Clinical Reasoning: Development of a Grading Rubric for Student Assessment
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Background and Purpose. Clinical reasoning is a complex but vital skill required for professional physical therapy practice. Experts agree that clinical reasoning is both difficult to define and challenging to assess. In order to facilitate the development of clinical reasoning skills in physical therapist (PT) students, educators need to be able to evaluate this process. The purpose of this paper is to describe the development and revision of a tool to assess PT student clinical reasoning skills across the curriculum.

Method/Model Description and Evaluation. A Clinical Reasoning Grading Rubric was created using the following multistep process: (1) Initial pilot research exploring the clinical reasoning process students used in a performance-based examination, (2) use of theoretical constructs from cognitive learning theory and learner skill acquisition, (3) content expert review, and (4) feedback from key stakeholder groups (clinicians, faculty, and students).

Outcomes. The rubric was developed to assess student clinical reasoning skills across the curriculum and evaluate student readiness for the clinical setting. The tool allows faculty and students a structure to identify and track the progression of student reasoning skill development.

Discussion and Conclusion. The Clinical Reasoning Grading Rubric is a tool that can be used to evaluate the clinical reasoning of students at multiple points in time across the curriculum. This instrument has applicability for assessment of clinical reasoning skill development from clinical to residency education. The rubric also provides insight into the teaching and learning environment and may be helpful in informing pedagogical strategies and curriculum change.

Key Words: Clinical reasoning, Student outcomes, Teaching methods, Teaching and learning.

BACKGROUND AND PURPOSE
If faculty members want to better understand student learning and the development of student reasoning abilities, avenues to gain insight into student thinking are needed. Sound teaching and learning strategies should be studied and shared to improve this educational process. In order to improve our ability as teachers, we must engage in inquiry into the process of teaching along with the evidence of student learning, the outcome of teaching. As described by Ernest Boyer, an inquiry driven approach consistent with the scholarship of teaching may best help us understand critical issues in the assessment of student learning.

Scholarship of teaching and learning projects allow educators to evaluate teaching strategies by using assessment of student learning as a primary source of evidence. To understand the development of a complex ability such as clinical reasoning, one must investigate the evidence of student learning, as well as the teaching strategies linked to it. Shulman describes it well, saying: To prompt learning, you’ve got to begin with the processes—the inside from the outside. The first influence on new learning is not what teachers do pedagogically but the learning that’s already inside the learner.

Clinical reasoning is a multifactorial and complex phenomenon. Research in the health professions identifies clinical reasoning used in clinical practice as a collaborative and reflective process that involves content-specific knowledge, engagement of the patient and family in understanding the clinical problem, and incorporation of critical contextual factors. All of these factors lead to deliberative decision making and sound clinical judgment. As defined by Christensen et al, clinical reasoning is the thinking and decision making process used for examination and patient management. The American Physical Therapy Association (APTA) recognizes the importance of clinical reasoning as a required practice skill. The Commission on Accreditation of Physical Therapy Education (CAPTE) requires that all physical therapist (PT) education programs develop and assess clinical reasoning skills as a professional practice expectation. Students must be able to utilize clinical reasoning to enhance patient care and minimize errors in practice.

A nonnegotiable component or foundation for the development of clinical reasoning is the students’ ability to engage in self-monitoring and critical self-reflection. The ability
to monitor self, stop the action, bring different frames of perspective to the situation, see the context of the problem, and grapple with the uncertainty of the situation are skills that depend on self-monitoring and critical self-reflection.11,12 Learners are engaged in a life-long process of honing their skills to be attentive, mindful, and nonjudgmental. These skills go well beyond the traditional notions of analytical thinking and looking for the right answer or definitive piece of evidence that are far too often seen as the most important aspects of critical thinking.1,11,13

Due to the multidimensional nature of clinical reasoning, assessment of this skill is challenging for educators and clinical instructors. There are few standardized tools available to evaluate student clinical reasoning abilities in physical therapy. Most of the existing assessment tools were developed for use in other health care professions and assess critical thinking rather than clinical reasoning.14 Some of these tools include the Health Science Reasoning Test and the California Critical Thinking Skills Test.15 While critical thinking is an important skill for all students, we argue here that clinical reasoning is a more robust concept, as it not only focuses on the mental processes, but also includes the connections between these processes and the behaviors that are shared between the patient, practitioner, and the environment.16

