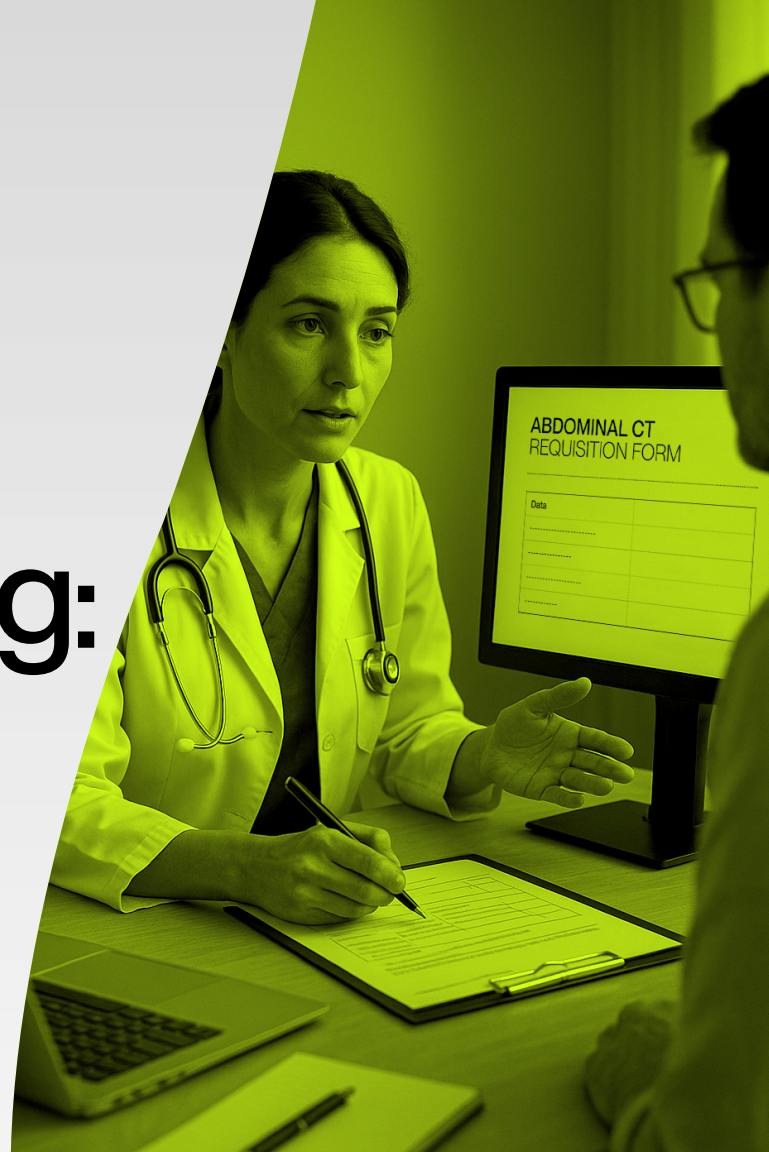


MODERN
RADIOLOGY
eBook

Prescription of Radiologic Imaging: Ingredients for Good Practice

ESR EUROPEAN SOCIETY
OF RADIOLOGY



/ Preface

Modern Radiology is a free educational resource for radiology published online by the European Society of Radiology (ESR). The title of this second, rebranded version reflects the novel didactic concept of the **ESR eBook** with its unique blend of text, images, and schematics in the form of succinct pages, supplemented by clinical imaging cases, Q&A sections and hyperlinks allowing to switch quickly between the different sections of organ-based and more technical chapters, summaries and references.

Its chapters are based on the contributions of over 100 recognised European experts, referring to both general technical and organ-based clinical imaging topics. The new graphical look showing Asklepios with fashionable glasses, symbolises the combination of classical medical teaching with contemporary style education.

Although the initial version of the **ESR eBook** was created to provide basic knowledge for medical students and teachers of undergraduate courses, it has gradually expanded its scope to include more advanced knowledge for readers who wish to 'dig deeper'. As a result, *Modern*

Radiology covers also topics of the postgraduate levels of the *European Training Curriculum for Radiology*, thus addressing postgraduate educational needs of residents. In addition, it reflects feedback from medical professionals worldwide who wish to update their knowledge in specific areas of medical imaging and who have already appreciated the depth and clarity of the **ESR eBook** across the basic and more advanced educational levels.

I would like to express my heartfelt thanks to all authors who contributed their time and expertise to this voluntary, non-profit endeavour as well as Carlo Catalano, Andrea Laghi and András Palkó, who had the initial idea to create an **ESR eBook**, and - finally - to the ESR Office for their technical and administrative support.

