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How to Image a Child by PET–Computed Tomography

Sue C. Kaste and M. Beth McCarville

Positron emission tomography (PET)–computed tomography (CT), which merges functional and anatomic imaging, is likely to herald a new generation of imaging modalities. Despite increasing interest and expertise in PET-CT, incorporation of such new technology into any department can be a challenge. Each department has its individual needs, personality, strengths, and weaknesses. The organization and integration of such imaging equipment must reflect these individual institutional and departmental characteristics, plus available supporting resources and the characteristics of patient cohorts.

The applicability of PET/PET-CT is well demonstrated in the adult population, particularly for oncologic and seizure imaging. It has only recently been applied in pediatrics, and therefore experience in the logistics and techniques for imaging children and adolescents are limited. Similarly, the diagnostic sensitivity and specificity of PET/PET-CT and its effect on patient management and outcomes are still largely uncharacterized.

This chapter addresses several issues raised by pediatric application of PET-CT. It is written primarily from the vantage point of a dedicated tertiary-care pediatric institution. However, it also addresses issues that can be expected to arise when children are scanned in a predominantly adult department. This chapter does not address all concerns, but rather lays a foundation for the implementation of this exciting new technique in the practice of pediatric imaging.

Pre-Scanning Considerations

Interaction with Patient and Family

Efficient and successful completion of the examination requires the cooperation of the patient and family, proper patient preparation, and relief of patient and family anxiety. An inviting, comfortable, child-friendly environment should greet the patient and family upon arrival to minimize their anxiety. At the time of scheduling, the patient and family should be advised of the pre-scan fasting requirements, adjust-

ment of potential hypoglycemic medications, the need for quiet rest during the equilibrium phase, the expected length of the examination, and the sharing of results with the appropriate family members.

Pre-scan education should be directed at both the parents and the patient. The amount of information that children can understand and their ability to participate in procedures are typically underestimated (1–4). However, children are not small adults, and interactions with them should be age-appropriate (1–4). The family should be instructed in radiation safety, with emphasis on maintaining maximum distance from the patient during the uptake phase. We typically permit one family member to remain with a young child during the uptake phase. However, pregnant family members and siblings should not be present after fluorine-18 fluorodeoxyglucose (^{18}F-FDG) has been administered. If a single adult arrives with the young patient and siblings, care for the siblings may be a matter of urgency. Therefore, the family should be advised to arrange for child care before the appointment, or provisions for such care should be proactively arranged by the institution or department.

The same principles of radiation safety must be extended to ancillary personnel, who should also be monitored for radiation exposure. This precaution applies particularly to those in prolonged close proximity to the patient, such as sedation nurses and anesthesiologists. A rotation schedule like that used for nuclear medicine technologists may be needed in some departments. Such provisions depend on the number of PET-CT cases per day, staff availability, and departmental and institutional resources. In some cases, movable clear shields may be used to enhance the protection of personnel and family members from radiation.

Scheduling and Logistics

Coordination of Related Services

Numerous institutional departments and services must coordinate their efforts in order to successfully care for the pediatric patient and obtain the optimal PET-CT imaging. Figure 9.1 shows many of the resource components that must be organized. The key to successful completion of the study is communication and coordination of the many services involved. The role of each component is briefly addressed below.

The PET/PET-CT study begins with a request for the examination by the health care provider. The request should include the age of the patient, details about why the examination is needed, pertinent medical history (e.g., allergies, current medications, history of diabetes, surgery), need for sedation/general anesthesia, and whether an interpreter is needed.

Upon receipt of the request, the scheduler must identify potential scheduling conflicts (e.g., other imaging studies, clinic appointments, sedation requirements, laboratory tests). The range of services needed and their availability for the individual patient must be identified. Upon verification of the PET/PET-CT appointment, the patient or

