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The Pharmaco-Radiological Nexus: A Review Of Iatrogenic Imaging Syndromes And The Imperative For A Pharmacy-Radiology-Nursing Defense Triad

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Abstract

Background: The diagnostic and therapeutic use of medications and medical imaging are cornerstones of modern medicine, yet their intersection creates a significant, under-appreciated domain of iatrogenic risk. Medication-related imaging harm (MRIH) encompasses adverse events where pharmaceuticals directly induce pathological imaging findings (e.g., drug-induced pneumonitis), complicate imaging procedures (e.g., contrast-associated kidney injury), or where imaging findings are misinterpreted due to a lack of pharmacological context. Preventing these harms requires coordinated action across traditionally siloed professions.

Aim: This narrative review aims to synthesize the evidence on the epidemiology, mechanisms, and multi-professional management of MRIH.

Methods: An integrative narrative review methodology was employed using a systematic search of PubMed, Embase, CINAHL, and Scopus (2010-2024).

Results: MRIH is prevalent and multifaceted. Key themes include: 1) Pharmacist-led stewardship is critical for pre-imaging medication reconciliation (e.g., holding nephrotoxic drugs, managing metformin), and post-imaging management of drug-induced diseases. 2) Nursing assessment and monitoring are paramount for detecting acute reactions (e.g., contrast extravasation, hypersensitivity) and longitudinal symptom tracking that correlates with imaging findings. 3) Radiologist recognition of specific drug-induced imaging patterns is essential for accurate diagnosis, but is often hindered by incomplete medication histories.

Conclusion: Mitigating MRIH necessitates reconceptualizing the medication-imaging pathway as a high-risk continuum requiring a dedicated safety triad. Proactive collaboration between pharmacy, radiology, and nursing—through shared protocols, cross-education, and integrated workflows—can

significantly reduce preventable patient harm, improve diagnostic accuracy, and optimize therapeutic outcomes.

Keywords: Drug-Related Side Effects and Adverse Reactions; Diagnostic Imaging; Patient Safety; Interprofessional Relations; Iatrogenic Disease; Contrast Media.

Introduction

Modern healthcare delivery relies profoundly on two powerful pillars: pharmacotherapy and medical imaging. While both have revolutionized diagnosis and treatment, their convergence creates a distinct and often overlooked landscape of iatrogenic risk (Chalikias et al., 2016). Medication-related imaging harm (MRIH) represents a spectrum of adverse events where pharmaceuticals and imaging procedures interact to cause patient injury. This harm manifests in several ways: medications can induce pathological changes that are subsequently visualized on scans, often as puzzling or misdiagnosed findings; drugs can increase the risk of complications from imaging procedures, most notably contrast-associated acute kidney injury; and the administration of imaging contrast media itself can precipitate acute adverse drug reactions. Conversely, a lack of integration between medication data and image interpretation can lead to diagnostic error, such as mistaking drug toxicity for disease progression (Ozkok & Ozkok, 2017).

The true prevalence of MRIH is difficult to quantify due to fragmented reporting, but its impact is substantial. Contrast-associated kidney injury remains a leading cause of iatrogenic renal failure (Davenport et al., 2020). Drug-induced interstitial lung disease, a potentially fatal complication of chemotherapy and immunotherapies, is frequently first detected—and must be accurately diagnosed—on computed tomography (CT) scans (Kusirisin et al., 2020). Bisphosphonate-related osteonecrosis of the jaw (BRONJ), a serious complication of antiresorptive therapy, requires precise radiological staging for management. These scenarios illustrate that the path from medication administration to imaging suite and back to clinical management is fraught with potential breakdowns (Hossain et al., 2018). Traditionally, responsibility for managing these risks has been dispersed and unclear. Pharmacists manage drug formularies and safety, radiologists and technologists administer contrast and interpret images, and nurses monitor patients and administer medications. This siloed approach creates dangerous gaps in the safety net (Xie et al., 2020).

