

DOI: <https://doi.org/10.63332/joph.v5i11.3697>

## Evaluating the Impact of Radiologic Procedures on Nursing Care Planning and Patient Recovery Outcomes

Abeer Mohammed Alshammary<sup>1</sup>, Awatif Mohammed saud Al shammary<sup>2</sup>, Ahmed Nashmi ALshmr<sup>3</sup>, Aisha Abdo Ahmed Al-Haisi<sup>4</sup>, Budur Zayed Alnadwi<sup>5</sup>, Ebtehal Mohammed Ali Hawsawi<sup>6</sup>, Fraih Ayadah Mutlaq AlShamerry<sup>7</sup>, Khaled Farhan Alshammri<sup>8</sup>, Mohammad Saleh Abdullah Alwakid,<sup>9</sup> Mostafa Jamil Aldabbous<sup>10</sup>, Saud Ali Al-Rashidi<sup>11</sup>, Tahani Mulahid Alanazi<sup>12</sup>

### Abstract

*Background:* Radiologic procedures are essential in today's healthcare system, affecting the whole process from diagnosis through treatment to recovery. The radiologic competency of the hospital, the risk management strategy, and the patient education will all depend on the imaging results. Hence, it is a must to know the radiology-nursing interaction in order to increase safety, improve communication and recovery outcomes. *Objective:* The review was intended to highlight the current practices, challenges, and opportunities for improvement in clinical and patient-centered outcomes by evaluating the impact of diagnostic as well as interventional radiologic procedures on nursing care planning and patient recovery. *Methods:* The authors performed a narrative literature review using PubMed and Google Scholar to locate peer-reviewed articles that were published within the time frame of January 2020 to September 2024. The search was done by employing the combination of Medical Subject Headings (MeSH) and free-text keywords related to radiologic procedures, nursing care, and patient recovery. The articles that were chosen for inclusion in the review were the ones that had provided quantitative, qualitative, or mixed-methods research, systematic reviews, and clinical guidelines centered on nursing roles in imaging, interdisciplinary coordination, and recovery outcomes. *Results:* The data extracted resulted in the identification of five main themes: 1) clinical nursing roles in pre- and post-procedure care, 2) interventional radiology and patient monitoring, 3) communication and education strategies, 4) technological integration, including informatics and imaging analytics, and 5) space barriers of limited training, ethical concerns, and communication gaps. It is a common viewpoint that the coordination of radiologic-nursing practices leads to an increase in the safety, satisfaction, and recovery of patients, but the total implementation across all hospitals is still in progress. *Conclusion:* Radiologic procedures are vital not only in the nursing care process but also in the recovery outcomes. To maximize the impact of radiology on nursing, comprehensive training, interdisciplinary coordination, and consistent hospital policies across departments are few of the ways.

**Keywords:** Impact, Radiologic Procedures, Nursing Care Planning, and Patient Recovery Outcomes.

### Introduction

---

<sup>1</sup>Nurse, Hail Health Cluster

<sup>2</sup>Staff nurse, Internal Audit Department

<sup>3</sup>Nursing, Erada and Mental Health Complex in Taif

<sup>4</sup>Nursing technician, Al-bahah Health Cluster, Primary Health Care Center in Atawla

<sup>5</sup>Nursing, Artificial kidney center, Alnoor specialist hospital

<sup>6</sup>Nursing, Artificial Kidney Center, Al-Noor Specialist Hospital

<sup>7</sup>Nursing, Aja long term care and medical rehabilitation Hospital

<sup>8</sup>Technician-Radiological Technology, Hail Health Complex - Al Shannan Hospital

