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STRENGTHENING ETHICS IN RADIATION PROTECTION: A REVIEW OF WORLD HEALTH ORGANIZATION (WHO) 2022 POLICY

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Abstract:

Medical imaging is vital in modern healthcare, yet its radiation protection practices have historically centered on scientific and technical principles, often overlooking explicit ethical considerations. In 2022, the World Health Organization (WHO) proposed the formal integration of ethics as a fourth independent pillar. This paper reviews WHO's policy brief, analysing its rationale, framework and implementation strategies. Drawing on literature, policy documents and ethical theory, the review finds that the proposal aims to embed core bioethical principles of autonomy, beneficence, non-maleficence and justice into routine imaging decisions. It emphasizes education, policy reform, governance alignment and culture change as essential components of this integration. While the framework offers a holistic shift toward more patient-centered and ethically sound imaging practices, it also presents challenges such as variable ethical norms across cultures, potential resistance from practitioners and a lack of measurable ethical indicators. The paper concludes that WHO's proposal is a timely and necessary step in aligning radiological protection with broader trends in patient-centered care and medical ethics. However, its success depends on multi-level collaboration, clear implementation pathways and ongoing evaluation. When fully realized, the ethics pillar has the potential to strengthen trust, improve patient outcomes and ensure radiological practices uphold both scientific integrity and moral responsibility.

Keywords:

Ethics, Radiation Protection, Medical Imaging

Introduction

Radiation protection in medical imaging has traditionally been guided by scientific and technical principles, aimed at minimizing harm from ionizing radiation. However, explicit consideration of ethical values in this domain has lagged behind other areas of medicine. In 2022, the World Health Organization (WHO) released a policy brief proposing to integrate ethics as a fourth pillar into the existing framework for radiation protection in medical imaging (WHO, 2022). This proposal emerges from growing recognition that patient-centered ethical principles such as respect for autonomy, beneficence, non-maleficence and justice should be more firmly embedded alongside the scientific and regulatory aspects of radiological practice. The following is a condensed review of the WHO's proposal, preserving the original article's scholarly analysis and structure while summarizing key arguments. It evaluates the rationale for an ethics pillar, the content of the WHO framework and the potential benefits and challenges of implementation. This review is intended for academics, healthcare practitioners and policymakers interested in the evolution of radiation protection standards.

Background: Ethics and Radiation Protection in Medicine

Medical imaging is an indispensable tool in modern healthcare aiding in the diagnosis of various diseases (Alcantara et al., 2023); but its safety practices have historically been rooted in radiation science and regulatory policy rather than in medical ethics (WHO, 2022). The classical radiation protection system which is grounded in the principles of (1) justification (Bernardo et al., 2022) which is only performing imaging when the benefits outweigh risks; (2) optimization (Cardarelli & Ulsh, 2018), which is keeping exposures as low as reasonably achievable; and (3) dose limitation (Alnaaimi et al., 2021) was originally developed to protect healthcare workers in dealing with radiation (Clarke & Valentin, 2009) and not patients. As a result, ethical considerations specific to patient care were not explicitly emphasized in radiological practice for many decades. Over the past 25–30 years, the use of ionizing radiation in medicine has greatly increased, bringing to light gaps in how well ethical values are understood and applied by imaging professionals. Studies and expert committees began to identify this lack of explicit reference to ethics in radiology, even as they acknowledged that most practitioners believed they were acting morally. For example, Bochud et al. (2020) and Malone et al. (2019) observed that discussions on radiological protection rarely addressed core medical ethics principles, and they advocated for stronger integration of ethical reasoning into imaging decision-making.

At the same time, healthcare at large was undergoing a paradigm shift toward patient-centered care, emphasizing patient dignity, autonomy and shared decision-making in all medical interventions (Grover et al., 2022). Within this context, radiology's traditionally paternalistic approach where clinicians made imaging decisions with minimal patient input (Alexander & Haugen, 2023) has been increasingly viewed as outdated. There is growing consensus that applying core bioethical values in radiological services would foster a shift from paternalism to patient-centered care, improving informed consent and shared decision-making, maximizing benefit by avoiding unnecessary exposure, and promoting fairness in how imaging resources are used (WHO, 2022).

