



The Role of Pharmacy in Preparing Patients for Optical and Radiology Diagnostics. A New Appraisal.

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Abstract

Pharmacists are increasingly recognized for their critical role in preparing patients for diagnostic procedures in optical and radiology settings. This role extends beyond medication dispensing, involving comprehensive patient education, medication management, and safety precautions that support accurate and effective diagnostic outcomes. Pharmacists contribute by managing pre-procedure medications, educating patients on the effects and risks of contrast agents in radiology, and advising on ocular preparations for optical exams. Their interventions can minimize potential drug interactions, prevent allergic reactions, and provide guidance on managing chronic conditions like diabetes, which can impact diagnostic clarity. By collaborating with radiologists, optical technicians, and other healthcare providers, pharmacists enhance patient safety, improve diagnostic accuracy, and foster a multidisciplinary approach to patient-centered care. This article reviews the multifaceted roles and responsibilities of pharmacists in preparing patients for these diagnostic procedures, emphasizing their contributions to improved healthcare outcomes and patient experiences.

Keywords: Pharmacy, Radiology Diagnostics, Optical Diagnostics, Patient Preparation, Contrast Agents, Medication Management, Diagnostic Accuracy, Interdisciplinary Collaboration

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1. Introduction

In modern healthcare, diagnostic procedures are essential for accurate assessment, diagnosis, and treatment planning for a wide range of medical conditions. Optical diagnostics, such as eye exams and imaging, and radiology diagnostics, including X-rays, MRIs, and CT scans, are critical tools in patient care. To ensure these procedures are effective and safe, interdisciplinary collaboration is necessary. Pharmacists, traditionally seen as medication dispensers, now play an expanded role in preparing patients for these diagnostic tests. This preparation includes managing medications, educating patients, and collaborating closely with radiologists, optical technicians, and other healthcare providers.

Pharmacists' expertise in pharmacology positions them uniquely to manage pre-procedure medications and advise on potential drug interactions that could impact diagnostic outcomes. For instance, some medications can interfere with imaging clarity, while others, such as contrast agents used in radiology,

require specific protocols to avoid adverse reactions. Additionally, patients undergoing optical exams often need guidance on managing chronic conditions like diabetes that can affect eye health or on the effects of specific medications that could influence their visual examination results. Pharmacists' involvement in these areas not only improves the accuracy of diagnostic procedures but also enhances patient safety and comfort.

This article explores the critical role that pharmacists play in preparing patients for optical and radiology diagnostics, focusing on the areas of medication management, patient education, and interdisciplinary collaboration. By actively participating in the diagnostic preparation process, pharmacists help ensure that patients are properly informed, at reduced risk for adverse effects, and prepared for accurate and effective diagnostic outcomes. ¹

2. Medication Management before Radiologic Procedures

Radiologic procedures, such as CT scans, MRIs, and X-rays, often require specific patient preparation to ensure accurate imaging results and patient safety. Pharmacists play a crucial role in managing medications before these procedures, advising on adjustments, and preventing potential interactions that could affect both the procedure and the patient's health. Their expertise is essential for preparing patients, particularly those on complex medication regimens or with underlying health conditions. ²

2.1 Managing Medications that Affect Imaging Accuracy

Certain medications can influence the clarity or quality of radiologic images, which may lead to diagnostic errors. For instance:

- **Calcium and Iron Supplements:** These supplements can interfere with abdominal imaging, potentially leading to false positives or obstructions in the scan. Pharmacists advise patients on when to stop taking these supplements prior to the procedure.
- **NSAIDs and Blood Thinners:** NSAIDs, anticoagulants, and other blood-thinning medications can increase the risk of bleeding during certain interventional radiology procedures. Pharmacists coordinate with physicians to determine if these medications should be temporarily discontinued before the procedure.
- **Bowel Preparation Medications:** For gastrointestinal imaging, patients may need to use bowel preparation medications. Pharmacists counsel patients on the correct use of these agents to ensure an empty digestive tract, which is essential for high-quality imaging.