The following tools and teaching strategies have been used with some success to assess clinical reasoning: the script concordance test, concept mapping, thinking aloud, quantitative standardized tests, reflection, interviews, and focus groups.16-21 Student self-assessment has also been used in occupational therapy to evaluate reasoning skills.22 None of these approaches specifically address the progression of clinical reasoning skill development in PT students.

The existing assessments typically address student outcomes, such as student safety and performance of specific test and measures or interventions, but do not provide insight or understanding into the learner’s process of clinical reasoning. For example, the student may have performed the appropriate test or measure; however, the assessment rubric didn’t require the student to justify why a specific test was chosen. Without insight into the learner’s reasoning process, faculty have little understanding of misconceptions the student may hold.11,16,23 In a recent qualitative study exploring the development of student clinical reasoning skills across the curriculum, investigators found that for these students in a Doctor of Physical Therapy (DPT) curriculum, the ability to reflect increased in depth and insight over time.21 Investigators also realized that the use of a current assessment tool did not adequately capture the students’ clinical reasoning process. That tool used a checklist approach to indicate satisfactory performance on the following criteria: demonstrate appropriate performance of tests and measures, interventions, safety, and overall format and flow, and thus was unable to encapsulate the variables that constitute reasoning. To address this need, a model rubric was developed that centered on these core components: learner use and application of types of knowledge (content and conceptual) and selection and application of skills.24 The faculty recognized the need for continual inquiry into the dynamic development and refinement of the rubric across multiple points throughout the curriculum, as students progress and learn in the didactic and clinical setting. Therefore, the purpose of this paper was to describe the development and revision of a tool to assess the clinical reasoning skills of PT students across time in the curriculum.

**METHOD/MODEL DESCRIPTION AND EVALUATION**

**Development of the Clinical Reasoning Grading Rubric**

The curricular need to develop a tool that can effectively assess student clinical reasoning skills emerged from a study that explored the development of student clinical reasoning abilities across the curriculum.21Investigators used qualitative methods (pre and postquestionnaire, utilizing open-ended questions) associated with the academic institution’s Clinical Competence Performance Examination to gain insight into student thinking and reasoning skills. The Clinical Competence Performance Examination is a practice-based case simulation in which faculty serve in dual roles as patient and evaluator to confirm student safety and competence in patient management prior to participating in a clinical experience. Results identified the inadequacy of the existing checklist in evaluating clinical reasoning skills.21

The initial Clinical Reasoning Grading Rubric (Appendix A) was based on 3 dimensions of student learning as it relates to the development of clinical reasoning skills: (1) the structure and application of knowledge (factual, conceptual, and procedural);25 (2) development of skill acquisition based on the principles of the Dreyfus model,26,27 and (3) explicit, consensus-based descriptions of clinical reasoning from experts to set the scale from beginner through proficient.4,28,30

**Theoretical Constructs of Clinical Reasoning Grading Rubric**

Clinical reasoning is the learner’s integration of knowledge, thinking, and skill application. The overemphasis on content knowledge and an assessment process and reward structure that focuses on the right answer remains a challenge in educational systems.13 We spend little time finding out where learner’s struggle, where they may hold misconceptions about the situation, or exploring multiple creative approaches to a comparable end point or solution. Krathwohl developed a revision of Bloom’s taxonomy that expanded our understanding of knowledge dimensions beyond factual or content knowledge.25 He proposed a broader and more comprehensive approach to viewing the concept of knowledge to include conceptual knowledge (the larger structure of knowledge, including the concepts that function together), procedural knowledge (how to apply knowledge and perform things), and metacognitive knowledge (awareness of one’s own cognitive, essential to critical self-reflection).25,31 While most educators are familiar with the use of Bloom’s taxonomy for classification of objectives, the revisions to the taxonomy place emphasis on the understanding and use of knowledge (factual, conceptual, procedural, and metacognitive).25 These knowledge dimensions provided a structure to help educators understand student use and application of knowledge.31