Modern Radiology embodies a collaborative spirit and unwavering commitment to this fascinating medical discipline which is indispensable for modern patient care. I hope that this **educational** tool may encourage curiosity and critical thinking, contributing to the appreciation of the art and science of radiology across Europe and beyond.

Minerva Becker, Editor

Professor of Radiology, University of Geneva, Switzerland

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<↑> **HYPERLINK**

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Diagnostic imaging plays a key role in modern medicine. Although its benefits are beyond any doubt, inappropriate prescription may lead to overuse and increased costs and may expose patients to potential adverse effects due to radiation and/ or contrast materials.

Good practice of prescription also includes to convey all necessary information to the radiology team at the time of the examination. Although prescription of a standard radiography may be straightforward, prescription of advanced cross-sectional imaging modalities, e.g., Computed Tomography (CT), Magnetic Resonance Imaging (MRI) or Positron Emission Tomography CT (PET CT) is often much more complex.

Referring physicians should be familiar with the specific information requirements that are necessary for optimal diagnostic procedures in which benefits outweigh risks.

At the receiving end, the radiology team must ensure that the necessary medical, practical and administrative information has been made available and that the examination is justified.

This chapter summarises some key points related to good practice of prescription of diagnostic imaging examinations for current and future referrers. It also discusses how common shortcomings can affect the quality of healthcare.

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/ The Referrer's Responsibilities

Correct indication and good practice of prescription are key components of the imaging quality chain because they have major implications for the planning, performance, and safety of a radiologic study and for the usefulness of the final diagnostic report.

Referrers should recognise that prescription of radiological studies and especially of advanced imaging, e.g., CT, MRI and PET CT is a **medical rather than administrative act**. Therefore, delegation of the prescription process to non-medical administrative personnel is usually inadequate if optimal results are to be achieved.

<=> ATTENTION

If an imaging examination is correctly indicated, prescribed and performed, its benefits for the patient will outweigh its risks.

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Prescription of complex radiological studies should be considered as a medical act and should not be delegated to administrative personnel.

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The referring physician also **must assess if imaging is useful and necessary** in a given clinical situation followed by the decision **which modality is the most appropriate** and which anatomical region(s) must be examined In order to answer a specific clinical question.

In view of the complexity of modern imaging protocols as well as the locally available infrastructure and expertise some referrers may find it difficult to make the right choice among the different imaging modalities. This is especially true for general physicians who have to deal with many pathologies in all organ systems and body regions.

<=> ATTENTION

The referring physician must decide if imaging is necessary for the diagnostic process. Therefore he or she must know the criteria for the choice of the most appropriate modality.

As a referring physician, ask yourself:

- / What am I trying to confirm or rule out?
- / Will this imaging examination change my management plan?
- / Do I follow general/ local guidelines?

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Referrers may obtain advice in the form of locally available guidelines or diagnostic pathways that have been defined and validated in collaboration between senior referring physicians and radiologists. Local guidelines take the available infrastructure and expertise into consideration and are based on evidence wherever possible.

In today's digital environment, algorithms based on artificial intelligence may become increasingly integrated in the prescription process in order to provide the referring clinician with additional information when entering his prescriptions into the ordering system

In case of doubt, however, direct contact with the responsible radiologist may be needed in order to clarify the situation.

<=> ATTENTION

Local guidelines, diagnostic pathways and clinical decision support systems may assist referrers when prescribing imaging studies.



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Prescription guidelines for studies have been developed as recommendations by several national radiological societies around the globe in order to facilitate the referrers' choice, thus helping referrers to avoid inappropriate prescriptions

Clinical decision support tools may be web- based or integrated into the user interfaces of health IT systems. For example, the *ESR iGuide*, has been developed as a clinical decision support system based on a collaboration between the European and American Societies of Radiology. This tool is accessible online and can be integrated in the local clinical prescription software. It is available in several European languages (reference). The ESR iGuide reports an Area Under the Curve (AUC) score using a 9-point scale ranging from 1 to 9:

- / 1 - 3: Generally, not recommended
- / 4 - 6: Possibly appropriate
- / 7 - 9: Generally appropriate



<=> ATTENTION

The ESR iGuide appropriateness score is designed to assist clinicians in making informed decisions about imaging. It is not a binary classification (simple yes/no) but the AUC scale provides a range of appropriateness.

<=> REFERENCE

European Society of Radiology (2019) ESR iGuide clinical decision support using European imaging referral guidelines.
<https://www.myesr.org/esriguide>

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Consult AUC | Dashboard

50 year old Male

Indication Information

pancreatitis

Sort by Rank Sort A -> Z

Indication Search Results

- ☐ Pancreatitis necrotizing
- ☐ Epigastric pain
- ☐ Pancreatitis, acute, critically ill
- ☐ Pancreatitis, chronic, follow up
- ☐ Pancreatitis, acute, initial episode
- ☐ Pancreatitis, acute, severe, > 7 days
- ☐ Pancreatitis suspected, atypical presentation/labs

Example from the ESR iGuide: 50-year-old patient with suspected pancreatitis. Different clinical scenarios are possible, e.g., initial episode of acute pancreatitis, critically ill patient with acute pancreatitis, patient with severe acute pancreatitis > 7 days, etc.

