

The Use of Station Time Allotments by Fourth Year Medical Students in a Standardized Patient-Based Clinical Skills Examination

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Introduction: We performed this study to assess medical student use of station time allotments in a standardized patient-based clinical skills assessment.

Methods: Videotapes of student-SP encounters were reviewed. Total encounter time, and time spend in the physical examination, were recorded in seconds. The mean time use for each station was calculated. Cases were categorized by patient age, case content and acuity. Times were compared across cases.

Results: On average, students spent most time in encounters requiring complex interviewing strategies or physical examination maneuvers. Students also spent more time on cases that involved content familiar to them from multiple clerkship disciplines.

Discussion: Many factors are believed to influence the use of station time allotments in SP-based clinical skills assessment. Our findings have provided information helpful for case refinement, and may assist others when planning multi-station examinations.

According to the 2003-2004 Liaison Committee on Medical Education survey, approximately 75% of US medical schools include a standardized patient-based clinical skills assessment in the latter part of clinical training.¹ These examinations, developed at the individual institutions, are varied in purpose, design and content. Preparation and administration of standardized patient-based examinations is complex and requires an institutional commitment of staff time and financial resources^{2,3}

Our medical school curriculum has included a year-IV standardized patient-based clinical skills assessment for over fifteen years. This examination, the Integrated Curriculum Evaluation Exercise (ICEE), draws case material from core clerkship disciplines. The scenarios are problem focused and are designed to assess student skills in the medical interview, physical examination, and patient counseling. Given the focus and objectives of the cases, we selected a time allotment of fifteen minutes for each station. However, while monitoring the examination we observed that many students were completing the patient encounters prior to the end of the allotted time.

Few articles are available that address optimal station time requirements in examinations of clinical skills. Some factors that appear to influence the appropriateness of time allowed for the encounter in-

clude the assessment objectives, examination structure, and scoring methods.^{4,5} Two studies have suggested that examinee use of the station time allotments appears to be influenced by the range of skills tested and the actual time provided for the encounter.^{6,7}

We undertook this study to better understand factors that influence students' use of station time. Our primary study goal was to determine whether the amount of time students spent in a patient encounter was influenced by the case content or by the specific skills tested. As a secondary question, we wanted to determine whether the amount of time students used in the patient encounter correlated with the score received for the station.

Methods:

The study was conducted through videotape review of fourth year medical students participating in the ICEE during the 2003-2004 academic year. Permission for the study was obtained through the Curriculum Research Committee and the Institutional Review Board.

Examination format - In its current format, the ICEE has two phases. The first phase is an eight-station assessment, scored by the standardized patients (SPs). Students who do not demonstrate satis-

factory skills (approximately 25% of the class) proceed to Phase II, a four-station examination that is directly observed and scored by two faculty members. Students must pass the ICEE to graduate. This study used videotapes from Phase I of the 2003-2004 ICEE.

Fourteen patient scenarios were prepared for the Phase I assessment. All students saw two "core" cases. The other 12 cases were paired by case content (medical discipline or organ system) and all students saw one case from each pair. For a given examination session, the test blueprint included patient presentations categorized as acute, chronic, behavioral, and well care; patients of both genders; and at least one pediatric (< 18 years old) and one geriatric (> 65 years old) case.

Fifteen minutes was allotted for the actual patient encounter. An additional three minutes was provided at the beginning of each station for review of the station information (patient's name, age, gender, vital signs, and instructions for the encounter). If a student completed an encounter before the end of the 15 minutes, s/he was permitted to leave the patient room but could not move to the next station. Because the focus of the Phase I assessment was to determine skill within the patient encounter, no post-encounter activities were included.

All standardized patients who participated in this examination had prior SP experience and had previously demonstrated the ability to both accurately portray and score an encounter. Two SPs were trained for each case except the core cases, for which three SPs were trained. A program-based standard SP training protocol was followed that included a minimum of four sessions of interactive case review, case portrayal and checklist completion. Throughout the actual examination sessions, each SP was monitored and scored by a trained observer at least once daily. Any concerns about portrayal or checklist accuracy were addressed immediately, and the videotape for that session was reviewed and rescored as needed by one of the trainers. Such occurrences were rare, and we felt confident that the standardized patients' accuracy of portrayal and scoring remained very good throughout the exam.

Two scores were calculated for each encounter. The content checklist for each case contained between 10 and 12 items and each item was scored as "done" vs. "not done". A separate interpersonal score was provided through a global rating. All scoring was done by the SPs immediately after the encounter. Checklist items were recorded electronically

using commercial software (Enterprise Messaging Services, West Chester PA). A final content score and interpersonal score was calculated by averaging the student's scores across all eight encounters. For student feedback, the score report on each case included an overall content score, an interpersonal score, and subscores for the medical interview, physical examination and patient counseling. Details of specific checklist items were not revealed to the students.

Each student-SP encounter was videotaped for quality assurance. To accommodate all students in the fourth year class, the examination was administered in 23 sessions during July and August 2003. For purposes of the study, a systematic sampling of available videotapes was undertaken. Tapes from all of the scenarios, and from the early, middle and late sessions of the examination were included.

