

Content Specificity of Clinical Reasoning (CR) in a Summative Internal Medicine Clerkship Structured Oral Examination (SCO)

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Background

“Current “dual process” theories of clinical reasoning suggest that two distinct psychological processes are at work when doctors reach a diagnosis. System 1 is a rapid, unconscious, intuitive, and primarily pattern recognition process involving retrieval of previous specific experiences from long-term memory. System 2, by contrast, is slow, conscious, effortful, logical, systematic, and based on explicit rules such as those that govern clinical diagnosis.” Norman et al Acad Med 2014

Assessment of clinical reasoning (CR) by clinical clerks has not been widely reported and detailed knowledge of student ability during high stakes summative examinations at the clerkship level is not well understood. Even less is known about the use of different systems of CR by junior learners and whether they display content specificity. Clerkship is a particularly interesting time to examine processes of CR as, in a Canadian context, it is the first time that students take on increased responsibility for clinical care.

The University of Toronto Internal Medicine Structured Clinical Oral (SCO) Examination was developed, in part, to examine proficiency in clinical reasoning (CR) skills.

In the eight 9-minute station examination, three stations require students to interact one-on-one with examiners (Figure 1) in structured case discussions that test CR skills around the diagnosis and/or management of a patient. Several structured questions in each SCO CR station (Figure 2) could be categorized as System 1 or System 2 tasks (Figure 3) after Croskerry Acad Med 2009. One of four global ratings in each CR station assessed integration and problem solving.

We previously determined clerk performance in a variety of measures of CR (Table 1). We were subsequently interested in analyzing student performance in System 1 and System 2 clinical reasoning tasks; did student performance correlate overall in these tasks and was there content specificity in task performance ability?

Figure 1.

Examiner one-on-one with a student in a Clinical Reasoning Clerkship Structured Clinical Oral Station



Figure 2. Sample Stem for a Clinical Reasoning (CR) Station

A 66-year-old man presents to the Emergency Department with generalized malaise after having had severe watery diarrhea for 5 days during the past week. The diarrhea resolved completely 2 days ago but his malaise persists with some postural lightheadedness. The patient was entirely well before the onset of the diarrhea. The patient's only past medical history was that of well treated hypertension for the past 20 years with Ramipril 10mg po od.

The emergency physician has obtained the following basic bloodwork: CBC: Hb 165, WBC 8.2, Platelets 250; Serum Lytes: Na 146, K 4.3, Cl 111, HCO₃ 24, Creatinine 320; Glucose: 6.6.

The CBC, electrolytes and creatinine were all known to be normal 1 month ago during a visit to the family MD. You see the patient after the Emergency Department physician refers him to the Internal Medicine service for the evaluation of the elevated creatinine.

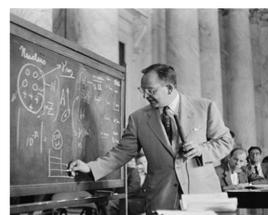
Please anticipate being asked about history, physical exam findings, and investigations needed to reach a diagnosis.

Figure 3. Sample Clinical Reasoning (CR) Questions

System 1 (Intuitive):
“What is the most likely diagnosis?”
Acute kidney injury due to volume contraction secondary to diarrhea



System 2 (Analytical):
“What is the differential diagnosis?”
Glomerulonephritis, Acute interstitial nephritis, Acute tubular necrosis



Global:
G3. Integration & Analysis of Data (Problem Solving)

Methods

During two separate Internal Medicine 8-week clinical clerkship rotations, student performance (n=85) was computed for System 1 and System 2 CR components of the SCO. Other measures of CR (global rating, overall station) and overall examination performances were also calculated. Performance on other assessment components of the IM clerkship were determined (Table 1). Pearson correlation coefficients between students' performance in these CR components were determined (Table 2). To establish possible congruence of CR ability within specific content being tested, correlation between students' System 1 and System 2 performance was also calculated for that subset of stations within which both types of questions existed.

Results

Table 1. Mean Marks Achieved in Assessment Components of the Internal Medicine Clerkship

Assessment Component (N = 85 students)	Mean Mark %	SD
Structured Clinical Oral Examination: 3 x CR Stations	78.6%	5.7%
System 1 (Intuitive) Tasks	85.8%	9.9%
System 2 (Analytical) Tasks	84.5%	10.2%
Global rating of CR	75.4%	12.2%
Written Examination	74.8%	8.4%
Overall Rotation Assessment	78.9%	4.0%

Table 2. Correlations between Clinical Reasoning Performance and Achievement on Other Assessment Components

	Clinical Reasoning SCO	System 1 Reasoning	System 2 Reasoning	Clinical Reasoning Globals
Final Mark		.406	.140	.492
Ward Mark	.189	.232	-.073	.263
Written Examination Mark	.491	.385	.182	.428
Ambulatory Clinic Mark	.241	.209	.072	.199

Table 3. Correlations between System 1 and System 2 Performance in Specific Contexts

Context	Correlation Coefficient
Hematology/Deep Vein Thrombosis	r = .038
Cardiology/Acute Coronary Syndrome	r = .304*
Gastroenterology/Melena	r = .043
Infectious Diseases/Fever	r = .415**
Hematology/Microcytic Anemia	r = .056

* p = 0.05
** p = 0.01

Mean % achievement on System 1 (Intuitive) (85.8%) and System 2 (Analytical) (84.5%) clinical reasoning questions was higher than mean overall performance (78.6%) on these stations. Global clinical reasoning ratings (75.4%) was lower.

System 1 intuitive clinical reasoning appeared to correlate strongly with overall clerkship marks and written examination performance. System 2 analytical clinical reasoning correlated poorly with other assessment components.

Content and context specificity appears to be extremely important in determining whether students have similar or dissimilar performance in System 1 and 2 reasoning. For more common topics like Fever (specifically urinary tract infection) and Acute Coronary Syndrome student performance was well correlated; while in more difficult topics the correlations were poor.

Conclusions

Clinical clerks in Internal Medicine perform well on individualized System 1 (Intuitive) and System 2 (Analytical) tasks during case based discussion in a high stakes summative clinical examination.

However, their performance in these different types of reasoning is content specific. System 1 and System 2 CR performance is more congruent in easier, more common topics. In more difficult, less common, and more complex topics the performance is poorly correlated.

References:
Norman G et al. The etiology of diagnostic errors: A controlled trial of system1 versus system 2 reasoning. Acad Med 2014; 89:277-84.
Croskerry P. A universal model of diagnostic reasoning. Acad Med 2009; 84: 1022-8.