

# Physical Diagnosis Courses— A Question of Emphasis

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The ability of 12 students to examine hospitalized patients at the end of a course in physical diagnosis was measured through the use of video tapes of patient examinations and audit of written summaries. The results indicate the course in physical diagnosis underemphasized the most important aspect of the patient examination, the patient interview. The errors most often committed by students performing physical examinations and taking histories from patients suggest that increased observation of students by preceptors would be profitable in improving the course. Course evaluation through video taping of actual student examinations proved highly instructive and useful in developing a more effective program.

Physical diagnosis remains the cornerstone of clinical medicine. All medical schools in the United States provide mandatory instruction in physical diagnosis for medical students. There have been few reported evaluations of most programs. However, evaluations of the patient examination skills of residents demonstrate prominent deficiencies in their techniques.<sup>1,2</sup> This finding may represent a serious flaw in physician training programs.

A reevaluation of the structure, organization, and goals of the course in physical diagnosis for sophomore students at the Milton S. Hershey Medical Center involved an evaluation of the effectiveness of the current program. This paper reports the results of an analysis of the weaknesses in patient examination skills of sophomore students who participated in their physical diagnosis course during 1975-1976.

## Background and Setting

The Milton S. Hershey Medical Center of The Pennsylvania State University was the setting for this study. All 98 second year medical students took the physical diagnosis course involving one half-day a week for two semesters. The first part of the course extended over 11 weeks and consisted of weekly, one-hour didactic lectures in which the essential techniques of physical examination and history taking were demonstrated, followed by two-hour sessions during which the students, under faculty supervision, practiced examining each other. In the second eleven-week semester, students spent one afternoon weekly examining hospitalized patients on the medicine services. Two preceptors assigned to each group of four students observed patient examinations, reviewed written summaries and oral presentations, and demonstrated the correct techniques of examination. Two or four students examined a single patient during each session.

The course design was the same for all students with the exception of 12 students who participated in an experimental program. These students undertook essentially the same course except that during the second semester they examined ambulatory patients requesting "check-ups," rather than hospitalized patients.

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Table 1. Student Interviewing Skills\*

Interviewing Skill	Skill Deficiency Rating
Logical sequence of follow-up questions	8.7
Clarity of questions	7.7
Tempo in delivery of questions	7.3
Control of interview	6.7
Flow of speech	6.3
Use of open-ended questions	5.7
Articulation	4.7
Emotional tone	4.7
Gestures	4.3
Rapport with the patient	4.3
Body posture	4.3
Eye contact	4.0
Distance	3.0

\*Interviewing skills in which students were frequently deficient. A high rating indicates a larger number of students demonstrated inadequate or partial skill development compared to skills associated with low deficiency ratings.

The skill deficiencies of 12 students examined to evaluate the physical diagnosis course are the subject of this report. Six of these students examined hospitalized patients and six examined ambulatory patients during the second semester of their course. A comparative study of the physical diagnosis skills acquired by the two groups of students showed no difference between the skills of students trained in an inpatient or an ambulatory setting.<sup>3</sup> All students showed similar weaknesses. The skills of both groups of students are therefore reviewed as one group in this report. The weaknesses demonstrated by all students suggest a flaw in the course design which was present in both variations of the course.

## Methods

Five parameters of student performance were examined in this study: (1) the hours of participation in the course, (2) the time required by students to complete examinations of hospitalized patients, (3) the student interviewing skills, (4) the

student physical examination skills, and (5) the quality and composition of written summaries. During the study, tabulations were also made of deficiencies in student performance. These included: physical examination maneuvers incorrectly performed, interviewing skills assessed as weak by judges, and essential elements of the written summary neglected by students. These deficiencies provide insight into the overall quality of the course and are the subject of this report.

The majority of students were from the middle of the class in academic rank rather than the first or fifth quintile. During the last two weeks of the course, matched pairs of students, each trained in different clinical settings, were video taped as they separately examined the same hospitalized patient. Study participants gave informed consent.

