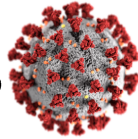


ACCESS

vACCine covid-19



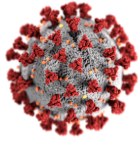
monitoring readinESS

EVENT DEFINITION FORM

Event: Acute kidney injury
Outcome/covariate: **outcome**
Version: 1
Status: *Final*

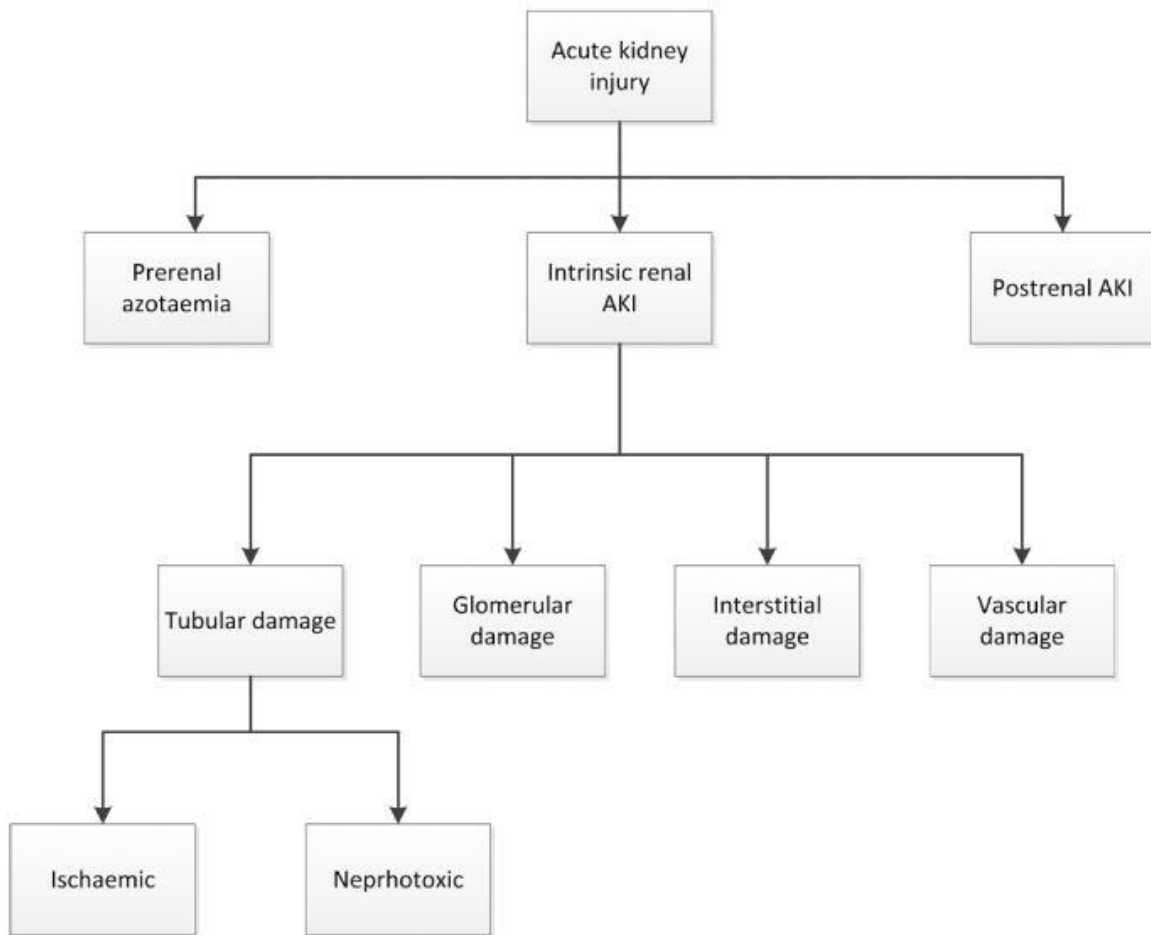
Contributing authors

| Authors | Expertise/role | Date |
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| Ilse Kelters (UMCU) | Medical | |
| Miriam Sturkenboom (UMCU) | Epidemiological (review) | 14-08-2020 |
| Leila Belbachir | Medical review | 23-08-2020 |
| Corinne Willame | Algorithm proposal | 02-09-2020 |
| Miriam Sturkenboom | Final codes | 14-2-2021 |
| Carlos Durán | Rev. narrow/possible assignments | 26-03-2021 |
| Miriam Sturkenboom | Inclusion of codes used in final report ACCESS | 23-08-2021 |



1. Event definition

Background information



(from: Markis *et al.*)

Definition: “AKI is defined as an abrupt (within hours) decrease in kidney function, which encompasses both injury (structural damage) and impairment (loss of function). It is a syndrome that rarely has a sole and distinct pathophysiology.” (Markis, et al)

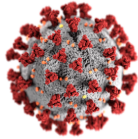
Signs and symptoms

AKI is not a single disease entity. It’s a heterogeneous group of conditions characterized by sudden decrease in glomerular filtration rate (GFR) followed by an increase in serum creatinine concentration or oliguria. It occurs in the setting of acute or chronic illness.

AKI is generally asymptomatic. Patients present in two ways. First a patient might present with an acute illness such as sepsis, or be exposed to a condition known to be associated with AKI such as a major surgery (Ronco, et al 2019).

Other symptoms can occur after major complications of AKI (examples with signs and symptoms are listed below (Levey, et al 2017)).

- Volume depletion/overload:
 - o Swelling or retaining fluid (in lungs, ankles, stomach), shortness of breath, high blood pressure.



- Dehydration leading to dizzy or lightheaded, haemorrhagic shock, weight loss, orthostatic hypotension, postural tachycardia.
- Electrolyte disorders e.g. hyperkalaemia, metabolic acidosis, hyponatremia, and hypernatremia, hypo/hypercalcemia, hyperphosphatemia, hypermagnesemia.
 - Cardiac arrhythmias, fatigue, lethargy, convulsions, seizures, nausea, vomiting, diarrhea or constipation, abdominal cramping, confusion, headaches, muscle cramping, muscle weakness, numbness and tingling.
- Uremic complications: encephalopathy, pericarditis, pleuritis, bleeding due to platelet dysfunction.
- Drug toxicity

Case definitions AKI

In Europe, the definition/guideline of KDIGO is leading. The KDIGO guideline defined AKI as follows (not graded):

- Increase in SCr by $\times 0.3$ mg/dl ($\times 26.5$ $\mu\text{mol/l}$) within 48 hours;

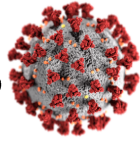
OR

- Increase in SCr to $\times 1.5$ times baseline, which is known or presumed to have occurred within the prior 7 days;

OR

- Urine volume < 0.5 ml/kg/h for 6 hours.

AKI is staged for severity according to different criteria. The first classification system, RIFLE, from the ADQI, incorporated 3 categories of injury and 2 outcomes that varied by severity. The outcomes (Loss, ESKD) were eliminated from the subsequent AKIN and KDIGO definitions. The AKIN definition incorporated smaller changes in Scr concentration, and the KDIGO definition added more definitive time frames to the definition. A key concept for the Scr-based definitions of AKI is the identification of baseline Scr concentration. Although the initial RIFLE criteria recommended the use of a Scr concentration that would equate to eGFR of $75 \text{ mL/min/1.73 m}^2$ by the MDRD Study equation (MDRD-75) if no baseline was available, this definition does not account for chronic kidney disease if present. It is essential to look for a prior baseline/reference Scr concentration, ideally from the 365 days before hospital admission from a clinical context in which there was not concern for AKI (eg, a stable clinic visit). This concept is discussed in detail in the KDIGO AKI clinical practice guideline (Markis *et al.*).



| AKI Stage | Urine Output ^a | KDIGO | AKIN | RIFLE |
|-----------|--|--|---|---|
| 1 | <0.5 mL/kg/h for 6-12 h | Scr to 1.5-1.9 × baseline over 7 d or ≥0.3 mg/dL absolute increase over 48 h | Scr to 1.5-2 × baseline or ≥0.3 mg/dL absolute Scr increase within 48 h | <i>Risk</i> : Scr to ≥1.5 × increase within 7 d, sustained for ≥24 h |
| 2 | <0.5 mL/kg/h for ≥12 h | Scr to 2.0-2.9 × baseline | Scr to >2-3 × baseline | <i>Injury</i> : Scr to ≥2 × increase |
| 3 | <0.3 mL/kg/h for ≥24 h or anuria for ≥12 h | Scr to ≥3.0 × baseline, or Scr increase to ≥4.0 mg/dL or initiation of RRT | Scr to >3.0 × baseline, or Scr increase to ≥4.0 mg/dL (with increase of 0.5 mg/dL) or initiation of RRT | <i>Failure</i> : Scr to ≥3.0 × increase or Scr increase to ≥4.0 mg/dL (with increase of 0.5 mg/dL) or initiation of RRT |
| | | | | <i>Loss</i> : Complete loss of kidney function for >4 wk |
| | | | | <i>ESKD</i> : ESKD for >3 mo |

Abbreviations: ADQI, Acute Dialysis Quality Initiative (international); AKI, acute kidney injury; AKIN, Acute Kidney Injury Network (international); eGFR, estimated glomerular filtration rate; ESKD, end-stage kidney disease; KDIGO, Kidney Disease: Improving Global Outcomes; MDRD, Modification in Diet in Renal Disease; RIFLE, risk, injury, failure, loss of kidney function, and end-stage kidney disease; RRT, renal replacement therapy; Scr, serum creatinine.