This narrative review posits that mitigating MRIH requires an explicit, proactive collaboration between three core professions: pharmacy, radiology, and nursing. This "safety triad" must work in concert across a continuum encompassing pre-procedural risk assessment, intra-procedural safety, and post-procedural detection and management. The review will synthesize current evidence to: 1) Catalog major categories of MRIH, 2) Define the specific, evidence-based roles for pharmacists, radiologists, and nurses in preventing and managing each category, and 3) Propose models for interprofessional communication and system-level intervention. By examining this negative intersection of two fundamental medical tools, we aim to illuminate a critical pathway for improving patient safety and diagnostic precision through structured collaboration.

A Taxonomy of Medication-Related Imaging Harm

To systematically understand, prevent, and manage medication-related imaging harm (MRIH), a clear categorization of its manifestations is essential. This functional taxonomy organizes MRIH into three principal, often interlinked, domains: pharmacotoxic injury visualized on imaging, procedural complications potentiated by pharmacotherapy, and diagnostic error from pharmacological-context deficiency. This framework provides a structured lens through which to analyze risks and deploy targeted, interprofessional interventions.

Pharmacotoxic injury visualized on imaging comprises direct organ toxicity from therapeutic medications that manifests as discernible, and often characteristic, abnormalities on diagnostic scans. This is a vast and rapidly expanding category, driven by the proliferation of potent chemotherapeutic,

immunomodulatory, and targeted biologic agents. In these cases, the drug itself is the proximate cause of the visualized pathology (Tibiletti et al., 2023). Classic examples include Drug-Induced Interstitial Lung Disease (DIILD), caused by agents such as bleomycin, checkpoint inhibitors, or amiodarone, which presents on CT scans with patterns of ground-glass opacities, consolidation, and fibrosis that radiologists must carefully distinguish from infectious pneumonitis, cardiogenic edema, or tumor progression (Skeoch et al., 2018).

Another archetypal example is Medication-Related Osteonecrosis of the Jaw (MRONJ), associated with antiresorptive therapies like bisphosphonates, where imaging via panoramic radiography, CT, or MRI is critical for diagnosis and staging, revealing hallmarks such as sequestrum, periosteal reaction, and osteolysis (Ruggiero et al., 2022). The category further includes drug-induced hepatotoxicity and pancreatitis, where imaging pattern recognition—such as the characteristically high hepatic attenuation seen on non-contrast CT in amiodarone toxicity—can suggest an iatrogenic etiology. Even Medication-Overuse Headache (MOH) represents a form of pharmacotoxicity, where the paradoxical effect of frequent analgesic use triggers a clinical presentation that often leads to a brain MRI to rule out ominous causes, thereby perpetuating a cycle of unnecessary imaging and therapeutic reinforcement (May & Schulte, 2016).

The second domain, procedural complications potentiated by pharmacotherapy, shifts focus from the drug as a direct toxin to its role in amplifying the inherent risks of an imaging procedure (Jain et al., 2018). Here, a patient's pre-existing pharmacotherapeutic regimen creates a vulnerable physiological state, transforming a routine procedure into a high-risk event. The quintessential example is Contrast-Associated Acute Kidney Injury (CA-AKI), where the nephrotoxic stress of intravascular iodinated contrast media is dramatically potentiated in patients concurrently receiving other renal insults from medications like NSAIDs, diuretics, or ACE inhibitors (Bahrainwala et al., 2020). Similarly, the risk of Metformin-Associated Lactic Acidosis (MALA) escalates not directly from the contrast agent, but from contrast-induced renal impairment that subsequently impairs the excretion of metformin (Huyut, 2021). Pharmacotherapy also influences procedural risks like contrast extravasation, where the severity of tissue injury can be exacerbated by chemotherapeutic agents that induce vascular fragility or by anticoagulant and antiplatelet therapies that increase bleeding risk (Silva et al., 2018). Conversely, this domain also includes the strategic use of premedication—corticosteroids and antihistamines—as a direct pharmacological intervention to prevent acute hypersensitivity reactions to contrast media in sensitized patients.