Data collection and analysis - Videotapes were reviewed for total encounter time (period from student entry to exit from the room) and, when included, the amount of time spent performing the physical examination. Times were measured using a stopwatch and recorded to the nearest second. Four members of the SP staff reviewed the tapes. For each reviewer, several tapes were independently reviewed and timed by a second reviewer. Agreement was within 10 seconds for all encounters. Identifiers included the case name, SP identity, SP gender, student identity, and student gender. The examination blueprint was used to classify the cases by case content, acuity, gender, and age. Overall case content scores, and physical examination subcomponent scores were obtained for each student-SP encounter.

Analysis of data - For each student-SP encounter, the identifiers, total encounter time, and overall case score were recorded. For encounters that included a physical examination (PE), the time spent performing the PE and the PE subscore were recorded. In addition to actual PE time, the percent of total encounter time spent in the PE was calculated. Data entry and all calculations were performed using Excel (Office 2000). The mean, standard deviation, and range of the total encounter time, physical examination time, percent of time spent in the PE, and scoring data were calculated for each case and for all encounters combined. Pearson correlation coefficients were determined for total encounter time and case content score, and for physical examination time and PE sub-score.

Results

A total of 163 students completed Phase I of the ICEE. Videotapes of 615 student-SP encounters (47% of all encounters) were reviewed. Tapes of all fourteen patient scenarios were included in the study.

Time spent in encounter - The mean total encounter time for all student-SP interactions was 12 minutes 32 seconds. (range 4:16-15:00). For cases that included a focused PE the mean time spent in the PE was 3 minutes 8 seconds (range 0:22- 8:45). When viewed as a percent of total patient encounter time, the mean percent of time spent in the physical examination was 24.1% (range 3.5-65.5%). Mean total encounter times, physical examination times, and percent of encounter time in physical examination for individual cases are shown in the table. Of the 615 student-SP encounters reviewed, 121 encounters (19.7%) lasted for the full fifteen-minute time allotment. For individual cases, the percent of students using the full time allotment ranged from 0 – 43%.

Scoring data - Student performance data was compared between the study sample and all students participating in the examination. The mean case score for each scenario showed no significant difference between the two groups.

For each case, the total time spent in the encounter was compared to the case content score. For four of the cases (Table: cases D,H,L,M), total encounter time showed a moderate correlation with case score ($r = 0.46-0.57$). In the remainder of the 10 cases, total encounter times showed a weak or negative correlation with the case score. In cases that included a requirement for a physical examination, time spent in the physical examination showed a moderate correlation ($r=0.47- 0.68$) with PE subscores in four of the nine cases (Table 1: cases B,E,G,L). The mean case scores were the lowest on the four cases with the shortest encounter times. A similar association was not seen for the cases with the longest encounter times.

Discussion

In the development of a standardized patient-based clinical assessment, the objectives of the examination must be balanced with the practical considerations of examination administration.⁴ Long

testing times and high case numbers are important for adequate sampling of examinee skills, however the cost of the examination from both a time and financial perspective cannot become prohibitive. Direct costs for our ICEE are approximately \$100 per student. The cost for SP preparation and training is fixed, with an hourly rate paid during the actual time of the examination. Therefore, the only option for reducing overall cost would be to shorten examination time. Reducing the number of stations would further limit the scope of clinical presentations seen. Therefore gaining an understanding of the appropriateness of our designated station time allotment became important.

A review of studies using standardized patient assessments reveal a wide range of designated station times. In a 1990 review article by van der Vleuten and Swanson the relationship between testing time and reproducibility of scoring is examined. They identify several issues to consider when selecting a time allotment for a station including the total number of stations to be used, the level of training of the examinee, the breadth of the skills to be tested, and the scoring methods of the assessment.⁵ For our examination, selection of fifteen minutes was made to allow fourth year medical students to demonstrate medical interview, physical examination and patient counseling skills in a variety of focused clinical challenges. We based this choice on our expectations of students at this level, and on prior experience with students in settings with similar case challenges. It is important to consider that the objective of the ICEE is to determine whether the student demonstrates satisfactory skills in the designated areas, and that follow up testing with direct faculty observation occurs for nearly 25% of examinees,

Chambers et al⁷ studied the use of station time by candidates in a high-stakes standardized patient assessment. The study used data from 1548 examinees and 75 different clinical scenarios. Their work demonstrated the average time use did differ by specifics of the station. Candidates took slightly longer with older patients, chronic problems, and in cases with complicated histories and highly detailed physical examinations. They found that candidates, on average, did not use the full fifteen-minute time allotment with the patients and concluded that fifteen minutes was an appropriate maximum station length time for their assessment.