Depending on the clinical scenario, the choice of the most appropriate imaging modality can differ. The appropriateness of imaging exams is indicated by colours.

AUC Score: ☒ Green (7-9) ☒ Yellow (4-6) ☒ Red (1-3) ☒ No Score

ESR iGUIDE
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Consult AUC | Dashboard

50 year old Male

Service: Not Selected

Indication(s): Pancreatitis, acute, initial episode

Appropriateness rankings for a 50 year old Male

Appropriateness	Service	Cost	RRL	Display Evidence...
9	US, abdomen	€€		Select this service
4	CT, abdomen, w iv contrast	€€	***	Select this service
4	MR, MRCP, abdomen, wo iv contrast	€€€		Select this service
4	MR, MRCP, abdomen, wo/w iv contrast	€€€		Select this service
3	CT, abdomen, wo iv contrast	€€	***	Select this service
3	CT, abdomen, wo/w iv contrast	€€€	***	Select this service
No Score	MR, abdomen, wo iv contrast	€€€		Select this service



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Consult AUC | Dashboard

50 year old Male Edit Service: Not Selected Edit Indication(s): Pancreatitis, acute, critically ill Edit

Appropriateness rankings for a 50 year old Male

Appropriateness	Service	Cost	RRL	Display Evidence...
9	CT, abdomen, w/ iv contrast	€€	***	Select this service
7	MR, MRCP, abdomen, wo/iv contrast	€€€		Select this service
6	MR, MRCP, abdomen, wo/iv contrast	€€€		Select this service
6	US, abdomen	€€		Select this service
5	CT, abdomen, wo/iv contrast	€€	***	Select this service
4	CT, abdomen, wo/iv contrast	€€€	***	Select this service
No Score	MR, abdomen, wo/iv contrast	€€€		Select this service
No Score	MR, abdomen, wo/iv contrast	€€€		Select this service

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Consult AUC | Dashboard

50 year old Male Edit Service: Not Selected Edit Indication(s): Pancreatitis, acute, severe, > 7 days Edit

Appropriateness rankings for a 50 year old Male

Appropriateness	Service	Cost	RRL	Display Evidence...
8	CT, abdomen, w/ iv contrast	€€	***	Select this service
7	CT, abdomen, wo/iv contrast	€€€	***	Select this service
7	MR, MRCP, abdomen, wo/iv contrast	€€€		Select this service
6	CT, abdomen, wo/iv contrast	€€	***	Select this service
6	MR, MRCP, abdomen, wo/iv contrast	€€€		Select this service
5	US, abdomen	€€		Select this service
No Score	MR, abdomen, wo/iv contrast	€€€		Select this service
No Score	MR, abdomen, wo/iv contrast	€€€		Select this service

<> REFERENCE

European Society of Radiology (2019) ESR iGuide clinical decision support using European imaging referral guidelines. <https://www.myesr.org/esriguide>

Vice-versa, the appropriateness of a particular imaging procedure can be evaluated for its suitability for a specific clinical scenario, e.g., to answer the question whether CT of the abdomen without iv. contrast is appropriate in a patient with an initial episode of acute pancreatitis (generally, not recommended).

Appropriateness	Service	Cost	RRL	Display Evidence...
3	CT, abdomen, w/o iv contrast	€€	★★★★★	Select this service
4	US, abdomen	€€		Select this service
4	CT, abdomen, w/ iv contrast	€€	★★★★★	Select this service
4	MR, MRCP, abdomen, w/o iv contrast	€€€		Select this service
4	MR, MRCP, abdomen, w/ iv contrast	€€€		Select this service
3	CT, abdomen, w/ iv contrast	€€€	★★★★★	Select this service
No Score	MR, abdomen, w/o iv contrast	€€€		Select this service

<!=> ATTENTION

The ESR iGuide was extended as an e-Learning tool to the teaching of medical students and doctors under the name ESR eGuide. It allows to successfully train medical students and doctors in choosing the best radiological imaging modality in typical scenarios.

<=> REFERENCE

European Society of Radiology (2019) ESR iGuide clinical decision support using European imaging referral guidelines.

<https://www.myesr.org/esriguide>

Dietkoff T, Kainberger F, Oleaga L, Dewey M, Zimmermann E. Effectiveness of the clinical decision support tool ESR eGUIDE for teaching medical students the appropriate selection of imaging tests: randomized cross-over evaluation. Eur Radiol. 2020 Oct;30(10):5684-5689. doi: 10.1007/s00330-020-06942-2.

