The Role of Nursing, Radiology, and Dental Assistant Technicians in Enhancing Patient Safety, Quality of Care, and Diagnostic Imaging Efficiency: A Comprehensive Review

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Abstract
Background: Diagnostic imaging involves a chain of clinical decisions, preparation, transport, image acquisition, interpretation, and follow-up. Nursing and radiology professionals intersect at multiple points in this pathway, yet responsibility is often fragmented. Objective: To critically synthesize literature available through 29 September 2025 on how nursing–radiology collaboration may influence patient safety, quality of care, and imaging efficiency. Methods: This comprehensive, evidence-informed narrative review draws on identified peer-reviewed studies, multidisciplinary consensus statements, and professional safety guidance. A transparent search framework is described; however, a fully reproducible systematic database search and formal screening log were not performed, and no pooled effect estimate is claimed. Results: The most defensible mechanisms involve accurate handovers, appropriate contrast-risk assessment, coordinated patient preparation, reliable escalation of deterioration, and closed-loop communication of actionable findings. Professional guidance provides comparatively strong support for these processes; direct causal evidence specific to nursing–radiology dyads is more limited. Workflow benefits are plausible but context-dependent and should be evaluated using balancing measures to avoid trading safety for speed. Conclusion: A shared governance model with explicit role allocation, standardized safety checkpoints, and auditable outcome indicators offers a credible route to safer and more reliable imaging services. Prospective multisite evaluation remains a priority. Dental assistant technicians also contribute at dental-imaging interfaces through patient preparation, infection prevention, positioning assistance, and communication of relevant oral-health information within their authorized scope. This expanded review includes dental radiography as a related but distinct imaging pathway; proposed benefits require direct evaluation.

Keywords: Interprofessional collaboration; nursing; diagnostic radiology; patient safety; contrast media; imaging workflow; handover; quality improvement; communication; radiology efficiency. dental assistant technicians; dental radiography; panoramic imaging; cone-beam computed tomography; infection prevention.

INTRODUCTION

Diagnostic imaging is frequently represented as a technical service, but its clinical performance depends on a distributed set of actions extending far beyond scanner operation. The correct

examination must be requested for the correct patient; the patient must be prepared and clinically stable; contrast and other medications must be assessed; images must be acquired at diagnostic quality; and clinically important findings must reach a responsible clinician in time to change management. Each transition creates an opportunity for omission, duplication, delay, or error. The World Health Organization (WHO, 2021) frames preventable harm as a systems problem rather than merely an individual lapse, an approach especially relevant to imaging pathways spanning multiple departments.

Nurses occupy a distinctive position in this system. Ward, emergency, intensive-care, procedural, and radiology nurses frequently know the patient's physiological status, allergies, vascular access, medications, functional limitations, and communication needs. Radiologists, radiographers/technologists, and radiology nurses bring complementary expertise in protocol selection, radiation and magnetic-resonance safety, contrast administration, procedural readiness, and image quality. Collaboration is therefore not a discretionary courtesy: it is the mechanism through which otherwise separate pieces of clinical information can be assembled into a safe imaging encounter (WHO, 2007; ACR, 2024).

At the same time, collaboration should not be presumed to improve every outcome automatically. A Cochrane review of practice-based interprofessional interventions found a heterogeneous and relatively limited evidence base, restricting confidence in universal effects (Reeves et al., 2017). Studies from surgery and general hospital care can illuminate mechanisms, but results from those settings cannot simply be transferred to diagnostic imaging. This review consequently distinguishes normative guidance, evidence from adjacent specialties, and direct imaging-specific evidence, avoiding the common error of equating professional consensus with demonstrated causal benefit.

The present review addresses three interdependent dimensions: safety, including prevention and recognition of harm; quality, including patient-centeredness, appropriateness, timeliness, and continuity; and operational efficiency, including the proportion of imaging capacity devoted to completed, clinically useful examinations. The central argument is that well-designed interdisciplinary coordination may improve all three, whereas poorly designed attempts to accelerate throughput can compromise safety, communication, and equity.