All 3 definitions (KDIGO, AKIN, RIFLE) use common urine output criteria.

2. Synonyms / lay terms for the event

Acute renal failure (ARF)

Acute renal injury

Acute renal injuries

Acute kidney injuries

Acute kidney injuries

Acute kidney failure

Acute renal insufficiency

Ischuria renalis

Acute tubular necrosis

Kidney tubular necrosis

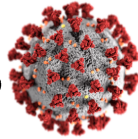
Acute tubular necrosis (ATN)

Interstitial or drug induced nephropathy

Renal insufficiency, acute

3. Laboratory tests that are specific for event

- **Serum creatinine.** This is a required part of the diagnosis and classification.
- GFR. Not specific for AKI, but for general kidney output.



- Bio-/Damage markers (preferably in ICU-hospital settings) to diagnose AKI in early settings, such as: serum cystatin C, IL-18, urine kidney injury molecule (KIM-1), urine neutrophil gelatinase-associated lipocalin (NGAL) (ref 231 in appendix guidelines KDIGO)
- Laboratory data suggesting dehydration/volume depletion: Electrolytes, urea, complete blood count (, and serum creatinine, GFR, and albumin).
- Albumin. Hypoalbuminemia is an independent risk factor for AKI

4. Diagnostic tests that are specific for event

- Urine output. This is part of the clinical diagnosis and classification together with serum creatinine. All other diagnostic tests are to exclude the diagnosis of AKI.

Diagnostic tests specific for different causes of kidney damage and/or failure.

- Ultra sound. Loss of renal cortex is a considered feature of chronic kidney disease. Ultra sound can evaluate kidney size. Also large kidneys, size discrepancy, hydronephrosis, cysts and stones can be visible by US.
- Urine dipstick and microscopic examination (sediment). Generally, a normal urine analysis in the setting of AKI suggests a prerenal or postrenal cause and an abnormal urinalysis a “renal” cause.
- Renal biopsy. Only in patients with AKI and normal-sized kidneys, who do not recover renal function after 3-4 weeks. A renal biopsy is taken to exclude other treatable causes.

5. Drugs that are used to treat event

- Restore fluid status for maintaining global haemodynamics, ensuring optimal kidney perfusion, enhancing kidney recovery. Isotonic crystalloids are recommended as initial management for expansion of intravascular volume in patients at risk of AKI (KDIGO, 2012).
- Vasopressors: norepinephrine, dopamine, vasopressin. In volume-resuscitated patients with vasomotor shock or at risk of AKI.
- Oxygen. Management of haemodynamic and oxygenation parameters is necessary to prevent worsening of AKI.

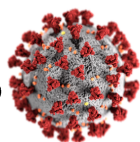
6. Procedures used specific for event treatment

- Discontinue all nephrotoxic agents when possible
- Admission to intensive care;

7. Setting (outpatient specialist, in-hospital, GP, emergency room) where condition will be most frequently /reliably diagnosed

Kidney disease is usually a silent condition. Patients present with other (acute) diseases or after a major surgery.

- Outpatient (crush syndrome, diarrhea-associated-hemolytic-uremic syndrome)
- In-hospital (most of the times, about 5-10 times higher than community acquired cases; mostly ICU-patients).



8. Diagnosis codes or algorithms used in different papers to extract the events in Europe/USA: seek literature for papers that have studied this event, and see how they extracted/measured the event.

Upon manual look-up

ICD 10

N17 – acute renal failure

extrarenal uraemia ([R39.2](#))

haemolytic-uraemic syndrome ([D59.3](#))

hepatorenal syndrome ([K76.7](#))

prerenal uraemia ([R39.2](#))

renal failure:

- complicating abortion or ectopic or molar pregnancy ([O00-007](#), [O08.4](#))
- following labour and delivery ([O90.4](#))
- postprocedural ([N99.0](#))

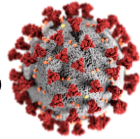
ICD 9

Acute kidney failure (584)

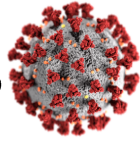
Renal failure unspecified (586)

9. Proposed codes by Codemapper

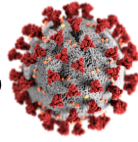
| Coding system | Code | Code name | Concept | Concept name | Algorithm |
|---------------|--------|---|----------|---|-----------|
| ICD10/CM | D59.3 | Haemolytic-uraemic syndrome | C0019061 | Hemolytic-Uremic Syndrome | Narrow |
| ICD10/CM | E83.41 | Hypermagnesemia | C0151714 | Hypermagnesemia | Possible |
| ICD10/CM | E86 | Volume depletion | C0546884 | Hypovolemia | Possible |
| ICD10/CM | E86.1 | Hypovolemia | C0546884 | Hypovolemia | Possible |
| ICD10/CM | E86.9 | Volume depletion, unspecified | C0546884 | Hypovolemia | Possible |
| ICD10/CM | E87.2 | Acidosis | C0001122 | Acidosis | Possible |
| ICD10/CM | E87.2 | Metabolic acidosis | C0220981 | Metabolic acidosis | Possible |
| ICD10/CM | I12 | Hypertensive renal disease | C0848548 | hypertensive nephropathy | Possible |
| ICD10/CM | I12.9 | Hypertensive renal disease NOS | C0848548 | hypertensive nephropathy | Possible |
| ICD10/CM | I13 | Hypertensive heart and renal disease | C0155601 | Hypertensive heart and renal disease | Possible |
| ICD10/CM | I13.9 | Hypertensive heart and renal disease, unspecified | C0155601 | Hypertensive heart and renal disease | Possible |
| ICD10/CM | K76.7 | Hepatorenal syndrome | C0019212 | Hepatorenal Syndrome | Narrow |
| ICD10/CM | N00 | Acute nephritic syndrome | C0268733 | Acute nephritis | Narrow |
| ICD10/CM | N00.9 | Acute nephritic syndrome, unspecified | C0268733 | Acute nephritis | Narrow |
| ICD10/CM | N08 | Nephropathy | C0022658 | Kidney Diseases | Possible |
| ICD10/CM | N12 | Interstitial nephritis NOS | C0027707 | Nephritis, Interstitial | Narrow |
| ICD10/CM | N14.0 | Analgesic nephropathy | C0149938 | Analgesic nephropathy | Narrow |
| ICD10/CM | N14.1 | Nephropathy induced by other drugs, medicaments and biological substances | C0451767 | Nephropathy induced by other drugs, medicaments and biological substances | Narrow |



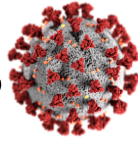
| | | | | | |
|----------|--------|--|----------|--|----------|
| ICD10/CM | N14.2 | Nephropathy induced by unspecified drug, medicament or biological substance | C0495053 | Nephropathy induced by unspecified drug, medicament or biological substance | Narrow |
| ICD10/CM | N17 | Acute renal failure | C0022660 | Kidney Failure, Acute | Narrow |
| ICD10/CM | N17.0 | Acute renal failure with tubular necrosis | C0022672 | Kidney Tubular Necrosis, Acute | Narrow |
| ICD10/CM | N17.0 | Renal tubular necrosis | C1720775 | Renal Tubule Necrosis | Narrow |
| ICD10/CM | N17.2 | Acute renal failure with medullary necrosis | C0574786 | Acute renal papillary necrosis with renal failure | Narrow |
| ICD10/CM | N17.9 | Acute renal failure, unspecified | C0022660 | Kidney Failure, Acute | Narrow |
| ICD10/CM | N19 | Unspecified renal failure | C0035078 | Kidney Failure | Narrow |
| ICD10/CM | N28.9 | Renal insufficiency (acute) | C1565662 | Acute Kidney Insufficiency | Narrow |
| ICD10/CM | N28.9 | Nephropathy NOS | C0022658 | Kidney Diseases | Possible |
| ICD10/CM | O08.4 | Renal failure following ectopic and molar pregnancy | C2903416 | Renal failure following ectopic and molar pregnancy | Narrow |
| ICD10/CM | O90.4 | Postpartum acute renal failure | C0157461 | Acute renal failure following labor AND/OR delivery | Narrow |
| ICD10/CM | R34 | Anuria and oliguria | C0028962 | Oliguria and anuria | Possible |
| ICD10/CM | R39.2 | Extrarenal uraemia | C0476303 | Extrarenal uraemia | Narrow |
| ICD10/CM | R39.2 | Prerenal uremia | C0554309 | Prerenal uremia syndrome | Possible |
| ICD10/CM | S37.0 | Injury of kidney | C0160420 | Injury of kidney | Possible |
| ICD10/CM | S37.00 | Unspecified injury of kidney | C0160420 | Injury of kidney | Possible |
| ICD10/CM | T79.5 | Crush syndrome | C0010392 | Crush syndrome | Narrow |
| ICD9CM | 580 | Acute glomerulonephritis | C0156221 | Acute glomerulonephritis | Possible |
| ICD9CM | 584 | Acute kidney failure | C0022660 | Kidney Failure, Acute | Narrow |
| ICD9CM | 586 | Renal failure, unspecified | C0035078 | Kidney Failure | Narrow |
| ICD9CM | 866 | Injury to kidney | C0160420 | Injury of kidney | Possible |
| ICD9CM | 275.2 | Disorders of magnesium metabolism | | | Possible |
| ICD9CM | 276.2 | Acidosis | C0001122 | Acidosis | Possible |
| ICD9CM | 276.5 | Volume depletion | C0546884 | Hypovolemia | Possible |
| ICD9CM | 276.50 | Volume depletion, unspecified | C0546884 | Hypovolemia | Possible |
| ICD9CM | 276.52 | Hypovolemia | C0546884 | Hypovolemia | Possible |
| ICD9CM | 283.11 | Hemolytic-uremic syndrome | C0019061 | Hemolytic-Uremic Syndrome | Narrow |
| ICD9CM | 403.9 | Hypertensive renal disease, unspecified | C0848548 | hypertensive nephropathy | Possible |
| ICD9CM | 404.9 | Hypertensive heart and renal disease, unspecified | C0155601 | Hypertensive heart and renal disease | Possible |
| ICD9CM | 572.4 | Hepatorenal syndrome | C0019212 | Hepatorenal Syndrome | Narrow |
| ICD9CM | 580.4 | Acute glomerulonephritis with lesion of rapidly progressive glomerulonephritis | C0156223 | Acute glomerulonephritis with lesion of rapidly progressive glomerulonephritis | Narrow |