<sup>9</sup>Nurse Specialist, Eradah Complex and Mental Health in Dammam

<sup>10</sup>Nursing Technician, Hail Health Cluster

<sup>11</sup>Nursing, Aja long term care and medical rehabilitation Hospital

<sup>12</sup>Nursing, Aja long term care and medical rehabilitation Hospital



Radiologic procedures, which are now essential for modern diagnostic and therapy, are still having an impact that extends beyond just getting pictures—they are altering the whole nursing care process and, finally, the patient's healing. The results of the imaging procedure activate the care pathways, and the lights of risk stratification and nursing interventions are turned on—these interventions are varied and include pre-procedure education and medication reconciliation, post-procedure monitoring, and discharge coordination. The role of radiology is being expanded—especially in the case of image-guided interventions—and so the response of nursing must also become more sophisticated to ensure that the outcomes which are of most importance to the patients: earlier mobilization, shorter length of stay (LOS), fewer complications, and better symptom control and understanding are obtained. Recent studies in different quality programs that are targeting perioperative care show that teams of professionals using evidence-based diagnostics backed by timely diagnostics can shorten LOS and reduce complications—this is precisely where the planning of nursing care coincides with the imaging-driven decisions (e.g., Enhanced Recovery After Surgery [ERAS]) (Sauro et al., 2024).

The downstream effect of imaging can be seen in relation to particular clinical pathways. To illustrate, the high-quality preoperative computed tomography (CT) staging of appendicitis has been linked to surgical strategy change and better decision-making—these changes directly impact the nursing workload concerned with analgesia, early feeding, mobilization, and readiness for discharge (Brillantino et al., 2023). In nursing care for neurovascular patients, monitoring of the workflow intervals, such as door-to-imaging, will significantly shorten transfer and treatment times. This fact emphasizes that nurse-led coordination around imaging milestones is necessary to completely eliminate the adverse effects of delays which are connected to poor outcomes (Royan et al., 2024).

In the same way, risks connected with the different radiological procedures must be factored in when devising nursing strategies. One of the treatments that continue to raise concern is contrast-associated acute kidney injury (CA-AKI) during contrast-enhanced CT and angiography. Current literature not only points out but also sharpens risk and prevention strategies (e.g., hydration, risk-prediction and mitigation) and thus, reinforces the need for a protocolized nursing assessment and surveillance before and after contrast exposure (Everson et al., 2020; Li & Wang, 2024). Making these assessments part of regular nursing practice will help to reduce unplanned care escalation and enhance the speed of recovery.

Patient comprehension and their involvement with imaging results are two important factors that also determine recovery time and adherence to treatment plans. A large comparative study indicated that patients who were first informed of the results through a portal experienced lower perceived understanding than those who were communicated with directly, thereby highlighting the time for nurse-mediated education when imaging information becomes part of the care plan (Garry et al., 2020). Radiologists and patients having direct and structured communication can even lead to clinically significant changes in reports which reinforces the models of two-way communication that include nursing as a facilitator for clarifying the past, the present, and the future (Gutzeit et al., 2021).

The recovery of image-guided therapies through patient-reported outcomes (PROs) is being conceptualized and increasingly prioritized. Systematic work done in interventional radiology

(IR) has shown the use of validated PRO measures to be growing—although it is still inconsistent—, which is a sign of the shift towards outcomes that can be directly influenced by the nursing teams through symptom management, education and coordinated follow-up (Datta et al., 2023). Citizenship Editorial and consensus updates in IR do also call for the routine collection of patient-centered metrics to verify whether or not the use of minimally invasive techniques leads to better recovery experiences—areas where nursing protocols (pain control, access-site care, mobility coaching) are crucial (Irvine et al., 2023).

In concert, contemporary literature is clear: radiologic procedures affect both the clinical pathways and the patient's experience in such a way that the intentional nursing care planning becomes inevitable—from risk mitigation and results communication to mobilization and discharge readiness. The systematic evaluation of these linkages is necessary to recover outcomes in diagnostic and interventional radiology optimally. Therefore, the main goal of this review is to assess critically the effect of radiologic procedures on nursing care planning and patient recovery outcomes in both diagnostic and interventional contexts.