The theoretical dimensions of skill acquisition as a developmental process is well understood across professions from fighter pilots to chess players, physicians, and nurses.22,23,30,32 The Dreyfus model of skill acquisition continues to be used as a framework for the benchmarks and developmental progression of the skill (beginner to proficient).30,32,33 Benner’s application of this model to clinical reasoning was used in nursing, where she described the phases through which a learner progresses when moving from novice to expert.26,27,34 During the first phase, the learner shifts from using absolute rules to incorporating past experiences to help guide decision making. The learner then is able to “see the big picture” or context of the situation in the second phase. Finally, the learner becomes an integral part of the situation and no longer views his or herself as an isolated component outside of the experience.34 These concepts were used to define and provide descriptors of the levels (beginner to proficient) across the categories. Additionally, the principles of the Dreyfus model of skill acquisition use similar terminology to that of the Clinical Performance Instrument, which is familiar to PT education faculty and clinical instructors.

**Initial Validation Process**

The initial validation process for the grading
rubric sought feedback from 4 key stakeholder groups based on a sample of convenience: interprofessional educators, PT clinical educators, PT education faculty, and content experts in clinical reasoning (Table 1). A focus group was held with educators selected from the Office of Interprofessional Scholarship, Service, and Education at Creighton University. These participants had an interest in clinical reasoning and were willing to provide feedback across the professions of physical therapy, occupational therapy, and pharmacy (n = 5) to review the proposed categories (factual, procedural, and conceptual) in the grading rubric. Forty-eight members of a clinical education consortium were surveyed to respond to questions addressing instrument salience, clarity, length, redundancy, and ease of use. The survey included the following questions: (1) What parts of this grading rubric worked well? (2) What parts of this grading rubric were difficult to use? (3) Suggestions for improvements, and (4) Are 3 categories and 5 anchors too many/too much? PT education faculty feedback was collected immediately following the use of the rubric during the Clinical Competence Performance Examination at the end of semester 5 (out of 8 semesters) during the spring of 2011 based on a sample of convenience of faculty involved in this process. Ten PT education faculty members (6 females, 4 males, equal mix of clinical and research doctoral degrees, range of academic experience 5–25 years) provided feedback about the usefulness of the Clinical Reasoning Grading Rubric after using it for student assessment during the Clinical Competence Performance Examination. Finally, a survey was sent to content experts known for their research in clinical reasoning to begin to establish content validity. Content experts (n = 6) were identified from a national clinical reasoning special interest group and were internationally recognized by faculty as experts in research on clinical reasoning in physical therapy (Table 2). The Clinical Reasoning Survey Tool (Appendix B), an online survey with closed and open-ended questions, was developed by the investigators. The survey addressed these specific content areas of the tool: (1) the conceptual and theoretical soundness of the categories in reflecting components of clinical reasoning, (2) accuracy of the category description, and (3) format of the grading rubric.

OUTCOMES

Results of Data Collection Tools

Focus group. The interprofessional educator focus group members indicated the 3 categories of clinical reasoning (factual knowledge, conceptual knowledge, and procedural knowledge and skill) were strengths of the tool and could apply to each of the 3 professions. Group members agreed that these categories would be helpful in identifying the specific components of clinical reasoning. However, a clearer definition of each of these categories would be beneficial to better understand the differences between procedural and conceptual knowledge.