The third and subtlest domain is diagnostic error from pharmacological-context deficiency. This represents a failure of information systems and workflow, rather than a direct biological interaction. It occurs when the interpreting radiologist renders a report without access to an accurate, current medication history, leading to a fundamental misinterpretation of the imaging findings. A classic and potentially harmful example is mistaking the distinctive pulmonary fibrosis pattern caused by amiodarone or a chemotherapeutic agent for idiopathic pulmonary fibrosis, sarcoidosis, or an infectious process. This error can trigger a cascade of inappropriate and potentially harmful interventions, including unnecessary biopsies, antimicrobial therapy, or immunosuppression, while the causative drug continues to be administered. This category underscores that MRIH is not solely a clinical or biological problem but is fundamentally a systems safety issue, where the siloing of pharmacological data from the radiological interpretation process itself becomes a root cause of patient harm (Budin et al., 2022). Figure 1 illustrates the three principal categories of medication-related imaging harm (MRIH).

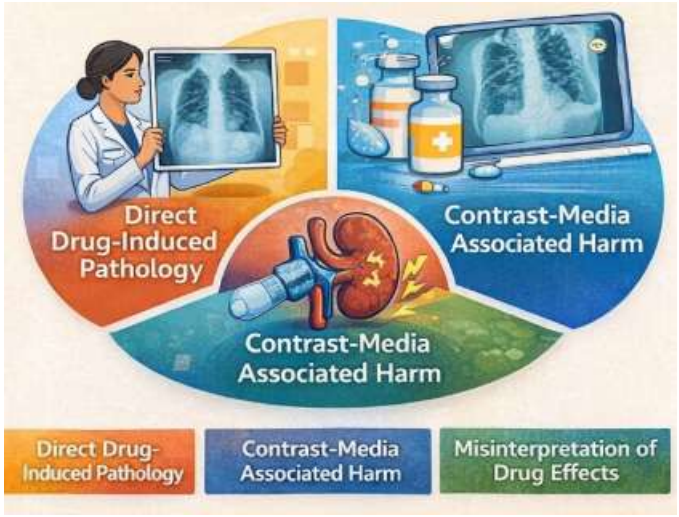

Figure 1. Medication-Related Imaging Harm (MRIH).

The Pharmacist's Role in Stewardship at the Point of Prescription and Procedure

The pharmacist serves as the cornerstone of pre-emptive risk mitigation across the medication-imaging continuum. Their expertise in pharmacology and therapeutics positions them uniquely to orchestrate safety from the earliest point of prescription through the procedural event and into the subsequent management phase, encompassing three critical domains of action.

Pre-Procedural Risk Assessment and Medication Reconciliation

This constitutes the primary and most crucial line of defense. Pharmacists must be embedded within teams that design and govern imaging referral pathways to implement systematic screening protocols. Through active medication reconciliation, they identify patients scheduled for contrast-enhanced studies who are concurrently on high-risk pharmacotherapy (Sůva et al., 2022). This includes flagging nephrotoxic agents (e.g., NSAIDs, diuretics, aminoglycosides), metformin, and other relevant drugs like chemotherapeutics or immunosuppressants that could precipitate harm (Morcos et al., 2019). Evidence consistently demonstrates that pharmacist-led medication review before procedures significantly reduces inappropriate prescribing and uncovers latent drug-related problems, establishing a vital safety checkpoint (Chandiramani et al., 2020).

Protocol Development and Management

Pharmacists are indispensable in the creation, implementation, and ongoing audit of evidence-based safety protocols (Petrov et al., 2022). Their leadership is central to standardizing interventions for common risks, such as protocols to prevent Contrast-Associated Acute Kidney Injury (CA-AKI). This involves defining criteria for pre-procedural intravenous hydration regimens (utilizing isotonic bicarbonate or saline), establishing clear guidelines for holding and restarting nephrotoxic medications and metformin, and managing premedication schedules for patients with a history of contrast allergy (Mehran et al., 2019). Their role extends beyond acute procedures; in the context of chronic therapies like antiresorptive agents, pharmacists are pivotal in patient education before drug initiation, coordinating necessary pre-therapeutic dental assessments, and monitoring for early symptoms of complications such as Medication-Related Osteonecrosis of the Jaw (MRONJ) (Sturrock et al., 2019).