## **Methods**

### **Study Design**

This study employed a **narrative literature review design** to critically examine recent evidence (2020–2024) on the **impact of radiologic procedures on nursing care planning and patient recovery outcomes**. The integration of peer-reviewed research findings was the primary aim of the study which considered the impact of diagnostic and interventional radiology on nursing workflows, risk mitigation, communication and post-procedure recovery. Besides, the review scrutinized the multidisciplinary interactions of nurses, radiologists, and allied healthcare professionals, alongside the novel trends in patient-reported outcomes and genomic or data-driven approaches within radiologic care.

### **Data Sources and Search Strategy**

A wide-ranging literature search was performed using PubMed and Google Scholar, which are the two most important databases for biomedical and health sciences research respectively.

The search strategy incorporated Medical Subject Headings (MeSH) and free-text terms associated with radiology, nursing care, and recovery outcomes. The Boolean logic applied was: (“radiologic procedures” OR “diagnostic imaging” OR “interventional radiology” OR “computed tomography” OR “magnetic resonance imaging” OR “ultrasound”) AND (“nursing care planning” OR “nursing interventions” OR “patient monitoring” OR “nursing communication” OR “care coordination”) AND (“patient recovery” OR “post-procedure outcomes” OR “length of stay” OR “patient satisfaction” OR “complications” OR “quality of care”).

Filters were applied to include only **peer-reviewed English-language articles published between January 2020 and September 2024**. Reference lists of identified systematic reviews, meta-analyses, and clinical guidelines (e.g., from the **American College of Radiology [ACR]**, **World Health Organization [WHO]**, and [posthumanism.co.uk](http://posthumanism.co.uk)

**International Council of Nurses [ICN]**) were also screened manually to capture additional relevant studies.

## **Inclusion and Exclusion Criteria**

### **Inclusion criteria:**

1. Articles focused on **diagnostic or interventional radiologic procedures** and their **influence on nursing care planning or patient outcomes**.
2. Studies addressing **nursing interventions, communication, or workflow** linked to imaging procedures.
3. Research reporting **measurable clinical or recovery outcomes**, such as complication rates, length of stay, readmission, or patient satisfaction.
4. Peer-reviewed **primary research (quantitative, qualitative, or mixed-methods), systematic reviews, or evidence-based guidelines** published between 2020–2024.

### **Exclusion criteria:**

1. Articles not in English or published before 2020.
2. Studies focusing exclusively on technical imaging performance (e.g., image resolution) **without nursing or recovery context**.
3. Opinion papers, editorials, or conference abstracts lacking empirical data.
4. Research centered on **non-radiologic medical procedures**.

## **Results**

Findings were categorized into core themes corresponding to the review objectives; Integrating Imaging Into Nursing Care Pathways: From Orders to Outcomes, Risk Anticipation and Prevention: Contrast-Associated Kidney Injury and Beyond, Communication at the Imaging Interface: Closing Loops, Centering Patients, Workflow, Technology, and the Clock: Why Minutes Matter for Recovery, Interventional Radiology and Recovery: Access Strategy, Closure, and Same-Day Pathways, Patient-Reported Outcomes and the “Recovery We Measure”, Sedation-Dependent Imaging and Throughput: Nursing as the Throughline, What “Good” Looks Like in Practice: A Nursing-Centered Imaging Playbook and Gaps and a Research Agenda

