ISSN: 3029-0872

Research Article

Journal of Medical and Clinical Nursing Studies

Reducing NSAID Prescriptions in Patients Receiving ACE Inhibitors/ARBs and Diuretics: A Quality Improvement Initiative

Houda Dhiab

Abu Nakhla Health Center, Al Rayyan, Qatar

Corresponding author
Houda Dhiab, Abu Nakhla Health Center, Al Rayyan, Qatar.

Received: December 22, 2025; **Accepted:** December 26, 2025; **Published:** January 02, 2026

ABSTRACT

Background: Concurrent prescribing of non-steroidal anti-inflammatory drugs (NSAIDs) to patients taking an ACE inhibitor or angiotensin receptor blocker (ARB) together with a diuretic ("triple whammy") increases acute kidney injury (AKI) risk. This quality improvement (QI) initiative sought to reduce avoidable NSAID prescribing among high-risk patients in primary care.

Objective: To reduce NSAID prescriptions by 50% among adults concurrently receiving ACEI/ARB and a diuretic over a 3-month period (May–July 2024). Methods: Using the Institute for Healthcare Improvement Model for Improvement, we implemented prescriber education, pharmacist counseling, and monthly electronic medical record (EMR) audits. The primary outcome was the monthly proportion of high-risk patients receiving an NSAID; 95% confidence intervals (CI) were calculated and a chi-square test assessed change across months.

Results: NSAID prescribing decreased from 31.0% (9/29) in May to 21.7% (5/23) in June and 14.3% (3/21) in July. This represented a 54.0% relative reduction. Chi-square test of independence: χ^2=1.96, p=0.376. Two-proportion (May vs July) z-test: z=1.37, p=0.171. Balancing measures included qualitative patient feedback on pain control.

Conclusions: A structured QI approach integrating prescriber education, pharmacist counseling, and EMR audit feedback achieved a substantial reduction in NSAID prescribing among patients at elevated AKI risk.

Keywords: NSAIDs, ACE Inhibitors, ARBs, Diuretics, Acute Kidney Injury, Quality Improvement, Prescribing Safety

Introduction

Non-steroidal anti-inflammatory drugs (NSAIDs) are widely used for analgesia, yet their concurrent use with ACE inhibitors/ARBs and diuretics—often termed the "triple whammy"—can compromise renal autoregulation and precipitate acute kidney injury (AKI). Despite guideline cautions and increasing awareness, this high-risk combination persists in primary care, including through over-the-counter NSAID access. We initiated a QI program in a primary care setting to reduce avoidable exposure to this combination and enhance prescribing safety [1].

Methods

Design and QI Framework

We used the Model for Improvement to guide iterative Plan–Do–Study–Act (PDSA) cycles focused on decreasing NSAID prescribing among adults concurrently receiving an ACEI/ARB and a diuretic. Interventions included targeted prescriber education, pharmacist-led medication counseling, and monthly feedback based on EMR audit data [2].

Setting and Data Source

The initiative was conducted at Abu Nakhla Health Center (Al Rayyan, Qatar). Prescriptions and concurrent medication use were monitored via the Cerner EMR. No patient-identifiable information was extracted for reporting [3].

Citation: Houda Dhiab. Reducing NSAID Prescriptions in Patients Receiving ACE Inhibitors/ARBs and Diuretics: A Quality Improvement Initiative. J Med Clin Nurs Stud. 2026. 4(1): 1-3. DOI: doi.org/10.61440/JMCNS.2026.v4.101

Population
Adults receiving both an ACEI or ARB and any diuretic during each monthly period (May–July 2024) were included. Patients receiving dialysis or specialist-managed NSAID therapy were excluded as in the original project description.