Post-Imaging Management of Drug-Induced Disease

When a drug-induced pathology is confirmed radiologically, the pharmacist’s role transitions to therapeutic management and pharmacovigilance. This involves collaborative decision-making with prescribers regarding drug discontinuation, dose adjustment, or therapeutic substitution. They also

manage the treatment of the toxicity itself, such as advising on corticosteroid regimens for Drug-Induced Interstitial Lung Disease (DIILD). Following contrast exposure, pharmacists monitor renal function to guide the safe reinstatement of medications like metformin. Furthermore, their expertise in adverse drug reaction reporting is critical for documenting these events, contributing to institutional learning and broader pharmacovigilance databases, thereby closing the safety loop.

The Radiologist's Role From Pattern Recognition to Proactive Consultation

The radiologist functions as the diagnostic arbiter, whose interpretive accuracy is paramount in both identifying iatrogenic injury and preventing its misinterpretation. Their role must evolve from a passive interpreter of images to an active consultant, a transformation enabled by access to the complete pharmacological context.

Pattern Recognition and Specific Diagnosis

A fundamental competency in mitigating MRIH is the radiologist’s ability to recognize the distinctive imaging signatures of drug toxicities. This demands moving beyond nonspecific descriptions of "opacities" or "edema" to suggesting a specific drug-related etiology (De Cicco et al., 2023). For instance, identifying the upper-lobe predominant fibrosis and characteristically hyperdense liver associated with amiodarone toxicity, the organizing pneumonia pattern triggered by certain chemotherapies, or the specific osseous findings of MRONJ on CT are essential skills (Ruggiero et al., 2022). This diagnostic specificity directly and powerfully alters clinical management, preventing unnecessary invasive biopsies, inappropriate antimicrobial therapy, or the dangerous continuation of an offending drug.

The Imperative for Medication History

Accurate and efficient interpretation is frequently impossible without knowledge of the patient’s current drug regimen. A radiologist reviewing a chest CT for new dyspnea in an oncology patient cannot provide an optimal differential diagnosis without knowing whether the patient is receiving bleomycin or a PD-1 inhibitor. Presently, this information is often absent from imaging requisitions, forcing radiologists into inefficient and time-consuming chart reviews that undermine workflow and safety. Radiologists must therefore advocate for and help design electronic imaging order systems that mandate structured fields for "current relevant medications" or "chemotherapy/immunotherapy history," ensuring this critical data is integrated directly into the diagnostic workflow (Arbabshirani et al., 2018).

Proactive Communication and Consultation

When a drug-induced injury is suspected, the radiologist’s report must transcend a mere description to become a clear, actionable communication. Phrases such as "findings are highly suggestive of drug-induced lung disease, clinical correlation with recent chemotherapy is advised" are essential. Moreover, radiologists should be empowered and expected to initiate direct communication with the referring team or consulting pharmacist when a critical, unsuspected drug-related finding is identified. This act of proactive consultation serves as a vital safety stop in the patient’s care pathway, ensuring that imaging intelligence triggers an immediate clinical response.

The Nurse's Role in the Continuous Monitor and Patient Advocate

Nursing practice provides the indispensable, continuous patient surveillance that bridges the entire medication-imaging continuum. As the constant at the bedside, nurses are the eyes and ears of the clinical team, making their role in early detection, patient advocacy, and protocol execution vital for a robust safety system.

Pre-Procedural Assessment and Patient Education

Nurses conduct the final, holistic patient assessment immediately before an imaging procedure. This critical point-of-care check involves verifying the completion of pre-hydration protocols, confirming that medication holds per pharmacy guidelines have been executed, assessing baseline renal function (often by checking a recent serum creatinine), and conducting a thorough allergy history screening (Sánchez-Borges et al., 2019). Beyond assessment, nurses provide crucial patient education, explaining what to expect during the procedure and outlining which symptoms should be reported immediately, thereby empowering patients as partners in their own safety (Böhm et al., 2017).