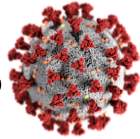
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| ICD9CM | 580.8 | Acute glomerulonephritis with other specified pathological lesion in kidney | C0156224 | Acute glomerulonephritis with other specified pathological lesion in kidney | Narrow |
| ICD9CM | 580.89 | Acute glomerulonephritis with other specified pathological lesion in kidney | C0156224 | Acute glomerulonephritis with other specified pathological lesion in kidney | Narrow |
| ICD9CM | 583.7 | Nephritis and nephropathy, not specified as acute or chronic, with lesion of renal medullary necrosis | C0156239 | Nephritis and nephropathy, not specified as acute or chronic, with lesion of renal medullary necrosis | Narrow |
| ICD9CM | 583.89 | Nephritis and nephropathy, not specified as acute or chronic, with other specified pathological lesion in kidney | | | Possible |
| ICD9CM | 584.5 | Acute kidney failure with lesion of tubular necrosis | C2712977 | Acute kidney failure with lesion of tubular necrosis | Narrow |
| ICD9CM | 584.6 | Acute kidney failure with lesion of renal cortical necrosis | C2712983 | Acute kidney failure with lesion of renal cortical necrosis | Narrow |
| ICD9CM | 584.7 | Acute kidney failure with lesion of renal medullary [papillary] necrosis | C2712745 | Acute kidney failure with lesion of renal medullary [papillary] necrosis | Narrow |
| ICD9CM | 584.8 | Acute kidney failure with other specified pathological lesion in kidney | C2712988 | Acute kidney failure with other specified pathological lesion in kidney | Narrow |
| ICD9CM | 584.9 | Acute kidney failure, unspecified | C0022660 | Kidney Failure, Acute | Narrow |
| ICD9CM | 593.3 | Unspecified disorder of kidney and ureter | | | Possible |
| ICD9CM | 639.3 | Kidney failure following abortion and ectopic and molar pregnancies | C2712637 | Kidney failure following abortion and ectopic and molar pregnancies | Narrow |
| ICD9CM | 669.32 | Acute kidney failure following labor and delivery, delivered, with mention of postpartum complication | C0157463 | Acute kidney failure following labor and delivery, delivered, with mention of postpartum complication | Narrow |
| ICD9CM | 669.34 | Acute kidney failure following labor and delivery, postpartum condition or complication | C0157464 | Acute kidney failure following labor and delivery, postpartum condition or complication | Narrow |
| ICD9CM | 788.5 | Oliguria and anuria | C0028962 | Oliguria and anuria | Possible |
| ICD9CM | 788.9 | Other symptoms involving urinary system | C0159064 | Other symptoms involving urinary system | Possible |
| ICD9CM | 788.99 | Other symptoms involving urinary system | C0159064 | Other symptoms involving urinary system | Possible |
| ICD9CM | 958.5 | Traumatic anuria | | | Possible |
| ICPC2P | K87002 | Hypertension;renal disease | C0848548 | hypertensive nephropathy | Possible |
| ICPC2P | K87003 | Hypertension;nephropathy | C0848548 | hypertensive nephropathy | Possible |



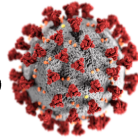
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|--------|--------|--------------------------------|----------|---|----------|
| ICPC2P | U05001 | Anuria | C0003460 | Anuria | Narrow |
| ICPC2P | U05006 | Oliguria | C0028961 | Oliguria | Possible |
| ICPC2P | U88001 | Nephropathy | C0022658 | Kidney Diseases | Possible |
| ICPC2P | U88007 | Glomerulonephritis;acute | C0156221 | Acute glomerulonephritis | Possible |
| ICPC2P | U88010 | Nephropathy;analgesic | C0149938 | Analgesic nephropathy | Narrow |
| ICPC2P | U99005 | Failure;renal;acute | C0022660 | Kidney Failure, Acute | Narrow |
| ICPC2P | U99022 | Insufficiency;renal | C1565489 | Renal Insufficiency | Narrow |
| ICPC2P | U99029 | Disorder;kidney | C0022658 | Kidney Diseases | Possible |
| ICPC2P | U99030 | Failure;renal;NOS | C0035078 | Kidney Failure | Narrow |
| RCD2 | 1AC0. | Anuria | C0003460 | Anuria | Narrow |
| RCD2 | 1AC1. | Oligouria | C0028961 | Oliguria | Possible |
| RCD2 | 44J3. | Serum creatinine | C0600061 | Serum creatinine level | Possible |
| RCD2 | 44J3z | Serum creatinine NOS | C0600061 | Serum creatinine level | Possible |
| RCD2 | C3520 | Hypermagnesaemia | C0151714 | Hypermagnesemia | Possible |
| RCD2 | C3534 | Hyperphosphataemia | C0085681 | Hyperphosphatemia (disorder) | Possible |
| RCD2 | C362. | Acidosis | C0001122 | Acidosis | Possible |
| RCD2 | C3620 | Metabolic acidosis NEC | C0220981 | Metabolic acidosis | Possible |
| RCD2 | C362z | Acidosis NOS | C0001122 | Acidosis | Possible |
| RCD2 | C365. | Volume depletion | C0546884 | Hypovolemia | Possible |
| RCD2 | C365z | Volume depletion NOS | C0546884 | Hypovolemia | Possible |
| RCD2 | D1113 | Haemolytic-uraemic syndrome | C0019061 | Hemolytic-Uremic Syndrome | Narrow |
| RCD2 | G22.. | Hypertensive renal disease | C0848548 | hypertensive nephropathy | Possible |
| RCD2 | G22z. | Hypertensive renal disease NOS | C0848548 | hypertensive nephropathy | Possible |
| RCD2 | G23.. | Hypertensive heart+renal dis. | C0155601 | Hypertensive heart and renal disease | Possible |
| RCD2 | G23z. | Hypertens.heart+renal dis.NOS | C0155601 | Hypertensive heart and renal disease | Possible |
| RCD2 | J624. | Hepatorenal syndrome | C0019212 | Hepatorenal Syndrome | Narrow |
| RCD2 | K00z. | Acute glomerulonephritis NOS | C0156221 | Acute glomerulonephritis | Possible |
| RCD2 | K04.. | Acute renal failure | C0022660 | Kidney Failure, Acute | Narrow |
| RCD2 | K040. | Acute renal tubular necrosis | C0022672 | Kidney Tubular Necrosis, Acute | Narrow |
| RCD2 | K04z. | Acute renal failure NOS | C0022660 | Kidney Failure, Acute | Narrow |
| RCD2 | K06.. | Renal failure unspecified | C0035078 | Kidney Failure | Narrow |
| RCD2 | K060. | Renal impairment | C1565489 | Renal Insufficiency | Narrow |
| RCD2 | K0A0. | Acute nephritic syndrome | C0268733 | Acute nephritis | Narrow |
| RCD2 | K0C0. | Analgesic nephropathy | C0149938 | Analgesic nephropathy | Narrow |
| RCD2 | K0C1. | Nphrp/ind oth dgs meds+biol sb | C0451767 | Nephropathy induced by other drugs, medicaments and biological substances | Narrow |