An additional motivation is the increasing complexity of diagnostic imaging. Patients undergoing computed tomography (CT), magnetic resonance imaging (MRI), ultrasonography, fluoroscopy, and image-guided procedures often have multiple comorbidities, devices, communication barriers, or physiological vulnerabilities. Appropriate pathways vary by modality and clinical urgency; a single generic checklist cannot replace modality-specific assessment. The value of collaboration lies in ensuring that the right information reaches the right professional at the right decision point.

Background and Context

The WHO patient-safety solutions specifically identify patient identification and communication during handovers as recurrent hazards that require standardized processes (WHO, 2007). Imaging departments are particularly exposed because patients may arrive from wards, outpatient clinics, emergency departments, operating theatres, and intensive-care units. During transfer, monitoring arrangements, oxygen requirements, isolation precautions, fasting status, pregnancy considerations, and lines or drains may not be visible in the imaging order. A well-structured transfer of responsibility therefore needs more than confirmation that the patient has physically arrived.

Contrast-media governance illustrates the need for role clarity. The American College of Radiology (ACR) Manual on Contrast Media offers modality- and agent-specific guidance for patient selection, preparation, administration, and response to reactions (ACR, 2024). The ACR–National Kidney Foundation consensus statements caution that the causal renal risk of modern intravenous iodinated contrast has historically been overstated and that clinically indicated imaging should not be withheld reflexively (Davenport et al., 2020). Nurses can identify relevant history and communicate changes in status, but prescribing, risk-benefit determination, and treatment decisions remain governed by professional scope and institutional policy.

Quality can be examined using Donabedian's structure–process–outcome framework. Structures include staffing, equipment, electronic records, and leadership; processes include patient verification, pre-scan screening, handover, and escalation; outcomes include preventable adverse events, timely diagnoses, patient experience, and avoidable repeat examinations (Donabedian, 1988). This distinction is important: a high checklist-completion rate is evidence of process adherence, not by itself proof of fewer patient injuries.

Radiation protection adds a second layer of shared responsibility. WHO guidance emphasizes justification of medical exposure and optimization of dose while preserving adequate diagnostic information (WHO, 2014). Nurses can contribute by identifying pregnancy possibility when relevant, facilitating suitable alternatives, preventing duplicate requests, and communicating patient characteristics that affect positioning or cooperation. Radiologists and imaging practitioners retain specialist responsibility for modality selection, technical parameters, and radiation protection decisions.

Finally, the imaging pathway has a diagnostic afterlife. A completed examination is not a completed episode of care until the report is available, important findings are acknowledged, and appropriate action is taken. The ACR communication practice parameter emphasizes timely conveyance of diagnostic information and reciprocal responsibilities among imaging and referring teams (ACR, 2024b). Nursing–radiology coordination is therefore relevant before, during, and after image acquisition.

Objectives

The primary objective is to evaluate the mechanisms through which nursing–radiology collaboration may influence preventable harm, care quality, and diagnostic imaging performance, using a critical synthesis of verifiable sources published no later than 31 December 2025.

Specific objectives are to: (1) characterize high-risk interfaces and responsibility transfers; (2) examine collaborative controls for patient identity, contrast safety, clinical deterioration, infection prevention, and modality-specific screening; (3) assess potential effects on patient preparation, waiting, cancellations, repeat imaging, and communication of results; (4) distinguish empirical evidence from recommendations and extrapolation; (5) identify implementation barriers and equity considerations; and (6) propose a practical measurement framework for future evaluation.

The overarching review question is: Across diagnostic imaging pathways, what is known about the relationship between coordinated nursing–radiology processes and patient safety, patient-centered quality, and operational efficiency, and where does the evidence remain insufficient?

LITERATURE REVIEW

Interprofessional teamwork and shared accountability

Collaboration is most useful when it changes observable work rather than merely professional attitudes. Reeves et al. (2017) evaluated practice-based interprofessional interventions and found that study designs, interventions, and outcomes varied substantially. This supports cautious implementation of local interventions with measurement rather than an assumption that all team-training programmes will produce equivalent gains. In imaging, shared accountability should be translated into named owners for preparation, clinical handover, screening, contrast decisions, observation, result communication, and discharge or return transfer.

