

# Artificial intelligence in the Italian Radiographers Code of ethics: analysis and application complexity profiles

Giovanni Di Giulio<sup>1</sup>, Anna Audino Longo<sup>1</sup>, Sara Pompei<sup>1</sup>, Massimo Burgio<sup>1\*</sup>

1. IRCCS Istituti Fisioterapici Ospitalieri (IFO), National Cancer Institute "Regina Elena" and Dermatological Institute "San Gallicano", Department of Research and Advanced Technologies, Radiology Unit, Rome, Italy.

\*Corresponding author: [massimo.burgio@ifo.it](mailto:massimo.burgio@ifo.it)

## KEYWORDS:

Code of ethics; artificial intelligence; professional responsibility; ethics and deontology; Radiographers and Radiologic technologists.

## ABSTRACT

*In Italy, the Radiographers (or Radiologic technologists) Code of ethics addresses the challenges introduced by artificial intelligence, recognizing it as a support tool and not as a substitute for professional judgment. The Radiographer needs advanced skills, attention to the protection of data confidentiality, a guarantee of transparency and critical supervision of the reliability of the results. This contribution, of an argumentative and reflective nature, enriched by examples partly drawn from the authors' professional experience, aims to translate the behavioral rules of Article 87 into concrete actions, highlighting any potential application complexities also with respect to Law no. 132/2025.*

## INTRODUCTION

In recent years, artificial intelligence (AI) has taken on an increasingly significant role in radiology disciplines, offering important opportunities for innovation, but also new ethical complexities [1].

In Italy, the Radiographers (or Radiologic technologists) Code of ethics [2] addresses the issue of AI for the first time, recognizing it as a resource to support the work of the professional and not as a substitute for his judgment [3].

This approach gives Radiographer a significant role, recognizing it as a conscious user of technologies and a critical interpreter capable of integrating AI into diagnostic and therapeutic processes based on human responsibility.

This entails new duties that extend the professional scope of the Radiographer, called upon to get new skills and to exercise active supervision over the correctness, transparency, security and confidentiality of data.

His intervention is not limited to the technical dimension of execution, but extends to the cognitive and evaluative one, in which professional judgment becomes a guarantee of the assisted person.

This contribution, of an argumentative and reflective nature, aims to translate the behavioral rules set forth in Article 87 into concrete actions, offering Radiographers conceptual tools useful for guiding responsible professional practice [4], highlighting potential elements of application complexity, or those provisions that may be difficult to implement at an operational level or potentially conflict with Law No. 132 of 23 September 2025 [5,6].

To complement the analysis, the contribution proposes some application examples, partially based on the authors' professional experience in the relevant operational contexts.

## Competence and professional updating

The first paragraph of article 87 of the Italian Radiographers Code of ethics says a principle of significant importance, intended to have repercussions on the updating of professional skills and daily practice: "The Radiographer maintains adequate competence on the use of artificial intelligence systems related to professional practice, understands their operating principles, applications, potential, limits, possible errors and ethical and legal implications related to their use."

The recall "maintains adequate competence" implies a permanent update, made indispensable by the rapid and continuous evolution of AI systems. For the Radiographer this involves participation in training courses aimed at the acquisition of operational skills, the understanding of algorithmic logics and the methods of application of innovative technology [7]. These paths, in line with the provisions of Law no. 132/2025, article 24, paragraph 2, point f, also fall under the responsibility of professional associations and trade associations, which are responsible for promoting the development of training and digital literacy of health professionals [8].

The provision "understands their operating principles, applications, potentialities and limits" instead shifts the attention from technical use to the assumption of a critical and conscious role: the Radiographers cannot limit themselves to receiving the output of the system but must assess its reliability of the professional standards and the reference context. The reference "possible errors and ethical and legal implications" further extends the scope of responsibility, requiring the professional to be able to identify the intrinsic fragilities of technology and to adopt proper behaviors to prevent risks to the safety of the assisted person.



Copyright: © 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).