Clinical education consortium. The revised Clinical Reasoning Grading Rubric (Figure 1) was then presented to the consortium members. These participants reported it was feasible to score a student on these 3 categories of clinical reasoning, as well as the 5 anchors (beginner to competent) in the clinical setting. They found the visual analog scale to be a positive addition, as one could document

<table>
<thead>
<tr>
<th>Date</th>
<th>Action</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2010</td>
<td>Initial grading rubric developed.</td>
<td>Result of initial qualitative study exploring development of clinical reasoning skills in physical therapy students across time.</td>
</tr>
<tr>
<td>October 2010</td>
<td>Focus group. Grading rubric revised.</td>
<td>Investigators revised rubric based on feedback from a focus group of interprofessional educators (n = 5).</td>
</tr>
<tr>
<td>November 2010–March 2011</td>
<td>Clinical Education Consortium. Grading rubric revised.</td>
<td>Revisions based on feedback from Clinical Education Consortium (n = 48) and further review by investigators.</td>
</tr>
<tr>
<td>April 2011</td>
<td>Faculty feedback. Grading rubric revised.</td>
<td>Grading rubric used for CCPE. Revisions based on feedback from faculty.</td>
</tr>
<tr>
<td>July 2011</td>
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<tr>
<td>November 2011</td>
<td></td>
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</tr>
<tr>
<td>January 2012</td>
<td>Received internal grant and initiated study.</td>
<td>Purpose of the grant was to further explore, revise, and establish content validity of the grading rubric.</td>
</tr>
<tr>
<td>March 2012</td>
<td>Survey sent to content experts. Grading rubric revised.</td>
<td>Revisions based on feedback from content experts (n = 6).</td>
</tr>
<tr>
<td>April 2013</td>
<td>Final grading rubric.</td>
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**Table 1. Process of Clinical Reasoning Grading Rubric Development**

<table>
<thead>
<tr>
<th>Highest Degree Earned</th>
<th>20%: MS 80%: PhD</th>
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<tbody>
<tr>
<td>Years of Experience</td>
<td>60%: 20-24 years 40%: 30+ years</td>
</tr>
<tr>
<td>Primary Employment Setting</td>
<td>100%: University</td>
</tr>
<tr>
<td>Primary Geographic Location</td>
<td>60%: United States 40%: Australia</td>
</tr>
</tbody>
</table>
progression over a short period of time, such as a short clinical experience. Suggestions for improvement included (1) expanding and clarifying the operational definitions of each category, as well as the descriptions of the key indicators under each anchor, (2) articulating the differences between the categories of factual and conceptual knowledge to enhance clarity for tool administration and scoring, and (3) condensing the tool to 1 or 2 pages to make it more efficient for use in the clinical setting.

**Faculty feedback.** Following the initial use of the Clinical Reasoning Grading Rubric for the end of semester Clinical Competence Performance Examination during the didactic curriculum at Creighton University, 10 faculty provided feedback and suggestions for revisions to the rubric. Faculty recommended adding a "comments" section where the faculty evaluator could document specific notes related to each category to provide the student with concrete examples of performance and an additional performance indicator under the conceptual knowledge and reasoning category. This new indicator would allow the evaluator to determine student ability to modify or adapt a test or measure, as this demonstrates an ability to be dynamic in the interaction. Faculty emphasized how this tool helped them identify where the student was either excelling or struggling during this examination, which in turn made it explicit to the student what components of the reasoning process needed improvement.

**Content experts.** All of the content experts indicated that all 3 categories (factual, conceptual, and procedural) should be included in the grading rubric, as they were critical components of clinical reasoning (Figure 2). Experts suggested that each of the categories needed to be more clearly defined and the sample questions or performance indicators, specifically in the conceptual and factual category, needed more clarity.

Content experts recommended expanding the conceptual reasoning category to place a greater emphasis on reasoning (instead of knowledge alone) to better align terminology of conceptual knowledge to case context. They also suggested a revision of the operational definitions of each category and to improve the descriptions across the levels (beginner to proficient).

The following 3 concepts emerged from the open-ended questions on the survey. First, content experts suggested that the importance of function and the International Classification of Functioning, Disability, and Health (ICF) framework should be incorporated into the Clinical Reasoning Grading Rubric. Respondents stated, "Consider the patient's activity, participation limitations, and psychosocial factors," and "How does the pathology impact the patient's function?" Experts indicated that reflection was a key component of clinical reasoning and should be explicit in the Clinical Reasoning Grading Rubric. For example, 1 respondent explained, "I might want an additional category aimed at reflection." Another stated, "It is important to assess one's own thought process." The last concept was theoretical foundation. Respondents commented on theoretical underpinnings of the Clinical Reasoning Grading Rubric, explaining, "The strong theoretical foundations upon which this rubric is built are a strength."