Teamwork should be defined by explicit information exchanges and decision rights. A nurse may identify deteriorating oxygenation; the radiology team determines whether acquisition can proceed safely; the treating clinician participates in decisions about urgency and alternative pathways. A reliable system creates escalation thresholds and a documented response, while preserving the authority of each professional within scope. Ambiguous responsibility is a latent hazard even when individual practitioners are competent.

Patient identification and pre-imaging verification

Wrong-patient and wrong-procedure events are preventable but cannot be controlled by a single electronic identifier alone. WHO patient-safety solutions advocate robust patient identification, particularly at care transitions (WHO, 2007). A practical imaging process checks at least two approved identifiers against the request, confirms the intended examination and body region, and reconciles discrepancies before scanning. Identification must be adapted for patients unable to speak, those with language barriers, and emergency situations.

Nursing–radiology collaboration contributes through independent confirmation and a shared stop-the-line culture. The sending nurse confirms clinical identity and transport documentation; the receiving team rechecks identity and the requested examination. This redundancy is purposeful rather than wasteful because errors originating upstream can otherwise become embedded in subsequent electronic workflow steps. However, the specific effectiveness of a nursing–radiology double-check requires prospective measurement rather than unsupported numerical claims.

Contrast-media risk assessment and response

Contrast-related decisions require careful separation of risk screening from clinical authorization. The ESUR Contrast Media Safety Committee provides evidence-informed guidance on post-contrast acute kidney injury and its prevention (van der Molen et al., 2018a, 2018b). The ACR–NKF consensus emphasizes that contrast-associated and contrast-induced kidney injury are not interchangeable terms and that blanket avoidance of contrast can itself delay diagnosis (Davenport et al., 2020). Nursing documentation can support appropriate review of prior reactions, acute illness, medication context, renal function when indicated, and venous access.

For patients receiving gadolinium-based agents, the ACR–NKF consensus reports very low nephrogenic systemic fibrosis risk with group II agents even in advanced kidney disease, while emphasizing individualized clinical decisions (Weinreb et al., 2021). A collaborative pathway should therefore avoid both indiscriminate screening and under-recognition of genuinely high-risk patients. Training must reflect the specific agent, route, modality, clinical indication, and current institutional protocol.

Anaphylaxis-like reactions and extravasation require rapid recognition and predefined emergency response. A radiology nurse or appropriately trained team member may administer

treatments under standing orders or direct medical supervision according to local policy. The bedside nurse's role may include communicating past events, ensuring safe transfer, and monitoring after return. Simulation of reaction recognition and escalation is reasonable, but claims about reduction in adverse events should be reserved for programmes with outcome data.

Radiation, MRI, and procedural safety

Radiation protection rests on justification and optimization, not simply minimizing all imaging. The WHO notes that clinically unjustified imaging can expose patients without net benefit, whereas underuse can also cause diagnostic harm (WHO, 2014). Nurses can flag duplicated requests, pregnancy-related questions, or clinical changes that alter the indication, while radiologists and imaging practitioners evaluate the appropriate modality and acquisition strategy.

MRI adds a different hazard profile: ferromagnetic objects, incompatible implants, and equipment can create serious risks in the magnetic environment. Screening should be repeated at the point of care by trained imaging personnel; ward documentation can inform but must not substitute for modality-specific verification. For sedated, critically ill, or pediatric patients, monitoring capability, emergency access, and escort arrangements should be agreed before transport.

Image-guided procedures further require a procedural safety pause, consent verification, medication review, infection prevention, and post-procedure observation. The surgical checklist literature offers an important analogy: Haynes et al. (2009) found improved outcomes after checklist introduction in a multicountry surgical setting. These results are not radiology-specific and should be cited as proof of concept for structured team coordination, not as a predicted effect size for imaging.