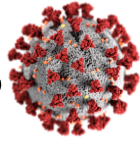
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|--------|-----------|---|----------|---|----------|
| RCD2 | K0C2. | Nphrp/ind unspc drg, med, bio sb | C0495053 | Nephropathy induced by unspecified drug, medicament or biological substance | Narrow |
| RCD2 | K13.. | Other kidney/ureter disorders | C0022658 | Kidney Diseases | Possible |
| RCD2 | Kyu2. | [X]Renal failure | C0035078 | Kidney Failure | Narrow |
| RCD2 | L393. | Acute renal failure post-deliv | C0157461 | Acute renal failure following labor AND/OR delivery | Narrow |
| RCD2 | R085. | [D]Oliguria and anuria | C0028962 | Oliguria and anuria | Possible |
| RCD2 | R0850 | [D]Oliguria | C0028961 | Oliguria | Possible |
| RCD2 | R0851 | [D]Anuria | C0003460 | Anuria | Narrow |
| RCD2 | R085z | [D]Oliguria and anuria NOS | C0028962 | Oliguria and anuria | Possible |
| RCD2 | R08z0 | [D]Extrarenal uraemia | C0476303 | Extrarenal uraemia | Narrow |
| RCD2 | S76.. | Injury to kidney | C0160420 | Injury of kidney | Possible |
| RCD2 | S76z. | Injury to kidney NOS | C0160420 | Injury of kidney | Possible |
| SCTSPA | 13010001 | insuficiencia renal aguda posterior al trabajo de parto Y/O parto | C0157461 | Acute renal failure following labor AND/OR delivery | Narrow |
| SCTSPA | 14669001 | síndrome de insuficiencia renal aguda | C0022660 | Kidney Failure, Acute | Narrow |
| SCTSPA | 19351000 | glomerulonefritis aguda | C0156221 | Acute glomerulonephritis | Possible |
| SCTSPA | 20165001 | hiperfosfatemia | C0085681 | Hyperphosphatemia (disorder) | Possible |
| SCTSPA | 23697004 | síndrome de aplastamiento | C0010392 | Crush syndrome | Narrow |
| SCTSPA | 28560003 | hipovolemia | C0546884 | Hypovolemia | Possible |
| SCTSPA | 28689008 | nefritis intersticial | C0027707 | Nephritis, Interstitial | Narrow |
| SCTSPA | 35455006 | necrosis tubular aguda | C0022672 | Kidney Tubular Necrosis, Acute | Narrow |
| SCTSPA | 37472003 | déficit de volumen | C0546884 | Hypovolemia | Possible |
| SCTSPA | 38481006 | nefropatía hipertensiva | C0848548 | hypertensive nephropathy | Possible |
| SCTSPA | 40095003 | lesión traumática del riñón | C0160420 | Injury of kidney | Possible |
| SCTSPA | 42399005 | síndrome de insuficiencia renal | C0035078 | Kidney Failure | Narrow |
| SCTSPA | 51292008 | síndrome hepatorenal | C0019212 | Hepatorenal Syndrome | Narrow |
| SCTSPA | 51387008 | acidosis | C0001122 | Acidosis | Possible |
| SCTSPA | 55655006 | azoemia prerrenal | C0554309 | Prerenal uremia syndrome | Possible |
| SCTSPA | 59400006 | nefropatía por analgésicos | C0149938 | Analgesic nephropathy | Narrow |
| SCTSPA | 59455009 | acidosis metabólica | C0220981 | Metabolic acidosis | Possible |
| SCTSPA | 61503006 | nefritis aguda | C0268733 | Acute nephritis | Narrow |
| SCTSPA | 66978005 | hipermagnesemia | C0151714 | Hypermagnesemia | Possible |
| SCTSPA | 83128009 | oliguria | C0028961 | Oliguria | Possible |
| SCTSPA | 86234004 | cardiopatía Y nefropatía hipertensivas | C0155601 | Hypertensive heart and renal disease | Possible |
| SCTSPA | 90708001 | nefropatía | C0022658 | Kidney Diseases | Possible |
| SCTSPA | 111407006 | síndrome urémico hemolítico | C0019061 | Hemolytic-Uremic Syndrome | Narrow |



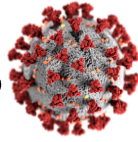
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|--------|-----------------|--|----------|---|----------|
| SCTSPA | 113075003 | medición de creatinina en suero | C0201976 | Creatinine measurement, serum (procedure) | Possible |
| SCTSPA | 123308008 | síndrome urémico hemolítico - RETIRADO - | C0019061 | Hemolytic-Uremic Syndrome | Narrow |
| SCTSPA | 166718008 | determinación sérica de creatinina, SAI | C0201976 | Creatinine measurement, serum (procedure) | Possible |
| SCTSPA | 190887001 | acidosis, SAI | C0001122 | Acidosis | Possible |
| SCTSPA | 190897005 | depleción de volumen, SAI | C0546884 | Hypovolemia | Possible |
| SCTSPA | 194776008 | cardiopatía Y nefropatía hipertensivas [dup] | C0155601 | Hypertensive heart and renal disease | Possible |
| SCTSPA | 194782006 | enfermedad cardíaca y renal hipertensiva, SAI | C0155601 | Hypertensive heart and renal disease | Possible |
| SCTSPA | 197588002 | glomerulonefritis aguda, SAI | C0156221 | Acute glomerulonephritis | Possible |
| SCTSPA | 197653006 | insuficiencia renal aguda, SAI | C0022660 | Kidney Failure, Acute | Narrow |
| SCTSPA | 197751003 | nefropatía inducida por otros fármacos, medicamentos y sustancias biológicas | C0451767 | Nephropathy induced by other drugs, medicaments and biological substances | Narrow |
| SCTSPA | 197752005 | nefropatía causada por fármaco, medicamento o sustancia biológica no especificados | C0495053 | Nephropathy induced by unspecified drug, medicament or biological substance | Narrow |
| SCTSPA | 207180001 | [D]oliguria y anuria | C0028962 | Oliguria and anuria | Possible |
| SCTSPA | 207181002 | [D]oliguria | C0028961 | Oliguria | Possible |
| SCTSPA | 207182009 | [D]anuria | C0003460 | Anuria | Narrow |
| SCTSPA | 207185006 | [D]oliguria y anuria, SAI | C0028962 | Oliguria and anuria | Possible |
| SCTSPA | 207199005 | [D]uremia extrarrenal | C0476303 | Extrarenal uraemia | Narrow |
| SCTSPA | 236423003 | disfunción renal | C1565489 | Renal Insufficiency | Narrow |
| SCTSPA | 236424009 | disfunción renal aguda | C1565662 | Acute Kidney Insufficiency | Narrow |
| SCTSPA | 264536006 | nefritis intersticial | C0027707 | Nephritis, Interstitial | Narrow |
| SCTSPA | 266230002 | enfermedad renal hipertensiva, SAI | C0848548 | hypertensive nephropathy | Possible |
| SCTSPA | 266553002 | insuficiencia renal no especificada | C0035078 | Kidney Failure | Narrow |
| SCTSPA | 269158000 | lesión de riñón, SAI | C0160420 | Injury of kidney | Possible |
| SCTSPA | 271845002 | oliguria y anuria | C0028962 | Oliguria and anuria | Possible |
| SCTSPA | 274108006 | enfermedad renal, SAI | C0022658 | Kidney Diseases | Possible |
| SCTSPA | 298015003 | necrosis papilar renal aguda con insuficiencia renal | C0574786 | Acute renal papillary necrosis with renal failure | Narrow |
| SCTSPA | 365757006 | nivel de creatinina sérica - hallazgo | C0600061 | Serum creatinine level | Possible |
| SCTSPA | 445646001 | azoemia prerrenal | C0554309 | Prerenal uremia syndrome | Possible |
| SCTSPA | 723188008 | insuficiencia renal | C0035078 | Kidney Failure | Narrow |
| SCTSPA | 723189000 | insuficiencia renal aguda | C1565662 | Acute Kidney Insufficiency | Narrow |
| SCTSPA | 733839001 | insuficiencia renal aguda posparto | C0157461 | Acute renal failure following labor AND/OR delivery | Narrow |
| SCTSPA | 367481000119108 | uremia extrarrenal | C0476303 | Extrarenal uraemia | Narrow |



