

A Single-Blinded, Direct Observational Study of PGY-1 Interns and PGY-2 Residents in Evaluating their History-Taking and Physical-Examination Skills

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Abstract

Background: Internal Medicine residents and interns are often the first contact for newly admitted patients in a teaching hospital. The proper evaluation, diagnosis, and treatment may depend on this initial encounter.

Objectives: To evaluate the history-taking and physical-examination skills of interns/residents on new admissions to the medical floors; to compare data from the patient encounter to the chart for evidence of accuracy; to measure the time spent on the initial encounter.

Methods: An independent medical observer used a yes/no checklist with 60 variables in a single-blinded observational study. Frequency tables were generated and results were based on descriptive statistics.

Results: In 7 categories specifically aimed at chart review for accuracy, discrepancies were found between what medical post-graduate year (PGY)-1 interns and PGY-2 residents (interns/residents) recorded in the patient's chart and the observed actions during the patient encounter. There were 25 encounters observed. In 64%, the time spent on history taking was <7 minutes. In 68%, the time spent for the physical examination was <5 minutes. In 72%, patients were not asked about family medical history. None of the observed interns/residents took their own measurements of the patient's blood pressure. No intern/resident asked about recent weight loss, weight gain, level of salt intake, despite patients with history of hypertension; nor did they perform any examinations of the eye fundi and accommodation, thyroid, carotids, or hearing. The majority of patients were asked about chest pain, cough, nausea, vomiting, chief complaint, and the onset of symptoms.

Conclusions: This study documents the poor overall performance in the quality of history-taking and physical-examination skills on newly admitted patients.

Introduction

Proper medical care depends not only on the knowledge base of clinicians, but also on their compulsiveness and their integrity. There have been several published studies that evaluate the skills of interns/residents. Evaluation methods used in previous published studies have included direct observation,¹⁻⁴ mini-clinical evaluation exercises (CEX),⁵⁻¹¹ objective structured clinical evaluation (OSCE),¹²⁻¹⁴ chart review,¹⁵ standardized patients and checklists,¹⁶⁻²¹ a 360-degree evaluation instrument,²² and use of a standardized patient satisfaction questionnaire.²³ Each of these evaluation tools is imperfect. Some tools use artificial situations whereas others suffer from the Hawthorne effect, in which clinical performance of the physician is greatly enhanced by knowledge that they are being evaluated. Moreover, none of these techniques has been designed to assess what the physician actually asked and examined compared with the actual work product. In review of these published articles, there is no single-blinded, direct observation of history and physicals conducted during the actual encounter with the patient. Because of a concern that the usual evaluation tools seriously overestimate physician performance, I undertook a single-blinded, direct observational study of Internal Medicine post-graduate year (PGY)-1 interns and PGY-2 residents (interns/residents) to evaluate their history-taking and physical-examination skills as well as to correlate the accuracy of the observed data collection with what they actually reported.

Methods

Direct Observation and Chart Review

A health policy doctoral candidate with an Educational Commission for Foreign Medical Graduates (ECFMG) certified medical degree with US clinical experience was recruited to directly observe the initial

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history taking and physical examinations performed by interns/residents of a New York City teaching hospital. It was imperative to this study that an independent (not affiliated with the study institution) observer was used who was not known to the interns/residents. The observer introduced himself to both the intern/resident conducting the patient encounter and to the patient as a medical researcher who wanted to learn about taking a proper history and physical examination. With the oral consent of both the intern/resident and the patient, the observer was present in the room and did not interfere with the history-taking and physical-examination process. Among the papers in the observer's hand was a thorough checklist with 60 variables that consisted of yes/no answers regarding the history and physical examination. During the actual patient encounter, the observer discreetly marked on the checklist to avoid relying on his memory to complete the checklist afterwards. The intern/resident was completely unaware that s/he was being evaluated by the observer during the patient encounter. The intern/resident had no prior knowledge from colleagues or the Residency Program Director about an evaluation. Hence, this direct observational study was single-blinded. The observer also recorded the length of time used in both the history-taking and physical-examination portions of the examination as an indication of completeness. Another important element of the checklist was the chart evidence section. After the intern/resident note was written from the encounter, the observer reviewed the results of several variables in the patient's chart to determine the degree of accuracy of the recorded information compared with what was actually performed during the encounter. The 7 variables used for chart review were: eye movements, PERRLA (pupils equal, round, reactive to light and accommodation), blood pressure, pulses, reflexes, muscle strength, and rectal examination. These 7 variables were chosen in particular because comments such as: EOMI (extra ocular movements intact), PERRLA, guaiac are regularly seen in interns/residents' notes.

