359 | Urethral stricture, Unspecified |
| N13739 | Vesicoureteral-Reflux with reflux nephropathy with hydroureter, Unspecified | N35911 | Unspecified urethral stricture, male, meatal |
| N138 | Other obstructive and reflux uropathy | N35912 | Unspecified bulbous urethral stricture, male |
| N139 | Obstructive and reflux uropathy, Unspecified | N35913 | Unspecified membranous urethral stricture, male |
| N320 | Bladder-Neck obstruction | N35914 | Unspecified anterior urethral stricture, male |
| N35010 | Post-Traumatic urethral stricture, male, meatal | N35916 | Unspecified urethral stricture, male, overlapping sites |
| N35011 | Post-Traumatic bulbous urethral stricture | N35919 | Unspecified urethral stricture, male, Unspecified site |
| N35012 | Post-Traumatic membranous urethral stricture | N3592 | Unspecified urethral stricture, female |
| N35013 | Post-Traumatic anterior urethral stricture | N401 | Benign prostatic hyperplasia with lower urinary tract symptoms |
| N35014 | Post-Traumatic urethral stricture, male, Unspecified | N403 | Nodular prostate with lower urinary tract symptoms |
| N35016 | Post-Traumatic urethral stricture, male, overlapping sites | N99110 | Postprocedural urethral stricture, male, meatal |
| N35021 | Urethral stricture due to childbirth | N99111 | Postprocedural bulbous urethral stricture, male |
| N35028 | Other post-traumatic urethral stricture, female | N99112 | Postprocedural membranous urethral stricture, male |
| N35111 | Postinfective urethral stricture, not elsewhere classified, male, meatal | N99113 | Postprocedural anterior bulbous urethral stricture, male |
| N35112 | Postinfective bulbous urethral stricture, not elsewhere classified, male | N99114 | Postprocedural urethral stricture, male, Unspecified |

| | | | |
|--------|---|--------|--|
| N35113 | Postinfective membranous urethral stricture, not elsewhere classified, male | N99115 | Postprocedural fossa navicularis urethral stricture |
| N35114 | Postinfective anterior urethral stricture, not elsewhere classified, male | N99116 | Postprocedural urethral stricture, male, overlapping sites |
| N35116 | Postinfective urethral stricture, not elsewhere classified, male, overlapping sites | N9912 | Postprocedural urethral stricture, female |
| N35119 | Postinfective urethral stricture, not elsewhere classified, male, Unspecified | Q642 | Congenital posterior urethral valves |
| N3512 | Postinfective urethral stricture, not elsewhere classified, female | Q6431 | Congenital bladder neck obstruction |
| N358 | Other urethral stricture | Q6432 | Congenital stricture of urethra |
| N35811 | Other urethral stricture, male, meatal | Q6433 | Congenital stricture of urinary meatus |
| N35812 | Other urethral bulbous stricture, male | Q6439 | Other atresia and stenosis of urethra and bladder neck |
| N35813 | Other membranous urethral stricture, male | | |

Solitary kidney diagnosis codes: (SOLKIDD)

| | | | |
|------|-----------------------------|------|----------------------------|
| Q600 | Renal agenesis, unilateral | Q606 | Potter's syndrome |
| Q602 | Renal agenesis, Unspecified | Z905 | Acquired absence of kidney |

Partial nephrectomy procedure codes: (PNEPHREP)

| | | | |
|---------|--|---------|---|
| 0TB00ZZ | Excision of right kidney, open approach | 0TB10ZZ | Excision of left kidney, open approach |
| 0TB04ZZ | Excision of right kidney, percutaneous endoscopic approach | 0TB14ZZ | Excision of left kidney, percutaneous endoscopic approach |