Three three-minute segments of the patient interview taken during the beginning, middle, and end of the students' historical review were video taped along with the entire physical examination. Following guidelines provided as part of their course, students submitted written copies of their history and physical findings after the examination. Students were not permitted to review the hospital records and were required to return summaries to the principal investigator within 24 hours of completing their examination.

Two teams of judges scored the performance of students by reviewing the video tapes of patient interviews. Each team of judges was composed of two physicians and a patient advocate, either a minister or a social worker. Judges were trained to score tapes by the investigators who reviewed with each judge the interviewing skills to be scored. Judges then reviewed a video tape of an examination not included in the study. One of the principal investigators alone scored all video tapes of the physical examinations.

Scoring criteria to assess the quality of interviewing and physical examination skills were drawn from several sources.<sup>4-6</sup> A list of selected skills to be acquired by all students had been provided during a physical diagnosis course. Point values were assigned to items to be reviewed.\* Two physicians and a patient advocate independently scored the video tapes of three matched

\*The rating scale instruments used are available on request from Thomas J. McGlynn, Jr., MD, Division of Internal Medicine, Milton S. Hershey Medical Center, Hershey, PA 17033.

Table 2. Five Interviewing Skills Most Often Deficient in Students

Interviewing Skill*	Skill Deficiency Rating	Common Criticism
1. Logical sequence of follow-up questions	8.7	"missed leads," "disorganized," "failure of student to determine sequence of illness," "suboptimal development and poor understanding of pathophysiology of symptoms"
2. Clarity of questions	7.7	"terminology not comprehensible to patient"
3. Tempo in delivery of questions	7.3	"halting," "unsure," "too slow," "presses patient," "groups questions," "too rapid"
4. Control of interview	6.7	"too loosely controlled," "poor direction," "allowed irrelevant material," "patient rambled"
5. Flow of speech	6.3	"excessive okay's," "too halting and hesitant"

\*Rank order of the skills which students most often had not mastered and the comments of judges scoring the video tapes.

pairs of students. Occasional maneuvers of the physical examination hidden from the video cameras were deleted from scoring. Students were penalized by judges only if they demonstrated major deficiencies.

Students were scored on 13 characteristics of proper history taking, as well as their ability to properly perform 62 maneuvers during the physical examination. Written summaries of the patient examination were also scored according to criteria obtained from source references and reviewed by Department of Medicine faculty. Judges of the written summaries were one of the principal investigators and students trained by the investigator to review and compare summaries. Judges of the written summaries reviewed each student summary and compared it with the recorded history and physical findings of residents and junior students in the patient's hospital record. Occasionally, the hospital record did not mention some scored items. These items were dropped from the scoring process.

Written summaries were scored using five parameters: (1) completeness and accuracy of the history and physical findings, (2) the number of important historical and physical findings not recorded, (3) the total number of recording errors, (4) items accurately recorded, (5) items inaccurately recorded. To gain experience scoring written summaries, judges first discussed the scoring criteria with the investigators. Each judge then scored a document not used as part of the research data.

## Results

Time logs showed students spent an average of six hours each week in activities related to the physical diagnosis course. By the end of the course, students were able to complete a patient examination in an average of 93 minutes. This was close to the course objective of developing students' abilities to the point at which they could

Table 3. Physical Examination Maneuvers Incorrectly Performed

Physical Examination Maneuver*	Number of Students Incorrectly Performing Maneuver	Frequent Criticism
Motor system; Extensors/flexors Strength and tone	8	Failure to elicit strength of extensors and flexors of feet, legs, arms, and hands
Radial pulses	6	Failure to palpate bilaterally
Neck lymph nodes	5	Supraclavicular lymph nodes not palpated
Chest resonance	4	Failure to percuss anterior chest
Abdominal palpation	3	Palpated prior to auscultation
Diaphragmatic excursion	3	Failure to percuss bilaterally
Oral mucosa	3	Gingival mucosa not inspected
Visual Acuity	3	Eyes were not evaluated separately

\*Rank order of physical examination maneuvers most often incorrectly performed by students.

complete a patient examination within 90 minutes.