During the two-week period of the study, 15 interns/residents were evaluated in 25 patient encounters (1 to 3 patients per intern/resident). Of the 25 patients, 14 were female and 11 were male. The 25 encounters consisted of abdominal pain (5), chest pain (3), respiratory disorder (6), neurological conditions (4), and "other" (7), consisting of hypokalemia, fever, sepsis, extremity pain, penile pain, and cellulitis.

Survey

After the observational part of the study was completed, a questionnaire was distributed to all interns/residents (PGY-1 and PGY-2), which asked them to estimate the average time they spent on history taking and physical examination of a new admission to the medical service. They were also asked to estimate how often (percentage of time) they personally completed 34 separate elements of the medical history and how often (percentage of time) they personally performed 26 elements of a physical examination. These elements were identical to the 60 elements the observer evaluated during the observed history taking and physical examination. The interns/residents were told the survey was anonymous and were encouraged to answer the questions honestly. No identifying information such as name, PGY, or sex was asked on the questionnaire to help ensure anonymity. Of 50 questionnaires distributed 43 were completed. Participation in the survey was voluntary.

Coding

The yes/no answers on the checklist were converted into codes (0 = no/not done, 1 = yes/done, 9 = not applicable). The sex of the patient was also coded (0 = female, 1 = male). In the chart evidence section of the checklist, the following codes were designated (1 = completed during encounter, recorded completed in the chart; 2 = completed during encounter, did not record in chart; 3 = did not complete during encounter, did not record in chart; 4 = did not complete during encounter, but, recorded completed in chart). The codes were entered into a software program called SPSS Version 11 (SPSS Inc, Chicago, IL) and statistical analysis used χ^2 . The identities of the interns/residents, the patients, and the hospital were all kept anonymous.

This research was approved by the institutional review board of the hospital where the study took place.

Results

Direct Observation and Chart Review

History—There were 25 patient encounters. In 36%, interns/residents did not introduce themselves to the patient. In 72%, the intern/resident did not explain what s/he was there to do.

Table 1. Time comparison of history taking and physical examination in 25 cases

Encounter time	Minimum (minutes)	Maximum (minutes)	Average (minutes)
History taking	2	15	7.30
Physical examination	3	20	5.29

The average length of time, minimum and maximum for both the history-taking and physical-examination portions are seen in Table 1. In 64%, the amount of time spent during history taking was ≤ 7 minutes. In 32%, the time spent for history taking was ≤ 5 minutes, and in one case, 2 minutes. However, in 16%, the time spent for history taking was 12 to 15 minutes. Table 2 shows the frequency of occurrence by percentage, for the 36 variables that were asked by the intern/resident during history taking. All patients (100%) were asked about their current medications, however, in 96% of the cases, the patients were not asked if they were taking those medications regularly, as prescribed. Patients were asked about their chief complaint (96%) or when their symptoms started (96%). A majority was asked about symptoms such as chest pain (88%), cough (80%), nausea or vomiting (80%), whereas questions about other symptoms were asked in only a minority of the encounters (ie, urinary problems [36%], visual problems [24%], and joint pain [20%]).

