Chelonian Conservation And Biology

Vol. 17 No.2 (2022) | https://www.acgpublishing.com/ | ISSN - 1071-8443

DOI:doi.org/10.18011/2022.04(1) 2159.2166

THE CHALLENGES OF INCIDENTAL FINDINGS AND OVERDIAGNOSIS IN RADIOLOGICAL PRACTICE

Nasser Ayed Salem Al-Sanani, Mohammaed Matleb Alanazi, Mufarreh Jubran Jubran Lughbi, Samar Ali Alhazmi, Saad Marui Mohammed Namis, Yahya Ahmed Yahya Mobarki, Ammash Ghali Alshammari, Abdulaziz Masad Alharbi, Yousef Mohammed Ahmed Al-Ahdal, Ahmed Mohammed Yousef Daghriry, Hamdan Ali Hamdan Alghamdi, Abdulaziz Mohammed A Almogamas, Aljawhara Saleh Aldalbahi, Abdulaziz Mohammed A Almogamas, Abdullah Nasser Alotaibi

Abstract

The objective of this research was to analyze the primary reasons that contribute to overimaging with X-ray, including self-referral, defensive medicine, and duplicate imaging procedures. Additionally, the study sought to highlight the ethical dilemma that arises from this issue. This study specifically examined the common causes of overdiagnosis, including the use of total-body CT scans for screening purposes in both public and private healthcare sectors. Additionally, it explored the selection of highly sensitive tests for various conditions such as pulmonary embolism, as well as the prevalence of ultrasound investigations for thyroid and prostate issues, and the use of MR examinations for musculoskeletal conditions. The immediate consequence of overdiagnosis and overimaging is an elevated risk of contrast media infusion, radiation damage, and increased expenses within the global healthcare system. The subject of the expenses associated with overdiagnosis is closely linked to the use of improper or inadequately justified imaging procedures. The ethical principles of trust and proper behavior are emphasized, since the primary ethical issues in radiology arise from the justification of medical exposures for patients during treatment. Close communication and collaboration among all doctors involved in patient care is crucial for determining the need for imaging examinations. This collaboration should carefully consider the potential drawbacks of ionizing radiation and the benefits it offers to the patient's overall treatment.

Keywords: overimaging, overdiagnosis, radiological practice, X-ray, drawbacks of ionizing radiation, treatment.

1. Introduction

The discipline of biomedical imaging, namely in the domain of radiology, has seen significant growth and development in the last 10 years. The current function of the radiologist is being questioned as physicians are increasingly relying on pictures. Over the last two decades, the advancement of medical imaging has unquestionably improved patients' life expectancy and

All the articles published by Chelonian Conservation and Biology are licensed under a Creative Commons Attribution-NonCommercial4.0 International License Based on a work at https://www.acgpublishing.com/

quality of life [1]. This progression demonstrates the use of advanced ionizing and non-ionizing radiation technologies, such as multidetector computed tomography (MDCT), positron emission tomography (PET), and magnetic resonance imaging (MRI). However, a portion of this development might be ascribed to the over use of imaging services.

2. **Overuse**

Several key factors that contribute to the excessive ‘use of imaging include the behavior of referring physicians, self-referral for additional radiological examinations, duplicate imaging studies, defensive medicine, missed educational opportunities when inappropriate procedures are requested, patient demand, payment mechanisms [2]. Self-referral has been recognized since the 1920s, prior to the introduction of advanced technologies in radiography. However, experts largely agree that its frequency has risen in the last 20-30 years [3]. Self-referral can occur in two primary forms: firstly, when a physician who is not an imaging specialist (or a non-physician provider) refers patients to their own on-site imaging services; and secondly, when physicians refer their patients to external facilities in which they have a personal financial stake. Self-referral occurs when a referring physician has a conflict of interest because they may prioritize the financial gain from performing a treatment above the medical need of the operation.

3. Defensive medicine

Defensive medicine is the practice of using diagnostic or therapeutic measures primarily to protect against prospective malpractice lawsuits rather than to assist the patient. Defensive medicine is a significant and prevalent issue in modern medicine, leading to excessive use of imaging. However, its use has a poor likelihood of really improving patient outcomes. The issues revolve on the apprehension of overlooking unforeseen or uncommon discoveries and the fear of legal action. Additional factors include the desire to prevent an erroneous diagnosis or to save expenses. Ordering diagnostic exams in a defensive manner may result in overdiagnosis, which refers to the identification of novel results that do not have a major effect on health. This, in turn, may lead to unneeded measures being taken.