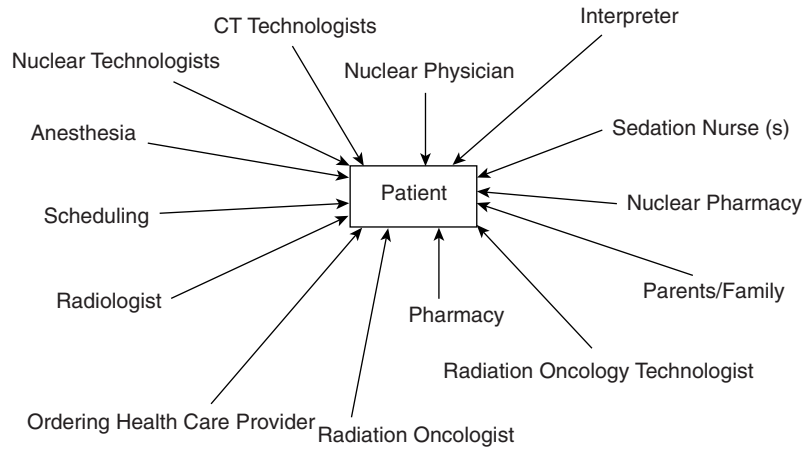

Figure 9.1. Diagram of the interaction of the multiple departments and personnel necessary for coordination of PET/PET-CT.

family is given the appointment time, preexamination preparation instructions, and contact information should the patient or family have questions.

Behind-the-scenes preparation includes the scheduling of a sedation team member or anesthetist, an interpreter if needed, reservation of the uptake room and PET/PET-CT scanner, identification of needed nuclear medicine or CT technologists, and scheduling of a recovery area in the event that sedation or anesthesia is used.

When the PET/PET-CT study is scheduled, order details entered into the scheduling system appear on the work schedules of the diagnostic imaging or nuclear medicine department, depending on the institution. This item on the schedule prompts the nuclear medicine technologist to interact with the nuclear pharmacy to ensure that the ^{18}F-FDG dose will be available at the appropriate time. The designated radiologist or nuclear medicine physician responsible for the study reviews the order details and prescribes the patient positioning, anatomic areas to be assessed, and possible use of contrast material.

If the information obtained from the PET/PET-CT study is to be used for radiation therapy treatment planning, direct interaction with the designated radiation oncologist and radiation therapy technologist is needed to facilitate PET/PET-CT data acquisition. This interaction is particularly important when PET/PET-CT images are to be electronically merged with information stored in computer programs used to design the radiation therapy treatment plan.

The primary health care provider and the institutional pharmacy should be notified of a PET/PET-CT study on an inpatient to allow adjustment of diabetic medications, intravenous fluids, and total parenteral nutrition.

In an institution such as ours that has central scheduling and electronic order entry, coordination of some of the resources can be built into the order set for the PET/PET-CT. Similarly, patient preparation

instructions can be automatically printed at the time of scheduling and given to the patient or appropriate family member. These instructions can be linked to the electronic medical record for the reference of house staff and nursing personnel.

In the absence of electronic scheduling, the needed services are usually coordinated by the scheduler, who phones each department to request that the needed services be available at the agreed-upon appointment time. One central person should be responsible for relaying the appointment information to the patient or accompanying family member.

Additional scheduling considerations may be necessary when pediatric patients undergo PET/PET-CT imaging in a predominantly adult department. Scheduling adjustments might include specified days of the week for pediatric imaging, a special waiting area with child-appropriate activities, pediatric-oriented informational brochures, and child life personnel who interact with patients and family members. To further minimize patient and family anxiety, consideration should also be given to placement of the intravenous access by pediatric specialists before the patient reports to the imaging department.

Diagnostic CT Imaging Performed Simultaneously with PET/PET-CT

Contemporary PET-CT units merge state-of-the-art CT and PET elements, allowing routine diagnostic CT imaging and PET scans to be performed independently of each other. In our institution, PET-CTs take priority over routine diagnostic CTs on the PET-CT unit. However, any unscheduled table time on the PET-CT unit may be used for routine CTs, biopsies, radiation therapy planning, etc. Such prioritization varies among institutions and depends on the number of CT scanners, the number of PET-CT scanners, and the number and types of cases. Similarly, scheduling of imaging for clinical management, as opposed to studies driven by research protocols, reflects the caseload of the institution.