**Application example** – After the installation, at the facility where he works, of a Magnetic Resonance Imaging (MRI) equipped with AI-based reconstruction algorithms, a Radiographer decides to participate in a professional refresher course to deepen the functioning of deep learning models, their application limits and possible biases derived from the training datasets.

In the training course, the professional also addresses the issues of the explainability of models, the ethical and legal implications related to the processing of sensitive data.

At the end of the course, based on the training experience acquired, the Radiographer updates the examination protocols, integrating AI-based reconstructions in a selective and controlled way, defining for each anatomical district the most appropriate levels of algorithm intervention with respect to the signal-to-noise ratio (SNR), spatial resolution and type of examination.

In this way, the Radiographer translates the deontological obligation to keep adequate competence into a concrete commitment to permanent training, strengthening his ability to evaluate algorithmic performance and to use technology in a conscious, transparent and oriented way towards the protection of the assisted person.

### **Complementarity and human judgment**

In the second paragraph, it is said that:

"The Radiographer is aware that artificial intelligence must be used as a complementary tool to professional practice and not as an alternative to human judgment or the professional's decision."

The provision transcends technical expertise and requires constant critical oversight of the role of AI. The reminder "is aware" takes the form of an active supervisory exercise, which commits the Radiographer to question the meaning of the results produced by the algorithms, to identify their limits and to place them within the broader context of reference.

The adjective "complementary" highlights that the algorithm provides data, suggestions and analyses useful for enriching the decision-making process, without exhausting its scope. For Radiographer, this means integrating AI into daily practices as a tool to increase technical quality, reduce the risk of error and optimize time, while always keeping a critical role as an evaluator.

The call not to consider it an "alternative to human judgment or the professional's decision" reiterates the non-delegability of responsibility: an algorithm can make mistakes, but the final control stays the exclusive prerogative of the professional.

In operational terms, this involves the critical validation of results, the documentation of choices and the role of security guarantor.

**Application example** – During an MRI examination performed with an AI-based reconstruction system,

the Radiographer finds that by setting the algorithm intervention level to "high", the images have a marked oversmoothing effect, with loss of definition of cortical structures.

Referring to article 87 of the Code of ethics, which enshrines the principle of complementarity, the Radiographer repeats the processing of datasets by setting the level to "medium", obtaining a best balance between SNR and spatial resolution.

At the end of the examination, the Radiographer informs the Radiologist and the health physicist, proposing a revision of the AI presets per anatomical district to optimize the reconstruction parameters, aware that AI represents a tool to support professional practice and not a substitute for human judgment.

The episode highlights the principle of complementarity between AI and professional competence, confirming the role of Radiographer in critical vigilance, diagnostic quality and safety of the assisted person.

### **Warranty and liability**

In the third paragraph, the text goes on to state that: "The Radiographer use their competences inherent in the operation of artificial intelligence systems to correctly manage the results produced by them. The final decision on the correct execution and result of the diagnostic or therapeutic technique is referred to the Radiographer even when artificial intelligence systems are used in the acquisition or evaluation of images."

The provision is divided into two fundamental guidelines. The first concerns the conscious use of professional competence: the reference "use their competences" reiterates that AI cannot be used uncritically but requires active cognitive mediation. It is not enough to know how to read an output, since the management of results implies understanding the technical assumptions and the ability to critically interpret their reliability.

The second guideline concerns the reaffirmation of the non-delegability of the final decision, sanctioned by the reference "The final decision [...] is referred to the Radiographer."

AI can assist the technical-diagnostic process, but not replace human discernment: the responsibility for the correct execution and technical result stays with the Radiographer. It is a "guarantee principle" that protects the assisted person, ensuring that the quality and safety of the technical act remain entrusted to the judgment of the professional.

**Application complexity** – The provision assigning the final decision on the technical correctness of the procedure to the Radiographer, even when AI systems are used in the acquisition or evaluation of images, may require clarification. Indeed, the term "image evaluation" could be interpreted as including a diagnostic assessment, typical of the medical specialist. Therefore, a specification of the technical-operational scope would help avoid overlapping

responsibilities and strengthen the provision's consistency with the Radiographer responsibilities.

