RENE Scoring Instrument

Note: This is an assessment of clinical reasoning. It is not designed to be a knowledge assessment. However, it might reveal gaps in knowledge. It is incumbent upon the faculty scorer to recognize potential gaps in knowledge and independently address these with the learner.

Directions: For each clinical reasoning domain (Problem Representation [1], Differential Diagnosis with Justification [2], Diagnostic Plan with Justification [3]), review the fellow's response and allocate points according to the questions below. Problem Representation has a total of 12 possible points; Differential Diagnosis, 12 possible points; Diagnostic Plan, 8 possible points. After adding the total points for each domain, calculate the percentage of total points achieved (points earned/total points possible X 100). This is the score for each domain. Scores below a certain threshold, suggest a need for remedial coaching.

1. Problem Representation

A concise statement that incorporates the key findings from the history, physical, and diagnostic tests in order to characterize the patient's primary problem.

Examples of Problem Representations:

A 65-year-old woman with history of type II diabetes mellitus, hypertension, and recent NSAID use presents with chronic progressive fatigue and generalized weakness, now found to have low grade fever, tachycardia, lymphadenopathy, hepatosplenomegaly, lower extremity edema, a moderate right pleural effusion, and oliguric acute kidney injury complicated by hyperkalemia, metabolic acidosis, hypercalcemia, and microscopic hematuria and proteinuria.

A 65-year-old woman with a history of type II diabetes mellitus, hypertension, and recent NSAID use presents with chronic progressive fatigue, dyspnea on exertion, anorexia, night sweats, and polydipsia. Exam shows diffuse adenopathy, low-grade fever, 2+ lower bilateral extremity edema, and hepatosplenomegaly in the setting of hypercalcemia, unilateral pleural effusion, hypoalbuminemia and oliguric AKI with microscopic hematuria and 2+ dipstick proteinuria.

1a. Is the tempo of the overall illness (not just the AKI) described? That is, are words such as "chronic," "subacute," or "progressive" used? Also, "yes" should be granted if a duration of signs and symptoms is given in days, months, or years.

- Yes (+1)
- No (0)

1b. Does the problem representation include the appropriate semantic qualifiers? That is, it translates key aspects of the patient's presentation into abstract medical terms. See below for the appropriate semantic qualifiers for this case.

Fatigue, weakness, or malaise (any of these)
B symptoms (or night swears, fever)
Dyspnea on exertion (SOB with exertion)
Edema (or swelling)

Polydipsia
Anorexia/poor appetite
Fever

Scoring:

- Most (4 or more) relevant semantic qualifiers are included (+2)
- Some relevant semantic qualifiers are included (+1)
- No semantic qualifiers are included (0)

1c. Are relevant historical data included in the problem representation? See below for relevant historical data.

Diabetes mellitus
Hypertension

Scoring:

- All relevant historical data are noted (+2)
- Some relevant historical data are noted (+1)
- No historical data are noted (0)

1d. Are relevant physical findings included in the problem representation? See below for relevant physical findings.

Fever (or B symptoms)
Lymphadenopathy
Hepatosplenomegaly
Edema (or swelling)
Reduced breath sounds at the right base (or a pleural effusion)
Oliguria

Scoring:

- Most (4 or more) relevant physical findings are noted, including the most discriminating feature, lymphadenopathy (2+)
- Some relevant physical findings are noted (+1)
- No physical findings are noted (0)

1e. Are relevant diagnostic test results included in the problem representation? See below for relevant diagnostic test results.

Elevated creatinine (compared to baseline creatinine)†
Hypercalcemia

Microscopic hematuria
Unilateral pleural effusion on CXR
Proteinuria
Hypoalbuminemia
Anion gap metabolic acidosis
Anemia

†Can be substituted with AKI

Scoring:

- Most (4 or more) relevant diagnostic results are noted, including acute kidney injury and the most discriminating feature, hypercalcemia (+3)
- 2 to 3 relevant diagnostic results are noted (+2)
- 1 relevant diagnostic result is noted (+1)
- No relevant diagnostic results are noted (0)

1f. How is the problem representation structured?