The level of demand for PET-CT studies shortly after installation of our equipment allowed the use of the PET-CT unit for both a PET-CT and a diagnostic CT on the same patient, when so ordered. The orders were designed so that the CT could be ordered within the PET-CT order; it was not necessary to schedule them separately. The two studies could be completed within a single 60-minute appointment time. This scheduling method made efficient use of the imaging table, shortened patient visits, minimized patient inconvenience, and averted any need for multiple administration of sedation or anesthesia. The imaging department member responsible for the PET-CT would prescribe the studies in such a way as to minimize radiation exposure to the patient and optimize the information obtained. Low-dose CT parameters are typically used for the attenuation-correction CT, and standard CT imaging parameters are used for the diagnostic study. However, a diagnostic-quality CT scan using a higher milliampere-second (mAs) setting than routinely used for the attenuation-correction CT can be used for used for PET-CT and eliminates the need to perform

two separate CT scans. If needed, display field of view (DFOV) can retrospectively be changed. An additional 10 to 15 minutes of postprocessing time on the system console is needed to convert the image data into an acceptable diagnostic CT. This method would typically include the oral administration of contrast material before the attenuation-correction CT is performed. Intravenous contrast material would be administered during the attenuation-correction CT. Like others, we have found that the intravenous nonionic contrast and low-density oral contrast media used with diagnostic CT are compatible with PET-CT (4–10).

Patients and parents can be confused by the need to maintain glucose restriction when diagnostic CTs are coordinated with PET-CT. We find that both intravenous (IV) and oral contrast agents used for diagnostic CTs can be used in pediatric PET-CT without compromising the PET-CT study. In fact, as others have reported (4,5), IV and oral contrast can improve interpretation of the PET-CT, particularly in studies of small children with limited retroperitoneal fat and in differentiation of vessels from lymph nodes and tumors that lack ^{18}F-FDG avidity in the mediastinum and neck. However, oral contrast agents must be taken with sugar-free beverages. We provide a choice of flavored sugar-free mixes to our patients. In a department such as ours, where CT and PET-CT technologists are shared and the examinations are performed in adjacent suites, sugar-free beverage mixes for oral contrast agent could be offered to all patients undergoing CT, whether or not PET-CT is also scheduled. Such an approach might minimize patient confusion but places the burden of dispensing the beverages on the technologists and the department. The logistics of such a practice depend on the department and the institution.

Arm position also becomes an issue when the two types of studies are combined; this consideration is discussed below (see Patient Positioning).

With increasing demand for PET-CT studies, we will likely begin performing on the PET-CT unit only those diagnostic CT studies that require sedation or anesthesia. All others will be scheduled on the standard diagnostic CT unit. The diagnostic CT is most often performed as a completely separate study after completion of the PET/PET-CT. This method optimizes use of the PET/PET-CT scanner for its specialized purpose, allows the patient to rest between studies, and allows more flexibility in the administration of oral and intravenous contrast.

Patient Preparation

Forcing of sugar-free beverages or intravenous fluids before administration of ^{18}F-FDG can help to clear background avidity and improve image interpretation. Oral administration of fluids must be coordinated with the need for sedation or anesthesia (discussed below).

To minimize competition between physiologic glucose and ^{18}F-FDG, patients are typically instructed to fast overnight for early morning studies and for a minimum of 4 hours before studies performed later

in the day. Departments may request an NPO (nothing by mouth) period of 4 to 8 hours before ^{18}F-FDG administration (4,11–16). The difference largely reflects patient age and the need for sedation or general anesthesia.

Adherence to an NPO instruction can be particularly challenging in pediatrics. Despite the best efforts of parents and health care providers, pediatric patients seem to have an endless hidden repository of sugar-laden treats. Although a single gummy worm may not adversely affect FDG uptake in an adolescent, a bag of jelly beans can potentially block FDG uptake in a 6-year-old, thus prompting cancellation of the study and the possible waste of the FDG dose.

When studies are performed on inpatients, similar coordination and education should be implemented with the nursing staff, pharmacy, sedation team, and primary care service. There is a real possibility that an inpatient may arrive in the nuclear medicine suite while receiving intravenous fluids, not uncommonly with added dextrose [e.g., dextrose 5% in water (D_5W) with 50 g added dextrose, total parenteral nutrition, etc.]. For this reason, the need for fasting and avoidance of glucose-laden solutions must be communicated to the primary health care service, nursing staff, and pharmacy. Further, management of serum glucose levels in diabetics may be more complicated than adherence to NPO restrictions. Modification of patient diet or medication should be coordinated by the responsible service or individual in collaboration with nuclear medicine, the patient, technologists, and other ancillary personnel.