By the late 2010s, international bodies started reformulating the radiation protection framework to explicitly incorporate ethics (Lochard, 2014; Cho, 2015). The International Commission on Radiological Protection (ICRP) in Publication 138 (2018) outlined the ethical foundations of radiological protection, identifying key values of biomedical ethics (Beauchamp & Childress,

2019) such as beneficence - doing good (Bester, 2020; Willemink et al., 2020); non-maleficence - not to do harm (Salerno et al., 2019); justice and respect for persons (human dignity) as cornerstones of the system. Likewise, the Bonn Call for Action issued by the International Atomic Energy Agency (IAEA) and WHO urged a stronger safety culture in medical imaging (World Health Organization, 2017), implicitly recognizing the role of ethics in areas like justification and optimization of procedures. These developments set the stage for WHO's initiative to more formally elevate ethics within the radiation protection framework for medical imaging.

WHO's 2022 Proposal: Ethics as the Fourth Pillar

In September 2019, the WHO convened a global workshop on ethical aspects of radiation protection in health care, gathering stakeholders from diverse fields (radiologists, technologists, ethicists, regulators, patient advocates, etc.) to discuss how ethical considerations could enhance radiation safety in medicine. Insights from this workshop informed the WHO policy brief "*Ethics and medical radiological imaging*" released in April 2022 (WHO, 2022). In this brief, WHO explicitly proposes that "*it adds a fourth component – ethics in medical imaging – to the framework and it is important that ethical values will become a central feature of imaging whether as part of patient-centred clinical pathways or in routine imaging practice*" (WHO, 2022; p. 2). This statement clearly positions ethics as a formal and equal companion to the three existing components of radiation protection: (1) professional development of health workers, (2) regulation and governance, and (3) safety culture in radiology departments.

The central idea is that ethical values should become a core feature of imaging practice, equal in importance to technical safety measures and professional competencies. In practical terms, this means that decisions about whether and how to conduct imaging would explicitly consider ethical principles in addition to following scientific guidelines. For instance, patient autonomy and informed consent would be given greater weight in the imaging decision process, ensuring patients' values and preferences are respected when balancing diagnostic benefits against radiation risks. Likewise, the principle of justice would encourage more equitable access to necessary imaging for all patients and avoidance of unnecessary or duplicate procedures that do not add value to care.

The WHO (2022) brief emphasizes that its ethics integration is holistic and meant to reinforce, not replace, the established safety principles. It aligns with broader WHO commitments to put ethics at the heart of health policymaking and with global initiatives like the WHO (2021) *Global Patient Safety Action Plan 2021–2030* which calls for eliminating avoidable harm in health care. The target audience for the policy includes operational healthcare leaders (hospital executives, imaging facility managers), frontline professionals (radiographers, radiologists, medical physicists, etc.), professional societies, educators as well as patients and their advocates. By engaging all these stakeholders, WHO envisions a culture change where ethical reasoning becomes embedded in everyday radiological practice from protocol design and referral justification to patient communication and reporting.

To support the integration of ethics, the WHO document outlines several strategic approaches (WHO, 2022). One key strategy is education and capacity-building by incorporating ethics into the training and continuing professional development of radiology and imaging. This involves teaching practitioners about ethical frameworks and how to apply principles like informed

consent, confidentiality, and risk-benefit analysis in the context of diagnostic imaging. Another strategy is strengthening governance by updating policies and guidelines to reflect ethical considerations. For example, ensuring that national radiation protection regulations encourage patient involvement and transparency about imaging risks.