Intra-Procedural Monitoring and Emergency Response

During the imaging procedure itself, nurses or specially trained radiologic nurses/technologists are responsible for continuous patient monitoring. They are the first line of defense for recognizing and managing acute adverse reactions to contrast media, which range from mild urticaria to life-threatening anaphylactoid reactions and extravasation injuries. Their competency in immediate recognition and initiation of emergency management—such as stopping the injection, administering emergency medications, and providing first aid—is a direct and non-delegable patient safety function. This role expands further in procedures requiring sedation, where nursing management of analgesic and sedative medications introduces an additional layer of pharmaco-imaging interaction risk.

Post-Procedural Surveillance and Longitudinal Tracking

The nurse's vigilant role extends far beyond the conclusion of the scan. They monitor for delayed reactions, including late-onset cutaneous reactions or subtle signs of worsening renal function, such as decreased urine output. Perhaps most significantly, nurses in settings like outpatient infusion centers or oncology clinics are often the first clinicians to assess and document new, insidious symptoms—a persistent cough, worsening dyspnea, or unexplained jaw pain—that may herald an emerging drug toxicity. Their accurate documentation and timely escalation of these symptoms are the essential triggers that prompt clinical correlation, leading to the ordering of diagnostic imaging and, ultimately, informing the radiologist's interpretation. This longitudinal, symptom-based tracking creates the indispensable clinical link between ongoing pharmacotherapy, patient experience, and radiological findings. Table 1 delineates the specific, complementary responsibilities of the pharmacist, radiologist, and nurse in preventing, detecting, and managing prevalent categories of medication-related imaging harm (MRIH), illustrating the operational model of the interprofessional defense triad. Figure 2 shows the proposed interprofessional safety triad model illustrating coordinated roles of pharmacists, radiologists, and nurses in preventing, detecting, and managing medication-related imaging harm.

Table 1: The Safety Triad in Action: Roles in Common Medication-Related Imaging Harms

Type of MRIH	Pharmacist Role	Radiologist Role	Nursing Role
Contrast-Associated AKI	- Identify high-risk meds (NSAIDs, diuretics). - Protocol for pre-hydration & medication holds. - Guide metformin management.	- Recommend low/iso-osmolar contrast. - Suggest alternative imaging if eGFR very low. - Report on renal imaging post-event.	- Administer pre-procedural IV hydration. - Verify medication holds completed. - Monitor I/O & post-procedural renal function.
Drug-Induced ILD (e.g., from chemo)	- Educate on risk pre-therapy. - Manage drug cessation/steroid therapy post-diagnosis.	- Recognize patterns (OP, HP, NSIP) on CT. - Differentiate from progression/infection.	- Assess & document respiratory symptoms serially. - Coordinate scheduling of

		- Suggest "drug toxicity" in report.	surveillance scans. - Monitor for steroid side effects during treatment.
MRONJ	- Provide oral health education before starting bisphosphonates. - Coordinate with dentistry.	- Stage severity on CT/CBCT (sequestrum, osteolysis). - Differentiate from tumor or osteomyelitis.	- Perform routine oral assessments during therapy. - Triage patient reports of jaw pain/dental issues. - Provide wound care post-dental procedures.
Contrast Extravasation	- Manage formularies for contrast agents. - Recommend treatment agents (e.g., hyaluronidase).	- Immediately recognize on monitoring. - Document extent and involved structures.	- Recognize signs/symptoms during injection. - Initiate first-aid (elevation, warm/cold compress). - Monitor for compartment syndrome.
Medication-Overuse Headache	- Identify the pattern of analgesic overuse. - Guide medication withdrawal regimen.	- Recognize normal or non-specific MRI. - Report: "Findings not explanatory for headache."	- Elicit detailed headache & medication history. - Support the patient through withdrawal. - Educate on the rebound headache mechanism.