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/ Overuse of Diagnostic Imaging

/ Overuse of Diagnostic Imaging

The role of diagnostic imaging has increased in almost all fields of modern medicine over the past few decades, and the number of examinations, and especially the cross-sectional modalities CT and MRI, has constantly grown. At the same time, it has been recognised that some of this growth may be due to unnecessary examinations, a phenomenon termed **overprescription**, leading to **overuse of medical imaging** (reference 1).

Overuse refers to the **ordering of imaging studies that are not clinically justified**, offer no net benefit to the patient, or are unlikely to alter patient management.

It has been estimated by some authors that as many as **20%–50% of all prescribed advanced imaging studies do not improve patient outcomes** (reference 2).

<!=> ATTENTION

Overuse of medical imaging may result in unnecessary radiation exposure, side effects, labour, and cost in many Western countries.

<∞> REFERENCE

1. Hendee WR, Becker GJ, Borgstede JP, Bosma J, Casarella WJ, Erickson BA, Maynard CD, Thrall JH, Wallner PE. Addressing overutilization in medical imaging. *Radiology*. 2010 Oct;257(1):240-5. doi: 10.1148/radiol.10100063.
2. Levin, D.C., Rao, V.M., & Parker, L. (2010). Trends in the utilization of outpatient advanced imaging after the Deficit Reduction Act. *JAMA Internal Medicine*, 170(10), 920-924. doi:10.1001/archinternmed.2010.89

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/ Driving Factors of Overuse

Some **typical causes** for overuse of diagnostic imaging include the following:

- / **Duplicate examinations** due to lack of communication between treating physicians
- / Referrers ceding to **unjustified patient expectations** (“Doctor, I want an MRI of my lumbar spine”)
- / Referrer’s **lack of clinical confidence or judgment**
- / **Absence or non respect of guidelines** leading to unnecessary examinations
- / **Organisation of workflow** (prescription of imaging studies without gathering clinical information or without seeing the patient)
- / **Fear of medicolegal claims** (“defensive imaging”)
- / **Conflict of interest** (self-referral and self-performance of imaging by the treating physician rather than referral to the radiologist)
- / **Availability bias**, where access to imaging technology encourages its use, even when not warranted

<=> ATTENTION

Referrers and radiologists should be aware of the different causes of overprescription and take action to avoid them as far as possible.

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- / **Ordering an inappropriate modality** (e.g., MRI instead of CT in acute head trauma).
- / **Improper timing** of tests (e.g., repeating imaging too soon in the course of a clinical condition or situation).
- / **Poor clinical indication**, where imaging is not justified with regard to the patient's symptoms or presumably fails to answer a specific diagnostic question.

<!=> ATTENTION

Incorrect use of diagnostic imaging contributes significantly to wasted healthcare spending. (reference).

<∞> REFERENCE

Institute of Medicine. (2012). Best Care at Lower Cost: The Path to Continuously Learning Health Care in America. National Academies Press. <https://nap.nationalacademies.org/catalog/13444/best-care-at-lower-cost-the-path-to-continuously-learning>

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/ Consequences of Inappropriate Use of Diagnostic Imaging

Possible harm to patients:

- / **Unnecessary exposure to ionising radiation**
may potentially contribute to the long-term risk of malignancies, especially in children (reference).
- / **Contrast-related complications** in vulnerable populations
- / **Unrelated, incidental findings**, may trigger unnecessary anxiety and follow-up tests
- / **Delayed or missed diagnosis** when using an inappropriate modality that is unlikely to give a conclusive answer

System inefficiency:

- / **Resource overutilisation** leading to inappropriate delays for other patients who need imaging
- / **Delay** through Increased workload for radiology staff.

Financial burden: Unnecessary imaging increases health-care costs for both institutions and patients

<!=> ATTENTION

Ways to avoid overuse and incorrect use:

- / **Implement and use disease-specific local guidelines**
- / **Education at the undergraduate level**
- / **Clinical decision support tools**
- / **Training for referring physicians on rational imaging practices**
- / **Multidisciplinary communication between referring physicians and radiologists**
- / **Audit and feedback systems to monitor and reduce inappropriate imaging**

<∞> REFERENCE

Brenner, D.J., & Hall, E.J. (2007). Computed tomography — an increasing source of radiation exposure. New England Journal of Medicine, 357(22), 2277–2284. doi:10.1056/NEJMra072149

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Prescription of imaging studies should preferably be done by means of dedicated forms. Hospitals and large ambulatory structures often integrate **dedicated radiology request forms**. In digital environments entry forms can communicate via interfaces with the radiology information system and may be easily adapted to each specific imaging modality. Automatic alerts informing the referrer about the risk of duplicate prescriptions are useful features in the digital environment.