## **Discussion**

### **Integrating Imaging Into Nursing Care Pathways: From Orders to Outcomes**

Radiologic tests are progressively being used as the first decision-makers for later clinical processes, and nursing care planning should be linked to imaging timelines if the recovery

outcomes are to be better. Studies conducted on perioperative pathways have shown that when diagnostics are integrated into structured, multidisciplinary protocols such as Enhanced Recovery After Surgery (ERAS), hospitals experience a decrease in complications and a shorter length of stay—results built on the teamwork of nurses in early mobilization, nutrition, analgesia, patient education, and discharge readiness (Sauro et al., 2024). The contribution of nurses to the activation of the “last meter” of the imaging protocols is very important: to radiology, to the patient's floor via a fast transport, to the management of drugs and allergies, to the communication about the results, to the modification of the patient's plan if the imaging alters the operative or interventional strategy. The integration of imaging and nursing this way is not just about the logistics, it is about the outcomes and it is causative. In stroke care systems, for example, the differentials between door-to-imaging and imaging-to-door times have a major impact on the door-in–door-out times for transfer candidates, thus revealing how nurse-led coordination at the imaging interface minimizes delays that otherwise affect reperfusion times and recovery trajectories (Royan et al., 2024). This means that the timing, reliability, and interpretation of imaging are all connected to nursing actions that transform pictures into safer, faster recovery.

### **Risk Anticipation and Prevention: Contrast-Associated Kidney Injury and Beyond**

Radiologic procedures pose risks to human physiology that need to be considered in advance in nursing care plans—the most important being contrast associated acute kidney injury (CA-AKI). Recent reviews indicate that ca-aki is still a clinically significant multi-factorial complication where terminology understanding and prevention strategies are constantly changing; hydration appropriate to risk and hemodynamics is still a primary method, together with active risk recognition and post-exposure monitoring (Everson et al., 2020; Li & Wang, 2024). There has been a rapid increase in literature on predicting the risk of CA-AKI without any clear single model being superior; thus, nurses have an important role in always implementing simple, high-yield measures such as baseline kidney function assessment, volume optimization, and nephrotoxin avoidance rather than relying heavily on imperfect scores (Kang et al., 2024). In practical terms, nursing protocols that help standardize pre-procedure screening (e.g., recent creatinine, diabetes/CKD history, concurrent diuretics), periprocedural hydration orders, and post-procedure urine output and creatinine monitoring can prevent unplanned escalations of care and shorten stays. Besides the kidneys, radiology-specific adverse events—from immediate contrast reactions to delayed skin injury after high-dose fluoroscopy—require surveillance knowledge: nurses should inform patients when and how to report delayed skin changes, document cumulative radiation dose on discharge instructions so that coming teams are aware of the risk (a concept being increasingly stressed in interventional radiology safety literature). The common idea behind this is that imaging exposures planned by nursing with risk consideration are a variable factor that determines recovery.

### **Communication at the Imaging Interface: Closing Loops, Centering Patients**

The movement of information has changed a lot especially due to the quick access to information through portals which are allowed under the information-blocking rules. Patients often receive the imaging results before the clinical interpretation is done which can be perceived as a lack of understanding and can also lead to anxiety. Comparative studies indicate that direct and

structured communication has better comprehension than portal-only notifications leading to a clear opportunity for nurse-mediated explanations and teach-back when results are available (Garry et al., 2020). Professional organizations have introduced frameworks for patient-facing reporting (e.g., Info-RADS) to eliminate confusion, however, the actual practice does not match the theory, and here the cooperation of radiology and nursing can set the standards for the calls made, the scripts used, and the time frames allotted for the different findings (e.g., pulmonary nodules vs. incidental aortic dilation) (Zygmunt et al., 2020; Milburn et al., 2024). Moreover, the quality-improvement literature indicates that closed-loop systems for critical and “actionable” results noticeably reduce communication failures and shorten time-to-treatment—benefits that are only accrued when nursing teams are involved in alert routing, escalation trees, and documentation (including naming the receiver and time of notification in the chart) (Kohli et al., 2022; Croft et al., 2022; Prabhakar et al., 2024). Consequently, the care plan should not simply say “await CT” but “await CT → RN to review impression and alert pathway → education + next-step orders”—thus making certain that the results consistently trigger the appropriate nursing and medical actions.