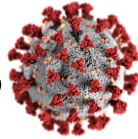
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|-------------|----------|--|----------|--------------------------------|----------|
| SNOMEDCT_US | 193003 | Benign hypertensive renal disease | | | possible |
| SNOMEDCT_US | 2472002 | Anuria | C0003460 | Anuria | Narrow |
| SNOMEDCT_US | 9918001 | Nephroptosis | | | narrow |
| SNOMEDCT_US | 14669001 | Acute renal failure | | | narrow |
| SNOMEDCT_US | 16934004 | Vascular disorders of kidney | | | possible |
| SNOMEDCT_US | 19351000 | Acute glomerulonephritis | C0156221 | Acute glomerulonephritis | Possible |
| SNOMEDCT_US | 20018005 | Other ureteric obstruction | | | possible |
| SNOMEDCT_US | 20165001 | Hyperphosphatemia | C0085681 | Hyperphosphatemia (disorder) | Possible |
| SNOMEDCT_US | 25341005 | Stricture of ureter | | | possible |
| SNOMEDCT_US | 28560003 | Depletion of volume of plasma AND/OR extracellular fluid | C0546884 | Hypovolemia | Possible |
| SNOMEDCT_US | 28689008 | Interstitial nephritis | C0027707 | Nephritis, Interstitial | Narrow |
| SNOMEDCT_US | 32482005 | Benign postural proteinuria | | | possible |
| SNOMEDCT_US | 32482005 | Postural albuminuria | | | possible |
| SNOMEDCT_US | 32482005 | Benign postural proteinuria | | | possible |
| SNOMEDCT_US | 32482005 | Orthostatic proteinuria | | | possible |
| SNOMEDCT_US | 32482005 | Postural proteinuria | | | possible |
| SNOMEDCT_US | 35455006 | Acute tubular necrosis | C0022672 | Kidney Tubular Necrosis, Acute | Narrow |
| SNOMEDCT_US | 35455006 | ATN - Acute tubular necrosis | | | narrow |
| SNOMEDCT_US | 35455006 | Acute tubule necrosis | | | narrow |
| SNOMEDCT_US | 35455006 | Tubulorrhexis | | | narrow |
| SNOMEDCT_US | 35455006 | ATN - Acute tubular necrosis | | | narrow |
| SNOMEDCT_US | 36388008 | Stricture of pelviureteric junction | | | narrow |
| SNOMEDCT_US | 37472003 | Fluid volume deficit | C0546884 | Hypovolemia | Possible |
| SNOMEDCT_US | 38481006 | Hypertensive renal disease | C0848548 | hypertensive nephropathy | Possible |
| SNOMEDCT_US | 40095003 | Injury of kidney | C0160420 | Injury of kidney | Possible |
| SNOMEDCT_US | 42399005 | Renal failure syndrome | C0035078 | Kidney Failure | Narrow |
| SNOMEDCT_US | 44730006 | Uraemia NOS | | | possible |
| SNOMEDCT_US | 44730006 | Uraemia NOS | | | possible |
| SNOMEDCT_US | 45456005 | Renal infarction | | | narrow |
| SNOMEDCT_US | 45456005 | Infarction of kidney | | | narrow |
| SNOMEDCT_US | 45456005 | Renal infarction | | | narrow |
| SNOMEDCT_US | 45456005 | Renal infarction | | | narrow |
| SNOMEDCT_US | 49220004 | Hypertensive renal disease with renal failure | | | narrow |
| SNOMEDCT_US | 49220004 | Hypertensive renal disease with renal failure | | | narrow |
| SNOMEDCT_US | 51292008 | Hepatorenal syndrome | C0019212 | Hepatorenal Syndrome | Narrow |
| SNOMEDCT_US | 51387008 | Acidosis | C0001122 | Acidosis | Possible |
| SNOMEDCT_US | 55655006 | Azotaemia | C0554309 | Prerenal uremia syndrome | Possible |



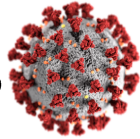
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|-------------|-----------|--|----------|--------------------------------------|----------|
| SNOMEDCT_US | 59400006 | Analgesic nephropathy | C0149938 | Analgesic nephropathy | Narrow |
| SNOMEDCT_US | 59455009 | Metabolic acidosis | C0220981 | Metabolic acidosis | Possible |
| SNOMEDCT_US | 61503006 | Acute nephritis | C0268733 | Acute nephritis | Narrow |
| SNOMEDCT_US | 65443008 | Malignant hypertensive renal disease | | | possible |
| SNOMEDCT_US | 66052004 | Benign hypertensive heart AND renal disease | | | possible |
| SNOMEDCT_US | 66610008 | Malignant hypertensive heart AND renal disease | | | possible |
| SNOMEDCT_US | 66978005 | Hypermagnesemia | C0151714 | Hypermagnesemia | Possible |
| SNOMEDCT_US | 86234004 | Hypertensive heart AND renal disease | C0155601 | Hypertensive heart and renal disease | Possible |
| SNOMEDCT_US | 90708001 | Kidney disease | C0022658 | Kidney Diseases | Possible |
| SNOMEDCT_US | 90708001 | Nephropathy induced by other drugs meds and biologi substncs | | | possible |
| SNOMEDCT_US | 90708001 | Renal disease | | | possible |
| SNOMEDCT_US | 90708001 | Nephrosis | | | possible |
| SNOMEDCT_US | 90708001 | Renal disorder | | | possible |
| SNOMEDCT_US | 90708001 | Disease of kidney | | | possible |
| SNOMEDCT_US | 90708001 | Nephropathy - chronic | | | possible |
| SNOMEDCT_US | 90708001 | Nephropathy, unspecified | | | possible |
| SNOMEDCT_US | 90708001 | Other nephritis and nephrosis unspecified | | | possible |
| SNOMEDCT_US | 90708001 | Other nephritis and nephrosis in diseases EC | | | possible |
| SNOMEDCT_US | 90708001 | Other nephritis and nephrosis NOS | | | possible |
| SNOMEDCT_US | 90708001 | Nephropathy induced by other drugs meds and biologi substncs | | | possible |
| SNOMEDCT_US | 90708001 | Other specified nephritis, nephrosis or nephrotic syndrome | | | possible |
| SNOMEDCT_US | 90708001 | Nephritis, nephrosis and nephrotic syndrome NOS | | | possible |
| SNOMEDCT_US | 90708001 | Other kidney disorders | | | possible |
| SNOMEDCT_US | 91003006 | Salt-losing nephritis | | | possible |
| SNOMEDCT_US | 91003006 | Salt-losing nephritis | | | possible |
| SNOMEDCT_US | 91003006 | Pseudo-Addison's disease | | | possible |
| SNOMEDCT_US | 91003006 | Salt-losing nephropathy | | | possible |
| SNOMEDCT_US | 91003006 | Salt-losing nephritis | | | possible |
| SNOMEDCT_US | 95579008 | Renal artery thrombosis | | | Possible |
| SNOMEDCT_US | 95579008 | Renal artery thrombosis | | | Possible |
| SNOMEDCT_US | 95580006 | Renal artery embolism | | | Possible |
| SNOMEDCT_US | 95580006 | Renal artery embolus | | | Possible |
| SNOMEDCT_US | 105999006 | Acquired cyst of kidney | | | Possible |
| SNOMEDCT_US | 105999006 | Acquired renal cystic disease | | | Possible |
| SNOMEDCT_US | 105999006 | Kidney cyst - acquired | | | Possible |
| SNOMEDCT_US | 105999006 | Acquired cyst of kidney NOS | | | Possible |
| SNOMEDCT_US | 111407006 | Hemolytic uremic syndrome | C0019061 | Hemolytic-Uremic Syndrome | Narrow |



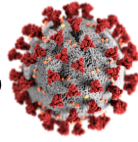
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|-------------|-----------|--|----------|---|----------|
| SNOMEDCT_US | 113075003 | Creatinine measurement, serum | C0201976 | Creatinine measurement, serum (procedure) | Possible |
| SNOMEDCT_US | 123308008 | Haemolytic uraemic syndrome | C0019061 | Hemolytic-Uremic Syndrome | Narrow |
| SNOMEDCT_US | 128073008 | Other ureter disorders | | | Possible |
| SNOMEDCT_US | 128606002 | Other kidney and ureter disorders | | | Possible |
| SNOMEDCT_US | 128606002 | Urinary system disease | | | Possible |
| SNOMEDCT_US | 128606002 | Urological disorder | | | Possible |
| SNOMEDCT_US | 128606002 | Other urinary system diseases | | | Possible |
| SNOMEDCT_US | 128606002 | Other kidney and ureter disorders | | | Possible |
| SNOMEDCT_US | 128606002 | Other kidney and ureteric disorders | | | Possible |
| SNOMEDCT_US | 128606002 | Other urethral and urinary tract disorders | | | Possible |
| SNOMEDCT_US | 128606002 | Urethral/urinary disorders NOS | | | Possible |
| SNOMEDCT_US | 128606002 | Disorder of urinary system, unspecified | | | Possible |
| SNOMEDCT_US | 128606002 | Other urinary tract disorders NOS | | | Possible |
| SNOMEDCT_US | 128606002 | Urethral and urinary tract disorders NOS | | | Possible |
| SNOMEDCT_US | 128606002 | Other specified diseases of urinary system | | | Possible |
| SNOMEDCT_US | 128606002 | Other urinary system diseases NOS | | | Possible |
| SNOMEDCT_US | 128606002 | [X]Other diseases of urinary system | | | Possible |
| SNOMEDCT_US | 128606002 | [X]Other specified disorders of urinary system | | | Possible |
| SNOMEDCT_US | 128606002 | [V]Other urinary problems | | | Possible |
| SNOMEDCT_US | 139460001 | Anuria | C0003460 | Anuria | Narrow |
| SNOMEDCT_US | 139461002 | Oliguria | C0028961 | Oliguria | Possible |
| SNOMEDCT_US | 144007006 | Serum creatinine (& level) | C0201976 | Creatinine measurement, serum (procedure) | Possible |
| SNOMEDCT_US | 154757004 | Acidosis | C0001122 | Acidosis | Possible |
| SNOMEDCT_US | 154763008 | Hypovolaemia | C0546884 | Hypovolemia | Possible |
| SNOMEDCT_US | 155299005 | Hypertensive heart and renal disease | C0155601 | Hypertensive heart and renal disease | Possible |
| SNOMEDCT_US | 155850003 | Acute glomerulonephritis | C0156221 | Acute glomerulonephritis | Possible |
| SNOMEDCT_US | 155850003 | Acute nephritis | C0268733 | Acute nephritis | Narrow |
| SNOMEDCT_US | 155854007 | Analgesic nephropathy | C0149938 | Analgesic nephropathy | Narrow |
| SNOMEDCT_US | 155855008 | Acute renal failure | C0022660 | Kidney Failure, Acute | Narrow |
| SNOMEDCT_US | 155871008 | Kidney disease NOS | C0022658 | Kidney Diseases | Possible |
| SNOMEDCT_US | 155876003 | Non-functioning kidney | | | possible |
| SNOMEDCT_US | 155876003 | Non-functioning kidney | | | possible |
| SNOMEDCT_US | 156092003 | Renal failure | C0035078 | Kidney Failure | Narrow |
| SNOMEDCT_US | 157343006 | Injury of kidney | C0160420 | Injury of kidney | Possible |
| SNOMEDCT_US | 157666004 | Crush syndrome | C0010392 | Crush syndrome | Narrow |
| SNOMEDCT_US | 158477003 | [D]Oliguria and anuria | C0028962 | Oliguria and anuria | Possible |



