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SHORT COMMUNICATION

# Strategies to reduce renal risks associated with the use of contrast

## Estrategias para reducir los riesgos renales asociados al uso de contraste

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**ABSTRACT**

The use of contrast agents transformed diagnostic and therapeutic procedures, allowing for better internal visualisation. However, it also generated complications such as contrast-induced acute kidney injury (CI-AKI), especially in patients with risk factors such as chronic kidney disease, diabetes or heart failure. In Argentina, during 2024, the importance of evaluating patients before the use of contrast, adequate hydration and the use of low-osmolality agents was recognised. Strategies such as standardised protocols, medical training and monitoring were established to reduce the incidence of this complication. Prevention and equitable access to resources were key to improving renal health outcomes.

**Keywords:** CI-AKI; Nephrotoxicity; Prevention; Contrast; Argentina.

**RESUMEN**

La utilización de agentes de contraste transformó los procedimientos diagnósticos y terapéuticos, permitiendo una mejor visualización interna. Sin embargo, también generó complicaciones como la lesión renal aguda inducida por contraste (CI-AKI), especialmente en pacientes con factores de riesgo como enfermedad renal crónica, diabetes o insuficiencia cardíaca. En Argentina, durante 2024, se reconoció la importancia de evaluar a los pacientes antes del uso de contraste, hidratar adecuadamente y emplear agentes de baja osmolalidad. Se establecieron estrategias como protocolos estandarizados, capacitación médica y monitoreo para reducir la incidencia de esta complicación. La prevención y la equidad en el acceso a recursos resultaron claves para mejorar los resultados en salud renal.

**Palabras clave:** CI-AKI; Nefrotoxicidad; Prevención; Contraste; Argentina.

## BACKGROUND

Using contrast agents in diagnostic and therapeutic procedures has revolutionized modern medicine, allowing detailed visualization of internal structures and facilitating accurate diagnoses.[1,2,3] However, their use is not without risks, with contrast-induced acute kidney injury (CI-AKI) being one of the most significant complications.[4,5,6,7,8] In the context of Argentine public health in 2024, it is essential to understand the impact of these agents on renal function, identify associated risk factors, and establish appropriate prevention and management strategies.

CI-AKI is defined as acute deterioration of renal function occurring within 48 to 72 hours after contrast media administration, after excluding other possible causes of renal injury.[9,10,11] Although the exact incidence varies depending on the population studied and the risk factors present, it is recognized that patients with chronic kidney disease (CKD), diabetes mellitus, and heart failure and those undergoing procedures with high

doses of contrast agents are at increased risk of developing this complication.[12,13]

Contrast-induced nephrotoxicity is mainly attributed to two mechanisms:[14]

- Renal vasoconstriction: The administration of contrast media can cause a reduction in renal blood flow, decreasing perfusion and oxygen supply to tubular cells.
- Direct toxicity to tubular cells: Contrast agents can induce direct damage to renal tubule cells, possibly by generating reactive oxygen species, leading to acute tubular necrosis.

Several factors increase susceptibility to developing CI-AKI, including:[15]

- Pre-existing kidney disease: Patients with reduced glomerular filtration rate (GFR) are more vulnerable.

Prevention is essential and should focus on the following:[16]

- Pre-procedure assessment: Identify patients at risk by assessing kidney function and the presence of comorbidities.
- Adequate hydration: The administration of isotonic saline solution before and after the procedure has been shown to reduce CI-AKI incidence.
- Use of low-osmolality contrast agents: These have a more favorable renal safety profile.
- Minimization of contrast dose: Use the lowest possible amount without compromising diagnostic quality.

Avoid nephrotoxic drugs: Temporarily discontinue medications that may enhance kidney damage.

In Argentina, CKD represents a growing challenge for the public health system. The prevalence of risk factors such as diabetes and hypertension has increased, which, combined with an aging population, increases susceptibility to kidney complications.[17] The availability of resources for preventing and managing CI-AKI varies across different regions, with significant disparities between urban and rural areas. In addition, training healthcare personnel in identifying and managing patients at risk is essential to improve clinical outcomes.

To address the impact of contrast agents on renal function, the following strategies are proposed:

- Standardized protocols: Implement national clinical guidelines for evaluating and managing patients requiring contrast studies.
- Continuing education: Train health personnel in identifying risk factors and preventive measures for CI-AKI.
- Equitable access to resources: Ensure the availability of low-osmolality contrast agents and means for adequate hydration in all health centers.
- Registration and monitoring: Establish surveillance systems to identify CI-AKI incidence and evaluate the effectiveness of the preventive measures implemented.

CI-AKI is a preventable complication that requires special attention in the context of Argentine public health. Early identification of patients at risk, implementation of preventive measures, and strengthening of health system capacities are essential to mitigate the impact of contrast agents on renal function and improve clinical outcomes in the population.

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## CONFLICT OF INTEREST

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