Updated Clinical Definitions of Acute Kidney Injury, Renal Failure, Sepsis, and Malnutrition

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Clinical Update: Sepsis and Malnutrition

Learning Objectives

• At the completion of this educational activity, learners will be able to:
  – Explain the recent definitional clinical guidelines for sepsis
  – Explain the recent definitional clinical guidelines for malnutrition
  – Describe how to formulate an effective query regarding the above clinical entities
  – Discuss why complete documentation of these conditions will benefit the physician, hospital, and patient care
Sepsis

- **Infection**: invasion of normally sterile tissue, fluid, or body cavity by pathogenic microorganisms
Sepsis

- **Bacteremia**: 790.7 (R78.81), a laboratory finding of viable bacteria in the blood without evidence of a systemic inflammatory response.

Sepsis

- **Systemic Inflammatory Response Syndrome (SIRS)**: 995.90 (R65.10), a syndrome defined by the presence of two or more of the following features of systemic inflammation:
  1. Fever (core temperature > 38.3°C or 100.9°F) or hypothermia (core temperature < 36°C or 96.8°F)
  2. Leukocytosis (white count > 12,000) or leukopenia (white count < 4,000 or > 10% bands)
  3. Tachycardia (> 90 beats per minute or more than two SD above the normal value for age)
  4. Tachypnea (respiratory rate > 20 breaths per minute or a pCO₂ of < 32 mm Hg)
Sepsis

- **Sepsis**: 038.9/995.91 (A41.9), synonymous with **SIRS due to infection without organ dysfunction**. This is an infection-induced syndrome defined by the presence of at least two **unexplained** features of systemic inflammation:

1. Fever (core temperature > 38.3°C or 100.9°F) or hypothermia (core temperature < 36°C or 96.8°F)
2. Leukocytosis (white count > 12,000) or leukopenia (white count < 4,000 or > 10% bands)
3. Tachycardia (> 90 beats per minute or more than two SD above the normal value for age)
4. Tachypnea (respiratory rate > 20 breaths per minute or a pCO2 of < 32 mm Hg)
5. Altered mental status
6. Significant edema or positive fluid balance (> 20 mL per kg over 24 hours)
7. Hyperglycemia, unexplained (glucose > 140 mg/dL in the absence of diabetes)
8. Evidence of hypoperfusion [hyperlactatemia (> 1 mmol/L)] or decreased capillary refill or mottling
9. Ileus (absent bowel sounds)
10. Arterial hypoxemia (Pao2/Fio2 < 300)
11. Acute oliguria (urine output < 0.5mL/kg/hr for at least 2 hours, despite adequate fluid resuscitation)
12. Creatinine increase > 0.5 mg/dL or 44.2 umol/L
13. Hyperbilirubinemia (> 2 mg/dL)*
14. Plasma C-reactive protein more than two SD above the normal value
15. Plasma procalcitonin more than two SD above the normal value

* Personal email communication with Mitchell M. Levy, MD, on May 14, 2013. Bilirubin levels for sepsis and severe sepsis were reversed with additional modifications to the clinical elements also based on the communication.
Sepsis

- **Septicemia**: 038.9 (A41.9), an antiquated, ambiguous term which has been used non-specifically in the past to imply either bacteremia or sepsis; therefore, should be eliminated from current medical usage

Severe Sepsis

- **Severe sepsis**: 038.9/995.92 (A41.9/R65.20) (sometimes referred to as sepsis syndrome), defined as **sepsis-induced tissue hypoperfusion or organ dysfunction** (any one of which due to infection):

  1. Sepsis-induced hypotension [systolic blood pressure (SBP) < 90 mm Hg, mean arterial pressure (MAP) < 70 mm Hg, or an SBP decrease by > 40 mm Hg in adults or less than two SD below normal for age]
  2. Lactate above upper limits of laboratory normal
  3. Acute oliguria (urine output < 0.5mL/kg/hr for more than 2 hours, despite adequate fluid resuscitation)
  4. Creatinine increase > 2.0 mg/dL
  5. Platelet count < 100,000/uL
  6. Coagulopathy (international normalized ratio > 1.5)
Severe Sepsis

7. Acute lung injury with Pao2/Fio2 < 250 in the absence of pneumonia as an infection source
8. Acute lung injury with Pao2/Fio2 < 200 in the presence of pneumonia as an infection source
9. Hyperbilirubinemia (plasma total bilirubin > 4 mg/dL)*

*Personal email communication with Mitchell M. Levy, MD, on May 14, 2013. Bilirubin levels for sepsis and severe sepsis were reversed with additional modifications to the clinical elements also based on the communication.