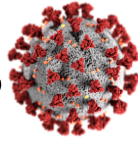
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|-------------|-----------|--|----------|---|----------|
| SNOMEDCT_US | 158478008 | [D]Oliguria | C0028961 | Oliguria | Possible |
| SNOMEDCT_US | 158479000 | [D]Anuria | C0003460 | Anuria | Narrow |
| SNOMEDCT_US | 158482005 | [D]Oliguria and anuria NOS | C0028962 | Oliguria and anuria | Possible |
| SNOMEDCT_US | 158493007 | [D]Extrarenal uraemia | C0476303 | Extrarenal uraemia | Narrow |
| SNOMEDCT_US | 166713004 | Creatinine - serum | C0201976 | Creatinine measurement, serum (procedure) | Possible |
| SNOMEDCT_US | 166718008 | Serum creatinine NOS | C0201976 | Creatinine measurement, serum (procedure) | Possible |
| SNOMEDCT_US | 190887001 | Acidosis NOS | C0001122 | Acidosis | Possible |
| SNOMEDCT_US | 190895002 | Hypovolaemia | C0546884 | Hypovolemia | Possible |
| SNOMEDCT_US | 190897005 | Volume depletion NOS | C0546884 | Hypovolemia | Possible |
| SNOMEDCT_US | 194773000 | Hypertensive nephropathy | C0848548 | hypertensive nephropathy | Possible |
| SNOMEDCT_US | 194775007 | Hypertensive renal disease NOS | C0848548 | hypertensive nephropathy | Possible |
| SNOMEDCT_US | 194776008 | Hypertensive heart and renal disease | C0155601 | Hypertensive heart and renal disease | Possible |
| SNOMEDCT_US | 194779001 | Hypertensive heart&renal dis wth (congestive) heart failure | | | possible |
| SNOMEDCT_US | 194780003 | Hypertensive heart and renal disease with renal failure | | | possible |
| SNOMEDCT_US | 194781004 | Hyperten heart&renal dis+both(congestv)heart and renal fail | | | possible |
| SNOMEDCT_US | 194782006 | Hypertensive heart and renal disease NOS | C0155601 | Hypertensive heart and renal disease | Possible |
| SNOMEDCT_US | 197578003 | Acute glomerulonephritis | C0156221 | Acute glomerulonephritis | Possible |
| SNOMEDCT_US | 197578003 | Acute nephritis | C0268733 | Acute nephritis | Narrow |
| SNOMEDCT_US | 197588002 | Acute glomerulonephritis NOS | C0156221 | Acute glomerulonephritis | Possible |
| SNOMEDCT_US | 197649009 | Acute tubular necrosis | C0022672 | Kidney Tubular Necrosis, Acute | Narrow |
| SNOMEDCT_US | 197653006 | Acute renal failure NOS | C0022660 | Kidney Failure, Acute | Narrow |
| SNOMEDCT_US | 197656003 | Renal failure unspecified | C0035078 | Kidney Failure | Narrow |
| SNOMEDCT_US | 197657007 | Renal impairment | C1565489 | Renal Insufficiency | Narrow |
| SNOMEDCT_US | 197680004 | Acute nephritic syndrome | C0268733 | Acute nephritis | Narrow |
| SNOMEDCT_US | 197681000 | Acute nephritic syndrome, minor glomerular abnormality | | | narrow |
| SNOMEDCT_US | 197682007 | Acute nephritic syndrome, focal+segmental glomerular lesions | | | narrow |
| SNOMEDCT_US | 197683002 | Acute nephritic syn, diffuse membranous glomerulonephritis | | | narrow |
| SNOMEDCT_US | 197684008 | Acut neph syn, diffuse mesangial proliferative glomnephritis | | | narrow |
| SNOMEDCT_US | 197685009 | Ac neph syn difus endocaply proliferative glomerulonephritis | | | narrow |
| SNOMEDCT_US | 197686005 | Acute neph syn, diffuse mesangiocapillary glomerulonephritis | | | narrow |
| SNOMEDCT_US | 197687001 | Acute nephritic syndrome, dense deposit disease | | | narrow |
| SNOMEDCT_US | 197688006 | Acute nephrotic syndrm diffuse crescentic glomerulonephritis | | | narrow |
| SNOMEDCT_US | 197750002 | Analgesic nephropathy | C0149938 | Analgesic nephropathy | Narrow |



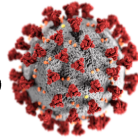
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|-------------|-----------|---|----------|---|----------|
| SNOMEDCT_US | 197751003 | Nephropathy induced by other drugs, medicaments and biological substances | C0451767 | Nephropathy induced by other drugs, medicaments and biological substances | Narrow |
| SNOMEDCT_US | 197752005 | Nephropathy induced by unspecified drug, medicament or biological substance | C0495053 | Nephropathy induced by unspecified drug, medicament or biological substance | Narrow |
| SNOMEDCT_US | 197801000 | Single acquired kidney cyst | | | possible |
| SNOMEDCT_US | 197801000 | Single acquired kidney cyst | | | possible |
| SNOMEDCT_US | 197802007 | Peripelvic (lymphatic) cyst | | | possible |
| SNOMEDCT_US | 197802007 | Peripelvic (lymphatic) cyst | | | possible |
| SNOMEDCT_US | 197805009 | Postoperative ureteric constriction | | | possible |
| SNOMEDCT_US | 197805009 | Postoperative ureteric constriction | | | possible |
| SNOMEDCT_US | 197808006 | Idiopathic retroperitoneal fibrosis | | | possible |
| SNOMEDCT_US | 197811007 | Vesicoureteric reflux | | | possible |
| SNOMEDCT_US | 197811007 | VUR - Vesicoureteric reflux | | | possible |
| SNOMEDCT_US | 197811007 | Vesicoureteric reflux | | | possible |
| SNOMEDCT_US | 197811007 | Ureteric reflux | | | possible |
| SNOMEDCT_US | 197812000 | Renal artery haemorrhage | | | possible |
| SNOMEDCT_US | 197812000 | Renal artery haemorrhage | | | possible |
| SNOMEDCT_US | 197813005 | Intrarenal haematoma | | | possible |
| SNOMEDCT_US | 197813005 | Intrarenal haematoma | | | possible |
| SNOMEDCT_US | 197816002 | Ureteric fistula | | | possible |
| SNOMEDCT_US | 197816002 | Ureteric fistula | | | possible |
| SNOMEDCT_US | 197817006 | Adhesions of kidney | | | possible |
| SNOMEDCT_US | 197818001 | Adhesions of ureter | | | possible |
| SNOMEDCT_US | 197819009 | Periureteritis | | | possible |
| SNOMEDCT_US | 197820003 | Pyelectasia | | | possible |
| SNOMEDCT_US | 197820003 | Pyelectasia | | | possible |
| SNOMEDCT_US | 197821004 | Polyp of ureter | | | possible |
| SNOMEDCT_US | 197821004 | Polyp of ureter | | | possible |
| SNOMEDCT_US | 197823001 | Megaloureter - acquired | | | possible |
| SNOMEDCT_US | 197823001 | Acquired megaureter | | | possible |
| SNOMEDCT_US | 197823001 | Megaloureter - acquired | | | possible |
| SNOMEDCT_US | 197824007 | Perirenal haematoma | | | possible |
| SNOMEDCT_US | 197824007 | Perinephric haematoma | | | possible |
| SNOMEDCT_US | 197824007 | Perinephric hematoma | | | possible |
| SNOMEDCT_US | 197824007 | Perirenal haematoma | | | possible |
| SNOMEDCT_US | 198524000 | Renal failure | C0035078 | Kidney Failure | Narrow |
| SNOMEDCT_US | 200118004 | Post-delivery acute renal failure - delivered with p/n prob | | | narrow |
| SNOMEDCT_US | 207180001 | [D]Oliguria and anuria | C0028962 | Oliguria and anuria | Possible |