This consideration is further supported by a comparison with the current regulatory framework. In this case, the ethical provision, adopted prior to the entry into force of Law No. 132 of 23 September 2025, does not appear to be fully aligned with the provisions of Article 7, paragraph 5 of the same Law, which instead assigns the final decision exclusively and "always" to the physician; adverb that suggests a responsibility exercised in any case and, therefore, independently of the specific area of professional competence [9].

Therefore, on the theoretical level, a possible interpretative divergence between the Code and the Law seems to emerge, which could generate some margins of uncertainty in application and make clarification from an ethical perspective appropriate.

Indeed, the same provision can be read in a perspective supplementary to the Law, as it contributes to clarifying the sphere of technical and operational responsibility of the Radiographer and to outlining a more advanced model of interprofessional collaboration, inspired by the principle of integration of skills.

**Application example** – During a [ $^{18}\text{F}$ ]-FDG PET/CT scan for oncological staging, the reconstruction system, which uses a deep learning-based attenuation (AC) and motion correction (MC) algorithm, signals an area of uptake in the lower lobe of the right lung. The Radiographer, pursuant to Article 87 of the Code of Ethics, identified a diaphragmatic movement artifact by analyzing sinograms and attenuation maps and verified a PET/CT misalignment of approximately 8 mm. As part of his technical and operational responsibility for the correct execution of the exam, he decided to repeat the acquisition during the controlled expiratory phase, temporarily deactivating the automatic AI-based corrections.

Comparison of the acquisitions revealed the disappearance of the false hyperuptake, confirming its artifactual nature and avoiding potential overstaging; the technical outcome was then communicated to the physician responsible for the clinical and diagnostic interpretation.

This case highlights how the Radiographer "final decision" should always be understood in a technical and operational sense and integrated into a multi-professional context, especially when AI systems are used.

### Data management and protection of confidentiality

In the fourth paragraph, it is established that:

"The Radiographer guarantees that the data of the assisted persons used in artificial intelligence systems are managed in accordance with laws on the confidentiality and security of personal data."

The provision calls on the Radiographer to have a technical and ethical-legal responsibility in data pro-

tection, requiring it to ensure that the use of AI takes place in compliance with the rules on confidentiality and security of personal information.

The first reference "guarantees" introduces a particularly binding obligation: the verb "to guarantee" does not express a recommendation, but a commitment to actively oversee a specific area. The Radiographer is not a simple user of information systems, but a "guarantor" who ensures that data is processed in compliance with current regulations.

The reference to "data of the assisted persons" recalls the particularly sensitive nature of the information, since radiological images and reports, for example, constitute an asset whose violation risks directly affecting the dignity and trust of the assisted person.

The next reference to "laws on the confidentiality and security of personal data" highlights the need for the Radiographer to develop a minimum level of legal-computer literacy, necessary to understand the risks associated with data processing: from informed consent to protection from unauthorized access.

This paragraph presents a new dimension of Radiographer professionalism: alongside technical and ethical competence, digital-legal expertise appears.

**Application complexity** – The responsibility attributed to the Radiographer with the verb "guarantee" deserves reflection, which, in the absence of a clarification of the scope of reference, seems to extend the perimeter of professional control beyond the limits that can be exercised. Data management depends on technological infrastructures and organisational choices involving multiple actors, as recognised by Law no. 132/2025, article 20, paragraph 1, providing for shared responsibilities and institutional supervision mechanisms [10].

A divergence of interpretation could appear: while the Code entrusts the Radiographer with the role of individual guarantor, the Law adopts a more systemic approach. Indeed, roles of individual guarantors are also found in other codes of ethics [11], but the peculiarity of the Radiographer Code lies in extending it to data management in AI systems, an area that opens to unprecedented profiles.