There were 5 variables (level of education, salt intake, weight loss/gain, sexually transmitted infections, or erectile problems) that were not addressed in any of the 25 encounters. Other important historic questions that were asked in $<50\%$ of the encounters included: allergies (44%), prior surgeries (32%), family history (28%), dietary history (12%), and occupation history (4%).

Physical Examination—For the physical examination in the 25 encounters, 68% took ≤ 5 minutes, 84% took ≤ 6 minutes. In 8%, the physical examination took 3 minutes. On the other hand, in one case, one examiner took 20 minutes and performed a thorough physical examination.

Table 3 shows the number and percentage of cases correctly performed during the physical portion of the examination. No patients were unnecessarily exposed and all patients had cardiac, abdominal, and pulmonary examinations to some extent. In 84% of cases, breath sounds were examined over the gown, and in 76%, cardiac auscultations were performed over the gown. No intern/resident independently took the patient's blood pressure. In 92% of the encounters, pulse was not measured. No intern/resident examined the patient's fundi, felt the carotids, checked the thyroid, or performed a pelvic examination. In a minority of cases, the examiner tested eye movements (4%), tested reflexes (12%), and observed the patient walk (8%). A rectal exam was asked for or performed in only 1 patient (4%) despite 5 patients (20%) presenting with abdominal pain. No pelvic exams were requested despite 2 women patients presenting with abdominal pain. Of the 24 physical exam variables evaluated, 12 were performed $<10\%$ of

the time and 7 of those variables were never performed during the 25 witnessed examinations.

Chart Review—Figure 1 demonstrates discrepancies in patient chart documentation by the intern/resident between what s/he tested on physical examination and what s/he documented in the written history and physical for each of 7 evaluated variables. A significant number of training physicians misrepresented that they performed tests, when in fact they had not (eye movements 60%, pupils and accommodation 80%;

Table 2. Rankings of variables used in history taking by frequency of occurrence

Variable	Frequency of occurrence (%)
Asked about current medications	100
Asked what the chief complaint was	96
Asked when symptoms started	96
Asked about chest pain	88
Asked about cough	80
Asked about nausea/vomiting	80
Asked about primary care physician	80
Asked about smoking history	76
Asked about alcohol use	72
Asked about illegal drug use	72
Asked about constipation/diarrhea	68
Introduced themselves to the patient	64
Asked about shortness of breath	60
Asked about previous hospitalizations	52
Asked about allergies	44
Asked about urinary problems	36
Asked about previous surgeries	32
For women patients younger than age 60 years, asked about Papanicolaou tests	29
Asked about family medical history	28
Explained to patient that s/he was to conduct a history taking and physical examination	28
Asked about any vision problems	24
Asked about joint pain	20
For women patients younger than age 55 years, asked about last menstrual period	17
Asked about patient's diet	12
Asked about memory problems	12
For women patients younger than age 70 years, asked about mammogram screening	11
Asked about hearing problems	8
Asked about depression	4
Asked about occupational history	4
Asked about weight gain/loss	0
Asked about level of education	0
Asked about salt intake	0
For men patients, asked about erection problems	0
Asked about sexually transmitted infections	0

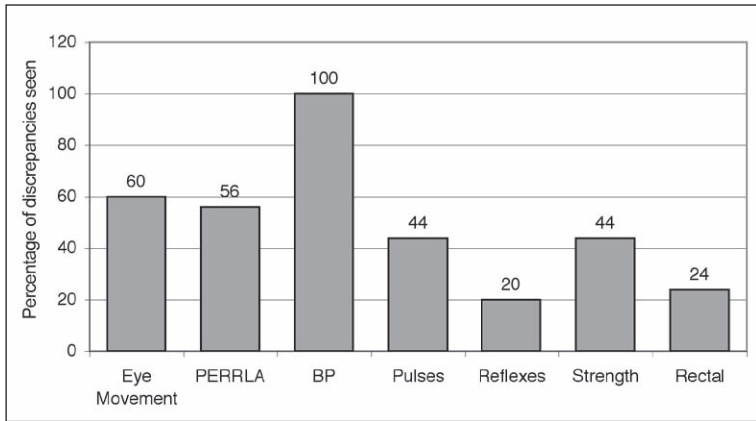


Figure 1. The percentage of discrepancies in intern/resident notes for seven variables, not supported by the observed physical examination.

