



Hospital Responsibility for Radiation Leaks in Radiology Rooms

Zainal Andy Saputra^{1*}, Wahyu Eko Putro²

^{1,2} Universitas STRADA Indonesia, Kediri, Indonesia

*Corresponding author: zainalczman@gmail.com

ABSTRACT

Radiological examination is currently widely used to diagnose disease especially in hospitals. But radiation is also very dangerous for patients if the exposure dose exceeds the dose threshold. This can happen if the x-ray device has a radiation leak. The government has made law number 10 of 1997 concerning nuclear power. This research was compiled using a type of normative juridical research, namely research focused on examining the application of rules or in positive law. The purpose of this study was to analyze the legal protection of hospital patients against radiation leaks and analyzing legal consequences borne by the hospital due to radiation leakage in the X-ray room. This research is intended to provide information to readers about the legal basis and responsibilities of hospital for radiation leakage in the X-ray room. For policy makers to be able to provide stricter regulations monitoring X-ray equipment in health service installations and follow up on all violations related to radiation leakage, and hospitals are expected to be more orderly in the provisions and maintenance of X-ray unit used in health services considering danger from radiation leakage.

Keywords: compliance testing, hospital, radiation leak, responsibility

*Copyright © 2025 Proceeding Strada International Conference on Health
All rights reserved*

BACKGROUND

Health is a human right guaranteed by the 1945 Constitution. The state is obligated to provide quality and equitable healthcare services to all Indonesians. In the development of healthcare, radiology technology has become a crucial tool in diagnosing disease. Radiology utilizes ionizing radiation (X-rays) to produce anatomical images of the patient's body. However, ionizing radiation also carries significant risks, particularly if radiation leaks from the medical equipment used.

Radiation leaks are nothing new in the medical world. Since the discovery of X-rays by Wilhelm Conrad Roentgen in 1895, there have been numerous reports of serious side effects from radiation exposure, ranging from tissue damage and cancer to death. In Indonesia, oversight of X-ray use is regulated by the Nuclear Energy Regulatory Agency (BAPETEN) and is regulated by various regulations, including Law No. 10 of 1997 concerning Nuclear Energy, Law No. 44 of 2009 concerning Hospitals, and Law No. 17 of 2023 concerning Health. However, implementation of these regulations often faces obstacles in the field.

In a legal context, patients are considered consumers of healthcare services and are entitled to legal protection as stipulated in the Consumer Protection Law. As healthcare providers, hospitals are fully responsible for patient safety. Therefore, this study is crucial to analyze how legal protection is provided to patients and the extent to which hospitals are responsible for radiation leaks.



METHODS

This research employs a normative legal method, also known as library legal research, which focuses on analyzing legal norms and principles contained in various legal sources. The study relies on three main categories of data sources. The first is primary legal materials, which include laws, government regulations, ministerial regulations, and regulations issued by the Head of BAPETEN as the main sources of binding legal authority. The second is secondary legal materials, consisting of books, academic journals, expert opinions, and previous research related to health law, which serve to provide interpretation and analysis of primary sources. Lastly, tertiary legal materials, such as legal dictionaries and encyclopedias, are used to support and clarify the understanding of legal terminology and concepts used in this study.

RESULTS

Based on the research findings, legal protection for hospital patients against radiation leaks is governed by various regulations; however, its implementation still faces significant challenges. The analysis of this issue is divided into two main areas: legal protection for patients and hospital legal liability. Patients, as consumers of healthcare services, have the right to safety during medical procedures. This right is safeguarded under several legal instruments, including Law No. 8 of 1999 on Consumer Protection, Law No. 17 of 2023 on Health, and Law No. 44 of 2009 on Hospitals. Legal protection can take both preventive forms, such as the establishment of strict regulations and operational standards, and repressive forms, including compensation and legal enforcement when violations occur. Meanwhile, hospitals bear multiple forms of responsibility when radiation leaks occur administrative sanctions like warnings or license revocation, civil liability for compensating victims based on Article 1365 of the Civil Code, and criminal sanctions for negligence causing death or serious injury under Articles 359–361 of the Criminal Code. Despite these provisions, the implementation of radiation safety standards remains problematic. Some hospitals fail to meet BAPETEN's regulatory requirements, with several cases revealing radiology units operating without proper licenses or supervision highlighting weak oversight and poor compliance. Therefore, preventive measures are essential, including regular equipment testing, radiation safety training for medical staff, provision of protective equipment such as dosimeters and lead shields, and integration of patient safety risk management within hospital accreditation systems.