A team of judges scored the video tapes of three pairs of students for interviewing skills. The number of students scored by each team of judges as deficient in a specific skill was averaged by dividing the total number of students scored as deficient in the skill by the number of judges. A skill deficiency rating was then obtained by adding the average score of both teams of judges. A high rating indicates that a large number of students failed to master the skill. Table 1 displays the interviewing skills and the deficiency rating of students for each interviewing skill.

Judges scored the students' mastery of each of 13 interviewing skills as either "adequate" (3 points), "partial" (2 points), or "inadequate" (1 point). The maximum score a student could obtain

was 39, the minimum 13. Physician judges awarded an average of 29.7 points, patient advocates an average of 33.5 points to students for their interviewing skills. An average of seven skills were scored as adequate, six as inadequate or partially acquired.

Interviewing skills most often given "adequate" ratings included rapport with the patient, distance between the student and the patient, eye contact, gestures, and body posture. Use of open-ended questions, articulation, and emotional tone were scored in an intermediate range. Table 2 summarizes the interviewing skills most often criticized. Judges' comments recorded at the time video tapes were reviewed provide insights into the nature of student deficiencies.

Each student was scored for his/her ability to

**Table 4. Physical Examination Maneuvers Frequently Omitted**

Physical Examination Maneuver*	Number of Students Neglecting to Perform the Maneuver
Cranial nerve I	10
Temperature	10
Joint range of motion	9
Vibratory sense	9
Babinski reflex	9
Inspection of hands, nails, and palms	8
Neck range of motion	8
Inspiratory/expiratory auscultation	8
Brachioradialis reflex	8
Superficial tactile sense	8
Superficial pain sense	7
Neck veins	7
Visual fields	6

\*Rank order of physical examination maneuvers most often not performed by students.

execute correctly 62 maneuvers during the physical examination. Table 3 summarizes maneuvers which were improperly or incompletely performed by three or more students examining their patients.

Students performing physical examinations executed an average of 41.7 maneuvers correctly. An average of 4.5 maneuvers were performed incorrectly. An average of 15.2 maneuvers were not performed by students during each examination. Those maneuvers not performed by six or more of the 12 students are summarized in Table 4.

Students usually did not assess the sense of smell or take the patient's temperature. This may represent a custom of practice students had acquired rather than true deficiencies.

Written summaries of the patient examination were compared by judges with the examinations recorded in the patient's hospital record. Table 5 summarizes items omitted by students in six or more of their summaries. Students' summaries on the average were complete regarding 57.6 items.

An average of 7.5 errors were present in each summary. An average of 27 items were omitted by each student.

### Discussion

This study provides three valuable insights. First, sophomore students completing this course performed poorly when interviewing patients. The written summaries of patient examinations demonstrated that reasonably accurate and comprehensive history and physical examinations were acquired from hospitalized patients. However, review of video tapes of the patient interviews clearly shows that history-taking skills were poorly developed in these students. The majority of students demonstrated difficulty with three of the most important patient interviewing skills. These were: logical sequence of follow-up questions, clarity of questions, and control of the interview. These deficiencies may develop from a poor understanding of patient interviewing tech-

**Table 5. Items Omitted in Written Summaries**

Element of the History or Physical Examination Not Recorded in the Summary	Number of Students Omitting Item
Psychiatric disorders (ROS)	11
Alcoholism (FH)	11
Babinski reflex (Px)	10
Brachioradialis reflex (Px)	9
Temperature (Px)	9
Neck veins (Px)	8
Sinus tenderness (Px)	8
Breasts (ROS)	8
Blood dyscrasias (FH)	8
Triceps reflex (Px)	7
Visual fields (Px)	7
Vibratory sense (Px)	6
Joint swelling (Px)	6
Back range of motion (Px)	6
Tongue (Px)	6
Coagulation Disorders (ROS)	6
Sleep (SH)	6

Rank order of important items most often omitted by students in the written summary. Parentheses indicate the part of history in which item was omitted. SH—social history, ROS—review of systems, FH—family history, Px—physical examination.

niques and/or a lack of experience.

