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The Appropriateness of Using a Medical Procedure Is Information in the Medical Record Valid?

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Understanding the clinical appropriateness of a procedure's use may be critical in explaining geographic variations in its use. Little is known, however, about whether data on appropriateness can be obtained from a medical record. A national panel of physicians formulated a list of 300 mutually exclusive, detailed clinical indications for performing coronary angiography. Using this list, we compared the reasons physicians perform coronary angiography as revealed in medical records with those given in interviews with the physicians who actually did the procedure. Thirty-five of 47 eligible billing entities (74%) from two Los Angeles Professional Standards Review Organization areas participated. These physicians practiced in 14 hospitals and accounted for 81% of all angiographies performed on Medicare patients in the two areas. Sixty-six records (approximately two per physician) were reviewed; physician interviews were conducted by two trained data collectors who were blinded to each other's results. Ninety-one percent agreement was reached on the specific indication for performing coronary angiography when information from the record review and interview was compared. We conclude that medical records yield valid information on why coronary angiography is performed and that they are a suitable source to use in judging the appropriateness of that use. Key words: use of medical records; validity of medical record information. (Med Care 1987; 25:196-201)

The age-standardized per-person use of specific medical and surgical procedures

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have been shown to vary dramatically by geographic area.¹⁻³ We do not know whether rates in high-use localities reflect too much care or those in low-use areas too little care. The variations have been attributed to differences in the availability of financial and technical resources, the needs and preferences of patients, and uncertainty about how to approach specific medical problems.⁴⁻⁶ To assess the appropriateness of the use of a specific procedure, however, we must be able to identify at a detailed clinical level why it was performed. Two potential sources of information are medical records and physician interviews.

Acceptance of the medical record as a valid source of information to judge the ap-

appropriateness of care is by no means universal. The medical record may not be complete, even though it is an essential source of information on the delivery of care.⁷⁻¹¹ Then why rely on the medical record? Why not just ask physicians their reasons for performing a service and then use that information to determine appropriateness? Interviews consume physicians' time, disrupt office routines, and are impractical to perform (the interviewer and physician must be available at a mutually convenient time).

This study used information from medical records and physician interviews to compare the reasons physicians perform coronary angiography. We selected coronary angiography because it is performed relatively frequently and its use varies widely by geographic region. In the United States, among people 65 years of age or older, for example, the age-sex-adjusted rate of the use of coronary angiography varies at least 200% among areas as large as individual states.¹

Methods

Sample

The Professional Standards Review Organization (PSRO) program divided Los Angeles County into seven geographic areas. For convenience, we used two of the seven areas to define our sample. We chose them because they were geographically distant from one another and contained patients of varying socioeconomic status. These patients, when hospitalized, received care mostly at nonteaching hospitals. To avoid biases in the quality of medical records perhaps associated with a hospital's teaching status, we excluded the PSRO areas containing UCLA and the University of Southern California.

To obtain our patient sample, we used data from the Part B Medicare carrier (the agency that reimburses physician services under Medicare) for Los Angeles County. Fifty-six physicians or groups of physicians (billing entities) in the two PSRO areas had

been reimbursed by Medicare, between August 1982 and April 1983 for performing at least five coronary angiographies. They accounted for 97% of all coronary angiographies performed on people 65 years of age or older.

Of the 56 billing entities, five were excluded because their last angiography was performed in 1982; three entities were excluded because their offices were geographically inconvenient to reach; and one was excluded because it was a teaching hospital affiliated with UCLA. The remaining 47 billing entities accounted for 90% of the coronary angiographies.

After phone calls or contacts, 35 (74%) of the billing entities agreed to participate in the study. We did not collect formal information on reasons for not participating. The most commonly cited reason was unwillingness to allow researchers to review medical records, which may or may not be related to the quality of record-keeping. The participating billing entities included 54 (84%) of the individual physicians performing coronary angiography in the two PSRO catchment areas and accounted for 81% of all angiographies. The 54 physicians performed angiography at 14 hospitals, all of which agreed to participate in the study.

