Communications

Old Electrocardiograms and Hospital Admission Decisions

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Electrocardiograms (ECGs) in asymptomatic individuals have come under criticism because they add little to patient management.[1] When used as a screening tool, the yield is small and perhaps not cost effective. From a diagnostic point of view the ECG is performed to provide information about rhythm abnormalities, conduction abnormalities, ventricular hypertrophy, ischemic heart disease, and metabolic changes in an individual. This information, however, frequently serves to confirm rather than formulate a clinical diagnosis. Nevertheless, ECGs will have been done on many individuals prior to acute episodes of chest pain.

The effect of a comparison electrocardiogram on the decision to admit or discharge was evaluated in a group of patients who presented with chest pain in an emergency department.

Methods

Rhode Island Hospital is a 719-bed voluntary general hospital affiliated with Brown University Medical School. The hospital serves a city with a population of 180,000, and a geographic area with a population in excess of 1 million people. The emergency department has 56,385 visits per year. Patients presenting to the Rhode Island Hospital Emergency Department are seen primarily by house staff. A full-time physician also treats patients and supervises the activities of the house staff. Rhode Island Hospital operates a very efficient medical records department; generally, previous records are available to emergency department physicians while the patient is being treated.

Emergency department records for two nonconsecutive months were reviewed. During that time 327 patients who were aged 50 years or older presented with chest pain. For these patients the following data were recorded: the availability of any previous ECG, whether the new ECG in the emergency department was interpreted as normal or abnormal by the examining physician, whether the new ECG obtained in the emergency department was interpreted as changed from the previous ECG, and whether the patient was admitted or discharged. The official interpretation of the ECG by the Division of Cardiology was not taken into account because these readings were not available during the decision-making process. For the same reason, no effort was made by the authors to interpret the ECG. Ninety-six patients with incomplete data were excluded (availability status of previous ECG unknown). The remaining 231 patients form the basis of the study.

Results

Previous ECGs were available for 108 patients (47 percent) among whom 75 were admitted to the hospital and 33 were discharged from the emergency department. Previous ECGs were unavailable for 123 patients (53 percent) among whom 62

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Table 1. Availability of Old Electrocardiograms by Normality of New Electrocardiograms

	New ECG Normal No. (%)	New ECG Abnormal No. (%)	Total No. (%)
Old ECG available	9 (15)	99 (58)	108 (47)
No old ECG available	51 (85)	72 (42)	123 (53)
Total	60 (100)	171 (100)	231 (100)

$\chi^2 = 32.83$ ($P < .01$)

Table 2. Admission Status of Patients With New Electrocardiograms Interpreted as Abnormal

	No Old ECG No. (%)	ECG Changed No. (%)	ECG Unchanged No. (%)	Total No. (%)
Not admitted	17 (24)	4 (9)	21 (38)	42 (25)
Admitted	55 (76)	39 (91)	35 (62)	129 (75)
Total	72 (100)	43 (100)	56 (100)	171 (100)

$\chi^2 = 10.50$ ($P < .01$)

were admitted and 61 were discharged. The higher proportion of admissions associated with availability of a previous ECG may be explained in part by a higher prevalence of underlying heart disease in patients with previous tracings, an association suggested by a higher proportion of cases with an available previous ECG among those with an abnormal ECG (Table 1).

Fifty-two (87 percent) of 60 patients with normal ECGs were discharged. One hundred twenty-nine (75 percent) of 171 patients with abnormal ECGs were admitted. Unavailability of a previous tracing did not affect the proportion of admissions (76 percent) for patients with abnormal ECGs (Table 2). When available, however, the comparison of a previous tracing with the present ECG correlated with admission or discharge in a statistically significant way. If the new ECG was changed, the patient was more likely to be admitted (91 percent); if it was unchanged, discharge was more likely compared with the overall group with abnormal ECGs.

Of the 96 cases who were excluded from the study because of incomplete data, 44 were admitted and 52 were discharged.

Comment

In current medical practice a large number of middle-aged and elderly people will have had an ECG performed by a physician, either to evaluate a suspected cardiac disease or as a screening test. A 47 percent prevalence of available old ECGs at the time of the acute episode is an underestimation of the true prevalence of tracings in the population because additional tracings performed outside the hospital were not available to the emergency department physician.

The observation that patients with an available previous ECG were more likely to be admitted is best explained by the higher likelihood of underlying heart disease in this group. This relationship is supported by the association of electrocardiographic abnormality with the availability of a previous tracing. As expected, patients with an abnormal ECG were more likely to be admitted than those with a normal tracing. However, of patients with abnormal electrocardiograms, those with new changes on the tracing compared with a previous electrocardiogram were the most likely to be admitted; those with an identical old electrocardiogram were the least likely to be admitted; those without an available comparison electrocardiogram had an intermediate likelihood of admission similar to that of the overall group of patients with abnormal ECGs.

These data suggest that the availability of a previous electrocardiogram influences the process of care for patients who come to an emergency room complaining of chest pain. The relationship between statistical and clinical significance of a previous ECG would require simultaneous analysis of all the clinical determinants of admission for chest pain. Indeed, many confounding factors coexist in the evaluation of chest pain. It is interesting to note that the proportion of admissions among patients with abnormal tracings was not related to availability of a previous one. The same patients might have been admitted, based on other clinical information, had the previous tracings not been available. Furthermore, the evaluating physician's interpretation of the ECG (and the comparison) may have been biased by other clinical factors used to decide whether or not to admit.

The relative contribution of the electrocardiogram with or without a comparison tracing in the management of patients with chest pain cannot be quantitated from this study. The description of the chest pain, the presence of coronary risk factors, and the physical examination should take precedence over the interpretation of the ECG. This study suggests, however, that availability of a previous ECG for comparative interpretation gives the clinician more information than a single tracing and influences the management of chest pain in an emergency department setting.

References

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