Scoring:

- The problem representation is very concise (1-2 sentences) (+2)
- The problem representation is moderately concise (3 sentences) (1+)
- The problem representation is not concise (> 3 sentences) (0)

Score Threshold for Coaching: 57%

2. Differential Diagnosis with Justification for the Lead Diagnosis

A list of diagnostic possibilities for the primary problem with data to support the most likely diagnosis (that is, the lead diagnosis) and to justify why other diagnoses are possible, but less likely.

2a. Is there a lead diagnosis with a written justification? A lead diagnosis can be indicated by designating it directly as such, or, by using language such as “most likely” or “probably.” Numbered lists alone are not enough to designate a lead diagnosis.

Scoring:

- No lead diagnosis is indicated. (+0)
- There is a lead diagnosis but no written justification. (+1)
- There is a lead diagnosis with a written justification. (+2)

2b. Is there a differential diagnosis with a written explanation? In other words, is there an explanation about why alternate diagnoses are being considered? The explanation should include why features of these diagnoses are concordant or discordant with the patient’s presentation (i.e., pertinent positives and negatives) and how likely they are *relative to the lead*

diagnosis and/or to other alternate diagnoses. Note: There should be appropriate use of pertinent positives and negatives *in general*, but it is not necessary to use both for every item on the differential diagnosis. See the table for examples of data that make a given diagnosis more or less likely.

Diagnosis	**Data For (Pertinent Positive)**	**Data Against (Pertinent Negative)**
Pre-Renal		
• Hemodynamic AKI (hypotension/volume depletion related to hypercalcemia/anorexia, hypercalcemia-induced renal vasoconstriction)	• Hypotension with tachycardia • ACE-I +/- NSAID use • Few hyaline casts • Hypercalcemia • Oliguria	• Spg 1.010 • Lack of a response to 2.5 L NS
• Cardiorenal syndrome	• Hypotension • LE edema • DOE • Has indicated that she sleeps in a chair (although no clear suggestion of orthopnea)	• Hypercalcemia • Unilateral effusion rather than bilateral • Lack of JVD • Fever, lymphadenopathy
• Hepatorenal syndrome	• Hepatosplenomegaly • Unilateral pleural effusion • Hypotension with tachycardia • Granular casts on U/A	• Fever, lymphadenopathy • Hypercalcemia • No other stigmata of liver cirrhosis such as ascites or spider angiomas (this would make a hepatic hydrothorax less likely) • Spg 1.010 (in HRS, the spg should be extremely concentrated)
Glomerular etiology		
• Malignancy-related GN (e.g., paraprotein MPGN or light-chain deposition disease)	• Lymphadenopathy • Hypercalcemia • Sub-nephrotic range proteinuria (dipstick) • Heme (dipstick) • B-symptoms • LE edema	• Proteinuria could be due to underlying diabetes • Microscopic hematuria must be confirmed by microscopy and could be due to urinary catheter
• Membranous nephropathy (lymphoma vs. solid	• Lymphadenopathy • B-symptoms • Unilateral pleural effusion	• Proteinuria is sub-nephrotic and could

malignancy vs. sarcoidosis)	• Hypercalcemia • Sub-nephrotic range proteinuria (dipstick) • LE edema • Hypoalbuminemia	be due to underlying diabetes • Edema could be due to DVT or fluid retention in setting of reduced GFR • Alone, might not explain significant elevation in creatinine
• Minimal change disease (lymphoma, other malignancy)	• Lymphadenopathy • B-symptoms • Proteinuria (by dipstick) • LE edema • Hypoalbuminemia • NSAID use	• Proteinuria is sub-nephrotic • Proteinuria could be due to underlying diabetes • LE edema and hypoalbuminemia have other explanations • Although NSAIDs are present, there are many other potential insults that are more likely to be responsible for the clinical presentation
• Infection-related GN	• Low-grade fever • Lymphadenopathy • Sub-nephrotic range proteinuria (by dipstick) • Heme (dipstick)	• Proteinuria could be due to underlying diabetes • Microscopic hematuria must be confirmed by microscopy and could be due to urinary catheter • No evidence (yet) of bacteremia
• Lupus nephritis	• Fatigue • Cytopenias • Pleural effusion • Microscopic hematuria • Proteinuria	• Age is older than one would expect for a de novo presentation of lupus • Does not explain hypercalcemia • Microscopic hematuria must be confirmed by microscopy and could be due to urinary catheter • Although SLE may present with diffuse lymphadenopathy, this