Communication, handover, and diagnostic follow-up

Communication failures may arise at the interface between ordering, transport, scanning, interpretation, and clinical response. WHO handover guidance recommends systematic communication of relevant information and opportunity for clarification (WHO, 2007). A structured imaging handover should include clinical indication, urgency, current observations, respiratory support, lines and devices, isolation status, capacity to cooperate, mobility, and immediate safety concerns. The content should be proportional to risk rather than an indiscriminate checklist.

After interpretation, actionable findings require closed-loop communication. The ACR practice parameter highlights timely communication to the responsible clinician and systems that support receipt and action (ACR, 2024b). Nurses may facilitate follow-up, particularly where they coordinate discharge or inpatient transitions, but should not be made the sole default recipient for findings requiring medical decisions. A reliable system documents who was contacted, when, and whether escalation occurred.

Patient-centered care and vulnerable populations

Imaging can be physically uncomfortable and psychologically distressing. Patients may experience claustrophobia, pain during positioning, fear of results, or uncertainty about contrast. Nursing and radiology staff can coordinate explanation, interpretation services, comfort measures, and support for informed participation. Patient-centeredness should be assessed through accessible information and respect for preferences, not inferred from throughput or staff satisfaction alone.

Vulnerability is not confined to intensive care. Patients with dementia, sensory impairment, limited health literacy, language differences, pregnancy-related concerns, or mobility restrictions face distinct hazards. A high-quality pathway anticipates these needs before the appointment, allocates appropriate escorts or assistance, and documents adaptations. Standardization should establish minimum safety expectations while allowing individualized care.

Imaging efficiency and system-level trade-offs

Operational efficiency is better defined as reliable completion of clinically appropriate examinations than as scanner utilization alone. A seemingly efficient department may achieve high throughput while accumulating late starts, preventable cancellations, incomplete preparations, and uncommunicated findings. Collaborative pre-appointment screening, transport coordination, and real-time prioritization may reduce rework, but each intervention must be tested against local bottlenecks and patient complexity.

For example, a pre-scan readiness check may increase preparation time but prevent a cancelled examination after a patient has already been transported. Conversely, adding unnecessary approval steps can delay urgent imaging. Meaningful evaluation should therefore include safety outcomes, time from order to completed clinically useful report, first-attempt completion, and balancing measures such as staff workload and delays for high-acuity patients.

Organizational barriers, training, and implementation

Common barriers include professional hierarchy, inconsistent staffing, incompatible information systems, fragmented documentation, unclear escalation authority, and separate departmental performance targets. Education alone cannot overcome structural constraints. Donabedian's framework suggests that improvement programmes must address structures as well as frontline processes (Donabedian, 1988).

Implementation can begin with a joint hazard analysis of a selected high-risk pathway, followed by agreed responsibilities, small-cycle testing, and audit-feedback. Simulation is particularly relevant to rare high-consequence events such as contrast reactions or unstable-patient transport. Leaders should monitor unintended consequences, including alert fatigue, excessive screening, reduced access for vulnerable patients, and the transfer of undocumented work onto nursing staff.

Dental assistant technicians: scope and imaging safety

Dental assistant technicians can support safe dental-imaging pathways by confirming patient identification against the request, obtaining and communicating relevant history, explaining procedural steps, facilitating positioning and patient cooperation, and applying standard infection-prevention precautions to intraoral receptors, positioning devices, and high-touch surfaces. Dental radiographs, panoramic examinations, and cone-beam computed tomography (CBCT) have different indications and dose considerations. Decisions on imaging justification, exposure parameters, image interpretation, and clinical diagnosis remain with appropriately authorized dental and imaging professionals. Local licensing rules, training, supervision, and institutional policies determine whether a dental assistant may perform any specific radiographic task. These contributions are proposed coordination mechanisms, not evidence that a particular staffing model independently reduces adverse events.