**Application example** – During a CT scan, the captured images are also processed by AI software. The Radiographer, as guarantor, verifies that the identification data of the assisted persons are correctly anonymized according to company procedures before transmission to the AI system. In addition, it checks that access to the workstation and processing platforms is limited to authorized personnel, through individual authentication and tracking of activities, and that the reconstructed images are stored exclusively in the protected company PACS servers, compliant with the computer system security requirements of the current regulation and national guidelines on the processing of health data.

Nonetheless, following a configuration error in the central IT system, some images were temporarily redirected to an unprotected server.



Copyright: © 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).



This event highlights how, despite proper oversight by the Radiographer, the overall management of information flows and digital infrastructures depends on organizational choices and responsibilities attributable to corporate governance and IT services, which are outside the Radiographer direct control.

The case therefore highlights how the Radiographer oversight and responsibility for healthcare data protection should be limited to the operational phases under its jurisdiction, encountering objective limitations related to the complexity of the IT infrastructure and the organizational size of the company's information systems.

### Transparency and explainability

The fifth paragraph provides that:

"The Radiographer endeavours to ensure that the judgments and decisions of the machines are as transparent and understandable as possible for the person being assisted and for the other professionals involved. Where possible and when necessary, he must use tools that allow the results of the system to be visualised or explained."

The provision addresses one of the most complex and controversial issues in the use of AI in healthcare: the transparency and comprehensibility of algorithms [12].

The first call "endeavours to ensure that the judgments and decisions of the machines are as transparent and understandable as possible" underlines the active role of Radiographer in countering algorithmic opacity, or "black box effect", i.e. the condition, inherent in AI systems, that hinders the understanding of decision-making processes and the criteria with which results are generated [13].

The Radiographer must not limit itself to receiving the output generated by the machine, but has the task of making it intelligible, translating it into a language accessible to "the person being assisted and for the other professionals involved."

Transparency is configured as a technical characteristic of the systems, and an ethical duty of communication.

This results in a double responsibility: towards the assisted person, who has the right to receive comprehensible information, and towards the health team, which needs clear interpretations to make shared decisions.

The subsequent reminder "where possible and when necessary, he must use tools that allow the results of the system to be visualised or explained." introduces an operational obligation: to privilege, where available, explainability tools (XAI) capable of providing visual representations or explanatory criteria of algorithmic decisions, compared to software that returns an opaque and non-interpretable output [14]. This provision highlights the need for specific training: it is not enough to know how to use the software, it is necessary to know the principles of explainability, the limits of algorithmic transparency

and to develop communication skills to make the results understandable.

In the sixth paragraph, the same principle is recalled, but with a broadening of perspective: from the conscious use of AI systems, we move on to the proactive role of the Radiographer, now called upon to influence the choices and orientation of the technologies adopted:

"The Radiographer has the duty to promote, where possible, the adoption of artificial intelligence systems that guarantee algorithmic transparency and explainability."

This provision calls for an active commitment to the dissemination of solutions that follow ethical and professional criteria. In fact, the expression "has the duty to promote" extends the responsibility of the Radiographer beyond the strictly individual sphere, configuring it as an actor that takes part in organizational decisions. Promotion translates into reporting critical issues, supporting the adoption of transparent tools and opposing opaque solutions that may compromise quality and trust.

Transparency and explainability represent real acts of ethical and relational responsibility, through which the Radiographer ensures the comprehensibility of the data and protects the relationship of trust with the assisted person.

The following phrase "where possible" implicitly recognizes the limits of this attribution: the Radiographer does not, in fact, have direct decision-making power over technological purchases (the competence of other subjects, often of health directorates), nor does it have the power to influence the design of algorithms, which is the exclusive prerogative of manufacturers. Rather, its margin of action is exercised through technical-professional competence and collaboration with professionals in the radiology area. The further reference "algorithmic transparency and explainability" takes up what has already been said in the earlier paragraph, reiterating the need to understand the decision-making processes within algorithms (transparency) and to translate their results into communicatively accessible forms (explainability).

