

Quality assurance in outpatient CT

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Quality assurance initiatives developed for outpatient CT are discussed in this report. Three user-friendly documents are described: a patient information sheet, a medical history questionnaire, and an emergency worksheet. In an era when more outpatient procedures are being performed with less personnel, these three documents can enhance patient care and improve communication among patients, technologists, nurses, and radiologists.

Introduction

In the current era of cost containment and managed care, most medical work-ups are performed on an outpatient basis. Working with a higher patient volume and a smaller work force (fewer technologists, nurses, and radiologists), optimizing patient care is a challenge to medical professionals in CT. The three quality assurance initiatives for CT described in this report aim to educate patients and the members of the CT team in the hopes that this will facilitate a smoother transition to successful managed-care procedures and diagnos-

tic treatment options. In this report, CT is addressed as a process, with communication presented as a key issue from the time of scheduling to the time that a final report is received.

Quality assurance in outpatient CT

Patients undergoing any medical procedure should be assured of the standard of quality of the procedure. Three quality assurance initiatives have been developed for outpatient CT to help further this goal. A one-page introductory form was designed for patients to read prior to their CT examinations. This form provides patients with information on dietary restrictions, examination times, and image interpretation and reporting. Secondly, a medical history questionnaire was developed to obtain any information that may be relevant to a diagnosis or to potential complications, as well as to enhance patient satisfaction with quality of care. Patients were asked to complete this questionnaire when they arrived in the radiology department on the day of their CT. The medical history form allows technologists, nurses, and radiologists to gain information about the patient's medical, surgical, and allergy history. Finally, a one-page emergency worksheet was designed to help the radiology staff to document any adverse reactions, and to record the appropriate interventions that followed.

Introductory form: the patient information sheet

The one-page introductory form shown in figure 1 had been distributed to patients when they registered at the CT desk on the day of the examination. In addition, in a pilot project involving referring physicians whose offices have high CT volumes, the introductory form was

given to patients at the time of exam scheduling. The dissemination of information about the CT exam has decreased patient anxiety and confusion. Also, the introductory form enhanced patients' knowledge of the CT procedure and how the results would be communicated. Information provided in this easy-to-read format has also helped to allay some of the worries and fears of the patients' family and friends. In the pilot project, where the introductory form was given to the patient at the time of scheduling, an added benefit was realized: Secretaries, nurses, and physicians in the referring doctors' offices had valuable input in how to explain the CT process and discuss examination preparations with the patients.

Future possibilities for enhancing the effectiveness of the CT introductory form include:

1. Expanding the distribution of the sheet to include all offices and clinics where CTs are ordered.
2. Developing information sheets for non-English speaking patients.
3. Changing the format to a videotape or interactive computer presentation.
4. Adding relaxation training to the provision of information.¹

Medical history questionnaire

Upon arrival in the radiology department on the day of their CT exam, patients were given a one-page medical history questionnaire (figure 2) to be completed immediately prior to the scan. The data helped the CT team to establish the reason for the study and the patient's risk profile, especially in cases where intravenous contrast material was administered.² In addition, the medical history form served as an introduction of the patient to the CT team. The provision of information regarding medical

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**PATIENT INFORMATION SHEET
CT SCAN (COMPUTERIZED TOMOGRAPHY)**

Your appointment is: Date _____ Time _____
 Type of CT Scan _____ Report to _____

Computed tomography (CT) uses x-rays and computers to image the body. We will make all attempts to perform your study on time. Occasionally, emergencies arise that may delay your scheduled CT appointment.

Preparation:
 Usually no special preparation is required. However, if you are scheduled for a CT of the abdomen/pelvis, you should not eat for 2 hours prior to the study.

Iodinated contrast material may be administered through a vein during the scan. You may experience a warm sensation which is expected. If you have a known allergy to iodine or radiographic contrast material, or if you have diabetes, asthma, multiple myeloma, or kidney problems, please notify the receptionist, technologist, nurse, or radiologist.

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Examination:
 A CT examination lasts approximately 30 minutes. During the CT examination, it is important to remain still and follow the technologist's instructions. You will be lying flat on a table which is controlled by the technologist. If you need the technologist's attention at any time, speak and the technologist will assist you.

After the scan is completed, we request that you wait in the radiology department while the images are photographed. The images will be evaluated to see if any additional scans are needed. Later, after careful examination of the images and comparison with other studies (if available), the radiologist will dictate a report to your physician.

If you encounter any problems understanding this instruction sheet or if you have any questions regarding your CT scan, please notify your requesting physician or the radiology department.

B

FIGURE 1. Patient information sheet.