A review of the course structure showed that very little emphasis was placed on the development of interviewing skills. A single, two-hour session during the first semester focused on interviewing techniques. Preceptors were depended upon to develop student interviewing skills during the second semester. It can be argued that students can only develop good interviewing skills with time and exposure to patients.<sup>7</sup> Retrospectively, however, it appears that the limited development of student interviewing skills may reflect the emphasis in the course design. Inadvertently, this traditional course in physical diagnosis emphasized the physical examination while neglecting the patient interview. Clearly, additional formal emphasis on interviewing techniques would be profitable in this course.

Secondly, overall performance of physical examination maneuvers by students is reasonably good. However, the maneuvers incorrectly executed by students showed considerable variation. These errors in technique can be easily identified by more frequent observation of students when they are examining patients. More frequent demonstration of correct techniques by preceptors during sessions with students may help to correct these problems.

Instructors in physical diagnosis must realize that students frequently begin to perform basic maneuvers incorrectly early in their careers. Barbee and Feldman have shown that the crucial period of skill development may occur early in student careers.<sup>8</sup> The suggestive evidence they have collected raises the issue of emphasis in physical diagnosis courses. Rather than emphasize

ing presentations, review of written summaries, and other aspects of the patient examination, preceptors should spend their time observing students and identifying and correcting errors during this period of rapid development.

Wiener and Nathanson recently studied the patient examination skills of residents.<sup>1</sup> They noted frequent errors of technique, omission, detection, interpretation, and recording. The present study provides strong support for their statement, "Errors of technique are usually based on a failure of the medical student to learn, during the second-year course in physical diagnosis, all the psychomotor skills of the physical examination." Other experienced clinicians and instructors have also commented on the serious oversight in not observing students and residents during their clinical training program.<sup>9,10</sup>

This study underscores the emphasis that should be placed on observation of students in physical diagnosis courses. The study shows that students may develop poor habits in their introductory course in physical diagnosis. Some techniques may not be understood or learned by students in their first introduction to the patient examination. This sets the stage for the development and perpetuation of poor habits. These students, practicing without appropriate observation and correction in their subsequent training program, will likely carry their poor habits into clinical practice.

The study provided another significant insight. Rating scales were successfully used to measure the skill development of individual sophomore students and to evaluate a medical school course. Video tape provided an economically feasible method for "observing" student interactions with patients. Other researchers have acquired valuable insights using this same technique.<sup>11</sup> Evaluative research was extremely helpful in examining the physical diagnosis course. Attention of program designers was directed to major oversights in the course design and options which could be used to correct the deficiencies. With a growing volume of medical knowledge demanding more time and sophistication on the part of students and medical evaluators, more frequent use of evaluative research must be made to assess the effectiveness of medical school curricula. Video taping is one well-developed and effective technique that can be used for this purpose.<sup>12</sup>

In conclusion, this study shows that evaluative research can be productive. When applied to a physical diagnosis course, the research demonstrated that the evaluated course suffered from a problem of emphasis. Patient interviewing skills and observation of students will be given greater emphasis in the physical diagnosis courses of this center. An introductory course in interviewing techniques is now a required part of the first-year curriculum. The clinical part of the course in physical diagnosis emphasizes history-taking during the first three weeks of the 11-week course. Since students clearly develop faulty techniques early in their careers, the importance of direct observation of students by faculty during examinations of patients is constantly emphasized and encouraged during the course.

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