

# The PET/CT Report: The Most Important Part of the Study

**T**he collaboration between the Centers for Medicare and Medicaid Services and the nuclear medicine community to develop and implement the National Oncologic PET Registry (NOPR) was a major step forward in defining the utility of  $^{18}\text{F}$ -FDG PET in areas of oncology not previously reimbursed. The effort grew out of a realization that it was the only practical way to develop the information needed to identify the indications in which PET was truly useful. The effort was

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also novel in that it accepted the trade-off between quality and quantity.

The most direct approach to determining the utility of PET for a specific indication in a specific malignancy would be to conduct a prospective multisite clinical trial for each situation. Such an approach, if done properly, would provide rigorous evidence on utility for each indication and type of cancer but would be prohibitively expensive and take years, if not decades, to complete. Such studies are also unlikely to be useful because of the constantly changing imaging technology—the information obtained would be obsolete by the time the trials were concluded.

Instead, the approach of accepting almost any  $^{18}\text{F}$ -FDG PET study in a

wide range of indications and malignancies, with a remarkably large number of participating sites, was undertaken. There was little attempt at standardization across imaging sites. Starting in May 2006, patient registration began. Within a year, 80% of the PET facilities in the United States had signed up to participate. By the end of September 2008, more than 100,000  $^{18}\text{F}$ -FDG PET studies had been entered (1). This has been a remarkably successful effort, and data analysis is continuing to help determine the efficacy of  $^{18}\text{F}$ -FDG PET in a wide variety of settings. Although this approach has the problem of the studies not being done in a standardized way, this problem can actually be viewed as an advantage since the results reflect the way PET/CT is done in the real world.

Because the dictated reports for each study were submitted for each of the NOPR cases, these reports also provide a rich resource for investigation. There is significant concern among the academic nuclear medicine community that the interpretation and reporting of PET results varies widely in quality and that if reports could be improved and standardized, the acceptance and use of PET by referring physicians would increase overall. This concern was part of the reason that the Society of Nuclear Medicine (SNM) PET Utilization Task Force was organized in the fall of 2007. The quality of PET reports was a specific concern identified, and a small subcommittee was formed to address this concern. An initial report, at least partially from this subcommittee, has been published (2).

In this issue of the *Journal of Nuclear Medicine*, a paper by Coleman et al. (3) examines the quality of these reports in terms of the presence or absence of 34 elements that should ideally be included

in a comprehensive report. Because there is likely to be significant interobserver variability in judging the quality of a report, Coleman et al. also looked at interobserver agreement, as well as the overall presence or absence of the specific elements in the reports.

As was suspected, the quality of PET/CT reports varies widely. In over 90% of the reports, 9 of the 34 elements were included, but in a remarkably large fraction of the reports, major elements were missing. The most disturbing is that in only 56% of the reports was the clinical indication for the study clearly addressed. This is probably the most important of the 34 elements. The referring physician has sent the patient to get an  $^{18}\text{F}$ -FDG PET/CT study done to answer a specific question. If the reason for doing the study is not clearly addressed in the impression portion of the report, the report is unlikely to have any impact on patient management. Further, the referring physician finds it discouraging to get a report that does not help. Ultimately, that physician's response will be to order fewer PET/CT studies if the perception is that they do not help in the clinical management of patients.

The problem sometimes is that the question is not well articulated, such as: "Patient with lung cancer. Please do PET scan." In only 58% of the reports is the reason for the study clearly indicated. Part of the time the reason was never specified adequately, and part of the time the interpreting physician did not appropriately include the reason in the dictation. If the request is not clear, it is the job of the PET center staff or the interpreting physician to ensure that a clear question is being asked. In either case, this element of the report is essential if reimbursement for the study is to be successful and if

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the interpreting physician is to render a meaningful report.

As has been recognized in the SNM PET Utilization Task Force, the referring physician is a critical element in increasing the appropriate use of PET/CT studies. There is a general recognition in the nuclear medicine community that  $^{18}\text{F}$ -FDG PET/CT studies result in a significant change in management in 10%–30% of the patients studied, with significant variation between different malignancies (4). Initial analysis of the NOPR studies showed a change in management in 38% of the patients (5). Certainly additional studies, including follow-up studies of the NOPR patients, need to be done to determine the appropriateness of the changes in management, but it is likely that most of the changes are indeed appropriate and often avoid futile surgery or ineffective chemotherapy.

Although health care regulators are increasingly concerned that the cost of sophisticated medical imaging, such as PET/CT, is getting out of control and must be decreased, the reality is that PET/CT, when done appropriately and with the results accurately conveyed to the referring physician, brings about a change in management that results in significant cost savings to the health care establishment. This point seems to be clear to many, if not most, nuclear medicine physicians but is not widely accepted by the health technology assessment community. It is the job of the nuclear medicine community to conduct the appropriate studies and to clearly communicate this fact to health care regulators.

A possible weakness of the paper of Coleman et al. is that, for practical reasons, only 180 reports were examined to generate the results. The paper would have been stronger and might have brought additional points to light if all the reports submitted as part of NOPR had been examined. Clearly, this is impractical using human observers. However, it may be possible to use computers to extract the presence or absence of the essential elements of a report (6). A brief review of the literature reveals a major area of research that is under way in automatic text recognition and that could be brought to bear on this question. The implications are significant. If the automatic approach can be made reliable, all the NOPR reports can be evaluated and a more extensive analysis done. The approach could presumably be extended to other settings, including collection of outcome data to correlate with the PET/CT reports and the change-of-management decisions. Computer analysis of reports would also be facilitated if the reports were in a structured format (7). In addition, the widespread use of structured reports would almost certainly improve their overall quality.

A particularly interesting possibility, assuming the computer analysis can be shown to be robust, repeatable, and accurate, would be to use the approach in a pay-for-performance program. The existing Centers for Medicare and Medicaid Services pay-for-performance programs have been difficult to implement and, particularly in imaging, have not accurately corre-

lated with true performance. A program that could accurately determine whether a report clearly addressed the clinical question would be a far better index of performance than determination that the current study was compared with a previous study (in bone scans), currently the only nuclear medicine pay-for-performance index that is in place (8).

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