RADIOLOGY INFORMATION WORKSHEET

Patient Name: _____ Sex: M / F
 Age: _____
 Name/phone number of physician who ordered this exam: _____

1. Reason for this exam: _____
2. Are you pregnant? Yes No NA
3. Have you had any barium or contrast exams within the past week? Yes No
 If yes, please notify the receptionist/ technologist immediately.
4. Do you have any allergies to:
 Medications: Yes No
 Food: Yes No
 If yes, please explain: _____
5. Do you take any medications? Yes No
 If yes, please list: _____
6. Do you have thyroid disease? Yes No
7. Is your iodine intake restricted? Yes No
 If yes, please notify the receptionist/ technologist immediately.
8. Do you have high blood pressure? Yes No
9. Do you have heart disease? Yes No

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10. Do you have asthma? Yes No
11. Do you have diabetes? Yes No
12. Do you have kidney disease? Yes No
13. Have you had a kidney removed? Yes No
14. Do you have any other known diseases? Yes No
 If yes, please explain: _____
15. Have you had surgery before? Yes No
 If yes, please explain: _____

Old imaging studies are often helpful as we interpret your current exam.
HAVE YOU HAD ANY SCANS, X-RAYS, OR IMAGING STUDIES IN THE PAST?
 What type of study? _____
 When? _____
 Where? _____

I hereby authorize the radiology department to obtain any of my previous x-ray studies.
 Signature: _____
 Date: _____
 Home Phone #: _____
 Work Phone #: _____

B

FIGURE 2. Medical history questionnaire.

RADIOLOGY EMERGENCY WORKSHEET	
TECHNICAL INFORMATION	
Scan type: _____	
Oral contrast	Yes No
IV contrast	Yes No
Other contrast : _____	
Contrast medium type: _____	
Concentration: _____ Total dose used: _____	
Injection: Single: _____ Multiple: _____	
Largest single dose: _____	
Duration of injection: _____	

IN CASE OF AN ADVERSE REACTION, PLEASE COMPLETE THE FOLLOWING:	
Reaction onset: during injection: _____	
After injection: _____	
Time of onset after injection: _____	
Describe symptoms: _____	
Urticaria	_____
Facial edema	_____
Difficulty breathing _____	
Bronchospasm _____	
Laryngeal edema _____	
Pulmonary edema _____	
Other: _____	
Treatment: _____	
Antihistamine _____	
Steroid _____	
Other: _____	
Outcome of reaction: _____	
Cause of reaction: _____	
Comments: _____	

_____ Signature of recording M.D., R.N., or technologist	

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FIGURE 3. Emergency worksheet.

and surgical problems and allergies helped the patient to communicate any special concerns to the CT staff and, therefore, helped to personalize patient care in a high-volume outpatient setting.

Future possibilities for enhancing the medical history questionnaire include:

1. Changing the format to a computer-based system, wherein entries would be maintained on a database and updated at the time of each CT.

2. Linking the data collection process to the referring physician's office in an attempt to obtain more accurate and up-to-the-minute medical and surgical information.

Managing contrast reactions: The emergency worksheet

Allergic reactions to contrast agents used in CT may be life-threatening. The patient should be monitored closely prior to, during, and after any CT study.³ Early signs of a contrast reaction may be subtle, such as reddish skin, itching, sneezing, a warm sensation, hives, a metallic taste in the mouth, or a tickle in the throat. More severe reactions, including difficulty swallowing, difficulty breathing, anaphylaxis, cardiac arrest, and respiratory arrest, may occur instantly in the CT suite, and they are potentially fatal. All members of the CT team must be able to

recognize the signs and symptoms of contrast reactions and be able to initiate proper resuscitative actions, when necessary. The CT team members should be able to monitor patients, obtain their vital signs, and record pertinent clinical information and resuscitative interventions on a flow sheet. The emergency worksheet shown in figure 3, was designed to help document adverse reactions, and to record the appropriate treatments.

In the future, the effectiveness of the emergency worksheet may be enhanced by transferring the documentation of an adverse reaction from the worksheet to the radiology department's information system computer. By transferring this document to the system, information on a patient's adverse reactions would be readily available to those monitoring that patient during the next imaging study.

Discussion

Quality assurance involves the introduction of changes to improve performance.⁴ Quality assurance is not meant to be a static entity; rather, it is an evolving, dynamic process. The three quality assurance initiatives described in this report grew out of informal collaborations among physicians, nurses, and technologists, with an interest in setting a standard of high quality in patient care. These ini-

tiatives place emphasis on the patient, allowing the patient to learn more about their CT examination and enabling the CT team to become better acquainted with the patient's specific needs.⁵

Quality assurance initiatives such as these questionnaires and information sheets can help to enhance patient care in an era where more outpatient procedures are being performed with less personnel. We feel that initiatives similar to those presented here should be developed for other modalities and for other organ systems within radiology. *AR*

Acknowledgments

The authors thank Joyce Buchanan and Mary Ann Waggoner for secretarial assistance.

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