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|-------------|-----------|--|----------|--------------------------|----------|
| SNOMEDCT_US | 207181002 | [D]Oliguria | C0028961 | Oliguria | Possible |
| SNOMEDCT_US | 207182009 | [D]Anuria | C0003460 | Anuria | Narrow |
| SNOMEDCT_US | 207185006 | [D]Oliguria and anuria NOS | C0028962 | Oliguria and anuria | Possible |
| SNOMEDCT_US | 207199005 | [D]Extrarenal uraemia | C0476303 | Extrarenal uraemia | Narrow |
| SNOMEDCT_US | 210209001 | Injury to kidney NOS | C0160420 | Injury of kidney | Possible |
| SNOMEDCT_US | 212376001 | Renal failure after crushing | C0010392 | Crush syndrome | Narrow |
| SNOMEDCT_US | 236386005 | Acute nephritic syndrome | C0268733 | Acute nephritis | Narrow |
| SNOMEDCT_US | 236423003 | Renal impairment | C1565489 | Renal Insufficiency | Narrow |
| SNOMEDCT_US | 236428007 | Acute renal failure induced by toxin | | | narrow |
| SNOMEDCT_US | 236429004 | Acute drug-induced renal failure | | | narrow |
| SNOMEDCT_US | 236438002 | Calcific papillary necrosis | | | possible |
| SNOMEDCT_US | 236441006 | Acquired renal cyst with neoplastic change | | | possible |
| SNOMEDCT_US | 236442004 | Acquired renal cyst without neoplastic change | | | possible |
| SNOMEDCT_US | 236487000 | Pararenal urinoma | | | possible |
| SNOMEDCT_US | 236487000 | Pararenal urinoma | | | possible |
| SNOMEDCT_US | 236489002 | Cholesterol embolus syndrome | | | possible |
| SNOMEDCT_US | 236489002 | Cholesterol embolisation syndrome | | | possible |
| SNOMEDCT_US | 236489002 | Cholesterol embolus syndrome | | | possible |
| SNOMEDCT_US | 236514003 | Nephropathy induced by unspec drug medicament or biol subs | | | possible |
| SNOMEDCT_US | 236514003 | Nephropathy induced by unspec drug medicament or biol subs | | | possible |
| SNOMEDCT_US | 236514003 | Toxic nephropathy, not elsewhere classified | | | possible |
| SNOMEDCT_US | 236514003 | [X]Toxic nephropathy, not elsewhere classified | | | possible |
| SNOMEDCT_US | 236522005 | Chronic cyclosporin A nephrotoxicity | | | possible |
| SNOMEDCT_US | 236522005 | Chronic cyclosporin A nephrotoxicity | | | possible |
| SNOMEDCT_US | 236596002 | Idiopathic dilation of ureter | | | possible |
| SNOMEDCT_US | 236608000 | Ureteric leak | | | possible |
| SNOMEDCT_US | 236609008 | Paraureteric urinoma | | | possible |
| SNOMEDCT_US | 264536006 | Interstitial nephritis | C0027707 | Nephritis, Interstitial | Narrow |
| SNOMEDCT_US | 266230002 | Hypertensive renal disease NOS | C0848548 | hypertensive nephropathy | Possible |
| SNOMEDCT_US | 266553002 | Renal failure unspecified | C0035078 | Kidney Failure | Narrow |
| SNOMEDCT_US | 266560008 | Ureterocele - acquired | | | possible |
| SNOMEDCT_US | 266612003 | Kidney diseases | C0022658 | Kidney Diseases | Possible |
| SNOMEDCT_US | 266613008 | Acute glomerulonephritis | C0156221 | Acute glomerulonephritis | Possible |
| SNOMEDCT_US | 266613008 | Acute nephritis | C0268733 | Acute nephritis | Narrow |
| SNOMEDCT_US | 266616000 | Renal failure NOS | C0035078 | Kidney Failure | Narrow |
| SNOMEDCT_US | 266624005 | Kidney disease NOS | C0022658 | Kidney Diseases | Possible |
| SNOMEDCT_US | 266627003 | Renal disease NOS | C0022658 | Kidney Diseases | Possible |



| | | | | | |
|-------------|-----------|--|----------|---|----------|
| SNOMEDCT_US | 269158000 | Injury to kidney NOS | C0160420 | Injury of kidney | Possible |
| SNOMEDCT_US | 269257004 | Renal failure following crush syndrome | | | possible |
| SNOMEDCT_US | 269257004 | Renal failure following crush syndrome | | | possible |
| SNOMEDCT_US | 269257004 | Renal failure after crushing | | | possible |
| SNOMEDCT_US | 270494003 | Acute renal medullary necrosis | | | possible |
| SNOMEDCT_US | 270494003 | Acute necrotising papillitis | | | narrow |
| SNOMEDCT_US | 270494003 | Acute renal medullary necrosis | | | narrow |
| SNOMEDCT_US | 270494003 | Necrotising renal papillitis | | | possible |
| SNOMEDCT_US | 270494003 | Acute necrotising papillitis | | | narrow |
| SNOMEDCT_US | 270918008 | Crush syndrome | C0010392 | Crush syndrome | Narrow |
| SNOMEDCT_US | 271845002 | Oliguria and anuria | C0028962 | Oliguria and anuria | Possible |
| SNOMEDCT_US | 271845002 | [D]Oliguria and anuria | | | possible |
| SNOMEDCT_US | 271845002 | [D]Oliguria and anuria NOS | | | possible |
| SNOMEDCT_US | 271846001 | [D]Deficient urine secretion | | | possible |
| SNOMEDCT_US | 271848000 | [D]Suppressed urine secretion | | | possible |
| SNOMEDCT_US | 274108006 | Kidney disease NOS | C0022658 | Kidney Diseases | Possible |
| SNOMEDCT_US | 279004007 | Ureteric neuromuscular incoordination | | | possible |
| SNOMEDCT_US | 298015003 | Acute renal papillary necrosis with renal failure | C0574786 | Acute renal papillary necrosis with renal failure | Narrow |
| SNOMEDCT_US | 302922004 | Compensatory hypertrophy of single kidney | | | possible |
| SNOMEDCT_US | 365757006 | Serum creatinine level - finding | C0600061 | Serum creatinine level | Possible |
| SNOMEDCT_US | 373599008 | Multiple acquired kidney cysts | | | possible |
| SNOMEDCT_US | 422593004 | Acute renal failure due to ACE inhibitor | | | narrow |
| SNOMEDCT_US | 422593004 | Acute renal failure caused by ACE inhibitor | | | narrow |
| SNOMEDCT_US | 422593004 | Acute renal failure due to angiotensin-converting-enzyme inhibitor | | | narrow |
| SNOMEDCT_US | 422593004 | Acute renal failure due to ACE inhibitor | | | narrow |
| SNOMEDCT_US | 429489008 | Acute renal failure due to urinary obstruction | | | narrow |
| SNOMEDCT_US | 433036004 | Calyceal diverticulum | | | possible |
| SNOMEDCT_US | 433036004 | Calyceal diverticulum | | | possible |
| SNOMEDCT_US | 443820000 | Other kidney and ureteric disorders NOS | | | possible |
| SNOMEDCT_US | 443820000 | Other kidney and ureteric disorders NOS | | | possible |
| SNOMEDCT_US | 443820000 | Kidney and ureter disease NOS | | | possible |
| SNOMEDCT_US | 443820000 | [X]Other disorders of kidney and ureter | | | possible |
| SNOMEDCT_US | 443820000 | [X]Other specified disorders of kidney and ureter | | | possible |
| SNOMEDCT_US | 443820000 | [X]Oth disorders/kidney+ureter/infects+parasitic diseases CE | | | possible |
| SNOMEDCT_US | 443820000 | [X]Other disorders of kidney+ureter in other diseases CE | | | possible |
| SNOMEDCT_US | 444645005 | Dent's disease | | | possible |



| | | | | | |
|-------------|-----------------|---|----------|---|----------|
| SNOMEDCT_US | 444645005 | Dent's disease | | | possible |
| SNOMEDCT_US | 444794000 | Acute renal cortical necrosis | | | narrow |
| SNOMEDCT_US | 444794000 | Acute renal cortical necrosis | | | narrow |
| SNOMEDCT_US | 444794000 | Acute renal cortical necrosis | | | narrow |
| SNOMEDCT_US | 445646001 | Prerenal azotemia | C0554309 | Prerenal uremia syndrome | Possible |
| SNOMEDCT_US | 710565001 | Ischaemic nephropathy | | | possible |
| SNOMEDCT_US | 710565001 | Ischemic nephropathy | | | possible |
| SNOMEDCT_US | 710565001 | Nephropathy due to ischemia | | | possible |
| SNOMEDCT_US | 710565001 | Ischaemic nephropathy | | | possible |
| SNOMEDCT_US | 723188008 | Renal insufficiency | C0035078 | Kidney Failure | Narrow |
| SNOMEDCT_US | 723189000 | Acute renal insufficiency | C1565662 | Acute Kidney Insufficiency | Narrow |
| SNOMEDCT_US | 733839001 | Postpartum acute renal failure | C0157461 | Acute renal failure following labor AND/OR delivery | Narrow |
| SNOMEDCT_US | 733839001 | Acute renal failure following labour and delivery | | | narrow |
| SNOMEDCT_US | 816082000 | Hypovolemia | C0546884 | Hypovolemia | Possible |
| SNOMEDCT_US | 367481000119108 | Extrarenal uremia | C0476303 | Extrarenal uraemia | Narrow |

10. Algorithm proposal

Broad algorithm:

