

Radiology's role in dermatology: A closer look at two years of data

Betül Tiryaki Baştuğ¹, Hatice Gencer Başol²

¹Department of Radiology, Faculty of Medicine, Bilecik Şeyh Edebali University, Bilecik, Türkiye; ²Department of Dermatology, Bilecik Training and Research Hospital, Bilecik, Türkiye

ABSTRACT

Objectives: Radiological imaging plays a vital role in dermatology, addressing complex diagnostic needs beyond visual examination. The study focuses on the use of radiology services by the dermatology clinic at Bilecik Training and Research Hospital over two years (January 2023-December 2024), focusing on modality preferences, clinical indications, and diagnostic impact.

Methods: Data from 451 imaging referrals were analyzed, covering patient demographics, imaging types, and clinical indications. Modalities included ultrasonography (USG), X-ray, magnetic resonance imaging (MRI), computed tomography (CT), and other specialized techniques. Trends and diagnostic yields were assessed, with subgroup analysis by age and gender.

Results: Ultrasonography was the most frequently used imaging method (65.2%), followed by X-ray (18.6%), with MRI and CT used less often (5.1% and 4.4%, respectively). General medical examinations (29.93%) were the leading indication, achieving the highest diagnostic yield (85%). Pruritus (9.31%) and psoriasis (7.76%) were also notable indications. Most referrals involved middle-aged (41-60 years) and older adults (61+ years).

Conclusions: Ultrasonography and X-ray remain foundational tools in dermatology, providing essential support for diagnosis and management. These findings highlight the need for resource optimization and stronger collaboration between dermatology and radiology. Future research should explore imaging outcomes and emerging technologies to advance dermatological care.

Keywords: Dermatological imaging trends, radiology utilization in dermatology, X-Ray, ultrasound, CT, MRI

Radiology has become an indispensable component of dermatology, providing critical insights beyond what is discernible through visual inspection alone. While many dermatological conditions can be diagnosed based on clinical examination, certain cases require additional imaging to confirm or refine the diagnosis. In such instances, radiological modalities play a pivotal role in bridging the gap between clinical suspicion and definitive assessment. Imaging tech-

niques such as ultrasonography (USG), X-ray, computed tomography (CT), and magnetic resonance imaging (MRI) have significantly enhanced the diagnostic and management capabilities of dermatologists. These technologies facilitate the precise evaluation of subcutaneous lesions, vascular anomalies, inflammatory disorders, and malignancies [1, 2].

Among these modalities, USG is particularly valuable due to its accessibility, non-invasive nature, and

Corresponding author: Betül Tiryaki Baştuğ, MD., Assit. Prof.,
Phone: +90 228 214 11 21, E-mail: betultryak@yahoo.com

How to cite this article: Tiryaki Baştuğ B, Gencer Başol H. Radiology's role in dermatology: A closer look at two years of data. Eur Res J. 2025;11(2):395-403. doi: 10.18621/eurj.1639130



This is an open access article distributed under the terms of [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/)

Received: February 13, 2025

Accepted: February 26, 2025

Published Online: February 27, 2025

Copyright © 2025 by Prusa Medical Publishing
Available at <https://dergipark.org.tr/en/pub/eurj>



real-time imaging capabilities. It is especially advantageous in assessing soft tissue pathologies and vascular abnormalities [3, 4]. Additionally, X-ray remains a fundamental tool, particularly in cases involving osseous structures or calcifications, often serving as the initial imaging modality when further investigation is required [5]. In more complex scenarios, such as those involving deep tissue involvement or suspected malignancies, CT and MRI provide superior resolution and detailed anatomical visualization, making them essential for both diagnostic and interventional purposes [6, 7]. Despite the growing integration of radiology into dermatological practice, there remains a limited understanding of its utilization patterns. Key questions persist regarding which imaging modalities are most frequently employed, the primary indications prompting dermatological referrals to radiology, and how these trends have evolved. Addressing these inquiries is essential for optimizing interdisciplinary collaboration, enhancing workflow efficiency, and ensuring that radiology departments are adequately equipped to meet the increasing demands of dermatological care [8, 9].

