

## **Solving the Problem of Thallium-201-Chloride Myocardial SPECT Imaging Procedure Cancellations**

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**Objective:** Thallium-201-chloride myocardial SPECT imaging accounts for about one-third of our daily nuclear medicine imaging workload. However, cancellation of imaging appointments has been an ongoing problem in our nuclear medicine practice. Because of an overall cancellation rate of 35%, we decided to incorporate this problem into our ongoing quality assurance review.

**Methods:** Three categories of cancellation were identified: avoidable, unavoidable and no show. To resolve the avoidable category, the following actions were taken: (1) discussed the problem with the outpatient clerk supervisor; (2) developed patient preparation protocols to be given to each patient scheduled for a test; (3) sent a memorandum to all housestaff explaining the protocol; and (4) called the patient's home the evening prior to the test to remind him of the necessary preparations.

**Results:** During fiscal year 1993, we performed more than 400 tests. At the beginning of the fiscal year, we were experiencing 10% avoidable and 13% no-show cancellations. At the end of our monitor, the percentage had been reduced to less than 2%.

**Conclusion:** The cancellation rate of <sup>201</sup>Tl myocardial SPECT can be improved if attention is paid to patient preparation and communication.

**Key Words:** thallium-201-chloride; myocardial SPECT; quality assurance; cancellation

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The cancellation of <sup>201</sup>Tl-chloride myocardial SPECT imaging had been an ongoing problem in our nuclear medicine service over the years. When we began the study, the overall cancellation rate was 32% and was as high as 35% in previous years. We decided to incorporate the problem into our ongoing quality assurance review to solve this problem. The effects of the cancellations were varied. They included inefficient use of personnel time, inefficient use of the gamma camera and increased radiopharmaceutical costs. Usually

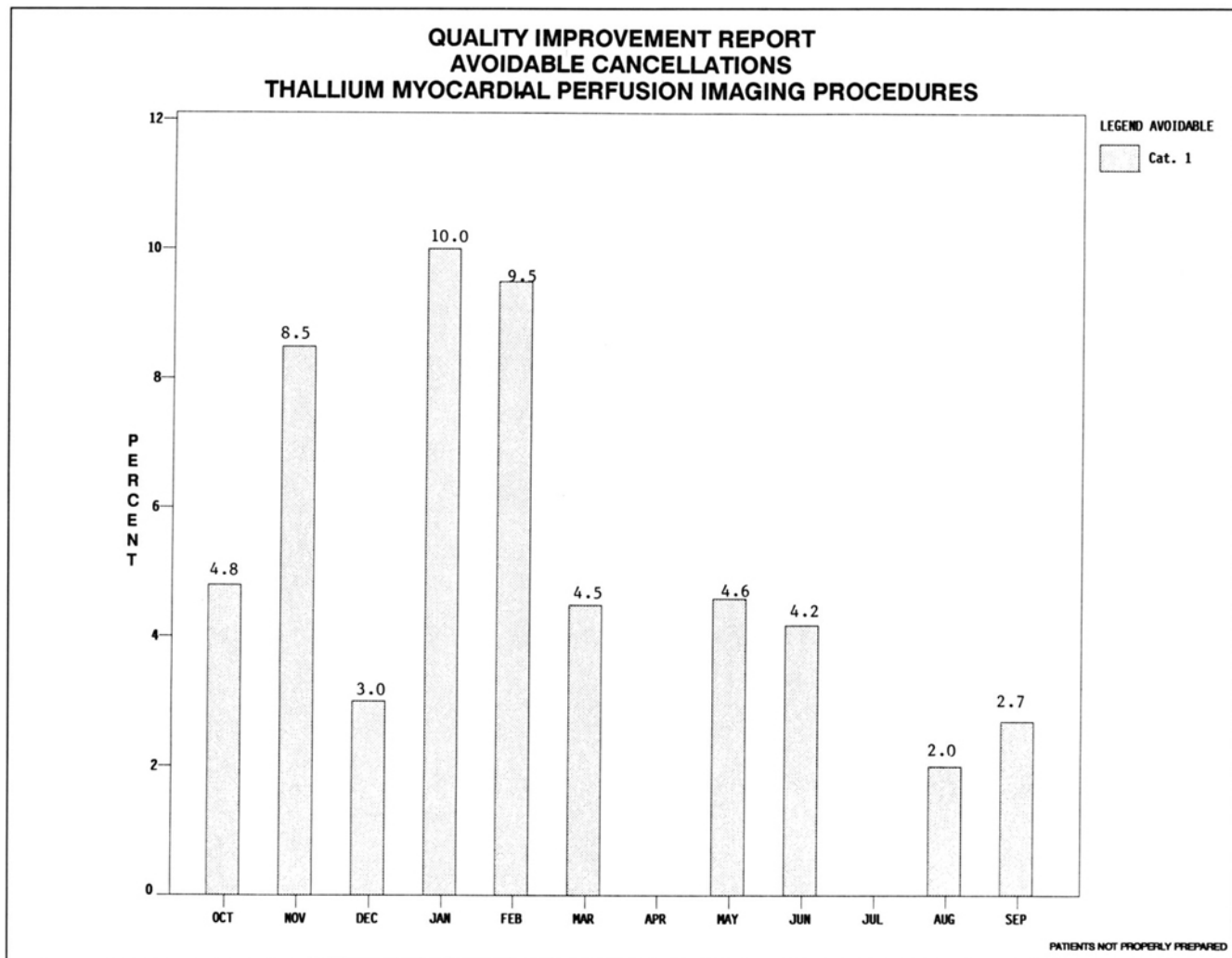
once a patient has cancelled, it is difficult to substitute another patient who is on the waiting list for that same day. At one time, we had a 2-mo backlog of scheduled patients. Therefore, it was imperative that we maximize utilization of camera and personnel time.