Fostering a safety and ethics culture is also crucial. Healthcare institutions should encourage open dialogue about ethical dilemmas such as potential overuse of scans or incidental findings and support staff in making patient-centered decisions. The WHO (2022) brief acknowledges that achieving this culture shift will require leadership, stakeholder engagement and adaptation to local contexts. It calls for broad consultation and the development of tools and guidance to help implement the new ethics pillar in diverse healthcare settings. Notably, the brief points to the COVID-19 pandemic as an example of how ethics can rapidly become central in medical decision-making: during the pandemic, values like solidarity, honesty, dignity and autonomy were brought to the forefront in debates on triage, resource allocation and public health measures. This experience, according to WHO, demonstrates the feasibility of bringing ethics into focus and could inform strategies to integrate ethics into radiological protection moving forward.

An Analysis of the WHO Proposal

WHO's initiative to formally recognize ethics as a foundational pillar in radiation protection for medical imaging is a timely and positive development. It addresses long-standing gaps between radiological practice and the ethical norms of general medicine. By explicitly adding ethics to the framework, the proposal sends a clear message that safeguarding patients' rights and well-being is as important as adhering to radiation dose limits. This explicit emphasis could improve clinical decision-making in imaging. For example, the principle of justification traditionally is a technical determination of whether an imaging procedure's benefit outweighs the risk. However, it gains depth when viewed through an ethical lens. Healthcare professionals must not only weigh clinical benefits but also consider the patient's personal values and understanding of those risks (Rahimzadeh, Kostick-Quenet, Blumenthal Barby & McGuire, 2023). Such a perspective encourages more thorough discussions with patients about why an imaging test is needed, ultimately supporting the ethical principles of autonomy and informed consent.

Moreover, integrating ethics can assist healthcare providers navigate complex scenarios that the standard guidelines don't fully cover, such as managing incidental findings or patient requests for unwarranted scans (ICRP, 2024). In these cases, having a strong ethical framework helps balance beneficence (acting in the patient's best interest) against non-maleficence, which (avoiding harm from unnecessary radiation) and justice (fair use of medical resources). The WHO proposal also reinforces the concept of do no harm in radiology by highlighting the moral obligation to avoid unnecessary exposure and to optimize procedures, an obligation that parallels the technical mandate to minimize doses. In sum, one strength of the WHO's approach is that it integrates the safety culture of radiology with the humanistic ethos of medicine, potentially leading to more compassionate, transparent and patient-centred imaging services.

Another notable merit of the proposal is its alignment with existing international efforts and ethical standards, which lends it credibility and potential for broad acceptance. In recent years, the ICRP and other expert groups have underscored the ethical underpinnings of radiation protection (WHO, 2022). So, WHO's call for integration is consistent with these expert views

rather than a radical departure. It effectively consolidates scattered discussions of ethics into a coherent policy direction. Additionally, by linking the ethics pillar to global health initiatives such as universal health coverage and patient safety goals, the WHO framework puts radiological protection within the larger movement for quality and safety in healthcare.

This can facilitate interdisciplinary cooperation of hospital administrators and policymakers who are already invested in patient safety and ethics in other domains may be more inclined to support ethical practices in radiology once it is highlighted as part of the standard framework. The proposal's broad stakeholder approach (including professional societies, patient advocates and educators) is wise, because ethical practice in imaging cannot be enforced top-down alone. It requires buy-in from the medical community and empowerment of patients. By recommending ethics education and dialogue, the WHO plan fosters an environment where radiographers and radiologists feel equipped and motivated to act according to ethical principles, not just technical protocols.

Despite its strengths, the WHO's ethics-as-a-fourth-pillar concept also faces significant challenges and potential limitations. First, one could argue that ethics should permeate all pillars of radiation protection rather than stand as a separate fourth pillar. There is a subtle risk that by compartmentalizing "ethics in medical imaging" as its own component, practitioners might misunderstand it as an isolated consideration, when in reality ethical thinking should inform professional training, governance and safety culture simultaneously.

The WHO brief does emphasize holistic integration, but successful implementation will require clear communication that ethics is not a mere add-on. It must be woven into every decision and practice. Achieving this will likely demand a culture change that is difficult and time-consuming. Health professionals may need to confront ingrained habits and biases. For instance, radiologists accustomed to making unilateral decisions might need to adapt to greater patient involvement and interdisciplinary ethical consultations (Perera Molligoda Arachchige & Stomeo, 2024). Such changes can meet resistance, especially if clinicians feel that their autonomy or efficiency is being constrained by new ethical checklists or procedures. Thus, a key challenge is to integrate ethics in a way that enhances care without overburdening workflows. This might be addressed by demonstrating that ethical practices like thorough justification discussions can be streamlined and ultimately save time by preventing conflicts or harm down the line.