This study aims to explore the utilization of radiology services by the dermatology clinic at Bilecik Training and Research Hospital over two years (January 2023-December 2024). By focusing on the practical and operational aspects of imaging use in dermatology, this research seeks to provide valuable insights into:

- The most frequently utilized imaging modalities and their corresponding clinical indications.
- The evolution of referral patterns over time and the implications of these trends for dermatological practice.
- Potential strategies for enhancing the efficiency and effectiveness of radiology services in dermatology.

METHODS

Study Design and Population

This retrospective study analyzed the utilization of radiology services by the dermatology clinic at Bilecik Training and Research Hospital over a two-year period (January 2023-December 2024). Ethical approval was

obtained from the hospital's Ethics Committee, and patient confidentiality was strictly maintained.

Inclusion criteria was the following: (a) All patients referred by the dermatology clinic for imaging, irrespective of age. (b) Referrals for any imaging modality, including ultrasonography (USG), X-ray, computed tomography (CT), magnetic resonance imaging (MRI), or specialized techniques.

Exclusion criteria was included incomplete or missing medical records, imaging conducted outside the hospital or unrelated to dermatology referrals, repeat imaging without a new dermatological consultation.

Imaging Modalities

Various imaging techniques were evaluated based on their indications and frequency of use:

- Ultrasonography (USG)*: Preferred for soft tissue lesions and vascular anomalies, particularly with Doppler USG for assessing blood flow.

- X-ray*: Frequently utilized for skeletal abnormalities and calcifications due to its accessibility and cost-effectiveness.

- MRI*: Used for systemic diseases, deep-seated lesions, and connective tissue disorders, offering superior soft tissue contrast.

- CT*: Reserved for complex cases, including deep infections and suspected malignancies, providing high-resolution imaging.

Other techniques included specialized imaging for interventional guidance and targeted assessments.

USG and X-ray were the most frequently utilized modalities, while MRI and CT were reserved for advanced diagnostic needs.

Ethical Considerations

All patient data were anonymized to ensure confidentiality. As a retrospective study, no direct patient involvement was required, eliminating the need for informed consent.

Data Analysis

Collected data were systematically analyzed to identify trends in:

- Patient demographics*: Age, gender, and referral characteristics.

- Imaging utilization*: Frequency and distribution of different imaging modalities.

•*Indications for imaging:* Common clinical scenarios necessitating radiological evaluation.

•*Operational efficiency:* Turnaround times and workflow optimization.

Statistical Analysis

Descriptive statistics were used to summarize patient demographics, imaging modality distributions, and clinical indications. Mean, median, standard deviation, minimum, and maximum values were calculated for age. Categorical variables, including gender distribution and imaging modality preferences, were presented as frequencies and percentages. Stratification by age and gender was conducted to assess referral patterns across different demographics. The study also evaluated diagnostic yield percentages for various clinical indications.

RESULTS

Demographic Characteristics

A total of 451 patients were referred by the dermatology clinic for radiological imaging between January 2023 and December 2024. The age range spanned from 4 to 96 years, with a mean age of 51.7 years and a median of 50 years. The interquartile distribution indicated that 25% of patients were under 37 years, while another 25% were over 69 years, demonstrating a broad age representation (Table 1).

Gender distribution was nearly equal, with 229 male (50.8%) and 222 female (49.2%) referrals. Stratification by age and gender revealed a peak in female

Table 2. Demographic details of dermatology imaging referrals by gender and age group

Gender	Age groups			
	0-18	19-40	41-60	61+
Male	32	68	57	55
Female	25	72	89	53

referrals within the 41–60 age group, suggesting either a higher prevalence of dermatological conditions requiring imaging or increased healthcare-seeking behavior in this demographic (Table 2).

These findings highlight the dermatology clinic's capacity to address dermatological conditions across all life stages. The near-equal gender distribution underscores the broad applicability of radiological services in dermatology. The observed referral trends provide valuable insights for optimizing imaging-resource allocation.