Prescription forms, especially those for advanced cross-sectional imaging studies, e.g., CT or MRI should have **mandatory fields** regarding administrative, general practical and medical information, including the management of modality-specific risks.

Anatomical structures or body region(s) to be examined (e.g., left or right extremity) must be carefully detailed in order to avoid misunderstandings and errors by administrative, technical or medical staff.

<!=> ATTENTION

Adequate completion of radiology request forms includes mandatory information about several aspects, namely:

- / Administrative
- / General practical
- / Anatomical and medical
- / Risk management

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/ General and Administrative Information

Regardless of the prescription format (i.e., handwritten or digital), some **general and administrative information** is required for all imaging examinations. This information may vary between inpatients and outpatients and includes the patient's basic identification data: name, age, gender, address and contact data (at home or on nursing ward) as well as the name and contact information of the responsible referring physician.

Practical information required for the radiology team include the patient's mobility conditions, existing handicaps or needs for special assistance or logistic requirements (e.g., ambulatory, bed, wheelchair, intensive care unit, special devices, etc).

The **requested delay** of the examination (e.g., emergency, as soon as possible, at a specific date, etc.) should always be based on the clinical situation rather than other priorities.

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General information includes administrative, practical logistic data and the requested delay.

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/ Medical Information

An appropriate prescription must always include a **precise clinical question and all relevant medical information regarding patient's context and history which are relevant** for the examination.

Although radiologists can nowadays access the patient's digital medical files in many situations, the number of cases and the workflow in daily routine make it usually unrealistic for the radiologist to analyse all information from all medical charts, let alone completing the history of all patients prior to the examination.

Therefore, it is crucial that the referring physician who knows her/ his patient best provides the radiologist with the relevant

information in the current medical context, including any relevant external imaging studies for comparison.

Furthermore, **the clinical question for the radiologist should be as precise as possible.**

<=> ATTENTION

Radiologists aren't mind readers — A meaningful diagnosis by the radiologist requires a precise clinical question and relevant clinical findings from the referrer.



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Referrers, radiologists and radiographers must collaborate in order **to identify and assess any risk factors and contraindications** which may vary from one specific examination to another (see examples below).

Current scientifically valid risks and contraindications are mentioned in detail in the references mentioned below. Some risk factors may require premedication or other preparatory measures.

<∞> REFERENCE

1. European Society of Radiology. Marta Sans-Merce, Mélanie Patonnier, (2025). ESR Modern Radiology eBook: Principles of Radiation Biology and Radiation Protection. DOI 10.26044/esr-modern-radiology-01
2. European Society of Radiology. Bénédicte MA Delattre, Andrea Laghi, András Kincses, Minerva Becker (2025). ESR Modern Radiology eBook: Magnetic Resonance Imaging. DOI 10.26044/esr-modern-radiology-05
3. European Society of Radiology. Johannes Fröhlich, Gabriella Hänggi (2025). ESR Modern Radiology eBook: Contrast Agents. DOI 10.26044/esr-modern-radiology-07

<!=> ATTENTION

A complete prescription for an imaging study must contain the relevant medical, administrative, practical, and safety-related information in compulsory fields.

→ see examples further below.

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Risk factors and contraindications vary from one imaging modality to another. Sometimes, they may warrant the choice of alternative examination that gives similar information, for example, MRI instead of CT or vice-versa.

Also, any known **contagious infectious diseases** must be mentioned because some conditions may require special measures in the radiology department as they can cause health risks for other patients or health professionals who are using the same infrastructure.

<!=> ATTENTION

The presence of a contraindication to a specific imaging technique may warrant an alternative modality that can give similar information, e.g., MRI instead of CT and vice-versa.

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/ Example of Safety Management in the Context of CT

CT may be contraindicated or warrant an alternative modality in certain situations, e.g. ,

- / ionising radiation of the pelvis during pregnancy should be avoided whenever possible (although emergency brain or lung CT can be done safely).
- / when major metallic implants (e.g., prosthetic material) may cause artifacts, rendering interpretation impossible.
- / when contraindications to intravenous iodinated contrast media are present, e.g., due to advanced renal insufficiency, thyroid disorders, or known allergic reactions.