2.2 Contrast Agent Precautions and Patient Counselling

Contrast agents enhance the visibility of specific organs, tissues, or blood vessels during imaging, but they also come with potential risks, particularly for patients with allergies, renal impairment, or specific medication histories. Pharmacists play an essential role in managing these risks by:

- ❖ **Assessing Kidney Function:** Patients with reduced renal function are at higher risk for contrast-induced nephropathy (CIN). Pharmacists review patients' kidney function tests and may recommend hydration protocols or other nephroprotective measures.
- ❖ **Managing Allergic Reactions:** Pharmacists evaluate patients' allergy histories to identify potential risks related to contrast agents. If a patient has a known allergy, pharmacists can advise on pre-medication protocols, such as corticosteroids or antihistamines, to reduce the likelihood of an adverse reaction.
- ❖ **Educating Patients on Contrast Effects:** Pharmacists educate patients on what to expect with contrast agents, including sensations of warmth or metallic taste. This information helps reduce anxiety and improves patient cooperation during the scan.

2.3 Drug-Interaction Prevention

Before radiologic procedures, pharmacists assess patients' full medication regimens to prevent interactions that could interfere with imaging or patient safety. For example:

- **Metformin and Iodinated Contrast Agents:** Patients on metformin may be at risk for lactic acidosis if they receive iodinated contrast. Pharmacists typically recommend that patients pause metformin for 48 hours following contrast administration and resume only after confirming normal kidney function.
- **Diuretics and Electrolyte Imbalance:** Diuretic use can cause electrolyte imbalances, which may affect imaging results or increase the risk of complications with contrast agents. Pharmacists assess and adjust diuretic use accordingly.
- **Antihypertensives and Stress Imaging Tests:** For patients undergoing stress tests, certain antihypertensive medications may need to be adjusted to avoid false-negative results. Pharmacists provide guidance on temporarily withholding or adjusting these medications to optimize imaging results.

2.4 Supporting Special Populations

Pharmacists also support specific populations, such as pregnant patients, children, or elderly patients, who may have unique medication needs and risks associated with radiologic procedures. They provide tailored guidance to ensure that these patients are optimally prepared and safeguarded.

- **Pregnant Patients:** Pharmacists work closely with radiologists and healthcare providers to determine the necessity of imaging and offer alternative preparations when possible to minimize fetal exposure.
- **Pediatric Patients:** Pediatric patients may require dosage adjustments or specific instructions for contrast agents. Pharmacists ensure that appropriate formulations and dosing are used, and provide counseling to caregivers on what to expect.
- **Elderly Patients:** Older adults often have complex medication regimens and multiple comorbidities, which can increase their risk for adverse effects from contrast agents. Pharmacists monitor renal function, manage medication interactions, and adjust dosing to support safe imaging for elderly patients.

Pharmacists play an essential role in medication management before radiologic procedures by ensuring medication safety, preventing interactions, and preparing patients for the effects of imaging agents. Through careful assessment of medication regimens, patient education, and collaboration with radiologists, pharmacists help minimize risks, improve imaging accuracy, and support optimal diagnostic outcomes. Their contributions to patient preparation are vital to a multidisciplinary approach to safe and effective radiologic diagnostics.

3. Pharmacy's Role in Optical Diagnostics

In optical diagnostics, pharmacists play an important role in supporting the preparation and safety of patients undergoing eye exams and related procedures. From managing medications that may affect eye health to providing education on the use of eye drops, pharmacists help ensure patients are fully prepared for optical diagnostics. Their involvement is particularly important in managing chronic conditions, such as diabetes, that can impact eye exams, as well as in advising on medications that may affect visual outcomes.³

3.1 Medication Considerations in Optical Exams

Some medications can alter eye function or interfere with the results of optical exams. Pharmacists assess patients' medication profiles and counsel them on any necessary adjustments before their eye exams to ensure optimal results.