### **MATERIALS AND METHODS**

During the past fiscal year from October 1, 1992 to September 30, 1993, we performed 412 <sup>201</sup>Tl-chloride myocardial SPECT imaging procedures. We reviewed the cancellations of all patients to find the reasons for the cancellations. The cancellations of <sup>201</sup>Tl-chloride SPECT were divided into three categories: avoidable, unavoidable and no show. Avoidable cancellations (n = 18) were defined as those resulting from patients who were not properly prepared, such as not fasting, medications not withheld as appropriate, and/or scheduled for the wrong test. No show cancellations (n = 32) were those which resulted from patients who either forgot or refused the test. Unavoidable cancellations (n = 38) resulted from patients who required emergency surgery, emergency catheterization, had elevated blood pressure or other health problems.

To resolve the cancellations, the following actions were taken. We discussed the cancellation problems with both the inpatient and outpatient scheduling supervisors and clerks. Patient preparation protocols were developed to be given to each patient scheduled for a test. The preparation protocol emphasized (1) nothing-by-mouth (NPO) after midnight except for water; (2) omitting the morning dose of beta-blockers and calcium channel blockers with the exception of Nifedipine; (3) taking the patient off Atenolol for 24 hr and Nadolol for 36 hr before the test; and (4) beta and calcium blockers not to be omitted in unstable patients and those patients with acute myocardial infarction occurring within 3 wks. For Persantine <sup>201</sup>Tl imaging, in addition to NPO, medicines containing methyl xanthine were not allowed for 24 hr before the test and for 36-48 hr for slow-release preparations and avoidance of coffee, tea and soft drinks containing

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**FIGURE 1.** Avoidable cancellations of  $^{201}\text{Tl}$  myocardial imaging procedures during fiscal year 1993.

caffeine for 6–12 hr. A memorandum was sent to all house-staff explaining the preparation protocol and stressing the importance of having the patient properly prepared. For outpatients, each patient's home was called the evening prior to the test reminding the patient of the test and its preparation. From this, we learned that many of the patients had not been informed of the procedure.

### RESULTS

During fiscal year 1993, we performed 412 procedures. Figures 1, 2 and 3 depict the data for avoidable, no show and unavoidable cancellations, respectively. During the first part of the year we were experiencing as high as 10% of avoidable cancellations and as high as 13% of no show cancellations. At the end of the year we had reduced the avoidable and no show cancellations to 2%–2.7% of total avoidable cancellations. There was no improvement in the unavoidable category.