Medications and liquids that might not readily be appreciated as containing sugars include diphenhydramine (Benadryl) liquid and cough medicines flavored with sugar syrups. Direct questioning of the patient or accompanying adult about the use of such medications is thus necessary.

Serum glucose should be assayed before the radioisotope is injected. Typically, a serum glucose concentration below 200 mg/dL is adequately low to allow FDG uptake into metabolically active tissues. Some departments prefer to maintain a glucometer in the nuclear medicine suite and incorporate a serum glucose check into the pre-scan preparation. In other institutions, serum glucose is determined in the main laboratory and expeditiously reported to nuclear medicine before FDG injection.

Uptake Phase

During the uptake phase (after ^{18}F-FDG injection and prior to imaging), the patient should rest quietly in a warm, nonthreatening environment designed to allay anxiety (Fig. 9.2). A nonpregnant parent, guardian, or health care provider may sit with young children but must adhere to radiation protection guidelines. If the patient is to undergo imaging of the axial and appendicular body, then quiet resting activity may be allowed. Such activity includes watching an age-appropriate video, listening to a story, or listening to music. It can be quite a challenge to keep a toddler or young child at quiet rest for up to an hour after injec-

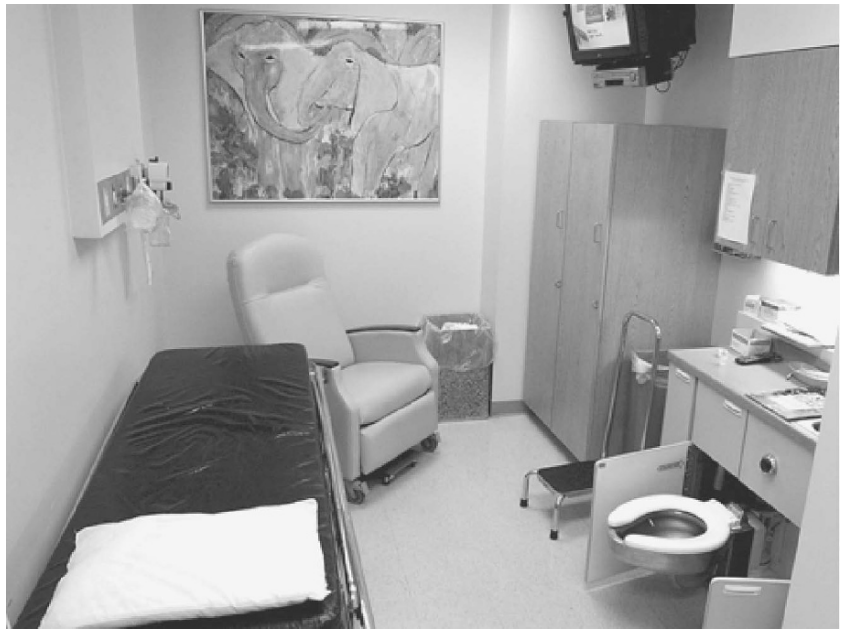

Figure 9.2. The PET/PET-CT uptake room should be fully furnished, comfortable, and nonthreatening for the patient and accompanying adult. Note the wall-mounted television. A ceiling-mounted video camera by which the patient is constantly monitored is located in the corner opposite the television.

tion; even such seemingly negligible activity as chewing gum, talking, or playing video games may complicate FDG interpretation.

If the patient is to undergo PET/PET-CT imaging of the brain, then any stimulation of the central nervous system should be kept to a bare minimum. The room should be darkened, quiet, and soothing. If possible, eye shields should be used to prevent visual stimulation, which can prompt occipital activity. Similarly, videos, music, and talking are avoided.