4. Ionizing radiation-based imaging services

Ionizing radiation-based imaging services, such as whole-body CT scans, are increasingly being advertised directly to the public. Individuals are sometimes encouraged to visit imaging facilities on their own for specialized investigations. Frequently, these studies incur high costs and provide uncertain advantages for the persons participating in them. Furthermore, clinicians should actively promote patients to disclose any prior imaging exams they have received to prevent redundant scans. Duplicate imaging investigations can occur when attempts to locate prior tests are inadequate or unsuccessful. Replicating research leads to excessive use of medical imaging [6].

Recent study indicates that over 33% of healthcare expenditures are redundant, ineffective, or have a negative impact on patients [7]. Unwarranted imaging scans seldom uncover the

underlying cause of patients' complaints, although they may yield incidental findings that need further imaging or interventional treatments for clarification [8]. Diagnostic imaging in isolation does not enhance patient well-being and does not inherently provide any benefit to patients. The only potential advantage of imaging is contingent upon a modification in patient therapy. Hence, comprehending the significance of imaging necessitates integrating imaging into a structure of medical decision-making and the choice of appropriate treatment. Additionally, diagnostic imaging inherently carries the possibility of yielding both false-positive and false-negative findings. Hence, it is crucial to recognize that imaging information should not be regarded as absolute, but rather should be comprehended within a particular clinical framework that incorporates the patient's medical history, prior radiological tests, and other clinical data. This comprehensive approach allows for a more reliable determination of whether a specific diagnosis is confirmed or ruled out [9].

The presence of potential self-interest among policy makers, payers, doctors, imaging industry, and patients highlights the ethical obligations of trust and proper behavior. The over use of medical imaging contributes to the escalating expenses in global healthcare systems and exposes people, as well as the general community, to avoidable radiation levels [10]. The rising healthcare expenses and fragmentation of medical treatment may be attributed to the lack of cooperation and coordination across many sectors, such as radiologists, industry, referring doctors, healthcare service payers, and public interest organizations.

The notion of distributive justice in bioethics states that healthcare resources should be allocated in a manner that is fair and equal. Providing pricey non-essential health treatments to one section of society while another sector lacks needed services is immoral due to limited resources for healthcare [11]. Although there is ongoing inequality in the allocation of healthcare resources in the United States, it is important to inquire if new medical techniques compromise the equitable distribution of health resources.Considering the significance of this topic and the substantial economic consequences it might have, it is crucial to reinstate impartiality.

When discussing radiological protection in greater detail, we often encounter not only unnecessary or unsuitable medical tests, but also imaging techniques that may have harmful consequences on patients, particularly when contrast agents are administered and there is exposure to radiation. The primary ethical dilemmas in radiology arise from the need to justify the medical radiation exposure of patients throughout the course of their treatment. Patients are deliberately exposed to medical procedures with the aim of directly benefiting their particular health. In comparison to other planned exposure situations, the responsibility for justifying the use of a particular procedure lies primarily with the profession rather than with government or regulatory authorities. The relevant physician, who should have knowledge of the risks and benefits associated with the procedures, ultimately bears the responsibility for justifying their use [12, 13].

If radiological examinations are performed beyond what is necessary for good medical practice, the only outcome may be an unwarranted potential risk for patients, without any actual benefit. This would violate the fundamental principles of radiological protection and medical ethics [14], leading to an impractical application of these principles. The possible hazards and uncertainties related to radiation exposure play a crucial part in determining whether to proceed with a therapy. Additionally, the intricacy of effectively conveying these risks must be considered. Indeed, informed consent entails more than just obtaining a patient's signature on a consent form. It is a communication process that necessitates additional time to ensure a thorough and genuine informed consent. This is also closely tied to the crucial matter of allocating sufficient time for each individual patient.

Assessing the suitability of a method involves understanding the consequences of the action and the ethical and social standards that should guide judgments on that action. The International Commission on Radiological Protection (ICRP) has developed and continues to develop a system of radiological protection based on three pillars: the science of radiological protection, a set of ethical values, and the experience gained from the daily practice of radiological protection by professionals [15, 16]. The process of measuring the advantages and disadvantages is often challenging, and the point at which an action becomes suitable or unsuitable might differ across individuals and groups of patients [17]. Furthermore, it is clear that ethics alone cannot give a conclusive resolution to difficulties and challenges. However, it may surely provide valuable perspectives on the principles and philosophy of radiological protection. This approach may facilitate communication between professionals, as well as between professionals, patients, and the general public, in order to emphasize the importance of values and preferences while considering the possible advantages and disadvantages.

In relation to the ethical aspect of radiological protection, it is worth noting the work of Giovanni Silini. In his Sievert Lecture in 1992, Silini examined the ethical basis of the radiological protection system. He emphasized that the system was developed in a rational manner, while also striving to act in a reasonable manner. The recent ICRP Publication on Ethical Foundations of the System of Radiological Protection [15] highlights the core ethical values that underpin radiological protection. These values align with the system's three fundamental principles: justification, optimization, and individual dose limitation, and are aimed at achieving the goals of the radiological protection system.