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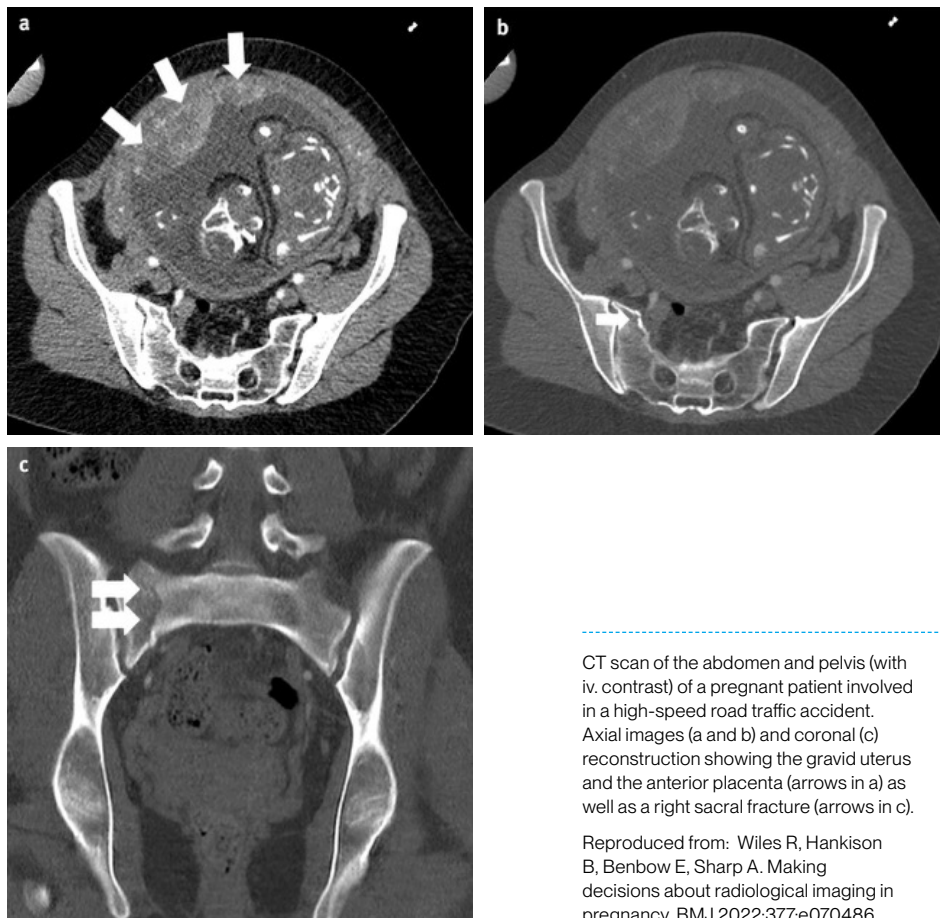
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<=> ATTENTION

The potential risk of radiation or contrast exposure when using CT, in emergency situations e.g., in the context of trauma must always be weighed against the risk of missing an important diagnosis warranting an intervention.



Reproduced from: Wiles R, Hankison B, Benbow E, Sharp A. Making decisions about radiological imaging in pregnancy. BMJ 2022;377:e070486

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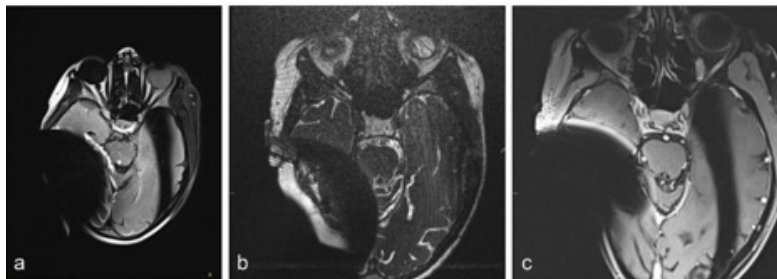
References

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/ Example of Safety Management in the Context of MRI

The indication for MRI may have to be reconsidered replacing it by an alternative modality in some situations, e.g. ,

- / when certain specific **electronic implants** (e.g., some cardiac pacemakers, neurostimulators or cochlear implants) may dysfunction or become impaired in the magnetic field.
- / when **paramagnetic surgical clips** or other paramagnetic metallic implants (e.g., prosthetic material) have been placed previously.
- / when there are **contraindications to Gadolinium-based contrast materials** e.g., severe renal insufficiency, or known allergic reactions (see reference).



Examples of transverse gradient-echo (GRE) MR images illustrating extent of cochlear implant artifact in a 53-year-old female patient to depict cochlear anatomy and vestibulocochlear nerve on the contralateral side. a) T2-weighted FLAIR image (FOV 250 × 203 mm², slice thickness ST 3.0 mm, slice gap 0.6 mm), b) T2/T1-weighted 3D CISS image, coherent balanced GRE using dual-excitation (FOV 180 × 180 mm², ST 0.6 mm), c) contrast-enhanced T1-weighted fat-saturated VIBE image, spoiled 3D GRE with volume interpolation (FOV 160 × 180 mm², ST 1.0 mm)

Reproduced from: Alberalar ND, Reis J, Piechotta PL, Beetz NL, Fehrenbach U, Geisel D, Thomas A, Busse H, Denecke T. Complications of cochlear implants with MRI scans in different body regions: type, frequency and impact. Insights Imaging. 2023 Jan 16;14(1):9. doi: 10.1186/s13244-022-01353-x. PMID: 36645551; PMCID: PMC9842833.