METHODOLOGY

Design. This manuscript is a comprehensive, evidence-informed narrative review with critical thematic synthesis. It is not presented as a completed systematic review, scoping review, or meta-analysis. The review was prepared around an explicit conceptual question and a set of independently traceable landmark sources. Because a reproducible database-by-database search export, deduplication log, full-text screening record, and formal appraisal dataset were not generated, numerical study-selection claims would be misleading and are intentionally omitted.
Search framework and sources. The evidence-identification framework included PubMed/MEDLINE, the Cochrane Library, professional guidance from WHO, ACR, and ESUR, and journal publisher records. The proposed search string for a future reproducible update is: (nurs* OR nursing) AND (radiolog* OR diagnostic imaging OR computed tomography OR magnetic resonance imaging OR interventional radiology) AND (collaboration OR interprofessional OR handover OR communication OR patient safety OR workflow OR efficiency). Complementary concept searches would cover contrast safety, critical-result communication, radiation protection, and patient identification. CINAHL, Scopus, and Web of Science should be searched formally before any submission describing exhaustive database coverage.
Eligibility and evidence hierarchy. Sources were considered relevant if published by 31 December 2025 and directly addressed imaging-related safety processes, cross-professional coordination, healthcare quality, or applicable patient-safety theory. Peer-reviewed original studies and systematic reviews were prioritized for effectiveness claims; multidisciplinary consensus statements and professional guidelines were used for practice recommendations; adjacent-setting evidence was clearly identified as indirect. Later updates to continuously revised websites were not treated as 2025 evidence unless a dated earlier version could be established.
Synthesis approach. Findings were organized across seven interfaces: identification, readiness and transport, contrast safety, modality-specific hazards, patient experience, reporting and follow-up, and operational performance. Claims were interpreted according to evidence type. Guidelines were not assigned invented quality scores, and no pooled risk ratio, event rate, or percentage improvement was calculated. Proposed performance measures are implementation recommendations rather than findings from a new patient cohort.
Limitations and reproducibility. The absence of an auditable comprehensive search and independent duplicate screening creates selection bias risk; the review may omit relevant nursing-specific observational or qualitative studies. Heterogeneity across settings limits transferability. Many cited sources are authoritative but do not directly test nursing–radiology collaboration as an isolated intervention. These limitations constrain causal inference and should be resolved by a preregistered review protocol or a prospective implementation study before stronger effectiveness claims are made.
Ethics. No patient-level data were collected, and no human participants were recruited for this review. No ethics approval number, funding source, or author declaration has been invented. Such disclosures must be completed by the actual authors before submission.

Table 1: Comparative Analysis of Nursing–Radiology Collaboration Approaches and Their Potential Effects

Collaboration approach	Safety mechanism	Quality / efficiency mechanism	Evidence interpretation

Structured handover	Transfers acuity, devices, isolation, and monitoring needs	May reduce unprepared arrivals and unsafe transfers	WHO guidance; direct effect needs local testing
Joint contrast-risk pathway	Recognizes prior reactions and relevant kidney-risk context	Avoids both inappropriate withholding and unsafe administration	ACR–NKF / ESUR consensus
Pre-examination readiness review	Checks identity, preparation, and modality hazards	May reduce avoidable cancellations and rework	Plausible process mechanism; no pooled effect
Closed-loop critical findings	Documents recipient and escalation of actionable reports	Supports timely downstream clinical response	ACR communication guidance
Joint simulation and escalation	Clarifies roles during deterioration or contrast reactions	May shorten response coordination	Implementation proposal; prospective evaluation needed

Integrated dental-imaging workflow and measurable outcomes

A practical three-profession pathway can begin with verification of the requested dental examination and patient identity, followed by clinical screening and infection-control preparation, coordinated positioning and acquisition by authorized personnel, and documented escalation of incidental or urgent concerns to the responsible clinician. For complex patients, nurses can contribute information on mobility, physiological stability, medicines, and communication needs; dental assistant technicians can contribute dental-procedure readiness and oral-health workflow information; imaging professionals retain modality-specific safety responsibilities. Potential audit indicators include first-attempt diagnostic image completion, avoidable retakes, identification discrepancies, infection-control compliance, documented scope-of-practice adherence, patient-reported understanding, and time to communication of actionable findings. These are proposed indicators and should not be presented as observed results.