Application complexity – While expressing broadly shared objectives, assigning the Radiographer the task of making the results of AI systems as transparent and understandable as possible, in the absence of a clear delimitation of the scope of competence, could encounter concrete obstacles: the algorithmic opacity, typical of AI systems, could prevent Radiographer from exercising effective control over the processes that lead to the production of results. Law no. 132/2025, article 3, paragraph 2, in line with EU Regulation 2024/1689 (AI Act), entrusts producers and developers of AI systems with the responsibility of ensuring correctness, quality and transparency [15].

Application example – A hospital implements an AI-based automatic triage system, integrated into

the CT workflow and designed to prioritize studies with suspected intracranial hemorrhage. During this activity, the Radiographer observes that, in some circumstances, the activation maps generated by the algorithm indicate hyperdense areas attributable to physiological calcifications or motion artifacts, potentially impacting the priority assigned to the exams.

As part of their professional expertise, the Radiographer activates the XAI features made available by the system to make the criteria on which the algorithm based its assessment more understandable, both for other professionals involved in the diagnostic process and, indirectly, for the patient.

This intervention is part of the critical monitoring function and ensures the appropriate use of technologies, as required by Article 87 of the Code of Ethics.

The Radiographer notes, however, that the explanations provided by the system are partial and not fully interpretable, as they are tied to deep learning models based on complex decision-making processes that cannot be directly traced back to explicit clinical criteria. This limitation does not depend on the Radiographer work, but rather on the intrinsic characteristics of the AI system and the design, validation, and technological governance choices, which are the responsibility of the manufacturers, company managers, and the organization's decision-making levels.

The case highlights how the Radiographer responsibility should be placed in the critical evaluation of the output, the informed use of available explainability tools, and the reporting of critical issues. The full transparency and interpretability of AI models should remain a structural responsibility that transcends the control of individual healthcare professionals.

### Vigilance and Technology Improvement

In the seventh and last paragraph, it is established that:

"The Radiographer constantly monitors the performance of the AI systems and provides input to ensure the continuous improvement of the technology."

The provision gives the Radiographer a dynamic responsibility: the professional is called upon to exercise a role of control and participation in the development of technologies.

The "constantly monitors the performance" introduces an obligation of continuous surveillance.

Unlike traditional technologies, AI systems are characterized by an evolutionary nature, being able to update, learn from new data and change their parameters. It follows that their reliability is not stable but can vary over time and in different contexts of application [16].

The Radiographer, therefore, must record any discrepancies between the output of the algorithm and the technical quality of the images, to report anomalies and to document the conditions in which they occur, transforming critical vigilance into a structural part of professional practice.

The second call "provides input to ensure the continuous improvement of the technology." emphasizes the collaborative dimension of responsibility.

The Radiographer is configured as a privileged observer, able to detect limits or technical problems thanks to direct contact with technology and its responsibility is articulated on a twofold level: on the one hand, to protect safety and quality of services; on the other, to contribute to technological progress by reporting and sharing the critical issues encountered.

This provision recalls the importance of specific skills: Radiographer must, even more, collaborate with technology assessment committees as part of Health Technology Assessment (HTA) activities, contributing to the collection and analysis of evidence on the efficacy, safety and organizational impact of the technologies used.

Application example – A CT department has been installed a patient self-positioning system based on 3D cameras and deep learning models, aimed at optimizing isocentric centering. During clinical activity, the Radiographer observes that, in the presence of obese patients or those wearing bulky clothing, the system produces an average positioning error of approximately 2 cm along the z-axis, resulting in an increase in delivered dose and a reduction in spatial resolution due to isocentric misalignment.

As part of their professional expertise and ethical duty to monitor the safe use of technology, the Radiographer documents the anomaly in the quality control log and initiates a technical verification using a standard anthropomorphic phantom. The results are then communicated to the medical physicist and clinical engineering team, responsible for dosimetric assessment, system calibration, and management of technical relationships with the supplier, suggesting a report for updating the algorithm calibration model.

