Efficient Diagnosis of Common Complaints: A Comparative Study in the United States and England

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Background. The purpose of this investigation was to compare the diagnostic efficiency of American and British family and general practitioners, as measured by their utilization of health care resources and the average length of the diagnostic interval, in diagnosing common complaints.

Methods. Several hundred charts from teaching practices in the United States and England were identified by computer search and reviewed. The charts were those of patients who had presented between 1978 and 1988 with a complaint of chest pain and were subsequently diagnosed as having angina pectoris or reflux esophagitis, or who presented with a complaint of shortness of breath and were subsequently diagnosed as having heart failure or asthma.

Results. The results of this study, which compared teaching family medicine practices in the United States and England, suggest that American family physicians diagnose common complaints such as chest pain and dyspnea in a shorter time with fewer visits and fewer consultations than their English counterparts, but order approximately the same number of diagnostic tests.

Conclusions. This study demonstrates the difficulties in interpreting international (cross-cultural) comparisons. Differences may be due to varying health care systems, economic factors, physician training, and physician practice styles, as well as patient expectations.

Key words: Dyspnea; chest pain; comparative study; diagnosis; physicians, family. *J Fam Pract 1991; 33:41-46.*

Ever-increasing health care costs in the United States have led to heightened interest in the efficient use of health care resources and studies of health care systems in other countries. Several studies have suggested that British physicians use less laboratory testing than American physicians.[1–3] Some studies have shown that hospitalizations and surgical procedures are less frequent in Great Britain than in the United States.[4,5] Other studies have shown that the health care cost per capita and the percentage of the gross national product devoted to health care are lower in Great Britain than in the United States.[6] These studies all seem to suggest that health care is more cost-effective in Great Britain. In addition, many clinicians believe that British physicians are more likely to make their diagnoses clinically with the aid of fewer diagnostic studies than American physicians. An extensive review of the medical literature dealing with 31 common complaints suggests that there are relatively more British than American articles that deal with the clinical diagnosis of these complaints.[7] To date, however, no studies have compared the efficiency of the diagnostic process in Great Britain with that in the United States.

The purpose of this investigation was to compare the diagnostic efficiency of American and British family physicians as measured by the amount of health care resources used in diagnosing common patient complaints and the diagnostic interval. Although it is difficult to do a cost-effectiveness analysis from this type of study, it certainly is preferable to diagnose early, thus requiring fewer visits, fewer diagnostic studies, and less use of consultants. In addition, the patient will benefit from an expeditious diagnosis.

Methods

All information for this study was obtained by retrospective review of several hundred patient charts from the Family Medicine Center of the School of Medicine and Biomedical Sciences of the State University of New York at Buffalo and from two teaching general practices affil-

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iated with the Department of General Practice of the United Medical Schools of Guys' and St. Thomas' University of London, England. The patients were not matched according to age, sex, or race. The criteria for inclusion in the study were that between 1978 and 1988, patients either presented with a complaint of chest pain and were subsequently diagnosed correctly as having angina pectoris or reflux esophagitis, or presented with a complaint of dyspnea and were subsequently diagnosed correctly as having heart failure or asthma. In each country, general practice teaching sites were used to obtain the patient population.

The charts were identified by a computer search for patients in whom a diagnosis of chest pain, angina pectoris, coronary artery disease, reflux esophagitis, hiatal hernia, or gastric reflux had been recorded. In England some of these patients were identified by using medication lists, ie, they had received nitroglycerin, calcium channel blockers, β-blockers, antacids, metoclopramide, H_2-receptor antagonists, or other drugs used to treat angina or reflux esophagitis. This approach revealed charts that were not identified by the computer search. Each chart was then read carefully to determine when the patient first presented with the complaint of chest pain. A patient was included only if he or she had presented with a chief complaint of pain in the chest. Patients with other presenting complaints such as heartburn, shoulder pain, fatigue, dyspnea with exertion, abdominal pain, or epigastric pain were excluded, as were all patients with a prior diagnosis of coronary artery disease, myocardial infarction, or peptic ulcer disease. Likewise, patients were excluded if they stated that they had previously been diagnosed as having angina pectoris or reflux esophagitis, or if they had received drugs commonly used in the treatment of these conditions. The diagnostic interval was defined as the number of weeks from the date of initial presentation with the complaint of chest pain, chest discomfort, or pain in the chest until the date on which the correct diagnosis of angina pectoris or reflux esophagitis was written in the chart.