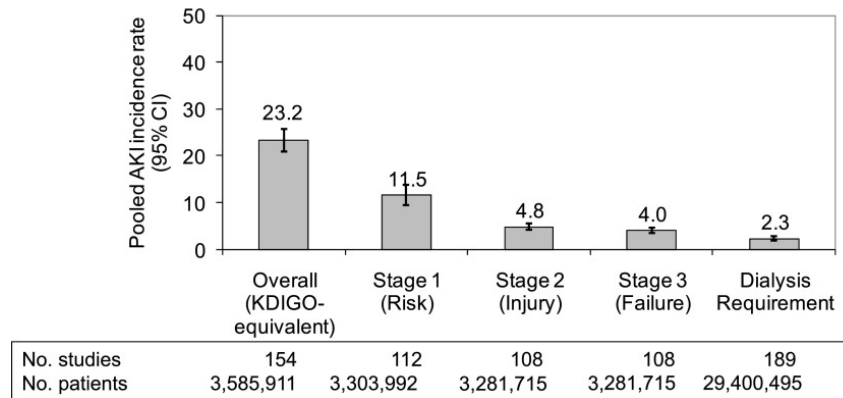
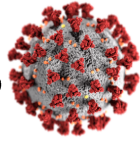
All concept sets = (Kidney_disorders, Renal_Insufficiency, Nephropathy, Kidney_necrosis, Uremia, Renal_failure_in_pregnancy, Oliguria, Creatinine_test, Metabolic_acidosis, Other_diseases) in any provenance, no prior codes, all items tagged as narrow or possible

- Index date: first occurrence of any of these concept sets

Narrow algorithm:

- Concept sets = (Kidney_disorders, Renal_Insufficiency, Nephropathy, Kidney_necrosis, Uremia, Renal_failure_in_pregnancy) in any other location (no prior codes), all those labelled as narrow
- Index date: first occurrence of any of these concept sets

11. Background rates



Pooled incidence rate of AKI in studies that used KDIGO-equivalent serum creatinine-based AKI definition and staging system, or dialysis requirement. Some studies and patients are included in more than one category. KDIGO, Kidney Disease Improving Global Outcomes; 95% CI, 95% confidence interval.

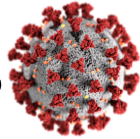


Table 2. Pooled incidence rate of AKI according to the KDIGO-equivalent definition

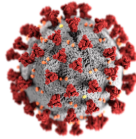
| Subgroup | Studies (n) | Patients (n) | Patients with AKI (n) | AKI Incidence Rate (%) | 95% Confidence Interval | Test for Heterogeneity | |
|--|----------------|-----------------|-----------------------------|------------------------------|-------------------------------|-------------------------|-------------------|
| | | | | | | I ² Index | Q Test P Value |
| All | 154 | 3,585,911 | 573,424 | 23.2 | 21.0 to 25.7 | 99.9 | <0.001 |
| Age category | | | | | | | |
| Adults | 130 | 3,571,691 | 569,861 | 21.6 | 19.3 to 24.1 | 99.9 | <0.001 |
| Children | 24 | 14,220 | 3563 | 33.7 | 26.9 to 41.3 | 98.3 | <0.001 |
| Clinical setting | | | | | | | |
| Community acquired | 7 | 548,398 | 4897 | 8.3 | 1.6 to 33.0 | 99.9 | <0.001 |
| Critical care | 41 | 888,604 | 272,580 | 31.7 | 28.6 to 35.0 | 99.9 | <0.001 |
| Cardiac surgery | 42 | 164,333 | 33,157 | 24.3 | 20.4 to 28.8 | 99.7 | <0.001 |
| Trauma | 4 | 14,947 | 2557 | 19.9 | 13.6 to 28.2 | 98.7 | <0.001 |
| Heart failure | 1 | 682 | 221 | 32.4 | 29.0 to 36.0 | — | — |
| Hematology/oncology | 3 | 2401 | 453 | 21.3 | 7.5 to 47.6 | 99.2 | <0.001 |
| Nephrotoxins | 4 | 17,786 | 1681 | 12.2 | 6.2 to 22.7 | 98.7 | <0.001 |
| Hospital acquired, unspecified | 52 | 1,948,760 | 257,878 | 20.9 | 17.2 to 25.2 | 99.9 | <0.001 |
| Continent | | | | | | | |
| Australia and New Zealand | 9 | 523,715 | 182,405 | 25.6 | 22.3 to 29.3 | 99.9 | <0.001 |
| Asia | 21 | 286,377 | 17,358 | 15.6 | 8.7 to 26.4 | 99.9 | <0.001 |
| Europe | 51 | 918,068 | 72,390 | 23.1 | 18.0 to 29.2 | 99.9 | <0.001 |
| America | 70 | 1,847,689 | 296,655 | 24.9 | 22.1 to 27.8 | 99.9 | <0.001 |
| Multiple continents | 3 | 10,062 | 4616 | 49.4 | 22.9 to 76.3 | 99.9 | <0.001 |
| World zone ^a | | | | | | | |
| Australia and New Zealand | 9 | 523,715 | 182,405 | 25.6 | 22.3 to 29.3 | 99.9 | <0.001 |
| Eastern Asia | 17 | 258,161 | 14,794 | 14.7 | 7.0 to 28.2 | 99.9 | <0.001 |
| Western Asia | 2 | 25,989 | 2006 | 16.7 | 3.3 to 54.3 | 99.3 | <0.001 |
| South Asia | 2 | 2227 | 558 | 23.7 | 7.5 to 54.4 | 99.4 | <0.001 |
| Eastern Europe | 2 | 2600 | 639 | 22.0 | 9.5 to 43.3 | 98.9 | <0.001 |
| Western Europe | 15 | 161,198 | 14,725 | 20.1 | 12.1 to 31.5 | 99.9 | <0.001 |
| Northern Europe | 12 | 607,956 | 8894 | 14.7 | 5.5 to 33.6 | 99.9 | <0.001 |
| Southern Europe | 18 | 24,080 | 6546 | 31.5 | 23.1 to 41.3 | 99.5 | <0.001 |
| Multi-zone Europe | 4 | 122,234 | 41586 | 32.5 | 28.3 to 37.0 | 99.6 | <0.001 |
| North America | 64 | 1,843,814 | 295,554 | 24.5 | 21.7 to 27.5 | 99.9 | <0.001 |
| South America | 6 | 3875 | 1101 | 29.6 | 19.1 to 42.7 | 98.3 | <0.001 |
| Multiple zones | 3 | 10,062 | 4616 | 49.4 | 22.9 to 76.3 | 99.9 | <0.001 |
| Latitude | | | | | | | |
| North | 138 | 3,057,543 | 389,454 | 22.6 | 20.2 to 25.2 | 99.9 | <0.001 |
| South | 15 | 527,590 | 183,506 | 27.0 | 24.2 to 30.0 | 99.8 | <0.001 |
| North and South | 1 | 778 | 464 | 59.6 | 56.2 to 63.0 | — | — |
| Country income classification ^b | | | | | | | |
| Low income | 1 | 1047 | 399 | 38.1 | 35.2 to 41.1 | — | — |
| Lower middle income | 1 | 1180 | 159 | 13.5 | 11.6 to 15.5 | — | — |
| Upper middle income | 20 | 248,718 | 14,335 | 19.5 | 10.4 to 33.7 | 99.9 | <0.001 |
| High income | 130 | 3,313,430 | 553,203 | 23.8 | 21.4 to 26.4 | 99.9 | <0.001 |
| Not available | 2 | 21,536 | 5328 | 25.1 | 23.6 to 26.7 | 80.4 | 0.02 |
| Country total health expenditure (% of GDP) ^c | | | | | | | |
| <5 | 8 | 222,178 | 7823 | 14.5 | 7.2 to 26.9 | 99.8 | <0.001 |
| 5–10 | 68 | 1,406,796 | 258,636 | 22.3 | 19.6 to 25.3 | 99.9 | <0.001 |
| >10 | 76 | 1,935,401 | 301,637 | 25.2 | 22.3 to 28.3 | 99.9 | <0.001 |
| Not available | 2 | 21,536 | 5328 | 25.1 | 23.6 to 26.7 | 80.4 | <0.001 |

KDIGO, Kidney Disease Improving Global Outcomes; GDP, gross domestic product.

^aAccording to the United Nations geo-scheme classification (11).

^bAccording to the World Bank's classification of income of countries (12).

^cAccording to the World Health Organization (14).



13. References

Makris K, Spanou L. Acute Kidney Injury: Definition, Pathophysiology and Clinical Phenotypes. *Clin Biochem Rev.* 2016;37(2):85-98.

Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group. KDIGO Clinical Practice Guideline for Acute Kidney Injury. *Kidney inter., Suppl.* 2012; 2: 1–138.

Moore, P. K., Hsu, R. K., & Liu, K. D. (2018). Management of acute kidney injury: core curriculum 2018. *American Journal of Kidney Diseases*, 72(1), 136-148.
<https://doi.org/10.1053/j.ajkd.2017.11.021>

Susantitaphong P, Cruz DN, Cerda J, Abulfaraj M, Alqahtani F, Koulouridis I, e.a. World Incidence of AKI: A Meta-Analysis. *CLIN J AM SOC NEPHROL* [Internet]. 6 september 2013;8(9):1482. Beschikbaar op: <http://cjasn.asnjournals.org/content/8/9/1482.abstract>

Ronco C, Bellomo R, Kellum JA. Acute kidney injury. *The Lancet* [Internet]. 23 november 2019 [geciteerd 16 juli 2020];394(10212):1949–64. Beschikbaar op: <http://www.sciencedirect.com/science/article/pii/S0140673619325632>

Levey AS, James MT. Acute Kidney Injury. *Annals of Internal Medicine* [Internet]. 7 november 2017 [geciteerd 16 juli 2020];167(9):ITC66–80. Beschikbaar op: <http://www.acpjournals.org/doi/full/10.7326/AITC201711070>