Following the corrective action implemented at the system level, the Radiographer proceeds with the operational verification through a new control acquisition, confirming the restoration of the correct isocentric alignment.

This episode highlights how the Radiographer responsibility lies in operational surveillance, the identification of critical issues, and the traceability of reports, while algorithm modifications, technical validation, and calibration decisions fall within the remit of technology governance and technical support professionals.



Copyright: © 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## CONCLUSION

The analysis of article 87 of the Italian Radiographer Code of ethics highlights how AI, although configured as a tool of extraordinary potential to support professional practice, can in no way replace human responsibility and discernment.

The provisions examined outline an articulated framework, in which individual responsibilities of the Radiographer (competence, awareness, critical management of results, protection of confidentiality, transparency, promotion of explainable solutions and continuous monitoring of technologies) and shared responsibilities involving healthcare companies, professional associations and technology manufacturers are intertwined, according to a logic of multi-level governance.

The Radiographer appears not as a mere passive user, but as an active guarantor of the technical quality, safety and centrality of the assisted person.

Of particular importance are the clear reaffirmation of the principle of non-delegability of professional judgment, the focus on algorithmic transparency and explainability, which have now become central to the national and international debate, and the enhancement of the proactive role of Radiographer in technological governance and in the processes of continuous improvement of AI systems.

However, some profiles of application complexity seem to emerge, in a purely theoretical way, whose possible repercussions on the Radiographer require adequate reflection: the qualification as a "final decision-maker", apparently in contrast with Law no. 132 of 23 September 2025, even in the face

of a deontological provision that clearly delimits its scope of application, and the use of the potentially ambiguous expression "image evaluation" (comp. ch.4); the attribution of the role of "guarantor" in the management of data and in the application of AI systems, which risks exceeding the real margin of individual control and own competences (comp. ch.5); finally, the duty to "endeavour" to ensure that AI decisions are transparent and understandable, which appears difficult to pursue due to the intrinsic opacity of the technology, the resolution of which is left to producers (comp. ch.6).

To give concrete follow-up to the deontological provisions, it seems appropriate to promote the development of specific training courses on AI, integrated into university programs and Continuing Medical Education systems; the definition of guidelines shared between Radiographer, medical professional and health authorities; as well as the strengthening of the role of professional associations in dialogue with institutions and producers. In line with the principles of transparency and information referred to in the Code, the need to make explicit in the medical report the possible use of AI systems may also appear soon, as a further form of clarity towards the assisted person.

In conclusion, although some provisions may appear complex to apply in everyday practice, Article 87 of the Radiographer Code of Ethics is an effective tool for the professional and institutional governance of technological innovation, focused on quality, safety and the protection of the person receiving care.

## References

1. The authors highlight the ethical issues appearing from the use of artificial intelligence systems. National Committee for Bioethics, National Committee for Biosafety, Biotechnology and Life Sciences (2020), Italy. Artificial intelligence and medicine: ethical aspects. Published at: <https://bioetica.governo.it/media/sr3gojkt/intelligenza-artificiale-e-medicina.pdf> (last consultation on 19 December 2025)
2. The Italian Radiographers Code of ethics has been approved by the National Council of Ethics National Federation of the Orders of Radiographers and Technical Health Professions, Rehabilitation and Prevention (FNO TSRM and PSTRP). January 31, 2025, Italy. Published at: [https://www.tsrp-pstrp.org/wp-content/uploads/2025/03/CD\\_TSRM-def.pdf](https://www.tsrp-pstrp.org/wp-content/uploads/2025/03/CD_TSRM-def.pdf) (last consultation on 19 December 2025)
3. Artificial intelligence must be considered as a tool to support decision-making processes, in this case of the doctor. Ministry of Health. Artificial intelligence systems as a diagnostic support tool. November 9, 2021, Italy. Published at: [https://www.salute.gov.it/imgs/C\\_17\\_pubblicazioni\\_3218\\_allegato.pdf](https://www.salute.gov.it/imgs/C_17_pubblicazioni_3218_allegato.pdf) (last consultation on 19 December 2025)
4. The codes of ethics regulate the professional practice and guide the ethical behavior of health professionals: They are also intended to guide ethical decisions by individual clinicians and to be consistent with the collective values of their profession. Collings-Hughes D, Townsend R, Williams B. (2022). Professional codes of conduct: A scoping review. *Nursing Ethics*, 29(1), 19-34. doi: 10.1177/09697330211008634.
5. The law lays down the principles for research, testing, development, adoption and application of artificial intelligence systems and models, and applies by Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024. 2025, 23 September. Law No. 132 of 23 September 2025, "Provisions and delegations to the Government on artificial intelligence". Official Gazette no. 223 of 25 September 2025, Italy. Published at: <https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2025-09-23;132> (last consultation on 19 December 2025)