<=> REFERENCE

European Society of Radiology. Johannes Fröhlich, Gabriella Hänggi (2025). ESR Modern Radiology eBook: Contrast Agents. DOI 10.26044/esr-modern-radiology-07

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/ Examples of Excessive Safety Precautions

On the other hand, management of risk factors should **not lead to withholding of a justified examination from a patient, for questionable reasons**, especially in emergency situations (see page 33).

Major progress has been achieved over the past decade with regard to the safety of contrast agents, examination time, patient comfort or radiation exposure.

Based on these innovations and new scientific insight some historically established contraindications may therefore be considered less stringent or no longer valid.

Current scientific guidelines regarding contrast materials can be consulted on the websites of the European Society of Urogenital Radiology (reference).

<=> ATTENTION

Do not withhold clinically necessary examinations from patients because of contraindications that may be based on very minor risks or not (or no longer) scientifically justified.

Updated guidelines for specific clinical situations can be consulted online.

<=> REFERENCE

<https://www.esur.org/esur-guidelines-on-contrast-agents/>

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Typical situations in which medically justified examinations may be withheld for inappropriate reasons include the following:

- / Emergency CT of the head (e.g., for trauma or stroke) or chest (e.g., for suspected pulmonary embolism) during pregnancy (reference 1)
- / A history of minor or moderate reactions to iodinated contrast materials, when nonionic products are available (references 2-4)
- / Mildly diminished renal function
- / Asthma that is well equilibrated under treatment
- / A vague notion of “iodine allergy” in the patient’s file without evidence of a previous reaction
- / Intolerance for certain foods (e.g., seafood)
- / Anamnestic claustrophobia at MRI (that can often be avoided by using modern equipment with large gantries or using medication).
- / Fear of Gadolinium – induced skin toxicity when using modern, stable molecules in patients with mild or moderate renal insufficiency (reference 2 - 4)

<=> REFERENCE

1. European Society of Radiology. Marta Sans-Merce, Mélanie Patonnier, (2025). ESR Modern Radiology eBook: Principles of Radiation Biology and Radiation Protection. DOI 10.26044/esr-modern-radiology-01
2. European Society of Radiology. Bénédicte MA Delattre, Andrea Laghi, András Kincses, Minerva Becker (2025). ESR Modern Radiology eBook: Magnetic Resonance Imaging. DOI 10.26044/esr-modern-radiology-05
3. European Society of Radiology. Johannes Fröhlich, Gabriella Hänggi (2025). ESR Modern Radiology eBook: Contrast Agents. DOI 10.26044/esr-modern-radiology-07
4. European Society of Urogenital Radiology (ESUR) guidelines on contrast agents 10.0. <https://www.esur.org/esur-guidelines-on-contrast-agents/>

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/ Practical Example – Prescription for CT

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Patient: <i>(name, birthdate, personal administrative data, code bar, contact data, weight, height)</i>			Requested examination: <i>CT abdomen/pelvis</i>	
Indication/ clinical symptoms:	<i>Fever, chills, left lower quadrant pain</i>		Requested delay:	<i>urgent</i>
			Patient mobility:	<i>in bed</i>
Previous examinations:	<i>CT 14 months ago (external) for acute diverticulitis</i>		Renal function (e-GFR):	<i>ok</i>
			Diabetes:	<i>no</i>
Access code:	<i>xxxxx</i>		Previous contrast reaction:	<i>no</i>
			Infectious risk:	<i>no</i>
Clinical question:	<i>Recurrent diverticulitis after conservative treatment? Complicated diverticulitis? Abscess? If yes, feasibility of percutaneous drainage?</i>		Metallic implants:	<i>hip prosthesis</i>
			Pregnancy:	<i>no</i>
Referring physician:	contact (phone): <i>xxxxx</i>	contact (email): <i>yyyyy@zzzzz.com</i>	Other risk factors: <i>not known</i>	