### **Workflow, Technology, and the Clock: Why Minutes Matter for Recovery**

Imaging workflow performance is an invisible lever on recovery outcomes because the delays are cascading: longer time-to-scan and report turnaround time (RTAT) lead to longer eventually in emergency department stay, to the postponement of therapeutic decisions, and to the movement of patients from same-day discharge to observation or admission. A number of quality-improvement studies point to the fact that focused process changes—mostly of the nursing kind—do diminish CT/MRI turnaround and lengthen stays (and thus prevent downstream risks like delirium and deconditioning) (McLaughlin et al., 2020; Subramaniam et al., 2024). AI-based worklists and decision support systems are becoming popular not just for their accuracy but also for their speed: the deep-learning tools that automatically identify possible pneumothorax cases and at the same time notify both the radiologists and the treating clinicians have been able to reduce the time to treatment in real-life scenarios—this is an impact that can only be seen by patients if nurses receive, acknowledge, and proceed with alerts according to the protocolized pathways (Ng et al., 2024). An algorithm forecasting prolongation in RTAT during off-hours can also be a great support for staffing and escalation rules implementation, letting nurse managers avert bottlenecks at the imaging squeeze (Kim et al., 2021). The operational lesson is: if nursing care plans incorporate very clearly imaging time objectives, contingencies for delays, and roles for handling AI-generated alerts, then the throughput gained is reflected in earlier interventions and better recovery metrics.

### **Interventional Radiology and Recovery: Access Strategy, Closure, and Same-Day Pathways**

Nursing staff are present throughout the patient's journey in the field of interventional radiology (IR), including pre-assessment, monitoring during the procedure, managing the access site, recovery, education, and follow-up. Each of these stages has an impact on the outcomes that patients go through—pain, mobility, confidence, and time at home. The strategy for access dictates the type of nursing care from the beginning. While specific data from IR are still developing, a considerable amount of cardiovascular literature until 2024 proves that the

transradial approach is less bleeding prone and sometimes leads to a shorter hospital stay compared to transfemoral access; when IR teams use radial approaches where possible, nursing protocols can prioritize early mobilization, easy access-site observation, and same-day discharge criteria (Andò et al., 2021; Moussa et al., 2024). If the femoral approach is used, then arterial closure devices (VCDs) are significant: recent studies in cardiology reveal that VCDs shorten the time-to-hemostasis and time-to-ambulation—efficiency indicators that nursing staff manage directly, which can then impact discharge eligibility (Marquis-Gravel et al., 2023). Similar observational and feasibility-based studies in radiology indicate that standardized nursing assessments and escalation criteria can allow safe and short recovery windows and same-day discharge after selected endovascular procedures (Hanna et al., 2022). The literature on IR services advocates for the establishment of day-case units with specialized nursing to facilitate pre-assessment, recovery protocols, and patient education, thus increasing throughput while maintaining safety (Sethuraman et al., 2023). The totality of the evidence supports the use of nursing-led care maps that (1) customize monitoring intensity according to access type and closure method, (2) create a uniform schedule for patient mobilization and restraint and line removal, and (3) make explicit, documented same-day discharge a standard practice.

### **Patient-Reported Outcomes and the “Recovery We Measure”**

One persistent criticism of the application of minimally invasive, image-guided techniques is that structural metrics such as technical success, complication rates, etc., overshadow the patient-centered recovery indicated by the patient's function, symptoms, and participation in roles. A thorough evaluation of literature that concerns the patient-reported outcomes (PROs) in interventional radiology shows a growing usage, though inconsistent, of validated instruments, thus, advocating for a careful integration of patient-reported outcome measures (PROMs) into the routine care and registries (Datta et al., 2023; Irvine et al., 2023). Nursing teams play a crucial role in this transition; they conduct PROMs at crucial time points, making sure that symptom scores (e.g., pain, fatigue) are influencing the processes of medication titration and activity planning, and they also take the nominated results to help set goals that are not only based on but are also respecting patient preferences. The radiology department, in general, is taking advantage of the PROMs to document the value perceived by the patient; consequently, the nursing care plans should have clear guidance for PROs documentation and the triggers for actions (e.g., if a patient reports PROMIS fatigue above the threshold, then adjust mobilization/education). The practical consequences involved in the situation are pretty clear: the standardization of the togetherness of the collection and use of the PROMs in the nursing protocols will likely lead to the transferring of the interventional and diagnostic imaging gains to better lived recovery.