RESULTS

Overview of synthesized evidence. The identified literature supports the importance of safe handovers, risk-sensitive contrast protocols, patient identification, radiation protection, and timely diagnostic communication. However, it does not justify a single numerical estimate of the effect of nursing–radiology collaboration on mortality, adverse events, or scanner productivity. The strongest conclusions are therefore about process design and plausible causal pathways; the weakest are claims of universal improvement in patient-level outcomes.

Patient safety: identity and transition controls. WHO patient-safety solutions identify patient identity and handover communication as cross-setting safety priorities (WHO, 2007). In imaging, these controls operate at several boundaries: referral to scheduling, ward to transport,

transport to scanning, and scanning back to the treating team. A shared verification process is especially relevant for patients unable to confirm their identity or clinical history. The expected benefit is reduced opportunity for mismatch; the magnitude of risk reduction in imaging requires direct study.

Patient safety: contrast and renal assessment. Contemporary consensus documents favor individualized assessment over blanket restrictions. Davenport et al. (2020) distinguish kidney injury temporally associated with contrast from injury caused by contrast and warn that unnecessary avoidance can delay necessary diagnosis. ESUR guidance likewise details risk stratification and prophylactic measures (van der Molen et al., 2018a, 2018b). The collaborative implication is a defined process for capturing accurate history and timely escalation of abnormal findings, rather than indiscriminate cancellation.

Patient safety: rare high-consequence events. Contrast reactions, unstable transport, and MRI screening failures are infrequent enough that individual departments may lack statistical power to show a rapid decline in event counts. Process audits, simulation performance, response-time measures, and case review are useful complements to outcome surveillance. Yet these surrogate indicators should never be described as equivalent to prevented harm.

Quality of care: patient experience and continuity. The evidence-informed model suggests that patients benefit when staff agree on the plan and communicate it consistently. Anxiety, mobility restrictions, communication barriers, and the need for interpretation services can be identified before transfer. Care quality also includes dignity and continuity after imaging: patients should know what happens next, and the treating team should receive clinically important information without avoidable delay.

Diagnostic efficiency: first-attempt completion. A joint readiness review can identify missing laboratory context when indicated, unavailable venous access, unaddressed pain, incompatible equipment, or lack of an appropriate escort. Addressing these issues before scanner arrival may prevent repeat scheduling or interruption. Nonetheless, screening itself consumes time and resources. Whether net throughput improves depends on the prevalence of preventable failures, staffing, patient mix, and how the check is embedded into existing workflows.

Diagnostic efficiency: downstream closure. A report delivered quickly but not acted upon is a failure of the wider diagnostic pathway. ACR guidance describes timely diagnostic communication as a reciprocal system responsibility (ACR, 2024b). For evaluation, turnaround time should be paired with acknowledgment of urgent findings and documented clinical action where feasible. Narrow metrics can conceal unresolved risk at the next interface.

Implementation: barriers and enabling conditions. A shared protocol is unlikely to succeed if no one owns its maintenance or if documentation systems force duplicate entry. Effective implementation requires executive sponsorship, nursing and radiology co-leadership, multidisciplinary training, and feedback from patients and transport personnel. Staffing and information-system constraints should be addressed explicitly, with attention to how the intervention affects the busiest clinical periods.

Equity and balancing outcomes. Processes designed around a typical communicative adult may disadvantage children, patients with disabilities, those requiring interpreters, and unstable patients. A useful dashboard should therefore stratify delays and cancellations by clinically relevant factors when lawful and feasible, while tracking balancing measures such as added nursing workload, emergency-imaging delays, and unnecessary contrast avoidance.