Septic Shock

- **Septic shock:** 785.52 (R65.21), severe sepsis with hypotension (systolic blood pressure < 90 mm Hg or a 40 mm Hg drop from the previous normal blood pressure) unresponsive to fluid resuscitation, requiring vasopressor intervention

  - When physicians document septicemia with shock or sepsis with septic shock, then the correct code assignment is 038.9/995.92/785.52 (A41.9/R65.21) and a code for the underlying infection.
References

• Bone, M.D., R.C., ACCP/SCCM Consensus Conference, Chest, 1992;101:1044-55.

Common Audit Sequencing Concerns Regarding Sepsis/Severe Sepsis

• If the reason for admission is sepsis or severe sepsis, the underlying systemic infection should be sequenced first (sepsis/severe sepsis) with the localized infection (cellulitis, pneumonia, etc.) being reported as a secondary code

• If the sepsis or severe sepsis occurs secondary to a post-procedural infection such as sepsis, secondary to an indwelling Foley catheter, the post-procedural code is sequenced as the principal diagnosis and the systemic infection is reported as a secondary code

➢ ICD-9-CM Official Coding Guidelines for Coding and Reporting, October 2011
Physician Communication Tool (Sepsis)

Dear Dr. __________________:

Urosepsis is a nonspecific entity for coding purposes. Based on the clinical elements documented in the health record (circled below), can you further specify if this patient had a:

- Urinary tract infection _____________________________
  Signature __________________ Date ____________

- Sepsis from a urinary source _____________________________
  Signature __________________ Date ____________

- Severe sepsis from a urinary source _____________________________
  Signature __________________ Date ____________

- Other: ________________________________
  Signature __________________ Date ____________

- Undetermined _____________________________
  Signature __________________ Date ____________

1. Fever (oral temperature > 38°C or 100.4°F) or hypothermia (oral temperature < 36°C or 96.8°F)
2. Leukocytosis (white count > 12,000) or leukopenia (white count < 4,000 or > 10% bands)
3. Tachycardia (> 90 beats per minute)
4. Tachypnea (respiratory rate > 20 breaths per minute or a pCO2 of < 32 mm Hg)
5. Altered mental status
6. Significant edema
7. Hyperglycemia, unexplained (glucose > 140 mg/dL in the absence of diabetes)
8. Oliguria (< 30 ccs per hour)
9. Hypotension (systolic blood pressure <90 mm Hg or a 40 mm Hg drop from the previous normal blood pressure responsive to fluid resuscitation)
10. Evidence of hypoperfusion (increase anion gap, reduced arterial pH, elevated lactate level, and reduced skin perfusion)
11. Elevated biomarkers (C-reactive protein, procalcitonin, Interleukin-6)
12. Acute renal failure
13. Coagulation abnormalities (INR > 1.5 or a PTT > 60 seconds)
14. Ileus (absent bowel sounds)
15. Thrombocytopenia (platelet count < 100,000 uL)
16. Hyperbilirubinemia (plasma total bilirubin > 4 mg/dL)
17. Arterial hypoxemia (PaO2/FiO2 < 300)

Please document your response either in the progress note, discharge summary, or as listed above (signed and dated).

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### Clinical Characteristics of Malnutrition

*Adapted From Academy/ASPEN (Journal of Parental and Enteral Nutrition, 2012 36:275)*

<table>
<thead>
<tr>
<th>ACADEMY/ASPEN clinical characteristics</th>
<th>Malnutrition of acute illness/injury</th>
<th>Malnutrition of chronic illness (&gt; 3 months)</th>
<th>Impaired social/environmental circumstances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of malnutrition</td>
<td>Non-severe malnutrition</td>
<td>Severe malnutrition</td>
<td>Non-severe malnutrition</td>
</tr>
<tr>
<td>Energy intake</td>
<td>&lt; 75% intake of estimated energy needs for &gt; 7 days</td>
<td>≤ 50% intake of estimated energy needs for ≥ 5 days</td>
<td>&lt; 75% intake of estimated energy needs for ≥ 1 month</td>
</tr>
<tr>
<td>Weight loss</td>
<td>1–2% in 1 week</td>
<td>&gt; 2% in 1 week</td>
<td>5% in 1 month</td>
</tr>
<tr>
<td></td>
<td>5% in 1 month</td>
<td>&gt; 5% in 1 month</td>
<td>7.5% in 3 months</td>
</tr>
<tr>
<td></td>
<td>10% in 6 months</td>
<td>&gt; 10% in 6 months</td>
<td>10% in 6 months</td>
</tr>
<tr>
<td></td>
<td>20% in 1 year</td>
<td>&gt;20% in 1 year</td>
<td>20% in 1 year</td>
</tr>
<tr>
<td>Subcutaneous fat loss</td>
<td>Mild</td>
<td>Moderate</td>
<td>Mild</td>
</tr>
<tr>
<td>Muscle loss</td>
<td>Fluid accumulation</td>
<td>Normal</td>
<td>Reduced</td>
</tr>
<tr>
<td>Grip strength</td>
<td>Normal</td>
<td>Reduced</td>
<td>Normal</td>
</tr>
</tbody>
</table>
Physician Communication Tool
(Malnutrition)