**Revisions to the Clinical Reasoning Grading Rubric**

The 4 key stakeholder groups provided essential feedback on the Clinical Reasoning Grading Rubric that addressed the process and implementation of the tool, as well as the theoretical and conceptual design. Figure 3 represents a flow diagram of the major revisions that were made to the Clinical Reasoning Grading Rubric based on stakeholder recommendations. The interprofessional educator focus group reviewed the initial categories proposed by the investigators and concluded that they were strong...
indicators of clinical reasoning. The clinical education consortium feedback led to modifications to the criteria in the categories of factual knowledge, conceptual knowledge, and reasoning to better distinguish the differences between these categories. The addition of the visual analog scale allows faculty to explicitly identify variation among students within each category, as well as progression of individual students across time. The tool was condensed to 1 page, front and back, for ease of use. Faculty expert recommendations resulted in the addition of a “comments” section under each category to allow faculty to document specific performance examples to improve student learning. A performance indicator (“appropriately select, modify, or adapt test/measure or intervention based upon patient case”) was added to the conceptual knowledge and reasoning category to accurately reflect the dynamic patient-therapist relationship. Content expert survey data helped formulate the following changes to the Clinical Reasoning Grading Rubric: (1) renaming the factual knowledge category and changing this to content knowledge to better reflect the dynamic and contextual nature of clinical reasoning, (2) adding the ICF framework to the content knowledge category to clearly identify a theoretical component to the rubric and emphasize function as well as context, (3) revising the conceptual knowledge and reasoning category to highlight the reasoning component, (4) incorporating psychomotor skill into the procedural knowledge category, (5) adding an emphasis on reflection as an integral component to clinical reasoning to the conceptual reasoning category, and (6) changing many of the anchor descriptions (beginner to proficient) to accurately reflect components of the category. The final version of the Clinical Reasoning Grading Rubric is shown in Appendix C.

**DISCUSSION AND CONCLUSION**

An important outcome of this study was the creation and revision of the Clinical Reasoning Grading Rubric to assess the clinical reasoning skills of PT students and evaluate their readiness to enter the clinical setting. The instrument is currently embedded in the Clinical Competence Performance Examination sequence at Creighton University beginning in semester 4 and continuing throughout semester 6 (out of 8). Students are on long-term clinical experiences during semesters 7 and 8, therefore the rubric isn’t used in these semesters. The creation of this rubric allows students to explicitly view the developmental progression (beginner to proficient) in their own reasoning process over time, as this tool was administered at the end of most se-
Figure 3. Revisions to Clinical Reasoning Grading Rubric

Clinical Education Consortium Feedback

Conceptual Knowledge — Interrelationships among basic elements — pieces fit together

Conceptual Reasoning — entails the interrelationships and synthesis of information which judgment is made utilizing reflection of self awareness

***Addition of Visual Analog Scale

Faculty Feedback

Conceptual Reasoning – Sample behaviors:
1. Interprets exam findings appropriately
2. Applies and interprets information to justify tests and measures

Applies and interprets information to justify tests and measures

Appropriately justifies, modifies or adapts tests and measures based on patient case.
1. Interprets exam findings appropriately
2. Applies and interprets information to justify tests and measures

***Addition of comments section in each category

Content Expert Feedback

Factual Knowledge

Conceptual Reasoning

Content Knowledge

Procedural Knowledge & Psychomotor Skill

Incorporation of more reflection

***Addition of ICF model into Content Knowledge category

mesters. This emphasis on looking at self is essential as they develop the ability to self-monitor and engage in critical self-reflection. We must remember that the interdependence between teaching and student learning is real and shares joint responsibility. As educators, we too must engage in a self-monitoring process and assess how to better understand the student’s development of clinical reasoning abilities. Through our faculty reflection and discussion, we found that the tool affords faculty the ability to identify specific areas of student weakness and offer guidance that is targeted at a student’s individual level. We are also using this tool in residency education (pediatric, neurologic, orthopedic, and geriatric programs) during resident midterm and final performance assessments. The modified rubric will be expanded to other points throughout the didactic curriculum, as well as on experiential opportunities and in the clinical setting.