		would be an atypical presentation
• ANCA Vasculitis	• Fatigue • Microscopic hematuria • Proteinuria • Generally affects older adults	• Absence of signs of diffuse alveolar hemorrhage • Absence of purpura
• Thrombotic microangiopathy (TMA)	• Microscopic hematuria • Proteinuria • Thrombocytopenia • Anemia • Possible malignancy (part of a paraneoplastic syndrome)	• Splenomegaly could also explain thrombocytopenia
Tubulointerstitial etiology		
• Acute tubular injury/ATN	• Potentially, prolonged ischemic insults (hypotension, hypercalcemia leading to vasoconstriction, NSAIDs, ACEI) • Oliguria • Spg 1.010 • No response to 2.5 L NS • Few granular casts	
• Tumor lysis syndrome (TLS) related to malignancy	• Lymphadenopathy • B-symptoms • Unilateral pleural effusion • Hyperkalemia	• Hypocalcemia is typically a feature of TLS (not hypercalcemia; although hypercalcemia could be driven by a separate malignancy-related process)
• Interstitial nephritis (granulomatous from infection vs. sarcoidosis or acute viral infection like HIV)	• Hypercalcemia • Lymphadenopathy • Recent trip to Texas (like coccidiomycosis) • Fever	• Presentation seems sub-acute; less likely timeline of sarcoidosis • Lack of classic lung features (nodules, hilar adenopathy, cavitary lesions) despite unilateral pleural effusion
• Interstitial nephritis (medication-mediated)	• PPI, NSAIDS	• This does not explain the other systemic features of the case (e.g., adenopathy)

• Cast nephropathy from multiple myeloma	• Hypercalcemia • Fatigue	• Lymphadenopathy is rarely a presenting feature of multiple myeloma
• Infiltrative disease	• Suggestion of lymphoproliferative disorder (fever, lymphadenopathy, hepatosplenomegaly)	• Does not account for the impact of hypotension, hypercalcemia, and other hemodynamic insults
Post-Renal		
• Above-the-bladder obstruction related to lymphadenopathy; tumor; stones from TLS (crystal formation) or hypercalcemia	• Lymphadenopathy • Hypercalcemia • Oliguria despite fluid resuscitation and urinary catheter placement	• Does not account for the impact of hypotension, hypercalcemia, and other hemodynamic insults

Scoring:

- There is no differential diagnosis provided. (+0)
- There is a differential diagnosis but no explanation. (+1)
- There is a differential diagnosis that is clearly supported by the use of pertinent positives, but no pertinent negatives. (+2)
- There is a differential diagnosis that is clearly supported by the use of pertinent negatives, but no pertinent positives. (+2)
- There is a differential diagnosis that is clearly supported by the use of both pertinent positives and pertinent negatives. (+3)
- There is a differential diagnosis that is clearly supported by the use of both pertinent positive and negatives and that also uses language to indicate the probability of alternate diagnoses relative to the lead diagnosis and/or other alternate diagnoses (e.g., “less likely,” “less probable,” “unclear,” etc.) (+4)

2c. Are common diagnoses considered? Common diagnoses are considered to have a high base rate in the hospitalized population.

Common Diagnoses
Hemodynamic AKI from hypotension/volume depletion/hypercalcemia (also give credit for “pre-renal” AKI)
ATN/acute tubular injury

Scoring:

- All common diagnoses are considered. (+2)

- Some common diagnose are considered. (+1)
- No common diagnose are considered. (+0)

2d. Are "cannot miss" diagnoses considered? "Cannot miss" diagnoses are those that, while potentially less likely, lead to poor outcomes if not identified and intervened upon expediently.