/ Practical Example – Prescription for MRI

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Patient: <i>(name, gender, birthdate, personal administrative data, code bar, contact data, weight, height)</i>			Requested examination: <i>MRI liver, bile ducts and pancreas Including MRCP</i>	
Indication/ clinical symptoms:	<i>painless jaundice, involuntary weight loss, subfebrile</i>		Requested delay:	<i>48 hrs</i>
			Patient mobility:	<i>wheelchair</i>
Previous examinations:	<i>Ultrasound showing dilated intrahepatic bile ducts, cholecystolithiasis</i>		Renal function:	<i>ok</i>
			Diabetes:	<i>no</i>
Access code:	<i>xxxxx</i>		Previous contrast reaction:	<i>no</i>
			Infectious risk:	<i>no</i>
Clinical question:	<i>level and cause of obstruction? bile duct stones? tumor? metastases?</i>		Claustrophobia:	<i>no</i>
			Electronic implants:	<i>no</i>
Referring physician:	contact (phone): <i>xxxxx</i>	contact (email): <i>yyyyy@zzzzz.com</i>	Metallic implants:	<i>hip prosthesis</i>
			Pregnancy:	<i>no</i>
			Other risk factors:	<i>not known</i>

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As soon as the prescription for an examination arrives in the radiology department it should be checked for its completeness and any open questions should be clarified. The process of verifying the request for imaging (vetting) should include the administrative personnel, radiographer and the radiologist. The radiologist should act as a consultant to the referrer and to the radiographer in this process.

<!=> ATTENTION

In the radiology department, the vetting process of requests for advanced or complex imaging studies (e.g., CT, MRI and invasive procedures) should include the administrative as well as the technical and medical staff.

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- / Referrers of imaging examinations must be familiar with the requirements related to good practice of prescription.
- / The choice of the most appropriate examination may be facilitated by local guidelines, clinical decision support systems, or direct contact with the radiologist.
- / Radiology request forms must be designed with mandatory fields for administrative, general practical, safety-related and medical information, depending on the requested modality.
- / Safety precautions are important for risk management but should not lead to withholding of justified examinations from patients.
- / Referrers should be aware of common causes of overuse and incorrect use of imaging in order to avoid potential harm to patients, inefficient use of resources and unnecessary cost.
- / A complete prescription must include the clinical context, and a precise clinical question : “A precise radiologic diagnosis requires a precise question by the referrer”.
- / Good practice for prescription is crucial not only for a meaningful, actionable radiology report but also for patient safety.

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- / European Society of Urogenital Radiology (ESUR) guidelines on contrast agents 10.0. <https://www.esur.org/esur-guidelines-on-contrast-agents/>

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<?> QUESTION

1

Adequate and complete prescription is a prerequisite for...

- ☐ adequate choice of the examination protocol by the radiology team
- ☐ patient safety
- ☐ the clinical meaningfulness of the radiology report
- ☐ the available imaging infrastructure

/ Test Your Knowledge

<?> ANSWER

1

Adequate and complete prescription is a prerequisite for...

- adequate choice of the examination protocol by the radiology team
- patient safety
- the clinical meaningfulness of the radiology report
- ☐ the available imaging infrastructure

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<?> QUESTION

2 Which of the following can help referring physicians to choose rapidly between available imaging examinations

- ☐ a clinical decision support system, e.g., the ESR i-guide
- ☐ direct contact with the radiologist
- ☐ knowledge of the locally available imaging infrastructure
- ☐ performing a meta-analysis of the existing literature

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<?> ANSWER

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- ☒ direct contact with the radiologist
- ☒ knowledge of the locally available imaging infrastructure
- ☐ performing a meta-analysis of the existing literature

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<?> QUESTION

3 Adequate referral of an imaging study includes, in addition to general demographic and administrative data, the following information

- ☐ the imaging modality
- ☐ the clinical question to be answered by the radiologist
- ☐ the radiologic examination protocol
- ☐ the degree of urgency

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<?> ANSWER

3 Adequate referral of an imaging study includes, in addition to general demographic and administrative data, the following information

- the imaging modality
- the clinical question to be answered by the radiologist
- ☐ the radiologic examination protocol
- the degree of urgency

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<?> QUESTION

4

Which of the following information should always be mentioned in the requisition form because they may imply specific safety measures prior to cross – sectional imaging studies

- ☐ previous allergic reactions to iodinated or Gadolinium-based contrast materials
- ☐ food allergies
- ☐ severe claustrophobia
- ☐ renal insufficiency

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<?> ANSWER

4 Which of the following information should always be mentioned in the requisition form because they may imply specific safety measures prior to cross – sectional imaging studies

- ☒ previous allergic reactions to iodinated or Gadolinium-based contrast materials
- ☐ food allergies
- ☒ severe claustrophobia
- ☒ renal insufficiency

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<?> QUESTION

5 Some typical reasons for overutilisation of imaging include

- ☐ lack of communication regarding duplicate examinations
- ☐ referrer's ceding to unjustified patient expectations
- ☐ the use of clinical guidelines or decision support systems
- ☐ conflicts of interest due to self-referral of imaging

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<?> ANSWER

5 Some typical reasons for overutilisation of imaging include

- lack of communication regarding duplicate examinations
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