

These guidelines are intended for referring physicians and other health care professionals and are aimed at assisting them in making decisions about appropriate diagnostic imaging for their patients. These guidelines are not intended as a means of restricting the physician's role in the process of decision making in regard to the imaging studies to be requested. They should not be used to diminish in any way the freedom of attending physicians to determine and order imaging studies for their patients for whom they have the ultimate responsibility. Although the guidelines are intended as a guide for referring physicians, we also encourage referring physicians to discuss with their radiologist colleagues if they are unsure about the appropriate imaging of their patients.

Clinical Diagnostic Problem

The guidelines are divided into thirteen sections:

- A. Central Nervous System
- B. Head and Neck
- C. Spine
- D. Musculoskeletal System
- E. Cardiovascular System
- F. Thoracic
- G. Gastrointestinal
- H. Urological, Adrenal and Genitourinary Systems
- I. Obstetrics and Gynecology
- J. Trauma
- K. Cancer
- L. Pediatrics
- M. Breast Disease

Investigation

Notes regarding the most frequent investigations listed:

Computed tomography (CT): CT is now a widely available modality. Furthermore, there have been recent important advances due to the development of spiral and multi-slice CT, which allow the acquisition of large amounts of data from a single breath hold. Such advances have opened up new diagnostic opportunities, such as the use of multi-slice CT in the diagnosis of coronary artery disease. It is worth remembering that CT imparts a relatively high radiation dose. Thus it is always worth considering alternatives, especially in view of the increasing role of MRI.

Magnetic resonance imaging (MRI): With the recent technical advances and increasing experience, the role of MRI continues to expand, and the limiting factor for further expansion is now often equipment availability.

Since MRI does not use ionizing radiation, MRI should be preferred in cases where it would provide information of similar value to that provided by CT (and when both are available).

Nuclear medicine (NM): The specialist in NM will be able to advise on which particular NM investigation should be used. Accordingly, referring physicians should indicate the precise clinical problem requiring investigation, because this will determine which radionuclide (or alternative) investigation is used.

Positron emission tomography (PET): Positron emission tomography has recently made large strides, and its availability is gradually increasing. Because of the short-lived nature of the key radionuclides (the glucose analogue F-18-fluorodeoxyglucose, FDG, is widely used), PET can only be offered within a reasonable distance of a cyclotron and radionuclide pharmacy.

Ultrasound (US): In the last 5 to 10 years, US equipment and expertise have advanced (colour Doppler, power Doppler, musculoskeletal, transvaginal gynecological work, etc.) and the scope of referrals has widened. These trends are to be welcomed because US does not employ ionizing radiation. Its inherent advantages which include cost effectiveness, lack of ionizing radiation, accessibility, multiplanar capability in real time, Doppler interrogation to assess vascularity and its noninvasive nature make US an excellent initial investigation for a wide range of clinical referrals.

Recommendation (Grade)

The recommendations are designated as:

- 1. Indicated:** The investigation most likely to contribute to clinical diagnosis and management.
- 2. Specialized investigation.** Frequently complex, time-consuming or resource-intensive investigations, usually only requested by a specialist or after discussion with a radiologist.
- 3. Not indicated initially:** Includes situations where experience shows that the clinical problem usually resolves with time, and where deferring the study is suggested.
- 4. Indicated only in specific circumstances:** Non-routine studies to be carried out if a physician provides cogent reasons or if the radiologist feels the examination represents an appropriate way of furthering the diagnosis and management of the patient.
- 5. Not indicated:** Examinations which will usually not contribute to the management of the patient

Levels of classification of evidence are based on the system developed by the US Department of Health and Human Services, Agency for Health Care Policy and Research. The levels are:

[A] Any of the following:

- High-quality diagnostic studies in which a new test is independently and blindly compared with a reference standard in an appropriate spectrum of patients
- Systematic review and meta-analyses of such high quality studies
- Diagnostic clinical practice guidelines / clinical decision rules validated in a test set

[B] Any of the following:

- Studies with a blind and independent comparison of the new test and reference standard in a set of nonconsecutive patients or confined to a narrow spectrum of subjects
- Studies in which the reference standard was not performed on all subjects
- Systematic reviews of such studies
- Diagnostic clinical practice guidelines / clinical decision rules not validated in a test set

[C] Any of the following:

- Studies in which the reference standard was not objective
- Studies where the comparison between the new test and the reference standard was not blind or independent
- Studies in which positive and negative test results were verified using different reference standards
- Studies performed in an inappropriate set of patients
- Expert opinion

Dose

The use of radiological investigations is an accepted part of medical practice justified in terms of clear clinical benefits to the patient, which should far outweigh the small radiation risks. However, even small radiation doses are not entirely without risk.

In the CAR Referral Guidelines, the doses have been grouped into broad bands to help the referrer understand the order of magnitude of radiation dose of the various investigations:

Band	Typical effective dose (mSv)
0	0
⊕	less than 1
⊕⊕	1–5
⊕⊕⊕	5–10
⊕⊕⊕⊕	more than 10

Comment

The comments listed in the CAR Referral Guidelines were written to provide direction on why a particular investigation would be the most effective to understand the particular diagnostic or clinical problem. The comments are deliberately informative but succinct, for easy integration into a computerized physician order entry (CPOE) system for diagnostic imaging with attendant computerized clinical decision support (CCDS).