

Comparison of Diagnostic Methods of Family Practice and Internal Medicine Residents

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The diagnostic methods of third year residents in internal medicine (N=23) and family practice (N=22) were compared with respect to common ambulatory patient problems. Five written simulated patients were presented and the dependent variables were: initial and revised diagnostic hypotheses, physical examination items, and laboratory charges. The two groups considered the same number and type of diagnostic hypotheses. There were large differences in the selection of physical examination items ($P<.001$), with the family practice group selecting fewer items. Laboratory charges were significantly greater for the internal medicine group with two patients ($P<.05$), and the charges were nearly identical with two patients. A high degree of patient-specific behavior was demonstrated by both groups. These findings have implications for the future training of primary care physicians.

Recent studies indicate that different types of physicians may use different diagnostic strategies in the same clinical situations. In the primary care setting in the United States, where different specialties care for similar clinical problems, the use of different diagnostic strategies among these specialties may have important implications for graduate medical education in primary care, and for cost and quality of medical care.

Although the issues of primary care training, costs, and quality give a timely curiosity to the study reported here, the motivation for this study lies at a more basic level of specialty description. So little is known about physician behaviors at the end of specialty training, that to generalize about specialty types is risky at best. As Donabedian concluded in a classic paper,¹ “. . . before one can make judgments about quality, one needs to understand how patients and physicians interact and how physicians function in the process of providing care.” This study is simply a descriptive look at the diagnostic behaviors of senior residents from two specialty groups, family practice and internal medicine. The effect of training is suggested, the issue of cost is mentioned relating to laboratory use, and the issue of quality is deferred.

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The clinical method generally taught in medical school is to collect exhaustive data by a thorough history and physical examination before formulating diagnostic hypotheses. The work of Elstein and Shulman^{2,3} and Barrows⁴ has demonstrated that practicing physicians rarely, if ever, use this exhaustive diagnostic process. Rather, physicians consistently begin to generate diagnostic hypotheses very early in a clinical encounter, and the diagnostic process is largely one of testing, reformulating, and verifying these hypotheses.

There have been very few studies comparing the clinical strategies used by family physicians and internists. Smith and McWhinney⁵ used a live simulated patient with three separate complaints (fatigue, sore throat, and headaches) and compared the diagnostic methods of nine family physicians and nine internists who were members of a university faculty. Their study emphasized history taking and found that the family physicians asked significantly fewer questions. They also found that the family physicians requested fewer items of physical examination and fewer laboratory tests.

Feightner, Norman, et al,⁶ as part of a larger study of clinical methods at McMaster University,⁷ reported a comparison of 20 family physicians and 20 general internists, all randomly selected from practice. They used four live simulated patients with diagnostic problems more complex than in the study cited above. With an emphasis on the diagnostic process, they found that the two groups conformed similarly to the model of early hypothesis generation and verification as described by Elstein and Shulman.^{2,3} They found no differences in the number or type of diagnostic hypotheses generated throughout the encounter. They did find that the family physicians asked significantly fewer history questions and performed less physical examination resulting in a greater efficiency score.

It is important to mention that both of these studies were done in Canada where internists are limited to a consultant practice. Also, the family physicians in these studies generally predated family practice residency training.

The study reported here concerns family practice and internal medicine residents at the end of their training in the United States. The focus is on the formation of diagnostic hypotheses and objective data collection (physical examination and lab-

oratory tests). The study was set up to test the following hypotheses: that the family physicians would consider fewer diagnostic hypotheses; that the family physicians would select fewer items of physical examination; and that the family physicians would order fewer laboratory tests resulting in smaller laboratory charges.

Methods

The two study groups were all of the third year residents in internal medicine at the University of Washington and all of the third year residents in family practice in five University of Washington affiliated programs (University Hospital, Providence Hospital, The Doctors Hospital, Group Health Cooperative of Puget Sound, and Family Medicine Spokane). All of these programs are well established and competitive in being able to select from many highly qualified applicants. The data were collected during March 1978, when all of the residents were in the last four months of their training program.

Five written simulated patients were used in this study. In brief, these were:

1. A 43-year-old male laborer with a six-week history of low back pain. There is no history of trauma. He is married, the father of three children, and has not missed work.
2. A 34-year-old woman with a one-month history of recurrent epigastric pain. She is having a concurrent marital problem.
3. An active widowed 76-year-old woman with a two-year history of occasional palpitations. The remainder of her cardiac history is negative.
4. A 64-year-old retired man with a six-month history of fatigue and weight loss. He is a chronic smoker, drinks alcohol regularly, and has symptoms in several organ systems.
5. A 48-year-old salesman with a six- to eight-month history of intermittent, cramping, middle and lower abdominal pain. He has had an increased frequency of loose stools without melena, and rectal bleeding. He is thin and his weight is stable. He is single and his future career is uncertain.