Limitations and Future Research

While the authors attempted to capture many aspects of clinical reasoning, the complexity and dynamic context of clinical practice makes it challenging to encompass and identify components of the different types of reasoning (deductive, ethical, etc). Because reflection is critical to clinical reasoning, students are asked to verbally reflect when using this tool versus using a written method. One of the recommendations from the content experts was to enhance the component of reflection embedded into the rubric. It is essential for the learner to develop the ability to engage in a metacognitive or reflective process that demonstrates self-awareness and self-regulation, leading to the ability to think deeply about context and engage in reflection-in-action. We argue here that the critical self-reflective process is part of all dimensions of the rubric and perhaps the most vital concept for the teaching, learning, and assessment of clinical reasoning. Specifically, reflection is addressed in the conceptual reasoning category of the rubric, as it is part of the definition, and is incorporated into the following questions to ask the learner: “What would you do differently if you were able to do this examination again?” Reflection is identified as a performance criteria of being “proficient,” where the learner demonstrates “reflection-in-action.” There is a continued need for work and dialogue around the importance and integration of reflection in the profession.
REFERENCES
### Grading Rubrics for Clinical Reasoning (Dreyfus Model)\(^{26,27}\)

#### 1) Novice: Rule-driven, analytical reasoning, difficulty with synthesis and inability to conceptualize the “big picture.”

<table>
<thead>
<tr>
<th></th>
<th>Novice (rule-driven, use absolute rules)</th>
<th>Advanced Beginner</th>
<th>Competent</th>
<th>Proficient</th>
<th>Expert</th>
</tr>
</thead>
</table>
| **Factual knowledge:** The basic elements students must know in physical therapy | Applies rules without considering emerging data  
Applies the knowledge without transforming (pattern recognition) or synthesizing information  
For example, a student screens just above and below, as well as spine, regardless of injury type, 2 days postankle sprain | Applies context  
Analytical reasoning and pattern recognition  
Applies knowledge with emerging physical therapy data | Sees the big picture  
More pattern recognition  
Asks specific questions  
Performs specific tests/measures  
Complex problems require analytical reasoning | Comfortable with ambiguous situations  
Relies on pattern recognition | Intuitive problem recognition  
Recognizes when symptoms don’t fit pattern (ankle sprain versus fracture) |
| **Conceptual knowledge:** Interrelationships among basic elements—How do the pieces of the puzzle fit together? | Understands how the facts link together  
Compartmentalized in thinking  
Unable to process conflicting tests and measures (ie, +talar, MMT = 5, ROM = WNL) | Uses physical therapy history to direct tests and measures (pattern recognition)  
Uses history to clear joints above and below  
Listens to patient response  
Beginning to use pattern recognition  
Systematic in patient exam | Begins to incorporate cultural/patient factors into exam/interventions  
Begins to address health promotion and wellness/recreational activities to decrease risk of chronic injury  
Applies ICF model | Uses broader conceptual frameworks  
Able to incorporate complex factors in addressing patient needs | Creative in interventions |
| **Procedural knowledge:** How you perform something (skill) | Checklist: test and measures  
Textbook procedure “Awkward”  
Unsure of their results | More fluid in patient handling  
More systematic in performance  
Begins to modify/adapt intervention to patient response  
Uses rules with differentiation of information  
Begins to apply appropriate information from patient case  
Students don’t always apply rules strictly (ie, student doesn’t screen spine with 2-day postankle sprain) | Anticipates basic patient response (pain, unwillingness to move)  
Can critically self-reflect on reasoning process ability (ie, handling skills)  
Moral self-awareness  
Thinking about patient | Anticipates all patient responses  
Takes past experience to change treatment and evaluation  
Based on metacognitive process  
Understands the meaning of physical therapy values (part of pattern recognition)  
Innovative  
Sees patient and the other systems/factors | Tacit Advanced observation/palpation |
| **Metacognitive knowledge:** Reflection, critique, “thinking behind the action”  
Different dimension | Reflects about self in a contained way  
Shallow (“I did the wrong technique”)  
Self-centered  
Thinking about performance (technical skills) | Beginning to move away from self to include physical therapy  
Beyond just the technique (“something else is going on here”)  
Beginning to recognize patterns, but not sure what to do with it or what to ask  
Attentive to patient needs but not sure how to respond | Can critically self-reflect on reasoning process ability (ie, handling skills)  
Moral self-awareness  
Thinking about patient | Takes past experience to change treatment and evaluation  
Based on metacognitive process  
Understands the meaning of physical therapy values (part of pattern recognition)  
Innovative  
Sees patient and the other systems/factors | Metacognitive process is unconscious  
Tacit Intuitive responses on management  
Knows when they don’t know and can change strategies midstream if they don’t understand (revert to backward reasoning) |
Appendix B. Clinical Reasoning Survey Tool