- ❖ **Systemic Medications with Ocular Side Effects:** Certain medications, such as antihistamines, antidepressants, and corticosteroids, can cause dry eyes, pupil dilation, or visual disturbances. Pharmacists can advise patients and optical technicians about these effects, ensuring the patient receives an accurate diagnosis without interference from medication side effects.
- ❖ **Blood Sugar Management in Diabetic Eye Exams:** Diabetes is a leading cause of visual impairment, and managing blood glucose levels before an eye exam is critical for obtaining accurate results. Pharmacists

assist diabetic patients by providing guidance on blood sugar control before eye imaging tests, ensuring that hyperglycemia or hypoglycemia does not distort diagnostic findings.

3.2 Guidance on Eye Drops and Topical Medications

Eye drops and topical medications are frequently used in optical diagnostics, either as part of the exam preparation or to achieve specific diagnostic outcomes, such as dilating the pupils or numbing the eye.

- **Patient Education on Dilating Drops:** Some optical exams require the use of dilating drops, which can cause temporary blurred vision and light sensitivity. Pharmacists educate patients on what to expect from these drops, advising on precautions like wearing sunglasses after the exam and avoiding driving until vision returns to normal.
- **Advising on Ocular Medication Interactions:** Certain topical eye medications may interact with systemic medications, such as beta blockers in glaucoma drops that can affect blood pressure. Pharmacists assess potential interactions and ensure the patient understands how to use these medications safely.

3.3 Preventing Medication Interference with Optical Diagnostics

Pharmacists help patients avoid medications that could interfere with optical diagnostic results. By reviewing patients' medication histories, they identify drugs that may affect visual acuity or other test outcomes.

- **Medications Affecting Intraocular Pressure:** For patients undergoing tests for conditions like glaucoma, pharmacists identify medications that may temporarily raise or lower intraocular pressure, such as steroids or beta agonists, and suggest temporary discontinuation if appropriate.
- **Managing Anticholinergic Medications:** Anticholinergic medications can cause pupil dilation, which may interfere with certain optical tests. Pharmacists advise on timing or alternative medications if needed to avoid compromising the results of the exam.

3.4 Supporting Optical Health in Chronic Conditions

Pharmacists frequently work with patients managing chronic conditions that impact eye health, such as diabetes, hypertension, and autoimmune disorders. In these cases, pharmacists provide guidance on medication management and explain how certain drugs can affect eye health.

- **Monitoring for Side Effects from Long-Term Medications:** Long-term use of medications such as corticosteroids, antimalarials, and some antihypertensives can have adverse effects on vision and overall eye health. Pharmacists educate patients on recognizing early signs of these side effects and advise them to seek regular eye exams.
- **Managing Diabetic Eye Complications:** Pharmacists counsel diabetic patients on controlling blood sugar levels to prevent complications, such as diabetic retinopathy, that can affect eye exam results and overall vision health.

3.5 Patient Education on Optical Diagnostic Procedures

Pharmacists contribute to patient education by providing detailed information about what to expect during optical exams and addressing patient concerns about vision-related procedures.

- **Explaining the Purpose and Process of Optical Tests:** Pharmacists help demystify the purpose of optical diagnostics, such as visual field tests, retinal imaging, and intraocular pressure measurements, ensuring patients feel informed and prepared for the procedures.
- **Post-Procedure Care Instructions:** After diagnostic procedures involving drops or anesthetic agents, pharmacists advise patients on aftercare, such as avoiding eye strain and watching for potential side effects, like redness or discomfort.

In optical diagnostics, pharmacists' expertise in medication management and patient counseling supports accurate diagnostic outcomes, safe medication use, and optimal eye health. By preparing patients for their eye exams and advising on potential medication effects, pharmacists help bridge the gap between optical and pharmaceutical care. Their collaboration with eye care professionals enhances patient experiences and contributes to accurate, effective diagnostic results in optical health.