Cannot Miss Diagnoses
Malignancy-related kidney disease (including any of the following: malignancy-related GN, TLS, lymphomatous infiltration, multiple myeloma)
Obstruction (mention of both upper and lower tract)
Acute glomerulonephritis

Scoring:

- All cannot miss diagnoses are considered. (+2)
- Some cannot miss diagnoses are considered. (+1)
- No cannot miss diagnose are considered. (+0)

2e. Are the clinical features from the problem representation (e.g., lower extremity edema, unilateral pleural effusion, hypercalcemia, etc.) clearly incorporated into the justification for the differential diagnosis? For example, if hypercalcemia is mentioned in the problem representation, it should clearly be part of the explanation for either a lead or alternate diagnosis. Or, if lower extremity edema is mentioned, there should be something on the differential diagnosis that incorporates it, such as nephrotic syndrome, heart failure, or lymphatic obstruction from malignancy.

Scoring:

- All clinical features mentioned in the problem representation are incorporated into the justification for the differential diagnosis. (+2)
- Some clinical features mentioned in the problem representation are incorporated into the justification for the differential diagnosis. (+1)
- None of the clinical features mentioned in the problem representation are incorporated into the justification for the differential diagnosis. (+0)

Score Threshold for Coaching: 59%

3. Diagnostic Plan with Justification

A list of recommended tests or procedures that aims to increase the certainty of the lead diagnosis(es) and exclude less likely diagnoses.

3a. Are further tests/procedures recommended?

Scoring:

- Yes (+1)
- No (+0)

3b. Are the diagnostic tests and/or procedures justified based on the differential diagnosis? Justification is defined by linking a test/procedure to a specific diagnosis and indicating its utility**.** See the table below for appropriate diagnostic studies for diagnoses that might appear on the differential with their justification. Note: if a diagnostic possibility is not mentioned in the differential diagnosis in the Differential Diagnosis with Justification section, then credit should not be given here. For example, if a renal ultrasound is suggested to "rule-out obstruction," then credit should only be given if obstruction is mentioned as part of the differential diagnosis in the Differential Diagnosis with Justification section.

Diagnosis	**Associated Diagnostic Studies**
Pre-Renal AKI	
• Hemodynamic AKI (hypotension/volume depletion related to hypercalcemia/anorexia, hypercalcemia-induced renal vasoconstriction)	• Urine electrolytes • Urine microscopy • PTH (initial test for hypercalcemia although signs of malignancy make non-PTH-mediated process more likely) • SPEP (with IF), free light chains, 1,25 vitamin D, PTHrp, bone scan/CT imaging (as initial vs. follow-up test for hypercalcemia if there is concern indicated for malignancy)
• Cardiorenal syndrome	• Echocardiogram
Glomerular etiology	
• Malignancy-related GN (e.g., paraprotein MPGN or light-chain deposition disease)	• Urine microscopy • Urine protein quantification (UPCR, UACR, 24-hour urine for protein/cr) • SPEP, free light chains • Imaging studies (CT) • Lymph node biopsy • Kidney biopsy (if an explanation cannot be arrived upon by the above tests or no clinical improvement with other management)
• Membranous nephropathy	• Urine microscopy • Urine protein quantification (UPCR, UACR, 24-hour urine for protein/cr) • Imaging studies (CT) • Lymph node biopsy • PLA2R (not a high-yield test given low suspicion for primary disease in this setting given other systemic findings, suggestive of a lymphoproliferative disorder)