The issue of radiation leaks in hospitals presents a serious legal and ethical concern that requires comprehensive regulation and strict implementation. Based on research, legal protection for hospital patients against radiation leaks is governed by various laws and regulations. Nevertheless, challenges persist in their practical application, particularly regarding compliance, enforcement, and supervision. The analysis of this matter focuses on two primary aspects: legal protection for patients and the legal responsibilities of hospitals. Both dimensions are essential to ensuring that patients' rights to health and safety are upheld within the healthcare system.

Patients, as consumers of healthcare services, have a fundamental right to safety and protection from harm while receiving medical treatment. This right is explicitly recognized and protected under several Indonesian legal frameworks, including Law No. 8 of 1999 concerning Consumer Protection, Law No. 17 of 2023 concerning Health, and Law No. 44 of 2009 concerning Hospitals. These laws ensure that patients are treated with care, competence, and respect for their well-being. Legal protection in this context can take two forms: preventive protection, achieved through the establishment of strict operational standards and safety protocols, and repressive protection, realized through compensation or legal enforcement in cases of violation or negligence.



Hospitals bear multi-dimensional responsibilities in cases of radiation leaks, encompassing administrative, civil, and criminal domains. Administratively, hospitals may face sanctions such as official warnings, suspension, or revocation of operating permits when safety standards are breached. In civil law, hospitals are obliged to provide compensation for damages suffered by patients as stipulated in Article 1365 of the Indonesian Civil Code, which holds individuals and institutions accountable for unlawful acts that cause harm. Furthermore, criminal liability may be imposed on hospital staff or medical personnel whose negligence leads to death or serious injury, as stated in Articles 359–361 of the Indonesian Criminal Code. These layers of responsibility ensure that hospitals are held accountable at every level of misconduct.

Despite the existence of these comprehensive legal frameworks, implementation remains problematic. In practice, several hospitals still fail to comply with safety standards established by the Nuclear Energy Regulatory Agency (BAPETEN). Investigations have uncovered radiology units operating without proper authorization or sufficient supervision, posing serious risks to both patients and healthcare workers. This indicates weaknesses in regulatory oversight, monitoring mechanisms, and institutional accountability. The lack of consistent enforcement also reflects the need for stronger coordination between health authorities and regulatory bodies to ensure compliance across the healthcare sector.

To address these challenges, hospitals must adopt proactive prevention strategies aimed at minimizing radiation risks. These include conducting periodic suitability and compliance tests on radiological equipment, organizing radiation safety training for medical personnel, and providing appropriate protective equipment such as dosimeters and lead shields for both staff and patients. Additionally, hospitals are encouraged to incorporate patient safety and radiation risk management into their accreditation and quality assurance systems. Such measures not only enhance compliance with BAPETEN standards but also foster a culture of safety and accountability within healthcare institutions.

Thus, the hospital's responsibility is not only legal but also deeply moral in nature, as it relates to the fundamental obligation to safeguard human life and dignity. Ensuring patient safety from radiation exposure reflects the ethical principles of beneficence and non-maleficence that underpin medical practice. Hospitals, therefore, must view compliance not merely as a regulatory requirement but as a professional and humanitarian duty. Upholding this dual responsibility legal and moral serves as a cornerstone for building public trust and maintaining integrity in the healthcare system.

CONCLUSION

Legal protection for hospital patients against radiation leaks has been established through various laws and regulations; however, its implementation remains weak in practice. Hospitals are legally bound by administrative, civil, and criminal responsibilities to ensure patient safety and to provide remedies for any harm caused by radiation exposure. Administratively, they may face sanctions such as license suspension or closure; civilly, they are obliged to compensate patients for damages; and criminally, negligence leading to injury or death can result in prosecution. Despite these provisions, weak supervision and poor compliance by hospitals continue to be major contributing factors to recurring radiation leaks in several healthcare facilities, highlighting the urgent need for stronger enforcement and accountability mechanisms within the health sector.