4. Patient Education on Procedure-Related Risks

Patient education is a core responsibility of pharmacists, especially when it comes to preparing individuals for diagnostic procedures that may pose certain risks. Pharmacists play a key role in providing clear, practical information about the potential risks and side effects of both radiologic and optical diagnostics, from reactions to contrast agents to the effects of dilating eye drops. By educating patients about what to expect and how to manage any side effects, pharmacists help reduce anxiety, increase compliance, and contribute to safer, more effective diagnostic experiences. ⁴

4.1 Educating Patients on Radiologic Contrast Agents

Contrast agents used in radiologic diagnostics (e.g., CT or MRI scans) can enhance the clarity of images but also carry risks, particularly for patients with certain health conditions or sensitivities. Pharmacists play a crucial role in providing guidance on these risks, especially to individuals with a history of allergies or kidney issues.

- **Explaining Possible Reactions:** Pharmacists inform patients about the common reactions to contrast agents, such as warmth, flushing, or a metallic taste in the mouth, which may occur during or immediately after the injection. For patients at higher risk, pharmacists explain the signs of more severe reactions, such as difficulty breathing or rashes, and emphasize the importance of reporting these immediately.
- **Counseling on Kidney Health:** For patients with kidney issues, certain contrast agents can pose a risk of contrast-induced nephropathy (CIN). Pharmacists educate these patients on the importance of staying hydrated before and after the procedure to support kidney function, and they may recommend additional protective measures based on physician guidance.
- **Preparing for Allergy Risks:** For patients with known allergies, particularly to iodine-based contrast agents, pharmacists explain pre-medication protocols (e.g., using antihistamines or corticosteroids) to minimize the risk of allergic reactions. This guidance ensures patients feel reassured and adequately prepared.

4.2 Radiation Exposure and Safety in Imaging Procedures

Radiologic imaging, especially involving X-rays and CT scans, can expose patients to radiation, a concern that some may find intimidating. Pharmacists help educate patients on radiation safety and provide information on minimizing unnecessary exposure.

- **Explaining Radiation Levels:** Pharmacists can help contextualize the radiation exposure associated with certain procedures by comparing it to everyday sources of radiation or discussing cumulative exposure levels for patients who undergo frequent imaging.
- **Providing Protective Measures:** For procedures involving multiple imaging sessions, pharmacists may advise patients on protective measures or suggest alternative diagnostic options to discuss with their healthcare provider.
- **Addressing Common Concerns:** Many patients, especially pregnant women or individuals with chronic conditions, may have specific concerns about radiation. Pharmacists provide reassurance, offer tailored advice, and encourage patients to voice any concerns with the radiology team.

4.3 Patient Counseling on Optical Diagnostic Risks and Eye Drops

Pharmacists provide essential education for patients undergoing optical exams, especially regarding eye drops used for dilation or numbing, which may cause temporary side effects.

- **Educating on Dilation Effects:** Eye dilation is common in many optical exams and can cause temporary blurred vision and light sensitivity. Pharmacists counsel patients on the expected duration of these effects, advise on precautions like wearing sunglasses, and recommend avoiding activities like driving until vision returns to normal.
- **Advising on Local Anesthetic Drops:** Some optical exams require anesthetic eye drops, which may cause temporary stinging or blurred vision. Pharmacists inform patients about these potential sensations, reducing anxiety and ensuring they understand the temporary nature of these side effects.
- **Guidance on Post-Procedure Care:** For patients experiencing prolonged or uncomfortable effects following an optical exam, pharmacists offer guidance on managing symptoms, such as using lubricating eye drops or resting the eyes.

4.4 Preparing Patients for Potential Drug-Procedure Interactions

Certain medications can influence the results of diagnostic procedures or cause adverse effects when combined with imaging agents. Pharmacists play a critical role in reviewing and managing potential drug-procedure interactions to optimize safety.