Uptake of ^{18}F-FDG by thermogenic "brown fat" can complicate image interpretation. The uptake of ^{18}F-FDG by brown fat has been attributed to the ambient outdoor temperature (17–19). It is seen more often in females than males and occurs more often in children and young adults than in older patients (17–19). Rats exposed to a cold room for several hours prior to imaging showed stimulation of ^{18}F-FDG uptake (19). The effect of brief exposure to cool or cold temperatures in humans has not been verified. However, this finding in rats suggests that a warm equilibrium room or possibly the use of an extra blanket or heavier clothing may minimize the ^{18}F-FDG avidity of brown fat. Such uptake can potentially complicate imaging interpretation, particularly when PET is performed without correlative CT imaging (11,12,17–21).

For patients who are extremely restless or anxious, quiet rest may be facilitated by the use of anxiolytic drugs during the equilibrium phase. We do not typically administer such agents. However, if a patient is

noted to be particularly restless during the equilibrium phase or scanning at our institution, or if children have a prior history of anxiety during studies at other institutions, anxiolytics are considered for future studies.

Patient monitoring begins with the registration of the patient in the imaging department and continues from the time of injection until completion of post-scan recovery. At our institution, the patient is injected with ^{18}F-FDG in the uptake room. This room is constantly monitored by a video camera, which allows real-time viewing of the patient and the room from the PET/CT scanning console area directly across the hall.

Scanning of the Patient

Timing of Imaging

Positron emission tomography imaging should be timed in coordination with the chemotherapy cycles to prevent their affecting the results of studies. Imaging done for staging purposes should be performed before induction chemotherapy or other therapeutic intervention.

The timing of follow-up imaging may be more variable. However, we have found that the optimal time to assess the response to therapy is probably just before the next course of therapy. This strategy minimizes any potential "flare" response from chemotherapy, granulocyte colony-stimulating factor, radiation therapy, or even radiofrequency ablation. A flare response typically occurs within 2 days of chemotherapy or radiation therapy. Similarly, postoperative changes are most apparent during the first several weeks after surgery. Therefore, we prefer to wait at least 2 to 3 weeks after surgery before performing follow-up imaging.

Standardization of technique is important to allow the comparison of studies, particularly when response is to be quantified by imaging. As many patients with cancer undergo serial imaging for assessment of treatment response, a log of prior imaging parameters or inclusion of these parameters in the dictated report is helpful to ensure consistent imaging. These include radiopharmaceutical dose, equilibration time, two- or three-dimensional image acquisition, patient height and weight, and patient positioning.

One potentially overlooked aspect of standardization is synchrony of the PET-CT clock with the clock used to determine dose assay times. The "hot lab" clock is typically used to calculate the dose of ^{18}F-FDG at the time of injection, and the clock in PET-CT is used to determine the time that scanning is initiated. Dose quantification for the study at the time of scanning will be inaccurate if these two clocks are not synchronized.

Immobilization of the Patient

Patient immobilization is paramount in obtaining well-registered PET/CT studies with minimal motion artifact. Difficulty in maintain-

ing immobilization is dependent on several factors: child age, medical condition, pain level, physical positioning of the patient on the scanning table, and length of time to complete the study (which is partly dependent on patient size).

There are several standard immobilization techniques that may be used with PET/CT. Swaddling may be considered for very young or small infants and children, particularly for short studies. This technique may be particularly effective if the scanning time can be coordinated with the patient's usual nap time. Immobilization is optimized by ensuring that the patient is comfortable and warm and that any potential pain has been controlled.

More sophisticated immobilization techniques include special cushions similar to those used in radiation oncology: the child is placed on a cushion that is filled with tiny plastic balls and is fitted to the contour of the patient by vacuum extraction. For more cooperative children, patient positioning may be maintained by using sandbags, rolled towels, or pillows held in place by strategically placed strips of tape or Velcro straps.

Certainly immobilization is optimized when the patient is sedated under general anesthesia. In such cases, the anesthesiologist is in control of the patient and positioning must adhere to the needs of the anesthesiologist in the interest of patient safety.