REFERENCES

- Aditama, Yoga Tjandra, (2002). *Rumah Sakit dan Konsumen*, PPFKM UI, Jakarta.
- Agus Yudha Hernoko, (2014). *Hukum Perjanjian Asas Proporsionalitas dalam Kontrak Komersial*, Kencana Prenadamedia Group, Jakarta.
- Alfiansyah, (2013). Tanggung Gugat Dokter Atas Kesalahan Diagnosis Pada Pelayanan Medis di Rumah Sakit (Studi kasus di Rumah Sakit Daerah. Dr. Soebandi Jember), *Jurnal Universitas Brawijaya*, Malang.
- Amir Ilyas, (2014). *Pertanggungjawaban Pidana Dokter Dalam Malpraktik Medik Di Rumah Sakit*, Rangkang Education dan Republik Institute, Yogyakarta.
- Arrie Budhiarti dan Muh Nasser, (2017). Fungsi Asas Kesetaraan Profesi Terhadap Pengembangan Figur Hukum Keperawatan Dalam Sistem Hukum Kesehatan, *SOEPRA Jurnal Hukum Kesehatan*, Vol. 3, No. 2.
- Bambang Heryanto, Malpraktik Dokter dalam Perspektif Hukum, *Jurnal Dinamika*.
- Bisnis Tekno, (2021). <https://teknologi.bisnis.com/read/20210217/84/1357379/dua-rumah-sakit-mau-pakai-teknologi-nuklir-ini-hasil-verifikasi-bapeten>, diakses tanggal 2 Agustus 2025, jam 19.50 WIB.
- Cahyo Agi Wibowo, Hari Wahyudi, dan Sudarto, (2017). Penolakan Pelayanan Medis Oleh Rumah Sakit Terhadap Pasien Yang membutuhkan Perawatan Gawat Darurat, *Justitia Jurnal Hukum*, Volume 1 No.1.
- Cnn Indonesia, (2022). <https://www.cnnindonesia.com/nasional/20220101041502-20-741290/rs-kariadi-terbakar-bapeten-klaim-tak-ada-peningkatan-paparan-radiasi>, diakses tanggal 01 Agustus 2025, jam 12.54 WIB.
- Dani Amalia Arifin, (2016). Kajian Yuridis Tanggung Jawab Perdata Rumah Sakit Akibat Kelalaian Dalam Pelayanan Kesehatan, *Jurnal Idea Hukum* Vol. 2 No. 1.
- Dony Setiawan Putra, (2019). Pertanggungjawaban Pidana Rumah Sakit Sebagai Perseroan terbatas Dalam Kasus Jual Beli Manusia, *Jurnal Hukum Magnum Opus*, Vol.II No.2.
- Dyah Hapsari Prananingrum, (2014) Telaah Terhadap Esensi Subyek Hukum : Manusia Dan Badan Hukum, Refleksi Hukum, *Jurnal Ilmu Hukum*.
- Endang Wahyati Yustina, (2012). Mengenal Hukum Rumah Sakit, Keni Media, Bandung.
- Erdiansyah, Pertanggungjawaban Pidana Terhadap Dokter Atas Kesalahan Dan Kelalaian Dalam Memberikan Pelayanan Medis Di Rumah Sakit, *Jurnal Ilmu Hukum*, Vol. 3 No. 2.
- Eri Hiswara, (2015). *Proteksi Dan Keselamatan Radiasi Di Rumah Sakit*, Batan Press, Jakarta.
- Gerardus Gegen, Endang Wahyati Y. dan Tri Wahyu Murni, (2017). Pelaksanaan Patient safety Dalam Program Corporate social Responsibility Melalui Bakti sosial Di Rumah sakit Premier Jatinegara, *SOEPRA Jurnal Hukum Kesehatan*, Vol.3 No.2.
- Gunawan Widjaya dan Ahmad Yani, (2003). *Hukum Tentang Perlindungan Konsumen*, Gramedia Pustaka Umum.
- H. Mulyono, (2007). Penentuan Strategik Prioritas Pelayanan Laboratium Klinik Menggunakan Teknik sfas (strategic factors analysis summary) Bersarana Acuan swot, *Indonesian Journal of Clinical Pathology and Medical Laboratory*, Vol. 13, No. 2.
- Hanifah Romadhoni dan Arief Suryono, (2018). Pertanggungjawaban Perdata Rumah Sakit Dalam Hal Penolakan Pasien Miskin Pada Keadaan Gawat Darurat, *Privat Law*, Vol.II No.2.
- Hasrul Buamona, (2016). Tanggung Jawab Pidana Korporasi Rumah Sakit, *Jurnal Ilmu Hukum Novelty*, Vol. 7 No.1.
- Herkutanto, Soerjono Soekanto, (1987). *pengantar Hukum Kesehatan*, Remadja Karya, bandung.