The five patients were selected using three criteria: (1) The presenting problems are common in ambulatory practice for both internists and fam-

ily physicians, being in the top 20 most common presenting problems in the National Ambulatory Medical Care Survey for 1975⁸; (2) Each patient does not have an obvious diagnosis, but rather has symptoms which suggest a number of diagnostic possibilities; (3) The evaluation of the presenting problems has not been well established by a protocol. The specific details of the patients were adapted from actual patients in the practice experience of the author (J.E.S.).

The five patients were presented in a standardized printed format, resembling the Patient Management Problems developed at the University of Illinois,⁹ and the Diagnostic Management Problems developed by Helfer and Slater.¹⁰ The instructions with the study instrument explicitly stated that problems were episodic visits in which the physicians should address the presenting problems only.

A brief but complete history was given for each patient. After each history, the residents were asked to write a prioritized list of the diagnostic hypotheses they would consider in this patient. Items of physical examination were then selected using a checklist in which the physical examination was arbitrarily divided into 52 items. The same checklist was used for each patient. The resident was given the option of selecting specific physical examination items, or selecting "General Physical Examination" which included all the items. On the page following the physical examination checklist, the resident was given information on the positive findings of the physical examination. All the patients had physical findings which were limited to the area of symptoms in order to avoid directing the unsuspecting resident to go back and check other areas of the examination. After the information on the physical examination was given, the residents were asked to write a revised prioritized list of diagnostic hypotheses. In the final step with each patient problem, the residents were asked to select whatever laboratory tests they would order. A rather thorough checklist was given in order to resemble the laboratory request sheets usually used and to avoid cueing the subjects. The same checklist was used for each patient and included tests in the following categories: x-ray, hematology, urine studies, chemistry, endocrine, immunology, and coagulation. Certain special studies and procedures were also listed which varied with the

patient problem, and blank lines were provided for writing in additional tests.

The instrument was administered in the following manner: Each resident was contacted by telephone and urged to participate in the study. The purpose of the study and the make-up of the study groups were not shared in order to avoid biasing the responses. The residents were informed that the study would be done anonymously, that there were no right or wrong responses, and that the study simply wanted to look at how residents approach common ambulatory problems. Each resident who agreed to participate and returned a completed instrument was given \$10. The materials were sent to the residents' homes with a stamped return envelope, and a three-week limit was put on the study. Those residents not responding after two weeks were again contacted by telephone and urged to complete the instrument. Of the 28 residents in internal medicine, 27 could be contacted and received a questionnaire, and 23 responded (85 percent). Of the 25 residents in family practice, 22 responded (88 percent).

Four dependent variables were analyzed for differences among the patient problems and between the two study groups using a repeated measures analysis of variance. These variables were: (1) initial diagnostic hypotheses (following the standardized history); (2) revised diagnostic hypotheses (following the selection of physical examination items and the standardized results); (3) items of physical examination; and (4) laboratory charges. The laboratory charges were calculated using the charges for each test at the University of Washington Hospital at the time of the study. The repeated measures analysis of variance permits comparisons among the five problems irrespective of specialty training, comparisons between the two specialty groups on the series of problems considered as a whole, and interaction effects (ie, differential performance between groups on particular problems). This allows an analysis of the individual problems and the series of five problems as a whole while taking into consideration the correlation in performance by a single resident with the five problems.

The selection of specific items of physical examination and specific laboratory studies were compared using a chi-square analysis. Fisher's exact test was used when the number of observations of any item was less than five.

	Patients					All
	1	2	3	4	5	
Internal Medicine (N=23)						
Mean PE Items	35.4	28.8	33.0	49.7	36.0	36.5
Family Practice (N=22)						
Mean PE Items	16.3*	11.1*	22.5**	45.9 ^{NS}	17.6*	22.7*
*P<.001 **P<.05 NS=Not significant Total possible number of items=52						

Results

The study groups were compared with respect to age, sex, medical school and year of graduation, previous postgraduate training other than present residency, and previous clinical experience other than present residency. No differences existed in the two groups except that 8 of 22 family practice residents had attended the University of Washington School of Medicine, compared to 1 of 23 internal medicine residents. No distinct pattern of responses was apparent for graduates of the University of Washington. Other postgraduate or clinical experience was negligible in the two groups.