A similar process was used to identify the charts of patients who had presented with the complaint of shortness of breath. Charts were identified using computer searches for the diagnoses of heart failure, congestive heart failure, asthma, and bronchial asthma. In England, medication records were also used to identify potential patients. The charts were reviewed if the patient had received diuretics, digitalis glycosides unloading agents, aminophylline derivatives, isoprotenerol, steroid inhalers, or other drugs used to treat heart failure or asthma. A patient's chart was included only if he or she had presented with a chief complaint of difficulty in breathing or shortness of breath. Each chart was then reviewed to determine when the patient first complained of having shortness of breath, trouble with breathing, or difficulty in breathing. Patients with other presenting complaints such as ankle swelling, orthopnea, paroxysmal nocturnal dyspnea, cough, nocturnal cough, or wheezing were excluded. Patients with prior diagnoses of heart failure, congestive heart failure, edema, asthma, or reactive airway disease were excluded, as were those who stated that they had been treated previously with drugs commonly used for heart failure or asthma.

The diagnostic interval was defined as the number of weeks from the date of initial presentation with shortness of breath or difficulty in breathing until the date on which the correct diagnosis of heart failure or asthma was recorded in the chart.

The number of visits required to make the diagnosis was the number of visits from initial presentation with the specified complaint until the time at which the correct diagnosis was recorded in the chart. If the diagnosis was made during the initial visit, which was often the case, the number of visits was specified as one. The other diagnoses, whether correct or incorrect, made for the aforementioned complaints were beyond the scope of this study. Approximately 500 charts were reviewed to obtain those cases included in this study.

The amount of health care resources used was defined by the number of visits the patient made and the number and type of diagnostic studies the patient underwent. Additional information included the number of visits during the diagnostic interval, the patient's age at the time of the onset of symptoms, sex, race, the number and type of diagnostic studies performed, and whether the diagnosis was made clinically, by a consultant, or by diagnostic studies.

Two common complaints were studied: chest pain that was diagnosed as angina pectoris or reflux esophagitis; and dyspnea or shortness of breath that was diagnosed as heart failure or asthma.

These diagnoses were chosen because they are frequent and can be made based on well-recognized clinical criteria and diagnostic studies. Chest pain is one of the common reasons why patients visit primary care physicians.[8] Many of these patients have angina pectoris. Of the approximately 600,000 patients yearly who undergo coronary arteriography as part of an evaluation of chest pain, it has been estimated that 180,000 (30%) have normal arteries and half of these (90,000) have demonstrable esophageal abnormalities.[9] Dyspnea, the awareness of difficulty in breathing, is commonly encountered in ambulatory practice.[10–12] It is often due to heart failure or asthma.

Documentation of well-accepted diagnostic criteria

Table 1. Average Number of Visits and the Diagnostic Interval for Four Diagnoses by Family Physicians in England and the United States

Complaint and Diagnosis	Number of Patients		Average Number of Visits*		Diagnostic Interval (wk)†	
	England	United States	England	United States	England	United States
Chest pain						
Angina	13	13	2.0	1.31	3.70	0.54
Esophagitis	8	8	2.5	1.50	4.47	2.28
Shortness of breath						
Asthma	17	6	2.0	1.0	2.55	0.14
Heart failure	12	6	1.83	1.33	0.64	0.62

**Number of visits is the number of visits from initial presentation with the specified complaint until the correct diagnosis was recorded on the chart. If the correct diagnosis was made on the initial visit the number of visits was specified as one.*

†Diagnostic interval was the number of weeks from the date of initial complaint until the correct diagnosis was recorded on the chart.

was required for the diagnosis to be considered as having been correctly made.