Thank you for your participation in the Clinical Reasoning study. Based on your review of the Clinical Reasoning tool, please complete the following survey.

The following questions were asked of each of the 3 categories listed below:

- **Factual knowledge**: The basic elements the students in physical therapy must know.
- **Conceptual knowledge and reasoning**: Interrelationships among basic elements.
- **Procedural knowledge/psychomotor skill**: Ability to determine appropriate test/measure/intervention and psychomotor performance of an intervention/skill.

1. This category should be included in the grading rubric. Y / N
   - This category is clearly defined. Y / N
   - The sample questions are appropriate for this category. Y / N
   - The sample questions are clearly worded. Y / N
   - The description for “Beginner” level is appropriate. Y / N
   - The description for “Beginner” level is clearly worded. Y / N
   - The description for “Intermediate” level is appropriate. Y / N
   - The description for “Intermediate” level is clearly worded. Y / N
   - The description for “Competent” level is appropriate. Y / N
   - The description for “Competent” level is clearly worded. Y / N
   - The description for “Proficient” level is appropriate. Y / N
   - The description for “Proficient” level is clearly worded. Y / N

2. What are your suggestions for question or description changes for the category?
   - ________________________________________________________________
   - ________________________________________________________________
   - ________________________________________________________________

Please respond to the following regarding the grading rubric overall:

3. The layout of the grading rubric is easy to read and understand.
   - Strongly agree
   - Agree
   - Slightly agree
   - Neither agree nor disagree
   - Slightly disagree
   - Disagree
   - Strongly disagree

4. What are your suggestions for the overall layout of the grading rubric?
   - ________________________________________________________________
   - ________________________________________________________________
   - ________________________________________________________________
5. Given the potential for this instrument to be used beyond entry-level assessment (eg, residencies and advanced mentoring), please share any thoughts you have about further development and refinement of the “Proficient” category:

______________________________________________________________
______________________________________________________________
______________________________________________________________

6. In the context of assessing clinical reasoning in entry-level physical therapist students, are there other components of the reasoning process we should consider?

______________________________________________________________
______________________________________________________________
______________________________________________________________

7. Please let us know if you have any other comments.

______________________________________________________________
______________________________________________________________
______________________________________________________________

Demographics:

How many years of experience do you have as a physical therapist:
☐ 0–4 years
☐ 5–9 years
☐ 10–14 years
☐ 15–19 years
☐ 20–24 years
☐ 25–29 years
☐ 30+ years

What is your highest degree earned?
☐ MS
☐ PhD
☐ DPT
☐ DSc
☐ Other ________________

What is your primary employment setting?
☐ University
☐ Clinical setting
☐ Other ________________

What is your primary geographic location?
☐ United States
☐ Australia
☐ Other ________________

Thank you for your feedback!
### Appendix C. Final Clinical Reasoning Grading Rubric