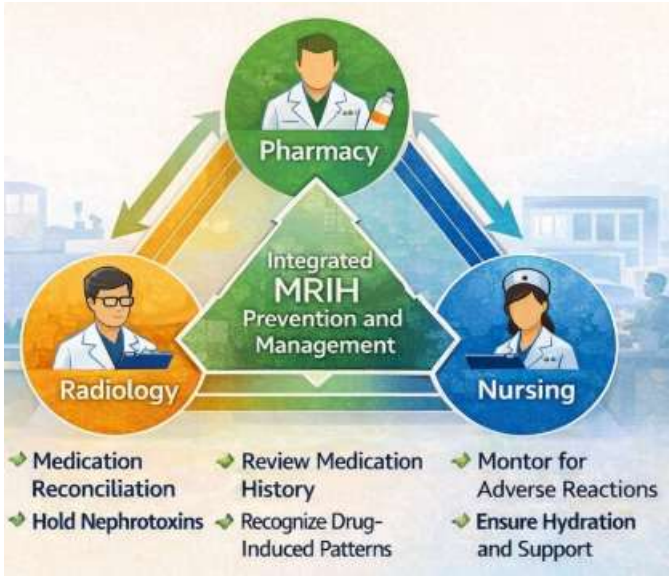

Figure 2. The Pharmacy–Radiology–Nursing Safety Triad for Preventing Medication-Related Imaging Harm

Gaps in Communication and Integration

Despite clear individual roles, MRIH persists due to systemic failures in communication and workflow integration. The most critical gap is the disconnect between medication data and the radiology workflow (Vincoff et al., 2022). Medication lists are typically housed in the pharmacy or electronic medication administration record (eMAR) modules, while imaging orders and reports exist in separate radiology information systems (RIS/PACS). This siloing means the radiologist often interprets images in an informational vacuum. Requisitions rarely include a focused medication history, and active medication lists are cumbersome to access during high-volume interpretation sessions (Roth et al., 2021).

Furthermore, ambiguous accountability for pre-procedural safety checks exists. Is it the ordering provider's, pharmacist's, nurse's, or radiologist's responsibility to ensure metformin is held or that hydration is complete? Without a clear, multi-professional protocol, tasks fall through the cracks. Reactive communication is also problematic; a radiologist suspecting amiodarone toxicity may document it in a report, but if the report is not urgently communicated, a patient may receive another damaging dose. These gaps illustrate that individual competency, while necessary, is insufficient without designed systems that facilitate collaboration.

Models for Interprofessional Collaboration

To transform the theoretical construct of a pharmacy-radiology-nursing defense triad into a functional clinical reality, healthcare institutions must intentionally engineer systems that dismantle traditional silos and foster proactive, structured collaboration. Effective implementation models are not serendipitous; they are deliberately designed around several core components that facilitate communication, clarify accountability, and embed safety into the daily workflow (Luk et al., 2017).

The foundation of this collaboration is integrated electronic health record (EHR) Tools. The EHR must evolve from a passive repository to an active safety partner, configured explicitly to support the triad's workflow. Key technological interventions include the implementation of intelligent, hard-stop alerts (Rear et al., 2016). For instance, when an imaging study requiring intravascular contrast is ordered for a patient taking metformin or concurrent nephrotoxic medications, the system can fire an alert that cannot be bypassed without documentation of a pharmacist consultation or a formalized safety plan. Furthermore, structured imaging requisitions are critical; order sets should mandate the entry of data such as "current chemotherapy/immunotherapy" and "key nephrotoxic medications" through dropdown menus or free-text fields that automatically populate the radiologist's interpretation worklist, eliminating the need for inefficient manual chart review (Wu et al., 2023). Finally, shared, real-time dashboards that display patients scheduled for high-risk imaging alongside their latest renal function metrics and medication flags enable pharmacy and nursing staff to prospectively identify and intervene for at-risk individuals, shifting the paradigm from reactive to pre-emptive care (Lin et al., 2022).

Alongside technological enablers, the establishment of standardized protocols with clear triggers and escalation paths is non-negotiable. Institutions require co-developed, interprofessional protocols that delineate profession-specific actions within an integrated sequence (Anton et al., 2023). A protocol for preventing Contrast-Associated Acute Kidney Injury (CA-AKI), for example, would explicitly define: the pharmacist's role in automated risk screening and medication reconciliation; the nurse's responsibility for implementing the prescribed hydration protocol; and the radiology technologist's duty to confirm all safety checks are complete before contrast administration. Crucially, these protocols must include unambiguous escalation pathways for when a safety checkpoint fails or a concern arises, ensuring that ambiguous situations have a predetermined resolution mechanism and no single professional bears the burden of decision-making in isolation (Ong et al., 2022).