A comparison of the study groups was made with respect to future practice intentions. Expressed in mean percent of professional time, the internal medicine residents indicated a mean 40.5 percent in primary care practice compared to 87.0 percent for the family practice residents. Intended time in primary care among the internal medicine group ranged from zero to 100 percent. The internal medicine residents with greater or lesser intentions for primary care practice were kept together in the analysis, because an analysis of them separately (divided into two groups by the median) showed no significant differences in their responses to any of the variables.

The results with respect to the four variables are presented separately.

Diagnostic Hypotheses

The initial and revised diagnostic hypotheses were analyzed by looking at the total number of diagnoses listed. The mean number of initial and revised diagnoses in both groups varied between three and six for the five problems. The differences were significantly related to the particular patient problem ($P<.01$), but not to the two study groups. Although the family practice residents tended to list slightly fewer diagnoses, none of the differences approached statistical significance.

Physical Examination

The greatest differences between the two groups occurred in the selection of the physical examination. Table 1 lists the mean total physical examination items selected for the five patients. Significant difference ($P<.001$) occurred for patients 1, 2, and 5, and for patient 3 ($P<.05$), with the family practice residents selecting many fewer items. In patient 4, with nonlocalized symptoms, the differences between the two groups largely disappeared.

The most striking finding comparing the two groups was the tendency for the internal medicine residents to select a general physical examination. Eight (35 percent) or more of the internal medicine residents selected a general physical examination

Table 2. Total Laboratory Charges Incurred in the Selection of Laboratory Tests by the Two Study Groups

	Patients					All
	1	2	3	4	5	
Internal Medicine (N=23)						
Mean Total Charges	\$43.71	56.34	157.59	158.84	193.38	121.97
Family Practice (N=22)						
Mean Total Charges	\$23.59†	39.99	141.13	175.20	144.82†	104.91††
†P<.05						
††P=.114						

on each patient. These were not always the same residents with each patient. Overall, the internal medicine group selected a general physical examination with a 50 percent frequency compared to 23 percent for family practice ($P<.001$). The family practice residents tended to limit the examination to items which corresponded to the presenting symptoms. In a patient with nonlocalizing symptoms (patient 4), the differences between the groups largely disappeared, with both groups selecting the general physical examination.

Even discounting those residents who selected the general physical examination, and looking at only those residents who selected a "limited physical examination," the internal medicine residents selected more items than the family practice residents ($P<.01$). Particular items which had significant differences in this analysis were the lymph nodes and certain areas of the neurologic examination (mental status, cranial nerves, coordination, and upper extremity sensory, motor strength, and reflexes). An attempt was made to see if more frequent selection of these items corresponded with hematologic and neurologic diagnostic hypotheses, but these relationships were not present.

A high degree of patient-specific behavior was again demonstrated by the number of physical examination items selected by the residents in both groups ($P<.001$). This was more striking for family practice than internal medicine because the latter group consistently selected the general physical examination.

Laboratory Tests

The dependent variable chosen to represent laboratory tests selected by the residents was total charges for the tests. Total charges were chosen in order to give a meaningful weighting to the laboratory test data.

Table 2 displays the total charges generated by the study groups for the five patients. Significant differences ($P<.05$) occurred for patients 1 and 5, with the family practice group incurring lower laboratory charges. For patients 3 and 4, the behavior of the two groups with respect to laboratory charges was nearly the same. The difference in laboratory charges between the two groups for all five patients together was not significant.

The patient-specific behavior of the residents in both groups is apparent ($P<.001$) by repeated measures analysis of variance. An analysis of the residents individually showed a high degree of variability in laboratory charges among the five patients.

Some significant differences occurred between the study groups with certain tests in certain patients, but with the large number of tested differences the significant findings may be spurious. Whenever significant differences did occur, the internal medicine group selected the test more often. With these patients, the greatest differences occurred in the selection of chemistry batteries (patients 1 and 5), and chest x-ray films in patients without symptoms referable to the chest (patients 1, 2, and 5).

Discussion

This study, which indicates differences in the clinical strategies used by residents from two specialty groups, has three limitations which must be considered in interpreting the results. These limitations arise from the selection of the study groups, the method, and the selection of patient problems.

The approach used in this study was to identify the clinical strategies used by residents in the two specialties at the end of their training. This selection of study group focuses on the effect of graduate medical training while not considering the effect of practice experience after training. Residents during the final months of their training probably use different clinical strategies than practicing physicians with years of primary care experience. Also, the internal medicine group was in a traditional residency curriculum with less than half the primary care activities experienced by the family practice group. Although a career interest in primary care among the internal medicine residents did not affect the data, simply a different amount of time in primary care training may explain some of the differences in this study. Finally, other personal characteristics of the residents selected into the respective programs under study, which were not considered in this study, may account for some of the differences in clinical strategy.