When a billing entity was synonymous with an individual physician, the medical records of the physician's three most recent coronary angiography patients were selected for inclusion in the sample. For billing entities that represented a group of physicians who used a single billing number, the three most recent angiographies were selected such that the records of no more than two physicians' patients were reviewed.

Indications for Performing Coronary Angiography

A comprehensive and mutually exclusive list of 300 clinically detailed indications or reasons for performing coronary angiography was prepared. The list was based on the findings of a literature review and the advice

TABLE 1. Selected Indications for Coronary Angiography

1. **Asymptomatic Patients**
Coronary angiography is indicated in patients in high-risk occupations if there is a positive exercise ECG and no exercise thallium scan.
2. **Chest Pain of Uncertain Origin**
Coronary angiography is indicated in patients with negative exercise ECG and no or negative exercise thallium scan.
3. **Chronic Stable Angina**
Coronary angiography is indicated in patients (without strong contraindications to coronary artery bypass graft surgery) in whom angina occurs with mild exertion (Class III or IV) and who have received no or less than maximal medical management and no exercise ECG, no exercise thallium scan, and no exercise MUGA.
4. **Unstable Angina**
Coronary angiography is indicated in patients (without strong contraindications to coronary artery bypass graft surgery) during the hospital admission for unstable angina only if pain persists after admission despite maximum medical inpatient management.
5. **During an Acute Myocardial Infarction (MI)**
Coronary angiography is indicated in the acute phase of an MI in patients without strong contraindications to coronary artery bypass graft surgery if the MI is complicated by persistent chest pain.
6. **Within Six Months of an acute Myocardial Infarction (MI)**
Coronary angiography is indicated in patients within six months of an MI (without strong contraindications to coronary artery bypass graft surgery), if the MI was subendocardial and angina occurs following the MI during mild exertion and the patient received no or less than maximal medical management regardless of exercise ECG results.
7. **Sudden Death Cardiac Survivors**
Coronary angiography is indicated in patients (without strong contraindications to coronary artery bypass graft surgery) if the sudden death episode was not associated with an MI and angina occurs following the episode of sudden death during mild exertion (Class III or IV), and patient has received no or less than maximal medical management, regardless of exercise ECG results.
8. **Following Coronary Artery Bypass Graft Surgery (CABS)**
Coronary angiography is indicated in patients with angina after CABS that occurs with mild exertion (Class III or IV), and who have received no or less than maximal medical management regardless of exercise ECG results.
9. **Other**
Coronary angiography is indicated in the preoperative evaluation of patients with cardiac valvular disease.

Source: Chassin.¹²

of a national panel of physicians.^{12,13} Indications were grouped by clinical presentation: asymptomatic (N = 28); chest pain of uncertain origin (N = 30); chronic stable angina (N = 108); unstable angina (N = 28); acute myocardial infarction (N = 5); within 6 months of an acute myocardial infarction (N = 68); sudden death survivors (N = 6); following coronary artery bypass graft surgery (N = 16); and others (N = 11). Numbers in parentheses indicate the number of specific indications in each clinical grouping.

As illustrated in Table 1, each indication represents a specific set of clinical circumstances under which it might or might not be appropriate to perform coronary angiography. The national panel that assisted in devising this catalog of indications also rated

each indication on a nine-point scale of appropriateness.¹² Thus, if we are able to obtain clinical data that are sufficiently detailed to classify a particular case into one of the 300 indications, we have sufficient information with which to judge appropriateness.

Data Collection

Two data collectors, neither of whom was a physician, were trained to review medical records and to interview physicians. Each record review required about 1 hour and each interview about 15 minutes. The potential sample was 105 patients (35 billing entities times three records per entity). Of the 105, 70 (two from each billing entity) were to be used for comparing medical rec-

ord reviews with interviews, and 35 were to serve as reliability checks. The later records were abstracted by both data collectors, but neither one knew which records were abstracted twice.