### **Sedation-Dependent Imaging and Throughput: Nursing as the Throughline**

MRI under sedation or general anesthesia is a significant bottleneck in many institutions with direct implications for discharge timing. In a recent multidisciplinary improvement study radiology and clinic nursing were explicitly included in the redesign of scheduling, pre-assessment, and day-of-scan workflows; the result was a significant reduction in delays, cancellations, and smoother throughput for sedated MRI implying strong nurse-driven process control (Subramaniam et al., 2024). The use of nurse-driven sedation protocols in critical care has shown that standardization of targets and awakening trials can lead to a reduction in

ventilation time and ICU length of stay; though the same is not true for MRI, the principle applies to: consistent RN-led assessment and titration, clear safety criteria, and pre-planned escalation paths can move patients through imaging faster and safer (Morris et al., 2021). The end result for recovery is quite practical: fewer failed scans, fewer repeat anesthetics and earlier diagnostic clarity—all these together have the effect of reducing length of stay and of aligning with patient preferences for minimal disruption.

### **What “Good” Looks Like in Practice: A Nursing-Centered Imaging Playbook**

Drawing on these elements, a perfectly-functioning radiology-nursing collaboration for recovery would resemble this. Before the imaging procedure, nurses conduct standardized risk screenings (renal function, allergies, access challenges), use plain-language materials for teaching, and set the expectations concerning timelines and sensations. On the imaging day, they look after the hydration protocols for high-risk contrast studies, arrange the transport in such a way that the timing is perfect for door-to-imaging targets (especially in time-sensitive syndromes), and check the safety checklists (e.g., MRI screening, criteria for sedation). Right after the imaging procedure, they open and close the communication loops using tiered urgency frameworks that are supported by automated tools, record the named receiver and the time, and start the protocolized responses (e.g., escalating for positive findings, safety-net educating for incidentalomas). In the case of interventional episodes, they determine the level of monitoring according to access strategy and closure method, facilitate early mobilization, and apply explicit same-day discharge checklists with follow-up calls that are scheduled. They also document and integrate patient-reported outcomes into the plan-of-care updates throughout the process. When this kind of playbook is established, the literature indicates that there will be significant improvements in the areas of LOS, complications, time-to-treatment, and patient experience—each being an imaging-triggered, nursing-mediated outcome (Sauro et al., 2024; Royan et al., 2024; Marquis-Gravel et al., 2023; Ng et al., 2024; Datta et al., 2023).

### **Gaps and a Research Agenda**

There are still quite a few gaps that need to be filled in. First of all, there is a lot of evidence that ERAS-style pathways improve outcomes, but imaging steps and associated nursing actions within these pathways have not been analyzed individually in any study yet. Prospective, cluster-randomized trials that change nursing interventions linked to imaging (for instance, hydration bundles, standardized result communication scripts, and AI alert response algorithms) could help to determine the size of the effect on recovery outcomes and readmissions. Secondly, CA-AKI prediction models exist liberally but not with consensus or strong calibration; hence, implementation would be troublesome; therefore, research should go on testing the pragmatic nurse-deployable risk tools with the embedded order sets and automatic hydration protocols while benchmarking against the hard outcomes (AKI stage, LOS). Thirdly, IR studies generally report technical success and 30-day adverse events but underreport recovery metrics on the day of the procedure (time to hemostasis, ambulation, discharge eligibility) and patient-reported recovery; standardized nursing data elements and PROMs in IR registries would align endpoints with what nurses can change. Fourthly, AI-assisted prioritization and notification can shorten time to action but pose a challenge for real-world safety (false positives/negatives) and “alert fatigue” which would require thoughtful nursing-inclusive governance and fail-safe protocols to