Sedation and General Anesthesia

As with other lengthy pediatric procedures, sedation or general anesthesia may be necessary to complete the PET-CT examination. This is particularly true when imaging very young children who cannot cooperate, those who are mentally impaired, and for the few who demonstrate claustrophobia (11). For some patients, adequate pain control may be all that is needed to complete the study. Our practice is to employ sedation or anesthesia only for the imaging phase of the examination. Rarely, sedation may be needed during the equilibrium phase as well, but such a practice considerably extends the sedation/anesthesia time.

We calculated that 11.3% (16/142) of patients who underwent PET-CT at our institution during the months of September through November 2004 received sedation or anesthesia. We performed eight studies in children aged 0 to 4 years, 28 studies in 5- to 10-year-old children, 74 studies in 11- to 18-year-olds, and 32 studies in patients older than 18 years. Of these, 10 patients aged 22 months to 7 years received intravenous sedation. General anesthesia was administered to five patients aged 23 months to 20 years. One additional patient received intravenous medication for pain control.

The preferred method of sedation/anesthesia varies by institution, department, resources, and patient demographics; detailed discussion is beyond the scope of this chapter. However, it should always be administered according to the published guidelines of the American Academy of Pediatrics and the American Society of Anesthesiologists (22,23). At our institution, sedation/anesthesia falls under the auspices

of the Department of Anesthesia. Under the direction of anesthesiologists or sedation physicians, nurse anesthetists and members of the nursing sedation team assess the patient prior to sedation and administer the sedation, or in the case of nurse anesthetists, general anesthesia. They monitor the patient throughout the examination until full recovery.

Other potential mechanisms for patient care and administration of sedation/anesthesia include management by a sedation pediatrician dedicated solely to this task or by the attending pediatrician, radiologist, intensivist, or emergency room physician. Regardless of the mechanism for managing the patient under sedation/anesthesia, qualified personnel whose only responsibility is the care and safety of the patient must be in attendance throughout the study.

The need for sedation/anesthesia affects study scheduling, the need for supportive staff and resources, and the use and timing of oral contrast administration. We have strict NPO requirements designed according to the practice guidelines of the American Academy of Pediatrics and the American Society of Anesthesiologists (22,23) that prohibit oral contrast ingestion less than 2 hours prior to sedation. These patients may require separate appointments for PET/PET-CT and a diagnostic CT for which opacification of the gastrointestinal tract is needed. We make every effort to minimize the number of potential sedations, contrast administrations, and appointments for the patient while optimizing the use of imaging and staffing resources. However, patient imaging must be managed on a case-by-case basis as discussed above.

Patient Positioning

The standard position for PET imaging is the position of comfort with the patient supine and arms at the sides or over the head if the patient can tolerate the position. If the primary site of interest is in the head or neck, then the arms should be placed alongside the torso. However, this position causes significant streak artifacts on the CT images, often limiting the utility of the images. This is particularly problematic when a diagnostic CT and PET-CT are combined in a single study. If the arms are positioned over the patient's head, then additional imaging stations are required to fully image the upper extremities in total body PET/PET-CT studies. This position is also difficult for patients to maintain during the prolonged PET imaging phase of the study. In such cases, positioning pads or cushions may be helpful. A possible alternative is to lay the patient's arms across the abdomen; however, this position is more difficult to accurately reproduce on subsequent studies. Arm positioning is a particular issue when the primary disease—or metastatic site—is in the upper extremity.

The positioning of the patient is also dictated by the need for sedation/anesthesia, which requires that the airway and the ability to monitor vital signs be given priority. As with any procedure, the physical condition of the patient plays a significant part in positioning. This can be particularly challenging in young or lightly sedated children.

The patience and creativity of the technologists or parents in working with the patient are often the key to successful imaging.

One aspect of positioning that might not be readily apparent is the alignment of the patient positioning for the PET/PET-CT study with the position used for radiation therapy. This positional coordination allows improved merging of image data with the treatment planning data. It may be necessary to scan patients in the prone position or on the positioning cushions as done for administration of therapeutic radiation. Therefore, the imaging team should interact with the radiation oncology team.

Scanning Sequence

Whether a whole-body study (vertex to toes) or a targeted study (e.g., head, torso, pelvis) is performed should be decided by the information needed to care for the patient. In many cases, a PET/PET-CT study is used for tumor staging. In such cases, detection of distant metastatic disease is important for selecting the appropriate treatment strategy. In other cases, determination of the response of a primary brain tumor or the presence of residual disease in a site of previous surgery or radiofrequency ablation may entail a study limited to the area of interest.