BP = blood pressure; PERRLA = pupils equal, round, reactive to light, and accommodation

Variable	Frequency of occurrence (%)
No inappropriate exposure of patients during physical examination	100
Performed abdominal examination	100
Auscultated breath sounds <i>over</i> gown	84
Listened to bowel sounds	80
Auscultated heart sounds <i>over</i> gown	76
Checked extremity pulses	40
Checked pedal edema	32
Examined pupils with light	24
Auscultated heart sounds under gown	24
Tested muscle strength	20
Auscultated breath sounds under gown	16
Looked in patient's throat	16
For women patients younger than age 70 years, breast exam done or offered	13
Tested reflexes	12
Tested gait	8
Measured pulse with watch	8
Tested eye movements	4
Touch to pinprick or cotton swab	4
Asked about or did rectal examination	4
Measured blood pressure	0
Examined fundus	0
Tested accommodation	0
Tested hearing	0
Felt carotids	0
Examined thyroid	0
Performed pelvic examination	0

blood pressure 100%, pulses 44%, reflexes 20%, muscle strength 44%, and rectal examination 24%). In no cases did a physician examine a variable and fail to document it. Table 4 shows frequency tables on accuracy of documentation in patients' charts.

Intern/Resident Survey

History—On the survey, interns/residents were asked about the 36 historic variables. In all variables except one (current medications), the estimate of tasks completed by the interns/residents was greater, and sometimes significantly greater than the observed frequency. Questions about 8 variables (hearing, depression, occupational history, weight gain/loss, level of education, salt intake, erectile problems, and sexually transmitted infections) were asked <10% of the time although it was estimated each was asked more often, ranging from erectile problems (46%) to occupational history (74 %).

These results contrast with the estimated length of time interns/residents reported on the survey that they spend. The mean amount of time they estimated spending on history taking was 28 minutes (minimum 8 minutes; maximum 90 minutes) vs actual time 7 minutes ($p < 0.001$); whereas the mean time they estimated performing a physical examination was 15 minutes (minimum 5 minutes; maximum 45 minutes) vs actual time of 5 minutes ($p < 0.001$).

Physical Exam—On the survey completed by the interns/residents, in 22 out of 24 physical examination variables, estimated compliance was statistically higher than actual compliance. Six elements of the physical examination were never observed although they were reported to have been performed, from testing fundi examination (9%) to testing pupillary accommodation (69%).

Discussion

The results obtained during this study demonstrated widespread deficiencies in both completeness of history taking and physical examination, and in the integrity of the written report. The study conducted at this institution was extremely important to elucidate intern/resident practices and the single-blinded nature allowed a level of objectivity in assessing medical care for newly admitted patients.

Although it is expected that interns/residents will read notes written in the Emergency Department before commencing the patient encounter on the medical floor, they are taught to complete a thorough history and physical examination. It is unacceptable that in 36% of patient encounters, the interns/residents did not intro-

duce themselves to the patient, but instead immediately began questioning upon entering the room. Patients are reassured if interns/residents explain what they are there to do. These improvements in communication and bedside manner add expected patient benefit.

As shown in Table 1, the amount of time spent on each portion of the examination appears greatly inadequate. Of note, on the survey, interns/residents estimated that they spend an average of 28 minutes for history taking and 15 minutes for physical examination.