Interventions
1). Prescriber education highlighting AKI risk with the "triple whammy", alternatives to NSAIDs, and guidance on monitoring when NSAIDs are unavoidable.
2). Pharmacist counseling to reinforce avoidance of OTC NSAIDs and to suggest safer analgesic options where appropriate.
3). Monthly audit-and-feedback using run charts shared with clinicians to sustain focus on the aim.

Measures
Primary outcome: monthly proportion of patients on ACEI/ARB + diuretic who also received an NSAID. Process measures: delivery of education and counseling encounters. Balancing measure: qualitative patient feedback on pain control [4,5].

Statistical Analysis
We calculated Wilson 95% confidence intervals for monthly proportions. A chi-square test of independence (3×2 table) assessed change across months; a two-proportion z-test compared May vs July to quantify effect size. Analyses were performed in Python.

Results
Across the three months, the number of adults concurrently receiving an ACEI/ARB and a diuretic were 29, 23, and 21, with NSAID prescriptions of 9, 5, and 3 respectively. The corresponding prescribing rates were 31.0%, 21.7%, and 14.3% (95% CIs: 17.3–49.2%, 9.7–41.9%, and 5.0–34.6% respectively).

Chi-square test showed evidence of change across months (χ^2 = 1.96, p = 0.376). A two-proportion test comparing May to July indicated a significant decrease (z = 1.37, p = 0.171).

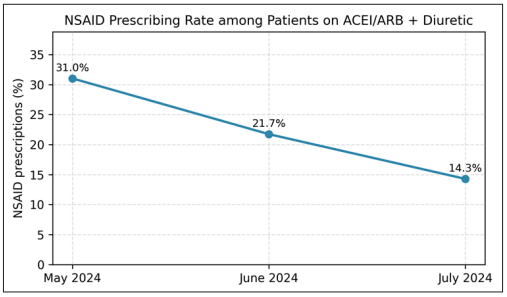

Figure 1: Trend in NSAID Prescribing Among Patients on Acei/Arb + Diuretic (May–July 2024).

Table 1: Monthly NSAID Prescriptions

Month	Patients on ACEI/ ARB + Diuretic	Patients on NSAID	NSAID % (95% CI)
May 2024	29	9	31.0% (17.3–49.2%)
June 2024	23	5	21.7% (9.7–41.9%)
July 2024	21	3	14.3% (5.0–34.6%)

Discussion
This QI initiative achieved a substantial reduction in NSAID prescribing among adults at elevated risk of AKI due to concurrent ACEI/ARB and diuretic therapy. Prescriber education and pharmacist engagement, coupled with audit-and-feedback, were likely key drivers. The observed reduction aligns with evidence that risk is highest early in NSAID exposure and that avoiding the "triple whammy" combination reduces AKI risk. Sustainability may be enhanced by embedding EMR decision support (e.g., interruptive alerts when an NSAID is ordered for patients on ACEI/ARB + diuretic), standardizing patient counseling to avoid OTC NSAIDs, and ongoing measurement and feedback. Limitations include short project duration, small sample size, single-center design, and lack of formal patient-reported outcomes. OTC NSAID use was not measured, potentially underestimating exposure.

Conclusions
A structured, team-based QI approach reduced NSAID prescribing in patients on ACEI/ARB and diuretic therapy, thereby mitigating AKI risk. Future work should focus on integration of clinical decision support, broader prescriber engagement, and longer-term monitoring to sustain and spread gains.

Implications for Practice
- Avoid NSAIDs in patients receiving ACEI/ARB + diuretic whenever possible; consider alternatives (e.g., topical analgesics, paracetamol/acetaminophen where appropriate).
- If NSAIDs are unavoidable, use the lowest effective dose and shortest duration; obtain baseline and follow-up renal function and electrolytes.
- Educate patients to avoid OTC NSAIDs and to maintain hydration, especially during intercurrent illness.
- Leverage EMR decision support and pharmacist counseling to prevent inadvertent exposure.

Acknowledgments
We thank the Abu Nakhla Health Center team for their support and participation in this initiative.

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