Table 1
Total Encounter Time and Physical Examination Time Use in a Fourth Year Medical Student Standardized Patient-Based Clinical Assessment

Case label n=number reviewed	Discipline or organ system	Case descriptors	Total Encounter time	Physical Examination	
				Time in PE	% of encounter in PE
A n=35	Psychiatric	behavioral, adult	14:32 (0:41) 12:28 – 15:00	N/A	N/A
B n=67	Neurological	acute, geriatric	14:14 (1:07) 9:48 – 15:00	3:56 (1:33) 0:35 – 8:45	27.55 (10.5) 4.9 – 58.3
C n=43	cardiovascular	chronic, geriatric	14:01 (1:12) 10:53 – 15:00	3:47 (1:21) 0:43 – 7:00	26.9 (8.9) 4.8 – 46.7
D n=49	gastrointestinal	acute, adult	13:39 (1:23) 9:26 – 15:00	2:45 (1:02) 0:55 – 6:52	20.2 (7.6) 6.1 – 46.8
E n=42	cardiovascular	chronic, adult	13:28 (1:26) 9:30 – 15:00	3:14 (1:15) 0:42 – 6:05	24.2 (9.0) 5.1 – 40.6
F n=42	psychiatric	behavioral, adult	13:24 (1:30) 9:03 – 15:00	N/A	N/A
G n=20	gastrointestinal	chronic, adult	13:14 (1:43) 8:37 – 15:00	3:06 (1:02) 1:19 – 4:57	23.2 (6.42) 13.6 – 34.0
H n=48	Cancer screen / head & neck	well care, adult	12:55 (1:56) 8:55 – 15:00	3:14 (1:01) 1:30 – 5:40	25.1 (6.9) 10 – 40
I n=36	musculoskeletal	chronic, geriatric	12:51 (1:48) 8:02 – 15:00	1:56 (1:16) 0:22 – 6:16	19.8 (8.2) 3.5 – 41.8
J n=41	gynecological	well care, adult	12:13 (2:25) 6:03 – 15:00	N/A	N/A
K n=84	Pediatric	well care, pediatric	11:35 (2:23) 6:32 – 15:00	N/A	N/A
L n=32	Cancer screen/ Dermatological	well care, adult	10:14 (2:33) 4:30 – 14:57	2:06 (1:16) 0:24 – 5:17	20.1 (11.0) 5.3 – 51.1
M n=33	musculoskeletal	acute, adult	9:41 (2:18) 5:46 – 14:50	2:33 (1:13) 0:40 – 5:44	27.0 (12.2) 6.9 – 65.5
N n=42	obstetrical	well care, adult	8:45 (2:14) 4:16-14:31	N/A	N/A

Times and percentages given as mean (standard deviation) and range

N/A :not applicable. Not all cases included the requirement for a physical examination.

with these findings. We found that on average, students spent the most time in cases that required complex interviewing strategies (behavioral issues or complicated, detailed histories) or detailed physical examination maneuvers (eg: neurological evaluation). However we also observed that students tended to spend the more time in scenarios that focused on medical content familiar to them from multiple clerkships. (cardiovascular, gastroenterological). It is plausible that students felt comfortable with this material and were able to gather detailed information covering a broad differential diagnosis. Chambers and colleagues found that examinees spent more time with patients presenting with chronic complaints, however case acuity was not a factor for station time use in our study. Our students spent the least amount of time in cases with very focused content (e.g.: obstetrical well care, acute musculoskeletal injury) The highly focused and specialized nature of these presentations appear to have influenced students data gathering during the patient encounter. In the three cases with the shortest mean case times, we observed that students often obtained very basic information (eg: “when did the injury occur”, “are you still in pain”), focused the physical examination to the area of pain, and then suggested to the patient that referral to a specialist was needed. (“you need and x-ray and referral to an orthopedic specialist.”)

Our examination requires students to perform a focused physical examination in only some of the stations. Student time in the PE varied both as a measure of absolute time used, and as a percent of total encounter time. It was important to note that mean total encounter time did not show an increase simply due to the inclusion of the physical examination requirement.

As a final observation, we noted that use of encounter time and PE time showed only a moderate correlation with student case score or PE subscore in a limited number of cases. While we felt this was important to evaluate, the result is not surprising. Checklist-driven examinations reward students for eliciting precise medical interview information, for performing particular physical examination maneuvers, and for covering specific details in counseling. Because efficiency in the encounter is not an examination objective, students may demonstrate the same skills over a broad range of times.

There are some important limitations to our study. This study was limited to an assessment of fourth-year medical students during one academic year at a single institution. The examination is developed locally and has a specific evaluation objective,

limiting the generalizability of our findings to other SP-based assessments. In addition, student familiarity with process and surroundings introduces a source of variation when comparing our findings to those of other investigators.⁷ Prior to the ICEE, our students have taken seven preclinical and clerkship SP-based examinations, have spent many hours with SPs in teaching encounters, and are familiar with the SP Center facility. Finally, unsatisfactory performance on Phase 1 of this assessment does not have a direct impact on the student’s academic record.

Providing an adequate amount of time for students to complete the required tasks in a clinical skills assessment is important. However providing excess encounter time is an inefficient use of testing resources. Use of the maximum allotted encounter time by the majority of students would raise questions about the complexity of the cases or specific performance requirements. Our study has provided information that can be applied during the review and refinement of existing cases, and in the selection of the case mix for this assessment. Our findings have also highlighted important parameters to consider during the development of new standardized patient scenarios.

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