Tracer activity in a full bladder can cause significant reconstruction artifacts and may obscure important pathology. To prevent problems caused by the bladder filling between the time scanning is initiated and the time the pelvis is imaged, we image the pelvis first and then scan cephalad through the head in the first set of acquisitions. The rest of the body (pelvis through legs) is scanned in the second set of acquisitions. Between the two sets of acquisitions, the patient is able to void if necessary. Although this method of scanning reduces artifact caused by a distended, radioisotope-filled bladder, it adds 25 to 30 minutes to the appointment.

An alternative method is to use bladder catheterization with gravity drainage. The bladder catheter should be placed prior to imaging but after the child has been sedated/anesthetized to minimize trauma to the patient. If the catheter is placed at a later time during the procedure, the remaining sedation may be inadequate to maintain the child's comfort. A bladder catheter may be needed for children who are to receive sedation/anesthesia, as such medications predispose the patient to bladder activity (11). To avoid catheter artifact, a drainage catheter should be long enough to position the drainage bag outside of the imaging field.

Technologists' Roles

State mandates regulating the licensing and handling of radiopharmaceuticals vary to a certain degree and should be consulted during planning for PET and PET-CT. The roles of the CT technologist and the nuclear medicine technologist must be addressed by each institution. The interest and skills of the available technologists, staffing limitations, and physical location of the equipment, together with

compliance with regulatory mandates, help to define technologists' roles. In some institutions, staffing and familiarity with the operation of a CT scanner may dictate that the CT technologist perform the actual scanning procedure after radiopharmaceutical injection by the nuclear medicine technologist. In other institutions, the nuclear medicine technologists learn CT scanning techniques and are responsible for completion of the entire study.

There are currently no formalized specialty registries for certification of PET-CT technologists. However, the American Society of Radiologic Technologists (ASRT) and the Society of Nuclear Medicine Technologist Section (SNMTS) are collaboratively designing a supplementary training curriculum that will address the needs of practicing technologists who wish to obtain competency in this new modality. The best source of information on local regulatory mandates and legislation is the Radiation Safety Office under which the PET/PET-CT facility operates and under which the technologists practice. Additional useful Web sites include those of the Nuclear Regulatory Commission (http://www.nrc.gov), the American Society of Radiologic Technologists (http://asrt.org), the Society of Nuclear Medicine (http://snm.org), the American Registry of Radiologic Technologists (http://www.arrt.org), and the Nuclear Medicine Technology Certification Board (http://www.nmtcb.org).

When we began PET-CT imaging, the nuclear medicine technologists accompanied the patient to the uptake room, injected the radiopharmaceutical, and transferred monitoring of the patient and completion of the study to the CT technologists. After the appropriate equilibrium time, the patient would be instructed to void and transported across the hall to the PET-CT scan room by the CT technologist, who would complete the patient scanning and image processing. If a diagnostic CT was also ordered, it would be completed during the same appointment time. After scanning was complete, the patient was dismissed by the CT technologists or observed by the sedation/anesthesia team until recovery.

Currently, our nuclear medicine technologists are responsible for all phases of the PET-CT examination. If a diagnostic CT has also been ordered, then one of the CT technologists performs that study separately. A diagnostic CT is currently ordered with PET/PET-CTs in approximately 80% of cases in our institution. This number varies by institution. Transfer of technologist responsibility and transfer of patients between scanners is facilitated in our department by design of the CT imaging suite. The dedicated CT scanner and the PET-CT scanner occupy adjacent rooms with a shared console area.

Conclusion

Positron emission tomography–computed tomography is an exciting imaging modality that merges functional and anatomic information and that is expected to refine assessment of disease and response to

therapy. Though in its infancy, particularly for imaging children and adolescents, it shows great promise in the detection and monitoring of disease. Special logistical procedures should be implemented for the care, safety, and monitoring of pediatric patients. This chapter serves as a starting point for planning and implementing PET-CT imaging in pediatrics.

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