Dear Dr. __________________________:

Please indicate the diagnosis which best correlates with the below-listed clinical indicators:

• Nutritional risk without malnutrition
• Severe malnutrition
• Non-severe (mild-moderate) malnutrition
• Malnutrition, severity undetermined
• Other: __________________________
• Undetermined

Clinical indicators found in the record: (circle your response)

• Clinical setting: Acute or chronic illness
  Acute injury
  Impaired social/environment circumstances
• Reduced energy intake _____% _____days
• Weight loss _____ % _____weeks _____months
• Body fat loss _____mild _____moderate _____severe
• Muscle mass loss _____mild _____moderate _____severe
• Fluid accumulation _____mild _____moderate _____severe
• Grip strength _____not reduced _____reduced

*Journal of Parenteral and Enteral Nutrition (JPEN), April 24, 2012, 36:275
Current Opinion Critical Care, 2012, 18:206-211*
Acute Kidney Injury, Acute Renal Failure

Today’s Speaker: Garry L. Huff, MD, CCS, CCDS
Learning Objectives

• At the completion of this educational activity, learners will be able to:
  – Describe etiologies of AKI and recognize clinical data that supports specific pathological subtypes of AKI, such as ATN, toxic nephropathy, etc.
  – Discuss how structured physician queries communicate more effectively the documentation required for these complex clinical issues
  – Explain sequencing of renal failure and its manifestations based on Coding Clinic directives
  – Discuss the changes in codes and guidelines under ICD-10 CM regarding diagnoses related to renal failure

Do not swallow your bubble gum if going to aerobics class
Relationship of Conditions

AKD: Acute kidney disease
AKI: Acute kidney injury (includes acute renal failure)
CKD: Chronic kidney disease

Acute Kidney Injury

• Definition
• Etiologies
• Coding issues
  – Acute kidney injury
Acute Renal Impairments

Acute kidney injury (AKI) – 584.9 (CC)
Acute renal failure (ARF) – 584.9 (CC)
Acute renal insufficiency (ARI) – 593.9 (No CC)
Acute tubular necrosis (ATN) – 584.5 (MCC)
Vasomotor nephropathy – 584.5 (MCC)
Toxic nephropathy – 584.5 (MCC)
Acute interstitial nephritis – 580.89 (MCC)
Prerenal azotemia – 790.6 (No CC)
Prerenal failure – 788.99 (No CC)
Acute kidney disease (AKD) – 593.9 (No CC)
Renal failure unspecified – 586 (No CC)

Acute Kidney Injury KDIGO 3/2012

<table>
<thead>
<tr>
<th>STAGE</th>
<th>Serum creatinine</th>
<th>Urine output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.5–1.9 times baseline within 7-day period OR ≥ 0.3 mg/dl increase over 48 hrs</td>
<td>&lt; 0.5 ml/kg/hr for 6–12 hrs</td>
</tr>
<tr>
<td>2</td>
<td>2.0–2.9 times baseline</td>
<td>&lt; 0.5 ml/kg/hr for ≥ 12 hrs</td>
</tr>
<tr>
<td>3</td>
<td>3.0 times baseline OR Increase in serum creatinine ≥ 4.0 mg/dl OR Initiation of renal replacement RX</td>
<td>&lt; 0.3 ml/kg/h for ≥ 24 hrs</td>
</tr>
</tbody>
</table>
**AKI: Clinical Application**

Serum creatinine (SCr) $\geq 0.3$ mg/dl increase over 48 hrs

- Dehydration with admit SCr 1.8 with increase to 2.1 over 48 hrs. AKI? **YES.** SCr was demonstrated to increase by $> 0.3$ mg% within 48-hr period.