Another challenge lies in the variation of ethical norms and resources across different settings and cultures (WHO, 2022). The WHO proposal is global in scope, but concepts like patient autonomy or shared decision-making may not be equally prioritized in all cultures or healthcare systems. In some regions, a paternalistic model of medicine remains the norm, and patients may be less accustomed to questioning doctors' orders or participating in decisions. Implementing the ethics pillar in those contexts will require sensitivity and perhaps gradual change, combining ethical education with respect for local values. Additionally, low-resource settings might struggle with some ethical recommendations: for example, the principle of justice would call for equitable access to imaging, but if a region has limited imaging equipment, tough choices must be made about allocation (Sethole, 2019 & Ismanto, 2019).

Ethical frameworks can guide such choices, but the solutions may highlight systemic healthcare inequities beyond the scope of radiology alone. The WHO brief acknowledges that initiatives

must be tailored to local context and resource availability, which is prudent, but this means the impact of the ethics pillar could be uneven worldwide. Measuring success also poses a limitation. It is relatively straightforward to audit radiation doses or compliance with safety checks, but harder to measure ethical performance. Metrics for concepts like patient involvement or ethical awareness are not well established. There is a risk that without clear indicators and accountability, the push for ethics could become symbolic. Ensuring that the ethics pillar leads to tangible improvements (such as better patient satisfaction, reduced inappropriate imaging or fewer incidents of overexposure) will require developing new evaluation tools and conducting research on outcomes.

Finally, the WHO proposal is a high-level policy brief and thus leaves many practical details undefined, which is understandable given its purpose but still worthy of critique. The document outlines *what* needs to change, but the *how* is left to future guidelines and the initiative of stakeholders. For instance, it calls for educational programs on ethics for imaging professionals, but curricula would need to be developed, faculty trained and time made in busy training schedules for this content. Similarly, updating regulations to reflect ethical tenets might involve revising national laws or accreditation standards, which can be slow processes. Without sustained advocacy and resource investment from WHO and international partners, there is a possibility that this well-intentioned brief could have limited practical effect.

Simply recognizing an issue in policy does not guarantee change on the ground. It must be followed by concrete action and support (Pollack Porter, Rutkow & McGinty, 2018). On the positive side, WHO has committed to developing comprehensive tools and guidance to help implement the policy; and the involvement of organizations like the International Atomic Energy Agency (IAEA) and professional societies provides an infrastructure for follow-up. The critical point will be maintaining momentum, keeping ethics in focus amid numerous competing priorities in radiology is itself an ethical commitment to patients' long-term welfare.

Implementation and Future Directions

To realize the vision of ethics as an integral pillar of radiation protection, a multi-faceted implementation strategy is required. Education is a top priority. Ethics should be incorporated into medical imaging curricula at all levels. Training programs for radiologists, radiographers, medical physicists and referring physicians should include case-based learning on ethical dilemmas in imaging. Professional societies and accreditation bodies can mandate a certain level of ethics competency, similar to how they mandate knowledge of radiation physics or anatomy. For instance, the World Medical Association's Declaration of Geneva (Rheinsberg, Parsa-Parsi, Kloiber & Wiesing, 2018) modernized the physician's oath to emphasize patient well-being, respect and autonomy, reflecting a global ethos that can be mirrored in radiological practice guidelines. Additionally, on-the-job continuing education should reinforce ethical practices for those already in the workforce. Hospitals might hold ethics workshops or multidisciplinary meetings where radiology staff discuss recent cases with ethicists or patient representatives to identify what went well or could be improved. Such reflective practice can gradually build an ethical culture.