The extent of the inadequacies of the interns/residents in performing basic skills in obtaining histories and physical exams is remarkable. Many of the interns/residents omitted a number of questions, which contributed to less time being spent on history taking of the newly admitted patient. Even though there were some patients with chest pain and shortness of breath, no intern/resident asked about weight gain or salt use. Less than half of the interns/residents inquired into such basic areas as allergies, prior surgeries, or family history of medical problems. About 25% of patients were not asked about basic health issues such as smoking, alcohol use, or illicit drug use. Although nearly all interns/residents asked the patient's chief complaint, when the symptoms started, and what the current medications were, these questions were rarely followed up with detailed questions to fully develop the nature of the patient's present illness. In one case in which the patient complained of penile pain, the intern/resident did not ask any questions concerning sexual activity, sexually transmitted infections, erectile problems, or urinary symptoms.

The deficiencies seen on the physical examinations were even more pronounced. Although every patient had, to some extent, an examination of the abdomen, chest, and heart, those examinations were performed over the gown approximately 80% of the time. No other element of the physical examination (with the exception of listening to bowel sounds) was performed more than 40% of the time. Only 1 of the 6 women patients <55 years of age was asked about last menstrual period. Only 1 of the 14 women patients was asked about most recent mammogram. Of the 4 neurologic cases, minimal status exams were not performed. Twelve of the 26 elements evaluated occurred <10% of the time and no intern/resident measured a patient's blood pressure, examined the carotids or thyroid, or performed a pelvic exam. In fairness, one would only expect a rectal or pelvic exam to be requested under appropriate medical conditions, ie abdominal pain.

These results were in stark contrast to the data

Table 4. Accuracy of documentation of patient charts

Validity	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Eye movements				
1.00	1	4.0	4.0	4.0
3.00	9	36.0	36.0	40.0
4.00	15	60.0	60.0	100.0
Total	25	100.00	100.00	
PERRLA				
1.00	6	24.0	24.0	24.0
3.00	5	20.0	20.0	44.0
4.00	14	56.0	56.0	100.0
Total	25	100.0	100.0	
Blood pressure				
4.00	25	100.0	100.0	100.0
Pulses				
1.00	9	36.0	36.0	36.0
3.00	5	20.0	20.0	56.0
4.00	11	44.0	44.0	100.0
Total	25	100.0	100.0	
Reflexes				
1.00	3	12.0	12.0	12.0
3.00	17	68.0	68.0	80.0
4.00	5	20.0	20.0	100.0
Total	25	100.0	100.0	
Muscle strength				
1.00	5	20.0	20.0	20.0
3.00	9	36.0	36.0	56.0
4.00	11	44.0	44.0	100.0
Total	25	100.0	100.0	
Rectal examination				
1.00	1	4.0	4.0	4.0
3.00	18	72.0	72.0	76.0
4.00	6	24.0	24.0	100.0
Total	25	100.0	100.0	

1.00 = procedure observed being done and result documented in patient's chart; 3.00 = procedure not observed being done and result not documented in patient's chart; 4.00 = procedure not observed being done but result documented in patient's chart; PERRLA = pupils equal, round, reactive to light, and accommodation

obtained in the survey. Although there was direct observation of 30% of the interns/residents, the returned surveys sampled 86% of the interns/residents. Although direct correlation is not possible, agreement was reached between the Department Chairman, the Program Director, and the Medical Researcher that, because of their extensive experience training and managing interns/residents in this program, associations could be suggested and potential explanations offered.

Of the 5 questions in the history that were not asked, the survey reported that the questions are usually asked 46% to 72% of the time. In the physical examination,

7 items were never examined yet the survey reported that they routinely test these items an average of 43% of the time. No intern/resident personally took a blood pressure, and only 8% actually measured the pulse; yet the survey reported that they personally took the patient's blood pressure 49% of the time and measured the pulse 59% of the time. Interns/residents listened to the lungs under the gown only 16% of the time, although they estimated doing so 89% of the time.

Unfortunately the study also confirmed faculty concerns that there are multiple discrepancies in the charts. For the 7 variables in Figure 1, the percentage of discrepancies in documented examinations ranges from 20% to 100%. It may be common practice to record a blood pressure even if you didn't personally measure it, however, the practice could be considered a subtle form of intellectual deception. This misrepresentation can be minimized by documenting the source of the result or finding in the intern/resident note. The interns/residents also miss the opportunity to see if important vital signs change during the hospital course.