- Nausea, vomiting, diarrhea with volume depletion and SCr of 2.5. What level would the SCr have to reach to be considered AKI, stage 1, by KDIGO in 48 hrs? **2.8 mg% (2.5 + 0.3)**

**AKI: Simple Calculation**

Change in SCr to $> 1.5$ times baseline over 7 days

**Determine baseline**

- Lowest SCr recorded during hospital stay (particularly if there is risk for or documented CKD) or
- Baseline stated by MD to be the baseline (if lower than the lowest recorded baseline)
- If there is no risk for CKD or documented CKD, the baseline should usually be less than 1.0 mg%

**Calculate the SCr measurement needed to qualify for AKIN, stage 1**

- Multiply the determined baseline by 1.5
- If any measured SCr during the hospital stay is equal to or greater than 1.5 times the determined baseline over any 7-day period, then AKI is established
AKI: Clinical Application

Change in SCr > 1.5 times baseline over 7 days

• Sepsis with SCr of 1.3 mg/dl on day 4 with SCr of 2.0 mg/dl on day 10. Query for AKI?
  YES. Baseline is 1.3, which if multiplied by 1.5 equals 1.95 mg/dl. Since the observed 2.0 is greater than the calculated 1.95 and the 2.0 has occurred within the 7-day period, then a query for AKI is appropriate.

AKI: Clinical Application

Change in SCr > 1.5 times baseline over 7 days

• Admission for dehydration with SCr of 3.6 mg/dl, received IVFs with discharge SCr of 1.8 on day 5. Query for AKI?
  YES. Baseline is 1.8, which if multiplied by 1.5 equals 2.7 mg/dl. Since the observed 3.6 is greater than the calculated 2.7 and the 3.6 has occurred within the 7-day period, then a query for AKI is appropriate.
Acute Kidney Injury

Anatomy

- **Cortex**
- **Medulla**
- **Intrarenal 35%**
- **Glomerular & tubulo-interstitial function**

**Blood flow**
- Prerenal 60%
- Postrenal 5%

**Urine flow**

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Prerenal Etiologies

- **Hypovolemia**
  - Dehydration
  - Hemorrhage
- **Left ventricular failure**
- **Sepsis**
- **Drugs** (e.g., NSAIDs, ACE inhibitors/blockers, cyclosporine)
- **Hepatorenal syndrome**

Intrinsic Renal Etiologies

**Acute tubular necrosis (ATN)**
- Ischemic/hypotensive induced (vasomotor nephropathy)
- Toxic (toxic nephropathy)
  - Drug induced (chemotherapy, antibiotics)
  - Radiological contrast
  - Myoglobin (e.g., rhabdomyolysis)
  - Uric acid (tumor lysis syndrome)

**Acute interstitial nephritis**
- Allergic
- Infection (e.g., acute pyelonephritis)

**Glomerulonephritis, acute**
**Vascular (renal infarction)**
Postrenal Etiologies

These are collectively known as: “postobstructive uropathy”

- **Bladder outlet obstruction** (e.g., BPH)
- **Ureteral obstruction** (e.g., stones)

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Acute Tubular Necrosis

<table>
<thead>
<tr>
<th></th>
<th>AKI/prerenal</th>
<th>AKI/ATN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U:P osmolality</strong></td>
<td>&gt; 1.4:1</td>
<td>1:1**</td>
</tr>
<tr>
<td><strong>U:P creatinine</strong></td>
<td>&gt; 50:1</td>
<td>&lt; 20:1**</td>
</tr>
<tr>
<td><strong>Urine Na (mEq/L)</strong></td>
<td>&lt; 20</td>
<td>&gt; 80**</td>
</tr>
<tr>
<td><strong>FENa (%)</strong></td>
<td>&lt; 1</td>
<td>&gt; 3**</td>
</tr>
<tr>
<td><strong>Urine exam</strong></td>
<td>Neg/hyalin casts</td>
<td>Granular casts</td>
</tr>
</tbody>
</table>

Rising SCr despite restoration of volume and/or relief of urinary obstruction

** only useful in oliguric renal failure
Biomarkers for AKI

- Kidney injury molecule-1 (KIM-1)
- Neutrophil gelatinase-associated lipocalin (NGAL)
- Cystatin C
- N-acetyl-β-glucosaminidase (NAG)
- Liver-type fatty acid–binding protein (L-FABP)
- Interleukin-18 (IL-18)