**Creighton University**  
**Clinical Competence Performance Examination**  
**Clinical Reasoning Grading Rubric**

Student Name: ____________________________________________

| Content Knowledge: Identifies appropriate foundational knowledge and information related to the International Classification of Functioning, Disability, and Health (ICF) Framework. Content knowledge is the knowledge the student brings to the case, not the knowledge the patient brings/shares. In addition, this is just the identification of the facts and NOT the interpretation of this information. Sample behaviors to assess:  
1) Identifies appropriate foundational knowledge integral to the patient’s health condition, including biological and physical (anatomy, histology, physiology, kinesiology, and neuroscience).  
2) Determines relevant ICF components as they relate to the patient case (identifies patient’s health condition, body structure and function limitations, activity limitations, participation restrictions, and personal and environmental factors). |
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<thead>
<tr>
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<tbody>
<tr>
<td><strong>Beginner</strong></td>
<td><strong>Intermediate</strong></td>
<td><strong>Competent</strong></td>
<td><strong>Proficient</strong></td>
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<tr>
<td>Comments:</td>
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| Procedural Knowledge/Psychomotor Skill: Ability to determine appropriate test/measure/intervention and psychomotor performance of an intervention/test/skill (when to perform skill, What skills to perform, and how to perform skill). Sample behaviors to assess:  
1) Determines appropriate test/measure/intervention to perform.  
2) Demonstrates the ability to safely and effectively perform test/measure/intervention (hand placement, patient positioning, palpation, force production, safety, use of equipment).  
3) Incorporates effective communication strategies, including verbal and nonverbal skills. (Can the student ask the patient the right questions?) |
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</thead>
<tbody>
<tr>
<td><strong>Beginner</strong></td>
<td><strong>Intermediate</strong></td>
<td><strong>Competent</strong></td>
<td><strong>Proficient</strong></td>
</tr>
<tr>
<td>Limited accuracy in performing test/measures/interventions, but can SAFELY perform these.</td>
<td>Moderate accuracy in performing test/measures/interventions, and can SAFELY perform these.</td>
<td>Strong accuracy in performing intervention/test efficiently and effectively utilizing appropriate knowledge base, verbal and manual cues, and use of equipment to allow the patient to complete test or fully participate in intervention.</td>
<td>Efficiently performs tests and interventions with skill and ease and able to build patient rapport during the exam and intervention.</td>
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<td>Comments:</td>
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Conceptual Reasoning (cognitive and metacognitive skills: data analysis and self-awareness/reflection): The interrelationship and synthesis of information upon which judgment is made utilizing reflection and self-awareness (making sense out of all of the information).

Sample behaviors to assess and questions to ask:

1. Appropriately justifies, modifies, or adapts test/measure or intervention based upon patient case.
2. Interprets exam findings appropriately, including interpreting information from the patient (communication).
3. Applies and interprets patient information across all aspects of the ICF model to justify test/measure or intervention.
4. Active listening.
5. What additional information do you need to make decisions/judgments?
6. What would you do differently if you were able to do this examination again?

VISUAL ANALOG SCALE (please mark)

Beginner | Intermediate | Competent | Proficient
---|---|---|---
Justifies choice for a few tests and measures/interventions. | Justifies choice for most tests and measures/intervention. | Justifies choice for all tests and measure/intervention. | Generates a hypothesis, understands patient perspective, and reasoning is a fluid, efficient, seamless process (demonstrates “reflection in action”).
Able to identify some patient problems. | Identifies relevant patient problems. | Prioritizes problem list and incorporates patient goals into plan of care. |
Interprets results of selected tests/measures. | Generates a working hypothesis and begins to prioritize a patient problem list. | Confirm/disprove working hypothesis and determines alternate hypothesis. | Synthesizes relevant patient data.

Comments:

Student must meet or exceed identified level (intermediate, competent, proficient) for satisfactory completion in the following areas (please check):

Content knowledge: _____Satisfactory _____Unsatisfactory
Procedural knowledge/psychomotor skill: _____Satisfactory _____Unsatisfactory
Conceptual reasoning: _____Satisfactory _____Unsatisfactory

General comments:

Evaluator: ___________________________ Date: ___________________________