Distribution of Imaging Modalities

Ultrasonography (USG) was the most frequently utilized modality, with 294 referrals (152 males, 142 females), reinforcing its central role in dermatological imaging (Table 3). X-ray, the second most used technique (84 referrals), showed a slightly higher utilization among males (45) than females (39), indicating its frequent application in systemic or skeletal assessments. MRI and CT referrals were lower but evenly distributed between genders. Notably, CT referrals were slightly higher in females (11) than males (9), reflecting its selective use in complex cases (Table 4).

Age-group analysis showed that USG was the pre-

Table 1. Demographic details of dermatology imaging referrals by age

	Data
Number of patients	451
Mean age	51.7
Standard deviation	21.2
Minimum age	4
25th percentile	37
Median age (50th Percentile)	50
75th percentile	69
Maximum age	96

Table 3. Frequency and distribution of imaging modalities used in dermatology referrals

Imaging modality	n	%
Ultrasonography	294	65.19
X-Ray	84	18.63
MRI	23	5.10
CT	20	4.43
Other	30	6.65

CT=Computed Tomography, MRI=Magnetic Resonance Imaging

Table 4. Distribution of imaging modalities by gender

Gender	Ultrasonography	X-Ray	MRI	CT	Other
Male	152	45	11	9	12
Female	142	39	12	11	18

CT=Computed Tomography, MRI=Magnetic Resonance Imaging

Table 5. Distribution of imaging modalities by age group

Age Group	Ultrasonography	X-Ray	MRI	CT	Other
0-18	42	8	2	1	4
19-40	103	24	9	6	7
41-60	87	29	7	7	16
61+	62	23	5	6	3

CT=Computed Tomography, MRI=Magnetic Resonance Imaging

dominant imaging modality across all demographics, with the highest usage in the 19-40 age range (103 referrals). X-ray referrals peaked in the 41–60 age group (29 referrals), correlating with a higher prevalence of systemic conditions in middle-aged individuals. CT and MRI were evenly distributed, emphasizing their targeted role in specific diagnostic needs. Specialized imaging categorized as "Other" was most frequently used in the 41-60 age group (16 referrals), suggesting an increased need for advanced diagnostic approaches (Table 5).

Trends Over Two Years

A longitudinal analysis of imaging utilization from January 2023 to December 2024 revealed distinct patterns (Fig. 1).

- Ultrasonography: Maintained consistently high referral rates, with a gradual increase, peaking in mid-2024, reflecting its expanding role in dermatological assessments.
- X-ray: Showed a steady upward trend, indicating its continued relevance for systemic evaluations.
- MRI: Displayed a slight increase toward late

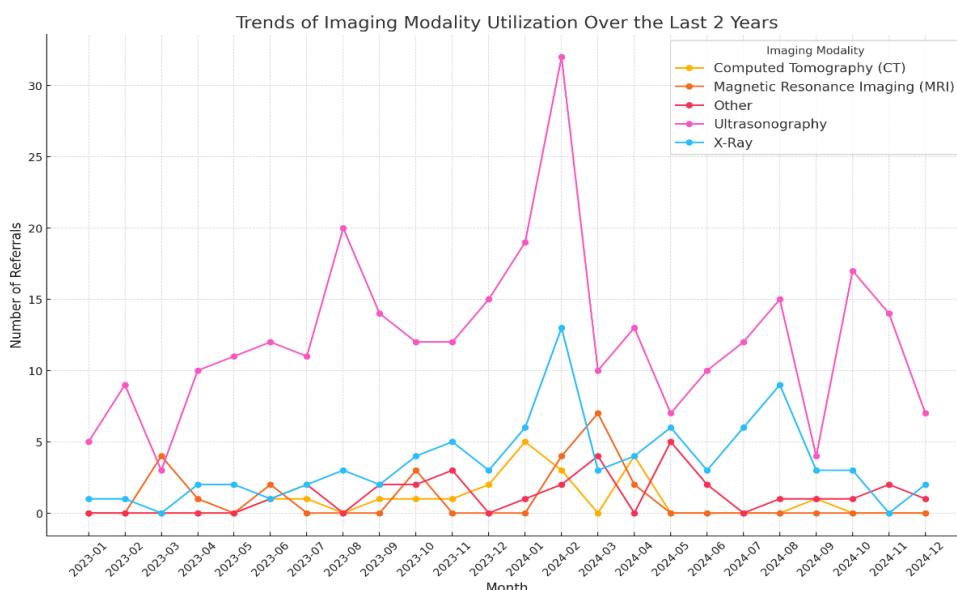


Fig. 1. Trends of imaging modality utilization over the last 2 years

Table 6. Clinical indications for imaging

Clinical indication	Number of referrals	Percentage (%)
General medical examination	135	29.93
Pruritus	42	9.31
Psoriasis	35	7.76
Dermatitis	34	7.54
Other Dermatitis	24	5.32

2024, highlighting its growing role in complex cases.