The present system of protection is based on four ethical values: beneficence/non-maleficence, prudence, justice, and dignity. The origin of medical ethics can be traced back to the Hippocratic oath and more recently to the approach developed by Beauchamp and Childress [19, 20], which is based on the four principles of biomedical ethics: autonomy, which refers to the right of patients to make their own decisions; beneficence, which involves acting in the best interest of the patient; non-maleficence, which emphasizes the importance of avoiding harm; and justice, which requires fairness in healthcare. The ethical principles underlying the system of radiological protection align closely with the concepts of biological ethics. This alignment is

evident in the integration of beneficence and non-maleficence into a unified concept, the substitution of autonomy with dignity, and the inclusion of caution.

5. Overimaging

Overimaging refers to the use of imaging methods in situations when it is unlikely to provide any extra benefits for the patient. This practice may lead to an increase in the average radiation dosage received by the population due to medical exposures. assessing the moral duty of healthcare practitioners to avoid causing injury, the ethical recommendation is to reduce the risk by carefully assessing and doing operations that are adequately prescribed and executed, with the benefits outweighing the risks. Simultaneously, there exists an ethical significance pertaining to the societal advantage, which is not attained and often ignored, when there is an imbalance between health outcomes and the associated expenses [22,23,24].

Supply and demand are seen as the primary processes behind overimaging. The increased accessibility of advanced medical procedures and the growing demand from patients and referring clinicians can lead to the perception that medical imaging provides comfort to both patients and clinicians. However, it is important to note that the benefits of imaging may be exaggerated, while the associated risks and costs are often overlooked [25]. The inclusion of individual health assessment, as outlined in the latest European legislation on radiation safety (BSS), may contribute to an increase in needless medical tests.

The duty to promote the well-being of the patient must be weighed against the duty to avoid causing harm, in order to ensure that the benefits outweigh the harms (beneficence, non-maleficence) [26]. Paying attention to these ethical principles can be challenging when the risks are uncertain, such as in the case of low doses. Overestimating hazards may lead to the avoidance of a potentially beneficial imaging treatment, while underestimating risks may raise the risk for both the patient and society without any benefits for the patient [27, 28]. Prudence is a crucial characteristic while making decisions in uncertain situations. Prudence should not be equated with conservatism or a complete avoidance of risk. Rather, it encompasses and guides the decision-making process, and extends beyond the mere consequence of such actions.

Prudence may be defined as the capacity to make a thoughtful and educated choice in the face of ambiguity, even when the entire repercussions of the chosen course of action are not known. The concept of justification integrates the ethical principles of doing good and avoiding harm, together with the ethical guideline of caution. Practicing ethical behavior and effective communication is a wise and necessary aspect of justification, particularly to prevent potential overimaging [21]. Justice, as a fundamental principle, requires fair and impartial treatment for every individual. An appropriately timed imaging examination, conducted with careful consideration of its necessity and efficiency, can provide substantial benefits to both the patient and society. However, excessive use of imaging leads to the inappropriate allocation of resources, which could otherwise be utilized for other medical purposes, thereby undermining the equitable distribution of advantages and disadvantages. Justice is connected to our perception

of fairness. When it comes to radiation danger, it is important to pay special attention to preventing excessive imaging of youngsters due to their increased vulnerability to the harmful effects of radiation, as compared to adults [28].

This is especially accurate when considering the rapid and significant rise in radiological tests over the last several decades, resulting in a higher number of imaging results that are unrelated to the initial diagnostic problem. Market research studies have shown that the number of computed tomography (CT) exams in the USA has doubled from 3 million per year in 1980 to 6 million per year in 2006. The projected annual growth rate falls between 8 and 10% [29,30,31].

6. Conclusion

Although the benefits of greater mortality reduction justify the radiation exposure risks associated with screening imaging, the negative impact of overdiagnosis cannot be ignored. In emergency imaging, both overdiagnosis and overuse contribute to increased radiation exposure for patients without any corresponding clinical benefits. Practically, the pursuit of rationality and tolerance involves a continuous endeavor to make sensible decisions, drawing upon acquired information, ethical ideals, and experiences. Effective and compassionate communication, together with including the patient in the decision-making process, may assist in selecting the greatest option for the patient's overall health.