Cultivating a shared understanding and mutual respect is achieved through deliberate interprofessional education and rounds. Moving from isolated expertise to a cohesive triad requires the development of shared mental models (Hsieh et al., 2022). Structured joint educational sessions—where radiologists teach pharmacists and nurses to recognize key imaging findings of drug

toxicity, and pharmacists educate radiologists on the profiles and risks of high-alert medications—are invaluable for building cross-disciplinary literacy (Sodagari et al., 2018). Furthermore, incorporating a pharmacist or a relevant nurse into complex case discussions, such as radiology-pathology conferences or tumor boards, transforms these forums from diagnostic exercises into holistic patient management sessions, enhancing learning and directly improving care coordination (McDonald et al., 2021).

Finally, the triad's efficacy and continuous improvement depend on a cycle of prospective audit and feedback. The collaborative team must jointly own quality outcomes by regularly reviewing key performance and safety metrics. This involves scheduled, multidisciplinary reviews of data such as CA-AKI incidence rates, cases of severe contrast extravasation, or instances of delayed or missed diagnosis of drug-induced interstitial lung disease (DIILD). These reviews should utilize structured root cause analysis methodologies to dissect failures, focusing relentlessly on identifying and remediating system-level flaws—such as broken communication channels or protocol ambiguities—rather than assigning blame to individuals. This closed-loop feedback system ensures that the collaboration is dynamic, self-correcting, and aligned with the ultimate goal of harm reduction. Table 2 outlines common systemic barriers to implementing the pharmacy-radiology-nursing safety triad and proposes concrete, multi-professional strategies to overcome them, providing a roadmap for operationalizing collaborative defense against medication-related imaging harm.

Table 2: Strategies for Implementing the Safety Triad: From Barriers to Solutions

Barrier to Collaboration	Proposed Systemic Solution	Role-Specific Actions
Information Silos (Medication data not visible in Radiology)	• Implement EHR integration: auto-populate key meds onto imaging reqs/worklist. • Create "Medication Safety for Imaging" tab in patient chart.	**Pharm:** Flag high-risk drugs in profile with imaging alerts. **Rad:** Advocate for IT changes; refuse incomplete reqs. **Nurse:** Verify key meds are listed on the pre-procedural checklist.
Ambiguous Accountability for Pre-Imaging Safety	• Develop and mandate use of a unified, multi-professional pre-contrast safety checklist.	**Pharm:** Owns protocol development & medication rec. **Nurse:** Owns checklist execution & patient assessment. **Rad Tech:** Owns final verification before contrast injection.
Lack of Shared Mental Models	• Institute regular interprofessional case conferences on MRIH. • Develop online learning modules shared across departments.	**Rad:** Present imaging cases of drug toxicity. **Pharm:** Present pharmacology of high-risk agents. **Nurse:** Present clinical monitoring findings & case progression.
Reactive, Non-Urgent Communication	• Establish a standardized critical finding alert system for suspected urgent MRIH (e.g., "Code Tox" alert to pharmacist/team). • Use secure messaging platforms for rapid consults.	**Rad:** Use alert system for urgent suspected toxicity. **Pharm/Nurse:** Designate a point-of-contact for imaging alerts. **All:** Agree on response time expectations.
Inadequate Post-Event Learning	• Establish a multi-professional MRIH Quality Improvement Committee.	**All:** Participate in QI committee. **Nurse/Pharm:** Report near-misses and adverse events.

	• Use structured tools (SBAR) for case review and system redesign.	**Rad:** Provide imaging data for event analysis.