The format of simulated patient problems may be a limitation in studying the strategies that are used with actual patients. The validity of written simulated patients with formats similar to that used here has been considered reasonable.^{3,9,10} This study contained a measure of internal validity by the patient-specific responses that were obtained with nearly all the residents. An evaluation of the study instruments by the residents in both groups indicated a nearly unanimous response that the five simulated clinical situations were realistic representations of common ambulatory patients. The use of a standardized history, which gave all the residents the same core of information on each patient, may have limited the study of diagnostic hypotheses and objective data collection in the two groups. This factor would tend to make the strategies more alike than if the histories were solicited by the residents. However, certain differences were demonstrated despite this limitation.

The third limitation lies in the specific patient

problems that were chosen. The patient problems in the study reported here were chosen to give a sampling of common ambulatory problems in order to find consistencies within the two groups. The great variation in responses to different patient problems indicates that the selection of patient problems is a major determinant of the results in a study such as this. This conclusion was also reached in the studies of Elstein et al.³ If patients 3 and 4 had not been a part of this study, the authors might have been led, as in a previous study,⁵ into making more general statements about the clinical strategies in family practice and internal medicine. This study suggests that, depending on the patients, the clinical strategies of family practice residents and internal medicine residents may be the same or quite different.

Keeping these limitations in mind, some statements can be made from this study. The finding of no significant differences in the number of diagnostic hypotheses during the encounter agrees with the findings of Feightner et al⁶ using live simulated patients. Contrary to the prestudy hypothesis, it appears that residents in the two specialties tend to generate similar lists of diagnostic hypotheses with ambulatory patients when provided with the same information. Both studies support the work of Elstein³ that the number of hypotheses considered at any one time is limited and usually does not exceed five.

The difference in physical examination strategies used by the two groups is the most impressive finding. This difference is supported by the two previous studies.^{5,6} The finding that with four of five patients, the family practice group consistently limited their physical examination to selected areas, while the internal medicine group tended to depend on a more general physical examination, suggests that there are major differences in the way the two groups used this diagnostic method. Internal medicine residents appear to use the thorough and exhaustive clinical method that generally is taught in medical school. The justification for this method is the traditional high priority given to the compulsive avoidance of making errors of omission.¹¹ Family practice residents, on the other hand, appear more inclined to limit the physical examination to those areas which would directly relate to the list of diagnostic hypotheses. This approach would more closely correspond to the hypotheses testing described by

Elstein.³ In more complex patients with non-localized symptoms, family practice residents may use the same strategy as the internists by changing to a general physical examination.

The behavior of the two groups with respect to laboratory tests and charges was less consistent than with the physical examination, and more patient specific. Previous studies of internists in ambulatory settings have shown great variations among physicians in the use of laboratory tests,^{12,13} and no association with quality of care.¹³ Great variation occurred with both groups in this study, not only among physicians, but among the patient problems for a given physician. The significantly lower use of laboratory tests and lower charges by the family practice group in two patients agrees with the study by Smith and McWhinney⁸ which showed lower laboratory testing by family physicians in two of three patients. However, the nearly same laboratory testing behavior of the two groups with two patients indicates that a more selective strategy of laboratory testing in family practice, resulting in lower laboratory costs, may be true for only certain ambulatory patients.

These findings, which suggest similar conceptualizations of diagnostic hypotheses yet different strategies of objective data collection in certain ambulatory patients, have implications for the future training of primary care physicians. The field of family practice is seeking to define itself in academic terms. The strategies described here, used by senior family practice residents, are quite similar to the strategies advocated by early scholars in general practice.^{14,15} Selective clinical strategies based on hypotheses testing, which differ from the traditionally taught clinical method, are currently being validated as an approach to patients.³

The field of internal medicine is seeking to define its role in primary care.¹⁶ New curricula are being developed for the training of internists specifically for primary care. Whether these curricula will result in different strategies of objective data collection than those reported here is conjectural.

Current options include a continuation of the present system with different specialties training physicians in parallel programs to deliver primary care to overlapping groups of patients, often using different diagnostic methods. Another option is a merging of primary care training in which more

consistent diagnostic methods are developed. Either way, it is likely that both family practice and internal medicine training programs will affect each other's strategies in the continuing development of primary care physicians.

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