For *angina pectoris*, the diagnostic criteria were dull, pressing chest pain with or without radiation to an arm, a shoulder, or the neck that was brought on by exertion and relieved by rest and/or nitroglycerin. In the diagnosis of angina pectoris, the pain should not have been described as "sharp," occurring at rest, radiating to anatomical locations other than an arm, a shoulder, or the neck, lasting hours, or being affected by deep breathing or body position. Useful diagnostic studies included a resting electrocardiogram (ECG), an exercise ECG, a stress test, a thallium stress test, and coronary arteriography. Descriptions that correlated positively with a diagnosis of angina included that the pain was brought on by exertion; that exercising at a certain level usually produced continuous pain until the patient rested, and that pain was usually relieved within 5 minutes of resting. Descriptions that correlated negatively included that the patient was able to continue normal activities when the pain occurred, that the pain occurred at rest, and that rest did not consistently relieve the pain.[13]

For *reflux esophagitis*, the diagnostic criteria were chest pain (substernal or subxiphoid); pain that radiated to the jaw, the back, or into the epigastric area; pain that was described as burning (heartburn) in quality, with or without a sour or burning substance in the mouth (pyrosis); pain that worsened with stooping or recumbency; pain that awoke the patient at night; pain that lasted for hours; and pain that was relieved with antacids. It has been stated that the diagnosis of esophageal disease can be made based on the patient's history alone in 80% of cases.[14] Although heartburn is often associated with disorders of esophageal motility, it is most often due to gastroesophageal reflux.[8,9] Useful diagnostic studies included contrast radiography, an endoscopy, radionuclide scintigraphy, esophageal motility studies including esophageal manometry, and acid perfusion studies.

Diagnostic criteria for *heart failure* included dyspnea on exertion, orthopnea, paroxysmal nocturnal dyspnea, cough, fatigue, insomnia, and, especially, shortness of breath associated with angina. Signs included basilar rales, pleural effusion, dependent edema, hepatomegaly, distended neck veins, cardiac enlargement, tachycardia, and an S_3 gallop. Diagnostic tests useful in the diagnosis of heart failure included a chest radiograph showing cardiomegaly with upper lobe redistribution or Kerley B lines; and two-dimensional echocardiography showing a dilated left ventricle and a decreased ejection fraction (less than 50%).[11] Other tests, usually unnecessary for the diagnosis of heart failure, were color flow Doppler echocardiography, gated nuclear angiography showing an ejection fraction less than 50%, cardiac catheterization (left ventricular end-diastolic pressure equal or greater than 20 mm Hg), and contrast ventriculography.

For *asthma*, diagnostic criteria included intermittent breathlessness, coughing, or wheezing; wheezing, dyspnea, or coughing after physical exertion; and, particularly, nocturnal coughing or wheezing. The signs included prolonged expiration, wheezing, exercise-induced wheezing, and shortness of breath in the absence of signs of heart failure and an accentuated pulmonic second sound. Useful diagnostic studies included an ECG showing signs of cor pulmonale, pre- and post-bronchodilator evidence of reversible airway obstruction (greater than 10% change), decreased FEV_1, a positive (10% decrease in FEV_1) methacholine challenge test, and asthmatic symptoms associated with eosinophilia in blood or sputum.[11,12]

Results

Table 1 presents the average number of visits and diagnostic interval for England and the United States for each of the four diagnoses. The average number of visits to diagnosis shows a consistent trend across the four diagnoses in which US physicians required fewer visits to

Table 2. Chest Pain Diagnosed as Angina Pectoris

Variables	United States	England
Number of patients	13	13
Age at time of presentation, y (range)	62.8(49–82)	49.2(41–61)
Sex		
Male/female, n	6/7	7/6
Race		
Black/white, n	9/4	0/13
Number of visits to diagnosis* (range)	1.31(1–2)	2.0(1–6)
Diagnostic interval,† wk (range)	.54(.14–2)	3.7(.14–16)
Diagnostic studies, n		
Electrocardiogram	8	7
Exercise ECG	1	2
Thallium stress test	1	—
Blood lipids	—	2
UGI	—	1
How diagnosis made, n		
Clinically	12	11
By diagnostic studies	1	—
By consultation	—	2

**Number of visits is the number of visits from initial presentation with the specified complaint until the correct diagnosis was recorded on the chart. If the correct diagnosis was made on the initial visit, the number of visits was specified as one.*
†Diagnostic interval was the number of weeks from the date of initial complaint until the correct diagnosis was recorded on the chart.
ECG denotes electrocardiogram; UGI, upper gastrointestinal series.