Conclusion

Medication-related imaging harm represents a significant, modifiable source of patient injury that lies at the intersection of two of medicine's most powerful tools. As pharmacotherapies become more potent and imaging more ubiquitous, the potential for harm only increases. This review demonstrates that mitigating this risk is not the sole responsibility of any single profession but requires the deliberate integration of the pharmacist's stewardship, the radiologist's diagnostic acumen, and the nurse's continuous surveillance.

The prevailing model of fragmented care is inadequate. The path forward requires a deliberate shift towards a safety triad model, built on integrated health information technology, co-developed protocols with clear accountability, and a culture of proactive, interprofessional communication and education. By viewing the patient journey through the imaging suite as a high-risk continuum requiring pharmacy, radiology, and nursing collaboration, healthcare systems can transform a zone of vulnerability into one of resilience. The goal is clear: to ensure that the profound benefits of medications and imaging are not undermined by preventable harms arising from their interaction, and that when drug-related injury does occur, it is detected with speed, diagnosed with accuracy, and managed with expertise.

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الارتباط الدوائي-الإشعاعي: مراجعة لمتلازمات التصوير الإياتروجينية والحاجة الملحة لثالوث دفاعي بين الصيدلة والإشعاعيات والتمريض

الملخص

الخلفية :يُعد الاستخدام التشخيصي والعلاجي للأدوية والتصوير الطبي أعمدة أساسية في الطب الحديث، إلا أن تقاطعهما يخلق مجالاً كبيراً وغير مقدر بشكل كافٍ للمخاطر الإياتروجينية. يشمل الضرر التصويري المرتبط بالأدوية (MRIH) الأحداث الضارة حيث تسبب الأدوية الصيدلانية مباشرة نتائج تصويرية مرضية (مثل التهاب الرئة الناتج عن الأدوية)، أو تعقد إجراءات التصوير (مثل إصابة الكلى المرتبطة بالتباين)، أو حيث تُفسر نتائج التصوير بشكل خاطئ بسبب نقص السياق الدوائي. يتطلب منع هذه الأضرار تنسيقاً بين المهن التقليدية المعزولة.

الهدف :تهدف هذه المراجعة السردية إلى تلخيص الأدلة حول الوبائيات، والآليات، والإدارة متعددة المهن للضرر التصويري المرتبط بالأدوية.

الطرق :تم استخدام منهجية مراجعة سردية تكاملية مع بحث منهجي في قواعد البياناتPubMed ، Embase، CINAHL، و Scopus (2010-2024).

النتائج :يُعد الضرر التصويري المرتبط بالأدوية منتشرًا ومتعدد الأوجه. تشمل المواضيع الرئيسية: 1) إدارة المضادات بقيادة الصيادلة حاسمة لتسوية الأدوية قبل التصوير (مثل إيقاف الأدوية السامة للكلى، وإدارة الميتفورمين)، وإدارة الأمراض الناتجة عن الأدوية بعد التصوير. 2) تقييم ومراقبة التمريض أمران بالغا الأهمية لكشف التفاعلات الحادة (مثل تسرب التباين، والحساسية المفرطة) وتتبع الأعراض الطولي الذي يرتبط بنتائج التصوير. 3) تعرف الإشعاعي على أنماط التصوير الناتجة عن الأدوية المحددة أمر أساسي للتشخيص الدقيق، لكنه غالباً ما يعيقه تاريخ الأدوية غير الكامل.

الخاتمة :يتطلب تخفيف الضرر التصويري المرتبط بالأدوية إعادة تصوير مسار الدواء-التصوير كسلسلة متصلة عالية المخاطر تتطلب ثالوث سلامة مخصص. التعاون الاستباقي بين الصيدلة، والإشعاعيات، والتمريض — من خلال بروتوكولات مشتركة، وتعليم عابر، وسير عمل متكامل — يمكن أن يقلل بشكل ملحوظ من الضرر القابل للمنع للمريض، ويحسن دقة التشخيص، ويحسن النتائج العلاجية.

الكلمات المفتاحية :تفاعلات جانبية وردود فعل ضارة مرتبطة بالأدوية؛ تصوير تشخيصي؛ سلامة المريض؛ علاقات متعددة المهن؛ مرض إيتروجيني؛ وسائط التباين.