6. Deontological norms cannot prevail over legislative ones: "The deontological norm has the nature of an extra-juridical precept and is destined to recede when the space it occupies is reached by juridical regulation". Benci, L. (2018, 21 January). Informed consent, DAT and code of medical ethics: the reasons for legislative prevalence. Published at: [Quotidiano sanità](https://www.quotidianosanita.it/governo-e-parlamento/articolo.php?articolo_id=58154). [https://www.quotidianosanita.it/governo-e-parlamento/articolo.php?articolo\\_id=58154](https://www.quotidianosanita.it/governo-e-parlamento/articolo.php?articolo_id=58154). (last consultation on 19 December 2025)
7. The need for Radiographer to be involved in specific training courses is highlighted, aimed at ensuring adequate preparation to face the challenges posed by artificial intelligence in a conscious and competent way: "[...] through the definition of training and information courses aimed at tending, with time and experience, to obtain a relationship with Artificial Intelligence that is increasingly ethical, transparent, safe and performing". FNO TSRM and PSTRP. November 8, 2020, Italy. Artificial Intelligence and Diagnostic Imaging - Implications for TSRM. World Radiology Day. Published at: <https://www.tsrmpstrp.org/wp-content/uploads/2020/11/Intelligenza-artificiale-e-TSRM-8-novembre-2020-FNO-TSRM-e-PSTRP.pdf> (last consultation on 19 December 2025)
8. The article states that: "[...] provision, by the most representative professional associations and trade associations, as well as by the aggregative forms of the associations referred to in article 3 of Law no. 4 of 14 January 2013, of literacy and training courses, for professionals and operators in the specific sector, in the use of artificial intelligence systems [...]" Italy. (2025). Law no. 132 of 23 September 2025, art. 24, c.2, letter f.
9. The legislator establishes that: "Artificial intelligence systems in the health sector constitute support in the processes of prevention, diagnosis, treatment and therapeutic choice, without prejudice to the decision, which is always left to the practitioners of the medical profession". Italy. (2025). Law no. 132 of 23 September 2025, art. 7, c.5.
10. The legislator establishes that: "In order to ensure the application and implementation of national and European Union legislation on artificial intelligence, the Agency for Digital Italy (AgID) and the National Cybersecurity Agency (ACN) are designated as National Authorities for Artificial Intelligence [...]". Italy. (2025). Law no. 132 of 23 September 2025, art. 20, c.1.
11. Some codes of ethics establish that: "The nurse guarantees and protects the confidential nature of the relationship with the assisted person" (FNOPI, 2025, art. 20). Published at: [https://www.fnopi.it/wp-content/uploads/2025/03/FNOPI\\_CodiceDeontol2025\\_web-2.pdf](https://www.fnopi.it/wp-content/uploads/2025/03/FNOPI_CodiceDeontol2025_web-2.pdf) (last consultation on 19 December 2025); "The midwife guarantees the confidentiality of the processing of personal data" (FNOPO, 2017, art. 3.17; from the institutional website of the FNOPO there do not seem to be any other officially published texts other than that of 2017. Published at: [https://www.fnopo.it/files/1685007262\\_CODICE%20DEONTOLOGICO%20luglio%202017.pdf](https://www.fnopo.it/files/1685007262_CODICE%20DEONTOLOGICO%20luglio%202017.pdf) (last consultation on 19 December 2025); "The physiotherapist must guarantee the utmost confidentiality and data protection" (FNOFI - AIFI, 2012, art. 30). Published at: [https://aifi.net/wp-content/uploads/2019/06/Codice\\_Deontologico\\_AIFI2019.pdf](https://aifi.net/wp-content/uploads/2019/06/Codice_Deontologico_AIFI2019.pdf). (last consultation on 19 December 2025)