Table 3. Chest Pain Diagnosed as Reflux Esophagitis

Variables	United States	England
Number of patients	8	8
Age at time of presentation, y (range)	43.6(25–73)	43.8(23–55)
Sex		
Male/female, n	5/3	3/5
Race		
Black/white, n	3/5	0/8
Number of visits to diagnosis* (range)	1.5(1–3)	2.5(1–6)
Diagnostic interval,† wk (range)	2.28(.14–17)	4.47(.14–1)
Diagnostic studies, n		
Echocardiogram	1	—
Exercise ECG	1	—
UGI	3	3
ECG	—	2
Diagnosis made, n		
Clinically	7	6
By diagnostic studies	1	1
By consultation	—	1
(Confirmed by endoscopy)	—	(4)

**Number of visits is the number of visits from initial presentation with the specified complaint until the correct diagnosis was recorded on the chart. If the correct diagnosis was made on the initial visit, the number of visits was specified as one.*
†Diagnostic interval was the number of weeks from the date of initial complaint until the correct diagnosis was recorded on the chart.
ECG denotes electrocardiogram; UGI, upper gastrointestinal series.

document their diagnoses than English physicians. Similarly, the average diagnostic interval was shorter for United States physicians for each diagnostic category. An analysis of variance of country within diagnoses yielded a significant effect of the diagnostic interval ($F[4,75] = 2.56$, $P = .045$) and a number of visits effect that approached significance ($F[4,75] = 2.31$, $P = .065$).

Chest pain: angina pectoris. Table 2 shows that in England more visits were required for the diagnosis of angina pectoris. Likewise, the diagnostic interval was longer in England. Diagnostic testing was similar. In England, as might be expected, there was a greater (2:0) use of consultants to make the diagnosis.

Chest pain: reflux esophagitis. Table 3 shows that, among the patients evaluated by British physicians, more visits occurred between presentation and diagnosis of reflux esophagitis and that the diagnostic interval was longer. The number of diagnostic studies employed was similar in both countries. A consultant established the diagnosis in one British patient, while no consultants were used to make the diagnosis in the United States.

Dyspnea: heart failure. Table 4 shows that the number of visits required to make the diagnosis of heart failure was greater in England but that the diagnostic intervals were similar.

Dyspnea: asthma. Table 5 shows that the number of visits and the diagnostic interval required to make the diagnosis of asthma were greater in England. More diagnostic tests were used by English practitioners, but all tests were determinations of peak expiratory flow rate (PEFR), which is a simple office procedure.

Discussion

The original premise that general practitioners in England, as compared with family physicians in the United States, would diagnose common complaints more efficiently was not confirmed in this study. The diagnostic interval was significantly shorter for patients seen by US family physicians than for those seen by their English counterparts. A similar trend was found in the number of visits to diagnosis. In England there were more visits,

Table 4. Dyspnea Diagnosed as Heart Failure

Variables	United States	England
Number of patients	6	12
Age at time of presentation, y (range)	57(38–78)	68.9(55–86)
Sex		
Male/female, n	2/4	5/7
Race		
Black/white n	4/2	1/11
Number of visits to diagnosis* (range)	1.3(1–3)	1.83(1–5)
Diagnostic interval,† wk (range)	.62(.14–3)	.64(.14–2.5)
Diagnostic studies, n		
Chest x-rays	3	2
Echocardiogram	1	—
Exercise ECG	1	—
PEFR	—	2
ECG	—	3
Diagnosis made, n		
Clinically	5	10
By diagnostic studies	1	1
By consultation	—	1

**Number of visits is the number of visits from initial presentation with the specified complaint until the correct diagnosis was recorded on the chart. If the correct diagnosis was made on the initial visit, the number of visits was specified as one.*
†Diagnostic interval was the number of weeks from the date of initial complaint until the correct diagnosis.
ECG denotes electrocardiogram; PEFR, peak expiratory flow rate.