- Infosatu, (2025). https://infosatu.co/bapeten-sosialisasi-pemanfaatan-nuklir-di-kaltim-edukasi-publik-dan-jaringan-komunikasi-daerah/#google_vignette, diakses tanggal 2 Agustus 2025, jam 19.40 WIB.
- Ishaq, (2009). *Dasar-dasar Ilmu Hukum*, Sinar Grafika, Jakarta.
- JJ.H. Bruggink dan B.Arief Sidharta, (2015). *Refleksi Tentang Hukum Pengertian-Pengertian Dasar dalam Teori Hukum*, Citra Aditya Bhakti, Bandung.
- Koesnadi, (2018). *Etika Hukum dan Kebijakan Kesehatan*, Strada Press, Kediri.
- Kusbaryanto, (2010). Peningkatan Mutu Rumah Sakit dengan Akreditasi, *Mutiara Medika* Vol. 10 No. 1.
- Marcel Seran, (2016). Kesalahan Profesional Dokter dan putusan Hakim: Dilema dalam Pelayanan Medis, *Media Hukum*, Vol.23 No.2.
- Marwan Mas, (2004). *Pengantar Ilmu hukum*, Ghalia Indonesia, Bogor.
- Muchsin, (2003). *Perlindungan dan Kepastian Hukum bagi Investor di Indonesia*, Universitas Sebelas Maret, Surakarta.
- Mudakir Iskandar Syah, (2019). *Tuntutan Hukum Malpraktek Medis*, Bhuana Ilmu Populer, Jakarta.
- Muhibbuthabary, (2015). *Dinamika Dan Implementasi Hukum Organisasi Perusahaan Dalam sistem Hukum Indonesia*, Asy-syar'iah, Vol.13 No.3.
- Mukh Syaifudin, (2016). *Dasar-dasar dan Aplikasi Biologi Radiasi*, Batan Press, Jakarta.
- Muntaha, (2017). *Hukum Pidana Malapraktik Pertanggungjawaban dan Penghapus Pidana*, Sinar Grafika, Jakarta.
- Peraturan Kepala Badan Pengawas Tenaga Nuklir Nomor 2 Tahun 2018 Tentang Uji Kesesuaian Pesawat Sinar-X Radiologi Diagnostik Dan Intervensional, Berita Negara Republik Indonesia Tahun 2018 Nomor 522.
- Peraturan Kepala Badan Pengawas Tenaga Nuklir Nomor 4 Tahun 2013 Tentang Proteksi Dan Keselamatan Radiasi Dalam Pemanfaatan Tenaga Nuklir, Berita Negara Republik Indonesia Tahun 2011 Nomor 672.
- Peraturan Kepala Badan Pengawas Tenaga Nuklir Nomor 4 Tahun 2020 Tentang Keselamatan Radiasi Dalam Penggunaan Pesawat Sinar-X Radiologi Diagnostik dan Intervensional, Berita Negara Republik Indonesia Tahun 2020 Nomor 1218.
- Peraturan Menteri Kesehatan No. 24 Tahun 2020 Tentang Pelayanan Radiologi Klinik, Berita Negara Republik Indonesia Tahun 2020 Nomor 1058.
- Peraturan Menteri Kesehatan No. 54 Tahun 2015 Tentang Pengujian Kalibrasi Alat Kesehatan, Berita Negara Republik Indonesia Tahun 2015 Nomor 1197.
- Peraturan Pemerintah Nomor 29 Tahun 2008 Tentang Perizinan Pemanfaatan Sumber Radiasi Pengion Dan Bahan Nuklir, Lembaran Negara Republik Indonesia Tahun 2008 Nomor 118.
- Peraturan Pemerintah Nomor 45 tahun 2023 Tentang Keselamatan Radiasi Pengion dan Keamanan Zat Radioaktif, Tambahan Lembaran Negara Republik Indonesia Nomor.
- Peter Mahmud Marzuki, (2017). *Pengantar Ilmu Hukum Edisi Revisi*, Kencana, Jakarta.
- Philipus M. Hadjon dan Tatiek Sri Djatmiati, (2016). *Argumentasi Hukum*, Gadjah Mada University Press., Yogyakarta.
- Philipus M. Hadjon, (1987). *Perlindungan Hukum Bagi Rakyat Indonesia*, Bina Ilmu, Surabaya.
- Pipin Syarifin, (2009). *Pengantar Ilmu Hukum*, Pustaka Setia, Bandung.
- Qamar et.al., (2017). *Bahasa Hukum (Legal Language)*, Mitra Wacana Media, Jakarta.
- Radar Mojokerto, (2024), https://radarmojokerto.jawapos.com/kesehatan/824739995/peran-petugas-proteksi-radiasi-ppr-pada-pelayanan-kesehatan#google_vignette, diakses tanggal 15 Juli 2025, jam 17.31 WB.