Table 2: Common Diagnostic Imaging Safety Risks and Coordinated Nursing–Radiology Responses

Risk / failure mode	Nursing contribution	Radiology contribution	Suggested measure
Wrong patient / wrong study	Verify identifiers and reconcile order with bedside context	Independent verification at acquisition	Identification discrepancies / 1,000 exams
Incomplete clinical handover	Communicate acuity, oxygen, devices, precautions	Confirm monitoring and acceptance readiness	Documented complete high-risk handovers
Contrast-related reaction	Document history; recognize and escalate symptoms	Agent-specific assessment; response protocol	Reaction response review / drills
Inappropriate renal-risk handling	Provide relevant renal and illness context	Apply current contrast-risk guidance	Avoidable contrast-related cancellations
MRI equipment / implant hazard	Communicate implants, devices, and escort needs	Perform definitive MRI safety screening	Screening near misses
Patient movement / falls	Assess mobility, pain, and transfer support	Arrange safe positioning and equipment	Transfer-related incidents
Unacknowledged critical result	Coordinate with responsible clinical team	Escalate and document urgent report communication	Time to confirmed acknowledgment



Figure 1: Conceptual relationship between shared structures, coordinated processes, and patient outcomes. This is an author-developed model, not a frequency chart or pooled effect estimate.

DISCUSSION

The synthesis suggests that nursing–radiology collaboration is best understood as a safety-critical interface rather than an isolated educational intervention. Each professional group holds information that may be incomplete in the other group's documentation. The clinically important question is whether that information reaches a decision-maker before an irreversible

or costly action occurs. Thus, coordination is most likely to add value at points of high uncertainty: an unstable patient awaiting transport, a questionable contrast history, a complex implant, an incomplete procedural preparation, or a critical finding requiring escalation.

This interpretation is consistent with the WHO's system-oriented patient-safety agenda and with Donabedian's distinction between structural capacity, process reliability, and outcomes (WHO, 2021; Donabedian, 1988). However, it also explains why checklist adoption alone may be disappointing. A form can be completed without meaningful transfer of responsibility; a warning can be documented without reaching an empowered clinician; and an apparently efficient scan can still produce delayed diagnosis if results are not acted upon. Evaluation should therefore privilege completion of the clinical loop rather than documentation volume.

The contrast-media literature offers a useful example of the tension between safety and access. Overly conservative screening can create avoidable delay and harm, while inadequate screening can expose susceptible patients to preventable complications. The ACR–NKF statements and ESUR guidance advocate more nuanced clinical decisions (Davenport et al., 2020; van der Molen et al., 2018a, 2018b). Nurses should not be tasked with making unsupported independent decisions about contrast use; rather, they should provide reliable clinical context and activate timely radiologist or prescriber review. This is a more defensible allocation of responsibility than either professional isolation or indiscriminate task shifting.

Likewise, the relationship between imaging speed and quality is not linear. Reducing scanner idle time may be desirable, but if it requires transporting unstable patients before adequate preparation, efficiency gains become false economies. Conversely, a short pre-transport huddle may improve both safety and flow by preventing an aborted study. A quality-improvement programme should therefore define the numerator and denominator of each metric, assess case-mix changes, and include balancing indicators. Time from request to scan is useful but incomplete; time to an actionable report and time to acknowledgment may better capture clinical value.

The literature on interprofessional interventions cautions against overconfidence. Reeves et al. (2017) found a limited heterogeneous evidence base, so a claim that collaboration reliably reduces adverse events by a particular percentage would be unjustified. Surgical checklist evidence is encouraging but indirect (Haynes et al., 2009). Future imaging research should evaluate specific interventions with clear comparators, measure fidelity and contextual factors, and distinguish intervention effects from simultaneous changes in staffing, information systems, or patient complexity.

A feasible implementation strategy begins with selection of one pathway rather than a hospital-wide launch. For example, a CT service could focus on transfers of high-acuity patients. Nursing and radiology leaders would map current failures, define a concise handover standard, establish escalation authority, train staff, and run repeated small tests of change. Baseline and follow-up data could include handover completeness, scan cancellation reasons, unplanned clinical deterioration during transport, time to completed imaging, and staff workload. Interrupted time-series or stepped-wedge designs may provide stronger evidence than an uncontrolled before-and-after comparison.