Another important direction is integrating ethical checkpoints into clinical protocols and quality assurance processes. For example, when developing or reviewing hospital policies on imaging committees should explicitly evaluate ethical implications. Decision support tools for imaging appropriateness could include prompts about patient values and consent. For example,

using consent forms or informational brochures that explain radiation risks to patients for certain procedures (Mavrodinova & Chernogorova, 2024) may support transparency and autonomy. On the global stage, organizations like the IAEA, ICRP, and WHO could collaborate to produce consensus documents that translate ethical principles into actionable standards for radiology departments, much like how safety standards exist for equipment and dosing. These could cover topics such as communication of risk, obtaining informed consent for medical exposure; managing conflicts of interest such as self-referral and financial incentives for more scans (Riegler, 2023), which pose ethical dilemmas; and ensuring equity in access such as avoiding situations where certain groups systematically receive lower-quality imaging or higher risk (DeBenedictis et al., 2022).

Engaging patients and the public is also key to the future of this initiative. Empowering patients with knowledge about the benefits and risks of radiological procedures will enable them to participate meaningfully in decisions (Dutrue et al., 2024). WHO's (2022) proposal recognizes patients and their advocates as stakeholders in this process. In practice, this could mean involving patient representatives in hospital radiation safety committees or in developing patient-friendly informational materials. Public awareness campaigns could help shift expectations; for example, countering the assumption that more imaging is always better by explaining when scans might be unnecessary or harmful. As patients become more informed, healthcare providers will be encouraged to follow ethical guidelines, since deviations may be met with greater scrutiny or even refusal by knowledgeable patients.

Looking ahead, research and continuous evaluation will play a crucial role. The integration of ethics into radiation protection should be monitored through studies that assess outcomes. Are we seeing changes in the rate of inappropriate imaging? Are patients reporting better understanding of their imaging choices? Do healthcare providers feel more confident in handling ethical issues? Early evidence of improvement would reinforce the importance of the ethics pillar and encourage further investment, while any shortcomings would highlight areas needing adjustment or more support. There is also an opportunity for ethics committees or consult services specialized in radiology to emerge in larger centers, providing guidance in difficult cases. Over time, the lessons learned can refine the ethical frameworks and ensure they remain relevant with evolving technology such as the rise of artificial intelligence in imaging, which introduces new ethical questions about algorithmic bias, data privacy and the healthcare provider-patient relationship.

Conclusion

The WHO's 2022 proposal to integrate ethics as a fourth pillar in the medical imaging radiation protection framework marks a pivotal moment in the evolution of radiological practice. This review finds that the proposal is well-founded in its recognition that technical excellence alone is insufficient for truly patient-centered care in radiology. By elevating ethical principles to the level of core requirements, the initiative promises to bridge the long-standing gap between radiation safety and biomedical ethics, ensuring that the use of ionizing radiation and other imaging modalities is guided not only by what is effective, but also by what is right for the patient. The strengths of the WHO framework lie in its alignment with global ethical trends and its comprehensive vision that engages multiple stakeholders in a culture shift toward greater transparency, respect, and justice in imaging.

Nevertheless, turning this vision into reality will require diligent effort including education, policy reform, resource allocation and cultural change which do not happen overnight. Challenges such as varying local norms, potential resistance and the need for clear implementation guidance must be actively managed. The success of this fourth pillar will ultimately be measured by safer, more equitable imaging practices and improved patient trust in the radiological services they receive.

In conclusion, ethics in medical imaging should move from being an implicit backdrop to an explicit cornerstone of radiation protection. The WHO's proposal is a significant step in that direction, reinforcing the idea that patient welfare is the ultimate goal of all medical endeavours, including those involving radiation. For healthcare practitioners and policymakers, the task ahead is to take the framework's lofty principles and embed them in day-to-day practice. Achieving this will fulfil the ethical mandate "first, do no harm" in a modern context by not only preventing radiation harm but also actively promoting the values that uphold patient dignity and societal trust in medical imaging. With ongoing commitment and collaboration, the integration of ethics into radiological protection can lead to safer technology use and a more humane healthcare system that benefits everyone.

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