12. Any clinical AI model must be transparent and interpretable, capable of making explicit its functioning, internal logic, parameters and assumptions that guide its processing: It is an implicit requirement that any clinical model needs to be interpretable or transparent and has an ability to describe its functioning, describe its structure, underlying parameters and explicitly state its assumptions. Balagurunathan Y, Mitchell R, El Naqa I. (2021). Requirements and reliability of AI in the medical context. *Physica Medica*, 83, 72-78. doi: 10.1016/j.ejmp.2021.02.024.
13. "Due to the lack of transparency (opacity of AI), it is difficult to detect and demonstrate possible violations of regulatory provisions [...]". European Commission. (2020, February 19). White Paper on Artificial Intelligence - A European approach to excellence and trust. Published at: <https://eur-lex.europa.eu/legal-content/IT/TXT/PDF/?uri=CELEX:52020DC0065> (last consultation on 19 December 2025)
14. The recent study (2025) highlights how explainability (XAI), a subdomain of AI, represents the attempt by engineers to make the functioning of complex Deep Learning architectures commonly called "black boxes" understandable, whose opacity is one of the main causes of user distrust: «XAI is an attempt by engineers to demystify the otherwise secretive working of complex DL architectures popularly referred to as "black boxes", which is the leading cause of mistrust for people». Hafeez, Y., Memon, K., Al-Quraishi, M. S., Yahya, N., Elferik, S., & Ali, S. S. A. (2025). Explainable AI in diagnostic radiology for neurological disorders: A systematic review, and what doctors think about it. *Diagnostics*, 15(2), 168. doi: 10.3390/diagnostics15020168.
15. The legislator does not expressly mention the "producers" or "developers" of artificial intelligence systems but seems to implicitly attribute to them their responsibility of ensuring fairness, quality and transparency. Art. 3, c. 2, in fact establishes that: "The development of artificial intelligence systems and models for general purposes takes place on data and through processes whose correctness, reliability, security, quality, appropriateness and transparency must be guaranteed and monitored [...]". To confirm, art. 1, paragraph 2, refers to the application following Regulation (EU) 2024/1689, which explicitly



Copyright: © 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).



regulates the responsibilities of suppliers. The national authorities (AgID and ACN), identified by art. 20, have instead the tasks of supervision, inspection and sanction. Italy. (2025). Law no. 132 of 23 September 2025, art. 3, paragraph 2; art. 1, paragraph 2.

16. The authors introduce the phenomenon of "AI aging", i.e. the degradation of the quality of AI models with the passage of time since the last training cycle: "we present the first analysis of AI "aging": the complex, multifaceted phenomenon of AI model quality degradation as more time passes since the last model training cycle". Vela D, Sharp A, Zhang R, Nguyen T, Hoang A, Pinykh OS (2022). Temporal quality degradation in AI models. Scientific Reports, 12(1):11654. doi:10.1038/s41598-022-15245-z.

**Conflicts of Interest.** The authors declare that there are no conflicts of interest.

**Annotation.** The authors declare that the English translation of certain terms contained in Article 87 of the Italian Radiographers Code of Ethics may not fully correspond to the meaning of the original Italian provisions, thereby posing a risk of potential interpretative inaccuracies.