Table 5. Dyspnea Diagnosed as Asthma

Variables	United States	England
Number of patients	6	17
Age at time of presentation, y (range)	25(13–40)	40.5(16–66)
Sex		
Male/female, n	2/4	7/10
Race		
Black/white, n	4/2	2/16
Number of visits to diagnosis* (range)	1(1)	2.0(1–5)
Diagnostic interval,† wk (range)	.14(.14)	2.5(.14–10)
Diagnostic studies, n		
Echocardiogram	—	—
Exercise ECG	—	—
UGI	—	—
ECG	—	—
PEFR	—	7
Diagnosis made, n		
Clinically	6	16
By diagnostic studies	—	—
By consultation	—	1

**Number of visits is the number of visits from initial presentation with the specified complaint until the correct diagnosis was recorded on the chart. If the correct diagnosis was made on the initial visit, the number of visits was specified as one.*
†Diagnostic interval was the number of weeks from the date of initial complaint until the correct diagnosis was recorded on the chart.
ECG denotes electrocardiogram; UGI, upper gastrointestinal series; PEFR, peak expiratory flow rate.

longer diagnostic intervals, and greater use of consultants.

There are several possible explanations for these observations. During part of this study, the author (R.H.S.) spent 5 months in England reviewing charts and talking to many general practitioners about their charts and patients. It became apparent that there is a reluctance among British physicians to label patients with a diagnosis. Despite this fact, however, the charts reviewed in this study revealed historical evidence and therapeutic maneuvers suggesting that a diagnosis *had* been made. British practitioners expressed that they prefer to observe the patient's symptoms over time before writing a diagnosis on a chart. It is possible that the physicians in our study had the diagnosis in mind but were reluctant to write the diagnosis in the chart. The fact that general practitioners in England are often reluctant to label patients with a disease condition until they are absolutely sure may have been a factor in their longer diagnostic intervals. Under Britain's National Health Service, patients have open access to primary care but are less able to seek the opinion of another general practitioner; therefore, the British physicians in the study may have felt less pressured to offer a diagnosis after the initial consultation.

Another factor that should be considered in interpreting these results is that patient visits to general practitioners in England are briefer than those made to their US counterparts. One study states that visits to English general practitioners average 8.25 minutes.[15] Another study estimates that office visits to American family physicians average 19.33 minutes.[16] Although the duration of physician visits could not be determined in this study using retrospective chart reviews, this information suggests that general practitioners in England might indeed be more efficient diagnosticians, as was the original premise.

The shorter diagnostic interval in the United States may be related to the fact that American family physicians believe that if they do not diagnose in a timely fashion, the patient may not return. Likewise, fear of possible litigation may also encourage early diagnosis. In England, malpractice litigation is exceedingly rare.

Consultants may be used more frequently in England because, under the National Health Service, there

is no direct charge for physicians' services to patients. In addition, several English general practitioners stated that some of their patients were more inclined to accept diagnoses of significant medical illnesses from consultants rather than from their general practitioners.

With the exception of the disproportionate use of peak expiratory flow rates in England (Table 4), which was probably related to one physician's interest in asthma, the number and type of diagnostic studies ordered was comparable between English and American family physicians. This contrasts sharply to a study of hypertensive patients in which British general practitioners ordered fewer tests than New England internists.[2]

In this investigation the number of American patients diagnosed as having angina or esophagitis was comparable to the number of English patients, but there were more English patients with dyspnea due to asthma or heart failure whose charts were reviewed. The smaller number of these patients seen by US physicians does not reflect a difference in the incidence of the disease but rather the smaller number of charts available that met the criteria for inclusion in this study. American patients who were later diagnosed as having asthma or heart failure often complained initially of coughing, wheezing, or ankle swelling rather than dyspnea and were therefore excluded from this study.

The differences in training between British and American family physicians is probably another factor that influenced the difference in diagnostic intervals.[17] American trainees spend approximately 40% to 50% of their 3-year residency in ambulatory care settings, which include the family medicine center. British general practice training consists of 3 years' post-registration experience. Two years must be spent in approved hospital posts and an additional 12 months must be spent working in a recognized training practice.

In conclusion, cross-cultural comparisons are difficult to perform and interpret. Differences observed may be due to differences in patient expectations, physician practice styles, systems of health care delivery, economic factors, reimbursement systems, availability and cost of consultants and diagnostic studies, the volume of patients, duration of office visits, liability factors, and physician training programs.

Any conclusions drawn from cross-cultural medical studies must be critically reviewed and interpreted, and the many factors that may account for the differences observed must be taken into consideration.

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