- CT*: Although the least utilized, its steady usage underscores its necessity for specialized diagnoses.

- Other modalities*: Showed sporadic yet increasing utilization, reflecting their value in unique clinical scenarios.

These trends emphasize dermatology’s increasing reliance on radiology, underscoring the need for strategic resource planning.

Clinical Indications for Imaging

The most common reason for imaging referrals was a general medical examination, underscoring the routine role of radiology in dermatology (Table 6). Gender-based analysis showed a slightly higher prevalence of pruritus and psoriasis in females, while dermatitis referrals were evenly distributed (Table 7).

Age-specific trends revealed that the 41-60 age group had the highest number of referrals, likely due to a higher prevalence of systemic and chronic dermatological conditions. The 19-40 age group showed a notable number of referrals for pruritus and psoriasis, while referrals for pediatric patients (0-18 years) were minimal (Table 8).

Diagnostic Yield

Imaging effectiveness was evaluated based on diagnostic yield:

- General medical examinations*: 85% diagnostic yield, reinforcing the role of imaging in routine dermatological assessments.

- Pruritus and psoriasis*: 75-80% yield, reflecting the utility of imaging in detecting deeper tissue involvement.

- Dermatitis*: 65-70% yield, underscoring the role of imaging in differentiating inflammatory conditions.

These findings highlight radiology's nuanced role in dermatological care, supporting both routine and complex diagnostic needs (Fig. 2).

DISCUSSION

The use of radiology in dermatology has become increasingly important as dermatological conditions grow more complex and diverse [7]. This two-year retrospective study sheds light on how radiological services are utilized in dermatological practice at Bilecik Training and Research Hospital (2023-2024). The findings emphasize the essential role of imaging in refining diagnoses, aiding clinical decisions, and improving patient outcomes in dermatological care [8].

Why Radiology Matters in Dermatology

One of the standout findings in this study is the consistent reliance on radiological tools for dermatological evaluations. Ultrasonography (USG), accounting for 65.2% of referrals, emerged as the preferred modality due to its accessibility and ability to assess subcutaneous and vascular conditions effectively [9].

The steady demand for radiological services can be attributed to several factors: (1) Improved imaging

Table 7. Clinical indications for imaging by gender

Gender	General medical examination	Pruritus	Psoriasis	Dermatitis	Other dermatitis
Male	72	19	16	15	10
Female	63	23	19	19	14

Table 8. Clinical indications for Imaging by age group

Age groups	General medical examination	Pruritus	Psoriasis	Dermatitis	Other dermatitis
0-18	12	4	2	1	1
19-40	35	12	8	9	6
41-60	52	18	14	12	10
61+	36	8	11	12	7

technology: Advances like Doppler USG have enhanced the precision and reliability of imaging in dermatology; (2) Complex cases: Imaging has become indispensable for diagnosing conditions involving deep-seated infections, systemic diseases, or malignancies with cutaneous involvement; and (3) Demographic trends: Middle-aged (41-60 years) and older adults (61+ years) were the primary users, reflecting the burden of chronic conditions requiring advanced diagnostic approaches.

These insights underscore the need for better resource allocation in radiology departments. Investments in staffing, equipment, and training are critical to meet the growing demand.

What Imaging Methods are Most Common?

USG dominated referrals, making up more than 65% of imaging requests. Its versatility, cost-effectiveness, and ability to provide real-time imaging for superficial tissues made it an invaluable tool in dermatological practice [9]. Doppler USG, in particu-

lar, proved essential for evaluating vascular anomalies like hemangiomas and venous malformations.

X-rays, the second most used method (18.6%), were primarily applied to systemic or skeletal evaluations, particularly in older adults with calcifications or bone involvement [10].