Completeness of history taking and physical examination practiced during patient encounters is encouraged so that interns/residents may make their own proper assessment and treatment plan. As well, a more thorough history taking and physical examination would make the intern/resident aware of other significant health issues warranting attention.

What are possible explanations for the performance demonstrated in this study? It is difficult to explain these large differences on perception alone. Other operative factors for the inflated estimates in the survey could include: fear of discovery, subject to more control and/or scrutiny, fear of affecting the program's reputation, a sense of shame about actual performance, and fear of offending the Program Director. To what extent any of these factors (or any other factors) is operative is impossible to determine. In terms of medical knowledge, the interns/residents at the institution have been tested in several ways. The average in training score is several points above the national average (58 percentile vs 55 percentile). The pass rate on the boards is consistently near 100%.

At orientation, the medical leadership emphasizes the importance of compulsiveness; and more importantly, they emphasize the necessity for integrity in every aspect of medical practice. It has been stated multiple times to interns/residents that medical mistakes, although regrettable, will be tolerated, but there is no tolerance for dishonesty. Each week the Department Director conducts chief-of-service rounds in which the major emphasis is on proper history-taking and

physical-examination techniques. All interns/residents are observed performing CEX examinations with largely satisfactory results. Frequent departmental chart review and morbidity/mortality reviews have not revealed anything to suggest the problems seen in this study.

Even though in their surveys, many interns/residents wrote that they do things when they feel they are appropriate and perform focused histories and examinations, they have been trained to perform a complete history taking and physical examination. The ability to persuade new interns/residents of the validity of this argument is somewhat diluted by the historic insistence to demand a complete multifaceted history and physical examination that includes some elements that rarely affect patient care. Furthermore, this argument was less persuasive when it was observed that, in patients with congestive heart failure, the intern/resident still didn't ask about salt intake or weight gain, or in patients with abdominal pain, no rectal examination or inquiry concerning last menstrual period was entertained, or in the patient with penile pain, no sexual history was taken. It is unclear what the most effective approach would be to change these behaviors.

Limitations

Single-blinded studies of interns/residents are difficult to conduct because direct observation of too many encounters over an extended period of time could alert them to a study and be communicated to colleagues, perhaps even jeopardizing future single-blinded studies. It was also important to minimize the Hawthorne effect by using an observer unknown to the interns/residents, and to prevent the examiners from noticing the evaluator's notetaking during the patient encounter. Given this, before this study began, it was determined that 25 patient encounters using 15 different interns/residents would be sufficient to reach valid and reliable conclusions about the attention given to newly admitted patients on the medical floors. The study took place in August of the academic year.

Conclusion

This single-blinded, direct observational study delineated systematic deficiencies in the thoroughness of history taking and physical examinations conducted by interns/residents. The chart review portion provided an accuracy comparison of the observed physical examination to the intern/resident's documentation. The study also demonstrated what real patients, newly admitted to the medical units, faced when encountering interns/residents under everyday, nontesting circumstances. The

... questions were rarely followed up with detailed questions to fully develop the nature of the patient's present illness.

A Single-Blinded, Direct Observational Study of PGY-1 Interns and PGY-2 Residents in Evaluating their History-Taking and Physical-Examination Skills

Hawthorne effect may play a key role in the performances of interns/residents in previously published studies not blinded to the examiner. More studies with a single-blinded approach are needed to get a true picture. ❖

Disclosure Statement

The author(s) have no conflicts of interest to disclose.

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Most Valuable Experience

One of the most valuable experiences the student may have from a pedagogical point of view is to be required to perform a complete physical examination on a patient under the eye of a senior instructor.

— Martini's Principles and Practice of Physical Diagnosis, 1935, Yale Kneeland, Jr and Robert F Loeb, editors