avoid unintended delays for non-flagged urgent conditions. Finally, equity deserves explicit attention: studies show demographic disparities in transfer intervals and imaging timeliness; nursing-led navigation and communication may mitigate these, but high-quality evidence is sparse. By closing these gaps, we will guarantee that the expansion of radiologic procedures will not only be a matter of better and fairer outcomes but also of nursing care planning, which is precisely the domain of nursing care planning.

## Conclusion

Radiologic procedures have been a great help in the nursing care planning and patient recovery process. The review suggests that if imaging is integrated into nursing processes correctly, the resulting benefits include among others early detection and risk management, smooth communication, and better post-procedure outcomes. Still, there are gaps in counseling, interdisciplinary coordination, and the utilization of advanced technologies such as expanded imaging analytics and patient-reported outcome tracking. It is proposed that nurse-radiologist collaboration, patient education and the implementation of evidence-based recovery protocols can all contribute to improved outcomes in this area. Moreover, future practice will have to deal with nursing models that are patient-friendly, technology-supported, and ethically grounded, which will convert radiologic advancements into safer and more efficient recovery experiences.

## References

- Andò, G., Capodanno, D., & Tamburino, C. (2021). Radial versus femoral access for coronary interventions: An updated systematic review and meta-analysis of randomized trials. *Catheterization and Cardiovascular Interventions*, *97*(7), 1387–1403. <https://doi.org/10.1002/ccd.29461>
- Brillantino, A., Iacobellis, F., Bruscianno, L., et al. (2023). Accuracy of computed tomography in staging acute appendicitis and its impact on surgical outcome and strategy: A multi-center retrospective case-control study. *Radiologia Medica*, *128*, 415–425. <https://doi.org/10.1007/s11547-023-01619-4>
- Datta, S., Cramer, P., Sung, J., Wright, D. N., & Charalel, R. (2023). Systematic review of use of patient-reported outcomes in interventional radiology. *Journal of the American College of Radiology*, *20*(8). <https://doi.org/10.1016/j.jacr.2023.05.009>
- Everson, M., Sukcharoen, K., & Milner, Q. (2020). Contrast-associated acute kidney injury. *BJA Education*, *20*(12), 417–423. <https://doi.org/10.1016/j.bjae.2020.07.005>
- Garry, K., Blecker, S., Saag, H., Szerencsy, A., Jones, S. A., Testa, P., & Kang, S. K. (2020). Patient experience with notification of radiology results: A comparison of direct communication and patient portal use. *Journal of the American College of Radiology*, *17*(9), 1130–1138. <https://doi.org/10.1016/j.jacr.2020.01.046>
- Gutzeit, A., Sartoretto, E., Reisinger, C., et al. (2021). Direct communication between radiologists and patients improves the quality of imaging reports. *European Radiology*, *31*, 8725–8732. <https://doi.org/10.1007/s00330-021-07933-7>
- Hanna, J., Harris, R. A., & Fraser, B. (2022). Safety of short 3-hour recovery and same-day discharge following lower-limb angioplasty. *Clinical Radiology*, *77*(12), 993.e1–993.e7. <https://doi.org/10.1016/j.crad.2022.08.009>
- Irvine, I., Hayden, R., Greene, L., & Ryan, A. G. (2023). An update on patient-reported outcomes in interventional radiology: The future measure of our success. *CardioVascular and Interventional Radiology*, *46*, 1602–1606. <https://doi.org/10.1007/s00270-023-03530-x>
- Kang, S., Lim, A., & Ng, Y.-Y. (2024). Predicting contrast-associated acute kidney injury: A systematic review and meta-analysis of risk-prediction models. *JAMA Network Open*, *7*(5), e249384.