Advanced imaging modalities such as MRI (5.1%) and CT (4.4%) were reserved for complex or critical cases, including: (a) MRI: Ideal for detailed soft tissue evaluation, systemic conditions, and deep-seated lesions [11]; (b) CT: Essential for assessing deep infections, suspected cancers, and staging malignancies [12]. Each modality had a clearly defined role, ensuring efficient use of radiological resources.

Why Were These Scans Ordered?

The study revealed a range of clinical indications for imaging referrals, with notable diagnostic yields:

- Routine medical evaluations:* The most common reason (29.93%) had an impressive diagnostic yield of 85%, showing its value in general dermatological care.

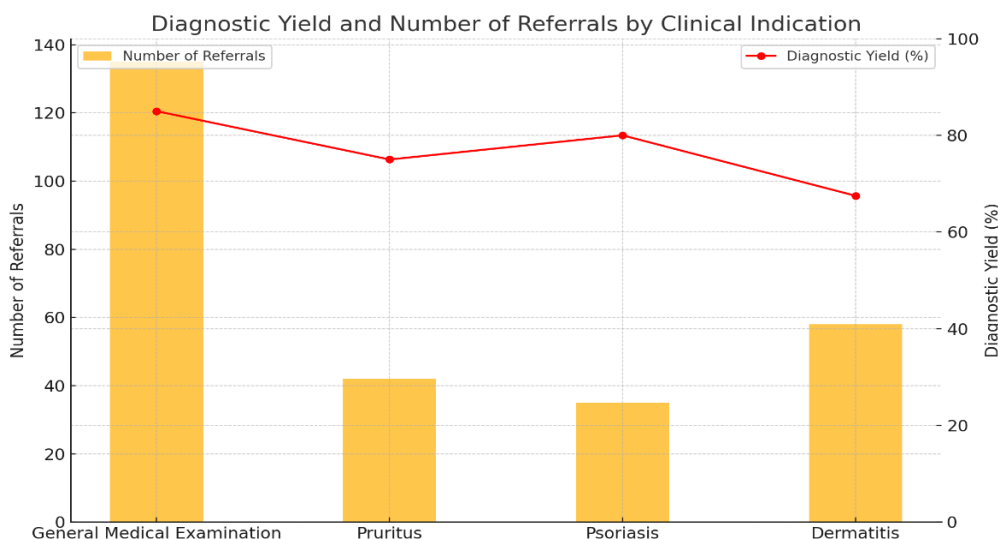


Fig. 2. Diagnostic referrals and yields across clinical indications

•*Pruritus and Psoriasis*: Chronic inflammatory conditions like these had diagnostic yields of 75-80%, highlighting their utility in detecting systemic or sub-clinical issues [13, 14].

•*Dermatitis*: Imaging helped differentiate benign conditions from deeper issues, with yields ranging between 65-70% [15].

These findings highlight the indispensable role of radiology in managing both straightforward and complex cases in dermatology.

Shifts in Imaging Trends

Over the two years, several trends emerged in imaging utilization:

•*Ultrasonography*: Maintained its dominance, with increasing usage reflecting greater awareness of its benefits.

•*X-rays*: Usage grew slightly, particularly among older adults, where systemic evaluations are common.

•*MRI and CT*: Usage remained stable but highly targeted, underscoring their importance in specialized diagnostic approaches.

These patterns reflect the evolving needs of the dermatological practice and highlight the value of interdisciplinary collaboration between dermatology and radiology [16].

How Do These Trends Compare Globally?

The findings align with global trends, particularly in the widespread use of ultrasonography and the selective application of advanced modalities like MRI and CT. Ultrasonography's popularity stems from its non-invasive nature, accessibility, and diagnostic versatility.

However, the study also reveals unique aspects of radiology use in Turkey:

•*Reliance on standard USG*: While consistent with global trends, the heavy reliance on standard ultrasonography emphasizes its practicality and availability in Turkey.

•*Limited MRI and CT use*: These modalities are reserved for complex cases, likely influenced by economic constraints and demographic factors.

•*X-rays as a Staple*: Despite global shifts toward non-ionizing methods, X-rays remain vital in resource-limited settings.