- Riduan Syahrani, (2006). *Seluk Beluk dan Asas-Asas Hukum Perdata*, Alumni, Bandung.
- Rini, Fitriani, (2017). Aspek Hukum Legalitas Perusahaan Atau Badan Usaha Dalam Kegiatan Bisnis, *Jurnal Hukum Samudera Hukum*, Vol.12 No.1.
- Safl Rudiarto Hendroyogi dan Mugi Harsono, (2016). Keterkaitan Antara Persepsi Pentingnya Akreditasi Rumah Sakit Dengan Partisipasi, Komitmen, Kepuasan Kerja, Dan Kinerja Karyawan, *Daya Saing Jurnal Ekonomi Manajemen Sumber Daya*, Vol. 18 No.2.
- Salim dan Erlies Septiana Nurbani, (2017). *Penerapan Teori Hukum Pada Penelitian Tesis dan Disertasi*, Rajawali Pers, Jakarta.
- Satjipto Raharjo, (2000). *Ilmu Hukum*, Citra Aditya Bakti, Bandung.
- Setyo Trisnadi, (2017). Perlindungan Hukum Profesi Dokter Dalam Penyelesaian Sengketa Medis, *Jurnal Pembaharuan Hukum*. Volume IV No. 1.
- Shelvy Haria Roza dan Syedza Saintika, (2016). Analisis Penyelenggaraan Sistem Pemeliharaan Peralatan Radiologi Di RSUP Dr. M. DJAMIL, *Jurnal Medika Saintika* Vol 7 (2).
- Soejadi, (1996). *Efisiensi Pengelolaan Rumah Sakit*, Katiga Bina, Jakarta.
- Soerjono Soekanto, (1984). *Pengantar Penelitian Hukum*, UI Press, Jakarta.
- Soeroso, (2008). *Dasar-Dasar Ilmu Hukum*, Sinar Grafika, Jakarta.
- Sofwan Dahlan, (2003). *Hukum Kesehatan Rambu-Rambu Bagi Profesi Dokter*, Badan Penerbit Universitas Diponegoro, Semarang.
- Sudikno Martokusumo, (1999). *Mengenai Hukum*, Liberty, Yogyakarta.
- Thegra Tawaris, (2017). Tanggung Jawab Menurut Hukum Perdata Rumah sakit Atas Kelalaian Tenaga Medis, *Lex et societatis*, Vol.V No.3.
- Thomas S. Bishoff and Jeffrey R. Miller, (2009). *Force Majeure and Commercial Impracticability: Issue to Consider Before the Next Hurricane or Mature Disaster Hits*, The Michigan Business Law Jurnal, Volume 1, Spring.
- Undang-Undang Nomor 10 Tahun 1997 tentang Ketenaganukliran, Lembaran Negara Republik Indonesia Tahun 1997 Nomor 23 , Tambahan Lembaran Negara Republik Indonesia Nomor 3676.
- Undang-Undang Nomor 23 Tahun 1847 Tentang Kitab Undang-Undang Hukum Perdata, *Staatsblad* Tahun 1847 Nomor 23.
- Undang-Undang Republik Indonesia Nomor 17 Tahun 2023 Tentang Kesehatan, Lembaran Negara Republik Indonesia Tahun 2023 Nomor 105, Tambahan Lembaran Negara Republik Indonesia Nomor 6887.
- Undang-Undang Republik Indonesia Nomor 39 Tahun 1999 Tentang Hak Asasi Manusia, Lembaran Negara Republik Indonesia Tahun 1999 Nomor 165, Tambahan Lembaran Negara Republik Indonesia Nomor 3886.
- Warta Kota, (2017). <http://wartakota.tribunnews.com/2018/08/09/alfakes-beberkan-penyebab-dokter-salah-mendiagnosa-penyakit>, diakses tanggal 07 Maret 2019, Jm 19.00 WIB.
- Wila Chandrawila Supriadi, (2001). *Hukum Kedokteran*, Mandar Maju, Bandung, 2001.