A second implementation pathway concerns urgent-result closure. Radiology should specify which findings require direct communication and the expected time frame; the clinical service should identify a reachable accountable recipient; and escalation should be automatic when contact fails. Nursing may support the operational chain without replacing the prescribing

clinician's responsibility. Audit should distinguish report availability, communication attempt, confirmed acknowledgment, and documented action. These are related but nonidentical steps. Education must be role-specific. Ward nurses may need to recognize contraindication flags and transport risks; radiology nurses may need advanced response skills for contrast or sedation events; radiographers need robust modality-specific screening and escalation protocols; and radiologists need reliable access to clinical context. Interdisciplinary simulation can reveal role ambiguity, especially when a patient deteriorates in a remote imaging suite. Educational outcomes should be assessed through observed behavior and scenario performance, not satisfaction surveys alone.

Patient participation is a further safeguard. Clear explanations, language access, opportunities to disclose prior reactions or implanted devices, and respectful responses to concerns can uncover information not recorded elsewhere. Yet patients should not bear responsibility for correcting systemic errors. The institution remains accountable for a reliable pathway, particularly for people who cannot communicate independently.

Digital integration may reduce transcription and handover burden if designed carefully. Structured electronic fields can transmit oxygen requirements, isolation precautions, implant details, and recent clinical observations. However, excessive mandatory fields may generate inaccurate completion and alert fatigue. A useful design principle is to make high-risk information visible at the decision point, with clear ownership for updates and escalation. Technology should support—not substitute for—verbal discussion when clinical uncertainty or urgency is high.

The proposed conceptual framework in Figure 1 links shared structures to coordinated processes and then to measurable outcomes. This model should be treated as a testable hypothesis. Stronger evidence would require multicenter prospective studies with standardized definitions of near misses, adverse events, repeat imaging, turnaround, patient-reported experience, and resource use. Subgroup analysis should consider emergency versus elective care, CT versus MRI versus image-guided procedures, and different staffing models.

This review has important limitations. It is not based on a documented exhaustive search across all bibliographic databases, does not include a formal risk-of-bias appraisal for every potential study, and cannot estimate intervention effect sizes. Some recommendations derive from authoritative professional standards rather than comparative trials, and some analogies are drawn from non-imaging settings. These limitations do not invalidate practical safety guidance, but they require modest conclusions about effectiveness and careful wording in any journal submission.

Implications for dental assistant training and research

Implementation should include role-specific competency assessment in patient identification, infection prevention, communication, positioning support, recognition of concerns requiring escalation, and radiation-safety principles. Dental assistants should not independently justify imaging or interpret radiographs unless separately credentialed and legally authorized. Future studies should compare clearly specified team models across dental clinics and hospital-based maxillofacial imaging services, with baseline case mix, image-retake rates, patient experience, and workload measured prospectively. General nursing–radiology evidence cannot be assumed to establish dental-assistant effectiveness without direct research.

CONCLUSION

Nursing–radiology collaboration offers a coherent organizational approach to the risks created by fragmented imaging pathways. Its principal value lies in ensuring that patient identity, clinical readiness, contrast-related concerns, modality-specific hazards, deterioration, and actionable results are communicated to the appropriate professional at the appropriate time. The available evidence supports the importance of these safety processes, but direct quantitative proof that a particular collaboration model improves all clinical and operational outcomes remains incomplete.

Healthcare organizations should establish shared governance, explicit professional responsibilities, risk-sensitive handover and screening processes, closed-loop escalation, and measurement systems that capture both benefit and burden. The priority for future research is not merely to demonstrate improved teamwork scores, but to test whether defined collaborative processes reduce preventable harm, improve patient experience, and increase completion of clinically useful imaging without introducing new delays or inequities.

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Editorial note: Author names, institutional affiliations, journal-specific declarations, and the exact 2025 edition status of continuously updated professional resources should be verified by the submitting authors. This manuscript is an evidence-informed narrative review; it does not claim an exhaustive systematic search or new empirical data.