### DISCUSSION

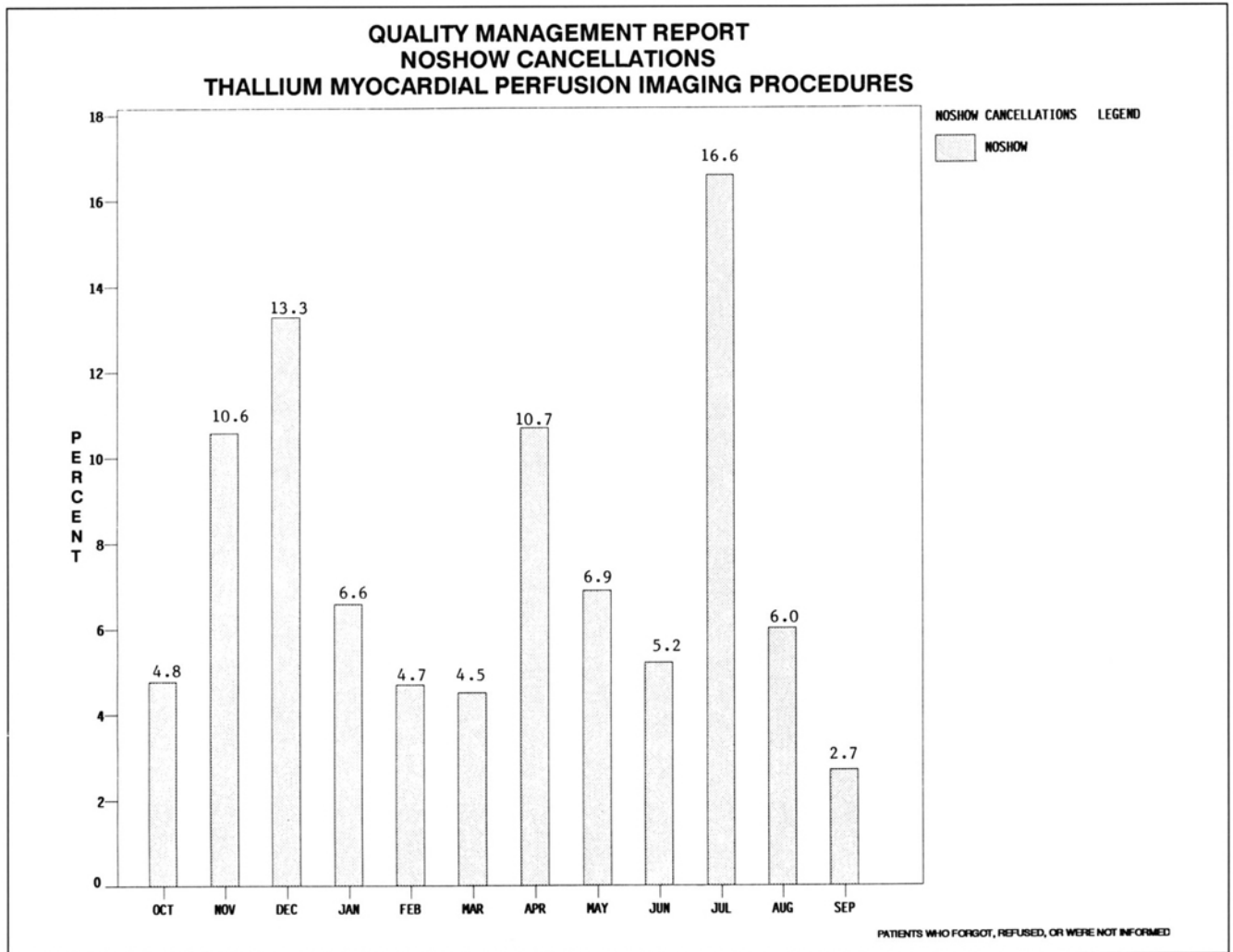
The clinical utility of  $^{201}\text{Tl}$  stress SPECT scintigraphy is well established (1,2). In spite of the recent introduction of

$^{99\text{m}}\text{Tc}$ -labeled myocardial perfusion imaging agents,  $^{201}\text{Tl}$ -chloride myocardial stress or Persantine SPECT is still routinely used in the detection of coronary artery disease (CAD) in patients presenting with chest pain (3,4), the assessment of myocardial viability, the determination of prognosis in CAD (3–6), and perioperative cardiac risk (2,7,8).

Thallium-201 is a cyclotron-produced radionuclide with a half-life of 73 hr that requires ordering on a daily basis from a radiopharmaceutical company. Besides the myocardium, thallium is initially distributed in other tissues or organs including the gut. Therefore, the patient should remain NPO for 4–6 hr before  $^{201}\text{Tl}$  is injected; this allows for a decrease in splanchnic blood flow and diminished thallium uptake in the bowel and the liver.

It has been recommended that calcium antagonists and beta-blockers such as propranolol be discontinued for a sufficient length of time before the examination to avoid any interference with obtaining an adequate stress test (9). Long-acting nitrates should also be withheld on the day of testing.

In this regard, controversy exists. One study demonstrated that pretreatment with isosorbide dinitrate increased



**FIGURE 2.** No show cancellations of  $^{201}\text{Tl}$  myocardial imaging procedures during fiscal year 1993.

$^{201}\text{Tl}$  uptake on exercise scintigraphy thus diminishing sensitivity for CAD (10). However, in other studies, neither beta-blockers nor calcium blockers seem to significantly affect the sensitivity or specificity of  $^{201}\text{Tl}$  imaging for CAD detection (1).

For the Persantine test, medicine containing xanthines should be discontinued for 24 hr and slow-release xanthine preparations should be discontinued for 36–48 hr (9).

The nature of  $^{201}\text{Tl}$ -chloride requires ordering in advance and the type of test requires extensive patient preparation. Also, approximately 50% of the patients were from the out-patient clinic, making it difficult to enforce preparation compliance. Making a phone call on the evening prior to the test to inform the patient of the procedure would certainly eliminate or reduce the no show and avoidable cancellations.