- Kim, D., Choi, J.-W., Kim, H., & Park, S.-H. (2021). Algorithmic prediction of delayed radiology turnaround time during non-business hours. *Academic Radiology*, 28(12), 1764–1772. <https://doi.org/10.1016/j.acra.2021.07.007>
- Li, Y., & Wang, J. (2024). Contrast-induced acute kidney injury: Definition, pathogenesis, risk factors, prevention and treatment. *BMC Nephrology*, 25, 140. <https://doi.org/10.1186/s12882-024-03570-6>
- Marquis-Gravel, G., Boivin-Proulx, L.-A., Huang, Z., Zelenkofske, S. L., Lincoff, A. M., Mehran, R., Steg, P. G., Bode, C., Alexander, J. H., & Povsic, T. J. (2023). Femoral vascular closure devices and bleeding, hemostasis, and ambulation following percutaneous coronary intervention. *Journal of the American Heart Association*, 12(1), e025666. <https://doi.org/10.1161/JAHA.122.025666>
- McLaughlin, P. D., Setser, R., Polansky, M., et al. (2020). Decreasing CT acquisition time in the emergency department through Lean Six Sigma methods. *Radiographics*, 40(6), 1634–1648. <https://doi.org/10.1148/rg.2021200107>
- Milburn, J., Thrall, J. H., & Glazer, D. I. (2024). Classification and communication of critical findings in emergency radiology. *Journal of the American College of Radiology*, 21(8), 1127–1137. <https://doi.org/10.1016/j.jacr.2024.05.011>
- Morris, L., O’Shaughnessy, J., & Botros, M. (2021). Favorable outcomes after implementing a nurse-driven sedation protocol. *Critical Care Nurse*, 41(6), 29–40. <https://doi.org/10.4037/ccn2021625>
- Moussa, I., Rymer, J., Cohen, D. J., et al. (2024). Complications of radial vs femoral access for coronary angiography and PCI. *The American Journal of Medicine*, 137(10), 913–920. <https://doi.org/10.1016/j.amjmed.2024.05.010>
- Ng, P., Tham, I., Foo, X., & Tan, C. (2024). Impact of deep learning-based computer-aided detection combined with electronic notification on time to treatment for pneumothorax. *Journal of the American College of Radiology*, 21(12), 1752–1761. <https://doi.org/10.1016/j.jacr.2024.08.019>
- Royan, R., Stamm, B., Giurcanu, M., et al. (2024). Emergency department process times and door-in-door-out times in interhospital transfers after acute ischemic stroke. *JAMA Network Open*, 7(9), e2431494.
- Sauro, K. M., Smith, C., Ibadin, S., et al. (2024). Enhanced Recovery After Surgery guidelines and hospital length of stay, readmission, complications, and mortality: A meta-analysis of randomized clinical trials. *JAMA Network Open*, 7(6), e2417310. <https://doi.org/10.1001/jamanetworkopen.2024.17310>
- Sethuraman, K., Everett, R., & Plumb, A. (2023). Developing day-case interventional radiology units: Imperative for optimal service delivery. *Clinical Radiology*, 78(4), 279–286. <https://doi.org/10.1016/j.crad.2022.12.005>
- Subramaniam, R., Goh, Y. E., Fong, L., et al. (2024). Reducing delays in MRIs under sedation and general anesthesia using improvement methods. *Journal of the American College of Radiology*, 21(7), 1017–1025. <https://doi.org/10.1016/j.jacr.2024.04.027>
- Zygmunt, M. E., Morin, R. L., Yucel, E. K., et al. (2020). Info-RADS: Adding a message for patients in radiology reports. *Journal of the American College of Radiology*, 17(12), 1675–1682. <https://doi.org/10.1016/j.jacr.2020.09.010>