When comparisons between interviews and office records were to be made, one data collector abstracted the office record of the physician who performed the angiography and its corresponding hospital record, while the second interviewed the physician. In three instances, because the cardiologist who performed the procedure did not actually evaluate the patient, we interviewed and abstracted the record of the cardiologist who did evaluate the patient prior to the procedure. In each of these three cases, both cardiologists were members of the same group. The data collectors did not discuss their findings with each other and were randomly assigned to either a record abstraction or interview.

To standardize the medical records review, we prepared detailed medical record abstraction forms and guidelines that asked for 108 specific bits of data that, taken together, would reveal the indications for the patient's coronary angiography.¹² To guide the interview process, a two-part form was prepared, with which we asked physicians to specify their reasons for performing coronary angiography. During the interview, the physician had access to all information included in the patient's medical record. The first part of the interview was open-ended and consisted of two questions. 1) "Can you give the main or primary reasons why you performed angiography on (give name of patient) on (give date of marker procedure)? Please be as specific as possible." 2) "Are there any other factors, like test results or functional status data, that affected your decision? Again, please be as specific as possible." In both cases, the physician's exact response was copied. The second part of the interview was highly structured (Fig. 1). With the medical record still available, physicians were asked to pick one or more of 300 mu-

tually exclusive indications for which the coronary angiography had been performed.

Complete medical record and interview data were available for 66 of the 70 patients (94%). The four patients eliminated had their angiography performed in a hospital that was out of our geographic area.

Data on reliability was obtained from 34 of the 35 eligible cases (97%). As above, the one missing case represents a procedure performed in an out-of-area hospital.

Results

Relationships Between Medical Records and Interviews

For 60 of the 66 records (91%), the medical record review and the interview agreed on the indications for performing the coronary angiography. For two of the six patients in which the methods produced disagreement, information was provided in the interview that was not asked for in our medical record abstract form. This problem was subsequently rectified; that is, the abstract form was changed to include questions designed to obtain this information. For two other patients, information provided in the interview conflicted with data in the medical record, and agreement could not be reached on which source was correct. For the last two patients, the interview provided information that was contradicted by objective data in the record; for these patients, we believe the medical records to be correct.

Agreement Between Data Collectors

Our criterion for establishing the reliability of the medical record abstraction process was agreement between the abstractors on the indication for performing the angiography. For 33 out of 34 cases (97%), this criterion was met. In addition, when specific items from the abstraction form were scrutinized, there was 80% agreement. This level of reliability, however, was improved when all different items measuring the same concept were grouped. Data collectors sometimes