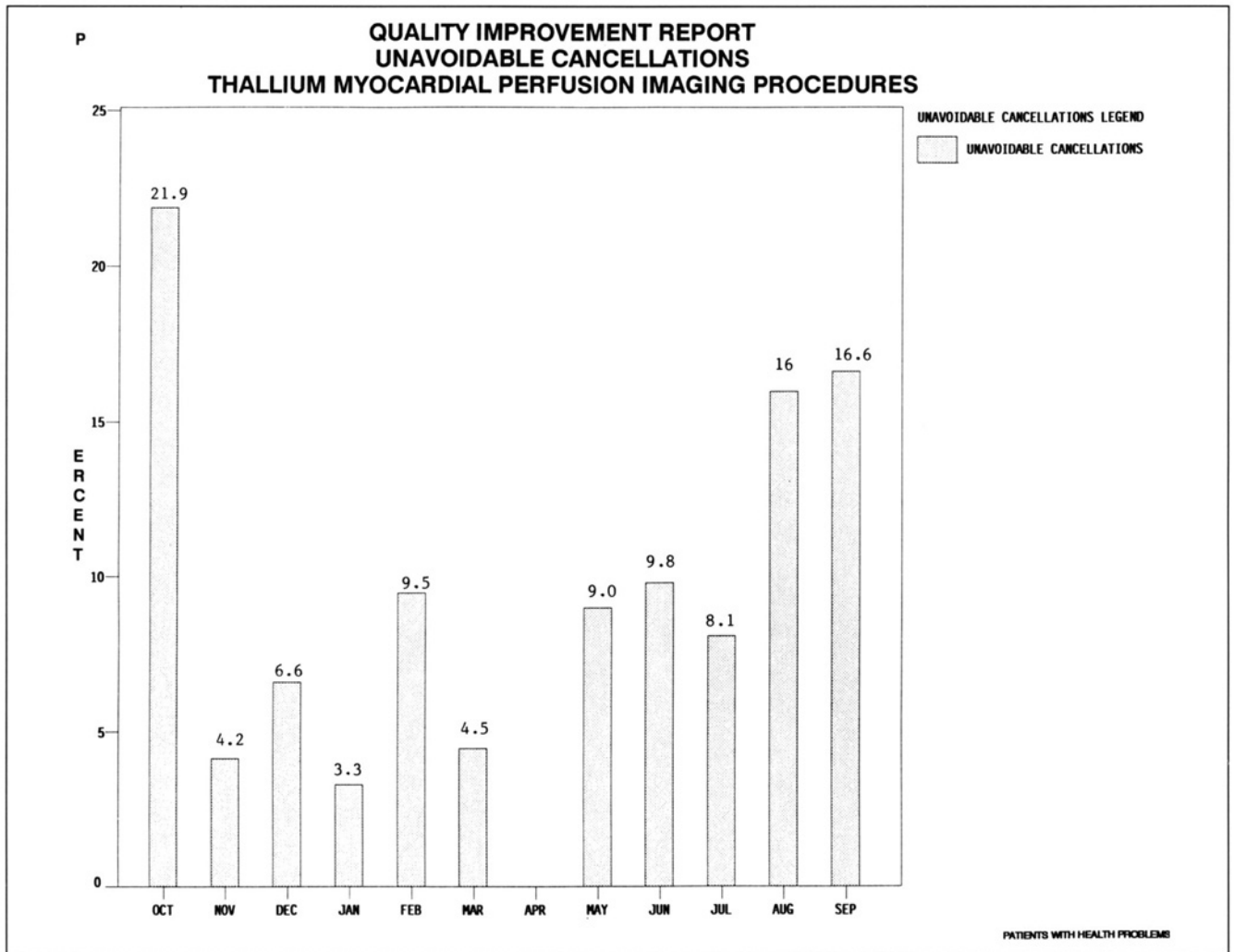
Improvement in the avoidable and no show categories were as anticipated. The results of the avoidable cancellation group showed a significant reduction from 10% to 2.7% and the no show group reduced from 13% to 2.7%. Improved communication between the nursing staff/clerks and pa-

tients, including verbal and hand-out material, resulted in reducing the category of avoidable cancellations. The result of our technology staff calling the patient's home as a reminder of the test and test preparations, resulted in a reduction in the no show category.

We had little or no control of the patients of the unavoidable cancellation group because the patient's cancellations were due to emergent surgery, emergent catheterization, elevated blood pressure and/or other health problems. In conclusion, cancellations of  $^{201}\text{Tl}$ -chloride myocardial SPECT can be improved if attention is paid to patient preparation and communication with patients.

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**FIGURE 3.** Unavoidable cancellations of  $^{201}\text{Tl}$  myocardial imaging procedures during fiscal year 1993.

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