References

1. ESR Executive Council 2009; European Society of Radiology (2010) The professional and organizational future of imaging. Insights Imaging 1:12–20

2. Hendee WR, Becker GJ, Borgstede JP et al (2010) Addressing overutilization in medical imaging. Radiology 257:240–245

3. Kouri BE, Parsons RG, Alpert HR (2002) Physician self-referral for diagnostic imaging: review of the empiric literature. AJR 179:843–850

4. Kainberger F (2017) Defensive medicine and overutilization of imaging-an issue of radiation protection. Wien Klin Wochenschr 129:157–158

5. Lee TH, Brennan TA (2002) Direct-to-consumer marketing of high-technology screening tests. N Engl J Med 346:529–531

6. Sistrom CL, Dreyer KJ, Dang PP et al (2009) Recommendations for additional imaging in radiology reports: multifactorial analysis of 5.9 million examinations. Radiology 253:453–461

7. Fisher ES, Wennberg DE, Stukel T et al (2003) The implications of regional variations in medicare spending. Part 1. The content, quality and accessibility of care. Ann Intern Med 138:273–287

8. Dunnick NR, Applegate KE, Arenson RL (2005) The inappropriate use of imaging studies: a report of the 2004 Intersociety Conference. J Am Coll Radiol 2:401–406

9. Blackmore CC, Castro A (2015) Improving the quality of imaging in the Emergency Department. Acad Emerg Med 22:1385–1392

10. Armao D, Semelka RC, Elias J Jr (2012) Radiology's ethical responsibility for healthcare reform: tempering the overutilization of medical imaging and trimming down a heavyweight. J Magn Reson Imaging 35:512–517

11. Fenton JJ, Deyo RA (2003) Patient self-referral for radiologic screening tests: clinical and ethical concerns. J Am Board Fam Pract 16:494–501

12. Malone J (2013) Ethical issues in clinical radiology. In: Oughton D, Hansson SO (eds) Social and ethical aspects of radiation risk management. Elsevier Science, Amsterdam, pp 105–130

13. ICRP (2007) Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann ICRP 37:2–4

14. Del Rosario PM (2015) Referral criteria and clinical decision support: radiological protection aspects for justification. ICRP 2015. Proceedings of the second international symposium on the system of radiological protection. Ann ICRP 44(1S):276–287

15. ICRP (2018) Ethical foundations of the system of radiological protection. ICRP Publication 138. Ann ICRP 47:(1)

16. Cho KW (2016) Ethical foundations of the radiological protection system. ICRP, 2016. Proceeding of the third international symposium on the system of radiological protection. Ann ICRP 45(1S):297–308

17. Brownlee S, Chalkidou K, Doust J, Elshaug AG, Glasziou P, Halth I, Nagpal S, Saini V, Srivastava D, Chalmers K, Korenstein D (2017) Evidence for overuse of medical services around the world. The Lancet 390(10090):156–168

18. Silini G (1992) Sievert lecture. Ethical issues in radiation protection. Health Phys 63:139–148

19. Beauchamp TL, Childress JF (1979) Principles of biomedical ethics, 1st edn. Oxford University Press, Oxford

20. Beauchamp TL, Childress JF (2012) Principles of biomedical ethics, 7th edn. Oxford University Press, Oxford

21. Dauer LT, Thornton HR, Hay JL, Balter R, Williamson MJ, St Germain J (2011) Fears, feelings, and facts: interactively communicating benefits and risks of medical radiation with patients. AJR 196:756–761

22. Busardò FP, Frati P, Santurro A, Zaami S, Fineschi V (2015) Errors and malpractice lawsuits in radiology: what the radiologist needs to know. Radiol Med 120(9):779–784

23. Olivetti L, Fileni A, De Stefano F, Cazzulani A, Battaglia G, Pescarini L (2008) The legal implications of error in radiology. Radiol Med 113(4):599–608

24. Ramella S, Mandoliti G, Trodella L, D'Angelillo RM (2015) The first survey on defensive medicine in radiation oncology. Radiol Med 120(5):421–429

25. Lysfahl KB (2012) Utilization and utility of diagnostic imaging. Quantitative studies and normative considerations. University of Oslo. ISBN 978-82-8264-065-7

26. Sokol DK (2013) 'First do no harm' revisited. BMJ 25(347):f6426.

27. Malone J, Zölzer F (2016) Pragmatic ethical basis for radiation protection in diagnostic radiology. Br J Radiol.

28. Salerno S, Nardi C, Tudisca C, Matranga D et al (2018) Complete written/oral information about dose exposure in CT: is it really useful to guarantee the patients' awareness about radiation risks? Radiol Med 123(10):788–798.

29. ICRP (2013) Radiological protection in paediatric diagnostic and interventional radiology. ICRP Publication 121. Ann ICRP 42(2):12

30. Brenner DJ, Hall EJ (2007) Computed tomography - an increasing source of radiation exposure. NEngl J Med 357:2277–2284

31. Behbahani S et al (2017) "Incidentalomas" on abdominal and pelvic CT in emergency radiology: literature review and current management recommendations. Abdom Radiol 42:1046–1061