These comparisons highlight areas where targeted investments—such as advanced ultrasonographic tools

and interdisciplinary training further optimize radiology's role in dermatology.

Practical Implications

The study offers actionable insights for improving collaboration between dermatology and radiology:

•*Training dermatologists*: Providing training on the appropriate use of imaging modalities can lead to more precise referrals and better resource use [17].

•*Optimizing resources*: Prioritizing ultrasonography and X-ray investments can ensure departments meet rising demand [18].

•*Fostering collaboration*: Regular meetings between dermatologists and radiologists can refine imaging protocols and improve outcomes [19].

Limitations

Like any study, this research had its limitations: (a) Retrospective design: Relied on existing records, which may limit data depth; (b) Single-center focus: Findings may not apply universally; and (c) Limited outcome data: The study focused on diagnostic yield but not on long-term patient outcomes.

Future research could address these gaps by: (1) Expanding to multiple centers for broader applicability. (2) Using prospective designs to evaluate clinical outcomes. (3) Exploring emerging technologies like high-frequency ultrasonography and AI-driven imaging tools for better precision.

CONCLUSION

Radiology has become indispensable in dermatology, providing critical support for diagnosing and managing increasingly complex conditions. Ultrasonography emerged as the most utilized modality, thanks to its accessibility and diagnostic accuracy, while X-rays, MRI, and CT found targeted applications in specialized diagnostic approaches. The study emphasizes the growing demand for radiological services tailored to specific age and gender groups. This underscores the need for customized strategies to address patient-specific challenges. Looking ahead, fostering interdisciplinary collaboration and integrating emerging technologies like AI into radiology can further enhance dermatological care. These efforts promise to align clinical practices with technological advance-

ments, transforming patient outcomes and setting new standards for healthcare delivery.

Ethical Statement

The study was conducted under the Declaration of Helsinki, and approved by the Institutional Review Board of the Ethics Committee of Non-Interventional Clinical Research of Bilecik Şeyh Edebali University (Decision date: 27.11.2024 and no: 3). Informed consent was obtained from all subjects involved in the study.

Authors' Contribution

Study Conception: BTB; Study Design: BTB; Supervision: BTB; Funding: N/A; Materials: N/A; Data Collection and/or Processing: HGB; Statistical Analysis and/or Data Interpretation: BTB, HGB; Literature Review: BTB, HGB; Manuscript Preparation: BTB and Critical Review: BTB.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

Financing

The authors disclosed that they did not receive any grant during the conduction or writing of this study.

Acknowledgment

We would like to thank Bilecik Training and Research Hospital for providing the dataset and all the patients who volunteered to participate. All individuals have agreed to this consent.

Editor's note

All statements made in this article are solely those of the authors and do not represent the views of their affiliates or the publisher, editors, or reviewers. Any claims made by any product or manufacturer that may be evaluated in this article are not guaranteed or endorsed by the publisher.