- ❖ **Blood Sugar Medications and Eye Exams:** For diabetic patients, managing blood sugar before an eye exam is essential to ensure accurate results. Pharmacists educate patients on maintaining stable blood glucose levels, emphasizing the impact of hyperglycemia or hypoglycemia on vision assessments.
- ❖ **Metformin and Contrast Agents:** Patients taking metformin for diabetes may be at risk for lactic acidosis if given iodinated contrast. Pharmacists inform these patients about temporarily discontinuing metformin, with guidance on resuming it after the procedure, based on kidney function monitoring.
- ❖ **Blood Thinners and Biopsies:** Some diagnostic procedures, like biopsy-based imaging, require caution with anticoagulants. Pharmacists coordinate with healthcare providers to advise on temporarily pausing these medications if necessary to prevent bleeding risks.

4.5 Communicating Safety Measures to Special Populations

Certain patient populations, such as children, the elderly, pregnant individuals, and those with chronic conditions, may have unique considerations for diagnostic procedures. Pharmacists tailor education and support for these individuals to ensure they understand any additional risks or preparatory steps.

- **Guidance for Pregnant Patients:** Pharmacists counsel pregnant individuals on potential alternatives to radiologic procedures that involve radiation. When imaging is essential, they offer information on protective measures to minimize fetal exposure.
- **Pediatric Patients and Parents:** For children, pharmacists often educate parents on preparing their child for procedures, explaining any sensations or side effects the child may experience to ease parental anxiety and ensure cooperation.
- **Elderly Patients:** Older adults may have comorbidities or polypharmacy concerns that require additional consideration. Pharmacists review these patients' medications and provide clear, age-appropriate guidance on how to prepare for and manage after-effects of diagnostics.

Patient education on procedure-related risks is a vital aspect of pharmacy practice, especially for those undergoing radiologic and optical diagnostics. Through personalized counseling on contrast agents, radiation exposure, eye drop effects, and medication management, pharmacists enhance patient safety, comfort, and preparedness. By addressing potential risks, educating on protective measures, and tailoring advice to special populations, pharmacists play a central role in ensuring patients are well-informed and feel confident in the diagnostic process. This patient-centered approach not only reduces anxiety but also fosters trust and compliance, leading to safer and more effective diagnostic outcomes.

5. Pharmacists' Contribution to Diagnostic Accuracy

Pharmacists play a key role in enhancing the accuracy of diagnostic procedures by managing medications, educating patients, and coordinating with healthcare teams. Their expertise in pharmacology allows them to identify potential drug-procedure interactions, mitigate the effects of certain medications on imaging clarity, and prevent adverse reactions that could interfere with diagnostic outcomes. By preparing patients appropriately and collaborating with radiologists, optical technicians, and other healthcare providers, pharmacists contribute significantly to the precision and reliability of diagnostic results. ⁵

5.1 Reducing Medication-Related Interferences in Imaging

Certain medications can affect the results of imaging tests by altering physical or biochemical conditions within the body. Pharmacists help optimize diagnostic accuracy by identifying these medications and advising on adjustments to ensure clear, reliable imaging.

- ❖ **Managing Contrast Interference:** Some medications, such as diuretics or NSAIDs, may interact with contrast agents used in CT or MRI scans, potentially leading to kidney complications or image artifacts. Pharmacists counsel patients on medication adjustments, hydration protocols, and contrast safety to avoid complications and ensure optimal imaging.
- ❖ **Avoiding Medications that Affect Intraocular Pressure (IOP):** For patients undergoing eye exams, medications that alter IOP, such as corticosteroids, can impact glaucoma screenings. Pharmacists work with patients and providers to pause or substitute medications temporarily to prevent skewed IOP readings and improve diagnostic clarity.

5.2 Ensuring Stable Baseline Conditions for Accurate Results

Pharmacists assist in managing chronic conditions, such as diabetes and hypertension, that could affect diagnostic accuracy if left uncontrolled. By helping patients maintain stable conditions prior to tests, pharmacists help establish consistent baselines for reliable results.