	• Kidney biopsy (if an explanation cannot be arrived upon by the above tests) or no clinical improvement with other management)
• Minimal change disease (lymphoma, other malignancy)	• Urine protein quantification (UPCR, UACR, 24-hour urine for protein/cr) • Urine microscopy • Imaging studies (CT) • Lymph node biopsy • Kidney biopsy (if an explanation cannot be arrived upon by the above tests or no clinical improvement with other management)
• Infection-related GN	• Urine microscopy • Urine protein quantification (UPCR, UACR, 24-hour urine for protein/cr) • Lymph node biopsy • Serum complements • Blood cultures • Kidney biopsy (if an explanation cannot be arrived upon by the above tests or no clinical improvement with other management)
Tubulointerstitial etiology	
• Acute tubular injury/ATN	• Urine microscopy • Urine electrolytes • Treat underlying hypercalcemia to see if kidney function improves (if so, might be more suggestive of pre-renal etiology)
• Tumor Lysis Syndrome	• Urine microscopy for crystals • LDH • Serum phosphate • Serum uric acid • Imaging (CT)
• Interstitial nephritis (granulomatous from infection vs. sarcoidosis or acute viral infection like HIV vs. medication)	• Urine microscopy • HIV test • Appropriate evaluation for lymphoproliferative disorder (imaging, lymph node biopsy, free light chains, etc.) • Appropriate evaluation for hypercalcemia to exclude granulomatous process (if other etiology is not discovered) • Hold NSAID/PPI • Kidney biopsy (if an explanation cannot be arrived upon by the above

	tests or no clinical improvement with other management)
• Infiltrative disease	• Imaging by ultrasound or CT (if it is being used to investigate adenopathy) • Kidney biopsy (if an explanation cannot be arrived upon by the above tests or no clinical improvement with other management)
• Above-the-bladder obstruction related to lymphadenopathy; tumor; stones from TLS (crystal formation) or hypercalcemia	• Imaging by ultrasound or CT (if it is being used to investigate adenopathy)

Scoring:

- Most (> 50%) proposed/tests procedures are justified (+2)
- Some (< 50%) proposed tests/procedures are justified (+1)
- None of the proposed tests/procedures are justified (+0)

3c. Does the diagnostic plan propose tests to evaluate for common diagnoses? See below for a table of common diagnoses and associated diagnostic tests/procedures.

Common Diagnoses	**Diagnostic Tests/Procedures**
Hemodynamic AKI from hypotension/volume depletion/hypercalcemia (also give credit for "pre-renal" AKI)	Urine microscopy, and/or urine electrolytes; and/or PTH (evaluation for hypercalcemia); and/or SPEP or free light chains (evaluation for hypercalcemia); and/or trial of volume resuscitation with IV fluids
ATN/acute tubular injury	Urine microscopy and/or urine electrolytes

Scoring:

- The diagnostic plan proposes evaluation of all common diagnoses. (+2)
- The diagnostic plan proposes evaluation of some common diagnoses. (+1)
- The diagnostic plan proposes evaluation of no common diagnoses. (+0)

3d. Does the diagnostic plan propose certain tests/procedures to evaluate for "cannot miss diagnoses"? See the table for a "cannot miss diagnoses" and associated diagnostic tests/procedures

Cannot Miss Diagnoses	**Diagnostic Tests/Procedures**
Malignancy-related kidney disease (malignancy-related GN, TLS, lymphomatous infiltration, multiple myeloma)	Urine microscopy to assess for glomerular hematuria; and/or urine protein evaluation; and/or renal imaging (CT or ultrasound); and/or SPEP/immunofixation/free light chains
Above-the-bladder obstruction	Renal imaging (CT or ultrasound)
Acute glomerulonephritis	Urine microscopy to assess for glomerular hematuria; and/or urine protein evaluation; and/or kidney biopsy if other tests inconclusive

Scoring:

- The diagnostic plan proposes evaluation of all “cannot miss” diagnoses. (+2)
- The diagnostic plan proposes evaluation of some “cannot miss” diagnoses. (+1)
- The diagnostic plan proposes evaluation of no “cannot miss” diagnoses. (+0)

3e. Does the diagnostic plan consider factors such pre-test probability and test invasiveness? To score “yes” for this question, there must be a sequence to the proposed diagnostic procedures/tests that considers pre-test probability and/or test invasiveness. For example, are viral serologies and ANA ordered only after a urine protein quantification and microscopy have confirmed proteinuria and possible glomerular hematuria? Or, is a kidney biopsy only considered after less invasive tests are used or after more common diagnoses are excluded? A “yes” should be granted as long as a testing sequence (with rationale) is proposed for at least one test or procedure.

Scoring:

- Yes (+1)
- No (0)

Score Threshold for Coaching: 62%