REFERENCES

- Gaurav V, Agrawal S, Najeeb A, Ahuja R, Saurabh S, Gupta S. Advancements in Dermatological Imaging Modalities. *Indian Dermatol Online J.* 2024;15(2):278-292. doi: 10.4103/idoj.idoj_852_23.
- Williams HC. On the definition of dermatological disease. Part 1: conceptual frameworks. *Clin Exp Dermatol.* 2022;47(10):1805-1811. doi: 10.1111/ced.15279.
- Rong J, Liu Y. Advances in medical imaging techniques. *BMC Methods.* 2024;1:10. doi: 10.1186/s44330-024-00010-7.
- Klibanov AL, Hossack JA. Ultrasound in Radiology: From Anatomic, Functional, Molecular Imaging to Drug Delivery and Image-Guided Therapy. *Invest Radiol.* 2015;50(9):657-670. doi: 10.1097/RLI.000000000000188.
- Ou X, Chen X, Xu X, et al. Recent Development in X-Ray Imaging Technology: Future and Challenges. *Research (Wash D C).* 2021;2021:9892152. doi: 10.34133/2021/9892152.
- Hussain S, Mubeen I, Ullah N, et al. Modern Diagnostic Imaging Technique Applications and Risk Factors in the Medical Field: A Review. *Biomed Res Int.* 2022;2022:5164970. doi: 10.1155/2022/5164970.
- Alamri A, Alshareef M, Aljoudi SB, et al. Patterns of Dermatological Diseases in Inpatient Consultations at King Abdulaziz Medical City, Jeddah, Saudi Arabia: An Underexploited Opportunity for Dermatology Clinical Training. *Cureus.* 2022;14(2):e22132. doi: 10.7759/cureus.22132.
- Meşe İ, Taşlıçay CA, Kuzan BN, Kuzan TY, Sivrioğlu AK. Educating the next generation of radiologists: a comparative report of ChatGPT and e-learning resources. *Diagn Interv Radiol.* 2024;30(3):163-174. doi: 10.4274/dir.2023.232496.
- Kaffas AE, Vo-Phamhi JM, Griffin JF, Hoyt K. Critical Advances for Democratizing Ultrasound Diagnostics in Human and Veterinary Medicine. *Annu Rev Biomed Eng.* 2024;26(1):49-65. doi: 10.1146/annurev-bioeng-110222-095229.
- Frush DP, Callahan MJ, Coley BD, Nadel HR, Paul Guillerman R. Comparison of the different imaging modalities used to image pediatric oncology patients: A COG diagnostic imaging committee/SPR oncology committee white paper. *Pediatr Blood Cancer.* 2023;70 Suppl 4(Suppl 4):e30298. doi: 10.1002/pbc.30298.
- Florkow MC, Willemsen K, Mascarenhas VV, Oei EHG, van Stralen M, Seevinck PR. Magnetic Resonance Imaging Versus Computed Tomography for Three-Dimensional Bone Imaging of Musculoskeletal Pathologies: A Review. *J Magn Reson Imaging.* 2022;56(1):11-34. doi: 10.1002/jmri.28067.
- Ståhlbrandt H, Björnöt I, Cederlund T, Almén A. CT and MRI imaging in Sweden: retrospective appropriateness analysis of large referral samples. *Insights Imaging.* 2023;14(1):134. doi: 10.1186/s13244-023-01483-w.
- Courtney A, Lopez DJ, Lowe AJ, Holmes Z, Su JC. Burden of Disease and Unmet Needs in the Diagnosis and Management of Atopic Dermatitis in Diverse Skin Types in Australia. *J Clin Med.* 2023;12(11):3812. doi: 10.3390/jcm12113812.
- Jaworecka K, Kwiatkowska D, Marek-Józefowicz L, et al. Characteristics of pruritus in various clinical variants of psoriasis: Final report of the binational, multicentre, cross-sectional study. *J Eur Acad Dermatol Venereol.* 2023;37(4):787-795. doi: 10.1111/jdv.18850.
- Shafiei M, Shomal Zadeh F, Mansoori B, et al. Imaging More than Skin-Deep: Radiologic and Dermatologic Presentations of Systemic Disorders. *Diagnostics (Basel).* 2022;12(8):2011. doi: 10.3390/diagnostics12082011.

16. Jartarkar SR, Patil A, Wollina U, et al. New diagnostic and imaging technologies in dermatology. *J Cosmet Dermatol.* 2021;20(12):3782-3787. doi: 10.1111/jocd.14499.
17. Li Z, Koban KC, Schenck TL, Giunta RE, Li Q, Sun Y. Artificial Intelligence in Dermatology Image Analysis: Current Developments and Future Trends. *J Clin Med.* 2022;11(22):6826. doi: 10.3390/jcm11226826.
18. da Silva RBZ, Fogliatto FS, Krindges A, Dos Santos Cecconello M. Dynamic capacity allocation in a radiology service considering different types of patients, individual no-show probabilities, and overbooking. *BMC Health Serv Res.* 2021;21(1):968. doi: 10.1186/s12913-021-06918-y.
19. Arkoudis NA, Karofylakis E, Moschovaki-Zeiger O, et al. Interdepartmental miscommunication regarding radiology: Addressing chronic challenges and exploring solutions. *World J Radiol.* 2024;16(5):109-114. doi: 10.4329/wjr.v16.i5.109.