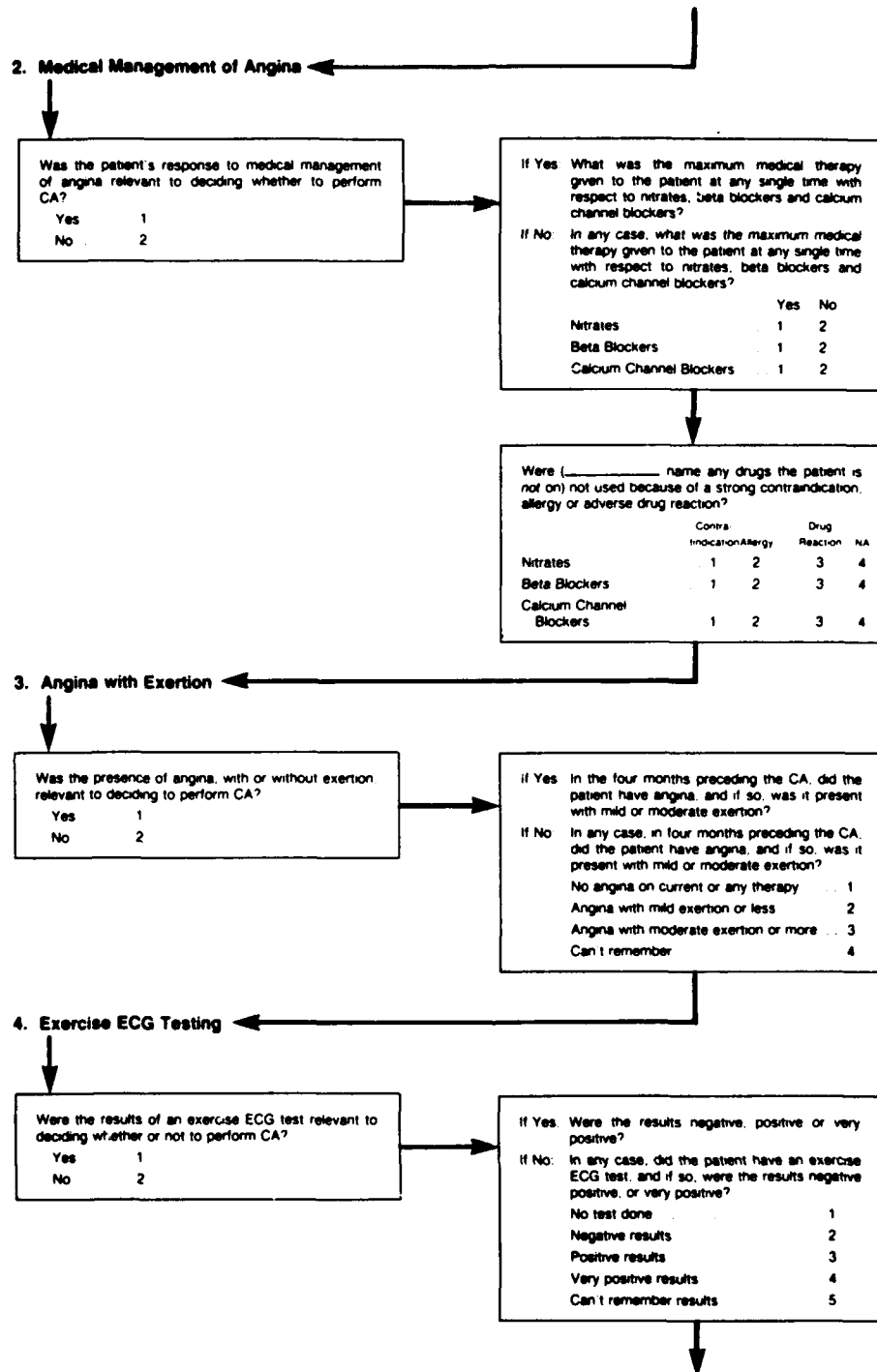


FIG. 1. A portion of a structured physician interview used to identify the reason for which the coronary angiography was performed.

missed a fact when it was asked in one fashion but usually found it when asked in another. For example, under a question about arrhythmias, a data collector missed the presence of multifocal premature ventricular contractions but later noted this finding as part of an ECG interpretation.

Discussion

The purpose of our study was to determine the validity of medical records in assessing the reasons for performing coronary angiography. If the results from a record review concurred with those from physician interviews, then collecting clinical data on why such procedures are performed would not be dependent on interviewing physicians.

In attempting to identify one or more indications from a list of 300, we found 91% agreement between data obtained from a medical record and the physician's stated reason for performing coronary angiography. When disagreement occurred, it was not evident which data source was correct. It should be noted that this level of agreement was obtained from a community-based sample of physicians performing angiography in the Los Angeles area. We have no reason to believe that their medical records were any more complete than those of physicians in other areas of the country. Thus, these findings may be generalizable, although this latter assertion should be tested. We also found the abstraction process to be reliable.

Obtaining these results was dependent on having well-trained abstractors spend at least 1 hour abstracting each medical record and on the use of a detailed abstraction form and accompanying guidelines. The preparation of the abstraction system took about 1 year

and required the expertise of a multidisciplinary team of researchers and physicians and a national panel of expert clinicians.

We conclude that medical records can be reliable and valid sources of information to identify the specific clinical reasons that physicians perform coronary angiography. How generalizable these findings are to other procedures should be examined.

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