- ❖ **Blood Glucose Management in Diabetic Retinopathy Screening:** Blood sugar levels can impact the results of eye exams, particularly for patients with diabetes. Pharmacists provide guidance on blood glucose control to ensure accurate retinopathy assessments and overall eye health.
- ❖ **Hypertension and Kidney Function in Radiology:** High blood pressure can influence kidney function, which in turn affects the body's ability to safely process contrast agents. Pharmacists counsel patients on managing blood pressure prior to scans to reduce risk and improve imaging outcomes.

5.3 Tailoring Medication Regimens to Support Diagnostic Goals

Pharmacists help tailor medication regimens to prevent complications and achieve diagnostic goals. This proactive approach includes evaluating patients' medication lists, identifying drugs that might interfere with procedures, and providing guidance on safe discontinuation if needed.

- **Guidance on Anticoagulants for Procedures Involving Biopsy:** For imaging that involves biopsies, such as liver or lung biopsies, pharmacists assess the need to temporarily discontinue blood thinners to prevent bleeding complications, coordinating with physicians to adjust dosing safely.
- **Anticholinergic Medications and Pupil Dilation:** Certain medications with anticholinergic properties, such as some antidepressants, can dilate pupils, potentially affecting optical diagnostics. Pharmacists advise on these risks and collaborate with healthcare providers to schedule exams at optimal times to prevent interference.

5.4 Enhancing Diagnostic Preparation through Patient Education

By thoroughly educating patients about procedure-related expectations and risks, pharmacists increase patient compliance and improve the reliability of diagnostic outcomes. Educated patients are more likely to follow preparation instructions accurately, which minimizes procedural disruptions.

- **Patient Instructions on Fasting and Fluid Intake:** Certain diagnostics, like abdominal ultrasounds or CT scans, require fasting or specific hydration levels. Pharmacists clarify these instructions, ensuring patients understand the rationale and adhere to protocols that enhance imaging quality.
- **Pre-Medication Protocols for Allergy Management:** For patients with known allergies to contrast agents, pharmacists provide detailed guidance on pre-medication protocols, such as taking corticosteroids or antihistamines, to reduce the risk of reactions. This preparation minimizes disruptions and supports a smooth diagnostic process.

5.5 Collaborating with Healthcare Teams for Comprehensive Care

Pharmacists play an important collaborative role in coordinating diagnostic care, acting as a bridge between radiology, optical diagnostics, and other medical teams. By sharing insights on patient medication profiles and potential risks, pharmacists help align treatment plans with diagnostic goals.

- **Coordinating with Radiologists on Contrast Dosages:** Pharmacists work with radiology teams to tailor contrast dosages based on individual patient needs, especially for those with kidney conditions or medication sensitivities, ensuring diagnostic safety and effectiveness.
- **Communicating with Optical Technicians on Medication Effects:** For patients using medications that may impact vision, pharmacists inform optical teams, helping adjust diagnostics as needed for clear results.

Pharmacists play a pivotal role in promoting diagnostic accuracy by managing medications, stabilizing patient conditions, educating on procedure protocols, and fostering interdisciplinary collaboration. Their contributions ensure that imaging and optical tests are conducted under ideal conditions, free from interference, and aligned with patient safety needs. Through this multifaceted support, pharmacists enhance both the precision of diagnostic results and the overall quality of patient care.

Conclusion

Pharmacists play a crucial role in ensuring the accuracy, safety, and effectiveness of diagnostic procedures in both radiology and optical diagnostics. By managing medications, providing patient education, and collaborating with other healthcare professionals, pharmacists help mitigate risks that could compromise diagnostic quality. They contribute to diagnostic accuracy by identifying potential drug-procedure interactions, advising on medication adjustments, and preparing patients to follow protocol guidelines. Furthermore, pharmacists' expertise in managing chronic conditions supports stable baseline health, enabling more reliable diagnostic outcomes.

Their involvement fosters an environment of interdisciplinary collaboration, where radiologists, optical technicians, and pharmacists work together to prioritize patient safety and clarity in diagnostics. Ultimately, pharmacists enhance the entire diagnostic process, from preparation to post-procedure care, ensuring that each patient receives comprehensive support tailored to their medical needs.

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