Clinical Coding Correlation

- Sequencing acute kidney injury as principal Dx
  - AKI secondary to dehydration both POA
    - AKI sequenced as PDx (CC 3rd Qtr. 2002, pp. 21–22)
  - Sepsis with AKI
    - Sepsis sequenced as PDx if AKI manifestation of SIRS with infection (Volume II of ICD-9-CM see 995.92; ICD-9-CM Official Guidelines I.C.1.b.5)
  - AKI in kidney transplant
    - Complication of kidney transplant as PDx (ICD-9 CM Guidelines I.C.17.f.1.b)
Clinical Coding Correlation

• Sequencing acute kidney injury
  – AKI due to rhabdomyolysis
    • AKI sequenced as PDx (CC 3rd Qtr. 2002, p. 28).
  – BPH with obstruction and AKI
    • AKI was sequenced as PDx given focus of care (CC 2nd Qtr. 2002, p. 28). Principal diagnosis may vary depending on chief reason for admission.

Undocumented Diagnosis of AKI

Patient was admitted for dehydration. The SCr on admission was noted to be 1.8 mg/dl. With treatment (IV fluids) the SCr improved at time of discharge (day 5) to be 0.7 mg/dl. Based on the degree of change in the SCr during the hospital stay, can you specify the level of renal dysfunction?

1. AKI due to dehydration
2. Dehydration only without AKI
3. Other: __________________
4. No further specification can be offered

The current AKIN criteria is attached to assist you in your response. Please contact us at XXX if you have any questions or concerns. Thank you for your cooperation.
Unspecified Diagnosis of AKI

Patient noted to have rise in SCr from 1.87 mg/dl to 3.71 mg/dl after cardiac catheterization. Patient was noted to have AKI with “contrast nephropathy.” Patient also noted to have relative hypotension (215/74 to 104/52). After study, can the contrast nephropathy and AKI be further specified as:

1. AKI with toxic nephropathy due to contrast dye
2. AKI with acute tubular necrosis due to contrast dye
3. AKI only
4. Other: _________________________________
5. No further specification can be made

Clinically Invalid Diagnosis of AKI

Patient was noted to have an SCr of 1.5 mg/dl at admission with diarrhea and vomiting. Acute kidney injury was noted in the H&P and progress notes. IVFs were given. SCr at time of discharge was 1.3 mg/dl, which was noted as baseline on hospital day 2. Based on KDIGO criteria (see attached) and given the clinical indicators present, do you feel the acute kidney injury was present during this hospital stay?

1. Yes
2. No
3. Other: ___________________
4. Clinically undetermined
Acute Renal Impairments in ICD-10-CM

Acute kidney injury (AKI) – N17.9 (CC)
Acute renal failure (ARF) – N17.9 (CC)
Acute renal insufficiency (ARI) – N28.9
Acute tubular necrosis (ATN) – N17.0 (MCC)
Vasomotor nephropathy – N17.0 (MCC)
**Toxic nephropathy – N14.X – NO LONGER an MCC**
**Acute interstitial nephritis – N10 (CC) – Change from MCC**
Prerenal azotemia – R79.89
Prerenal failure – R39.2 (prerenal uremia)
Acute kidney disease – N28.9
Renal failure unspecified – N19

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Acute Renal Impairments in ICD-10-CM

- ICD-9-CM: Toxic nephropathy and acute tubular necrosis (ATN) shared the same code.
- ICD-10-CM:
  - N14.x Drug- and heavy metal–induced tubulo-interstitial and tubular condition
    - Add a code from Acute kidney failure category, N17.0, to capture AKI or ATN
    - Add a code N10 category to specify the acuity of the tubulo-interstitial disorder
  - N17 and N10 conditions are excluded as CC/MCC if a coder N14.x is used as PDX. If the PDX is a poisoning code, the N17 and N10 conditions are not excluded as CC or MCCs.
Acute Renal Impairments in ICD-10-CM

• DRG impact – Loss of MCC designation with toxic nephropathy.
• DRG impact – Acute interstitial nephritis has been changed to a CC; it is excluded as a CC if listed as an ODX with drug- or heavy metal–induced nephropathy. A “T” code for poisoning or toxic effect as PDX does not exclude AKI or acute interstitial nephritis as CC/MCC.

Acute Renal Impairments in ICD-10-CM

• No changes/additions to chapter-specific Official Guidelines for Coding and Reporting
• Diagnoses noted in previous slide used as principal diagnosis are classified to the same MS-DRGs as in ICD-9-CM with exceptions:
  – Acute interstitial nephritis (N10) is classified to 689–690 instead of 698–700
  – Toxic nephropathy (N14.X) is classified to 698–700 instead of 682–684
My New Grandson

Thank you. Questions?

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