Real-World Outcomes and Healthcare Burden: Claims Analysis of IV Ibuprofen vs Ketorolac

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INTRODUCTION

- Adverse drug reactions (ADRs) have considerable clinical and economic costs.
  - 2.2 million hospitalizations and 106,000 deaths annually[1]
  - Up to $136 billion spent on ADRs annually in the US[2]
- IV ibuprofen (IVIB) and ketorolac are both non-selective cyclooxygenase (COX) inhibitors; however, they differ in their degree of COX-1/COX-2 inhibition and subsequent risk of gastrointestinal toxicity, nephrotoxicity, and bleeding[2,3]

OBJECTIVE

Compare and describe ADRs between IVIB and ketorolac and the economic impact through differences in health care resource utilization (HCRU)

METHODS

- Retrospective, longitudinal, observational, all-payer database assessing patients between January 1, 2014 to June 20, 2023
- Common ADRs identified a priori and assessed within 72 hours from the last dose of the index drug administered
- Inpatient and outpatient HCRU were evaluated 29 days after the last dose of the index drug administered
- Propensity score matching 1:4 (IVIB:ketorolac)
  - Variables included age, sex, reason for administration (surgical, fever, other), number of doses administered.
- **Inclusion criteria:** ≥18 years old, received one or more doses of IVIB or IV/IM ketorolac, baseline records available for ≥12 months prior to drug administration
- **Exclusion criteria:** Claim for renal dysfunction, GI or general bleeding disorders, low back pain, headache, abdominal pain, nausea/vomiting, or throat pain during 12-month baseline period, received oral/ophthalmic/nasal formulations, or received both medications.

RESULTS

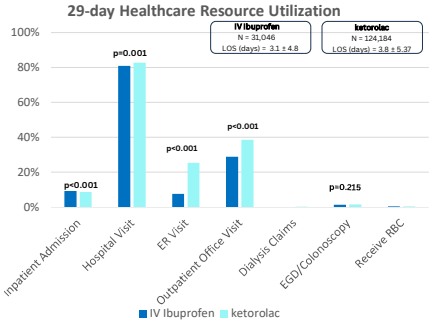
Demographics after Propensity Score Matching

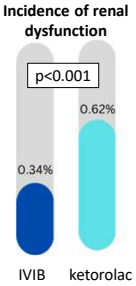
	Adult IV ibuprofen N=31,046 N (%)	Adult Ketorolac N=124,184 N (%)
Mean Age	52 ± 16	52 ± 16
Age 65+	27%	27%
Gender		
Male	33%	33%
Race		
White	19,768 (84%)	80,384 (87%)
Black	3,229 (14%)	10,314 (11%)
Asian	633 (3%)	1,936 (2%)
Reason for drug administration		
Surgery	94%	94%
Fever	0.38%	0.38%
Non-surgical	5.2%	5.2%
Mean Dose	784 ± 445mg	30 ± 16mg
Number of Doses		
1	93.1%	93.1%
2	6.4%	6.4%
Payer Channel		
Medicaid	5,957 (19%)	29,751 (24%)
Medicare	6,033 (19%)	28,963 (23%)
Private Insurance	17,456 (56%)	60,695 (49%)

PATIENT RECORDS IDENTIFIED: 17,336,749

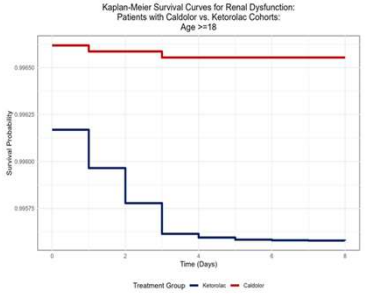
FINAL ADULT PATIENT COUNT: 10,294,051

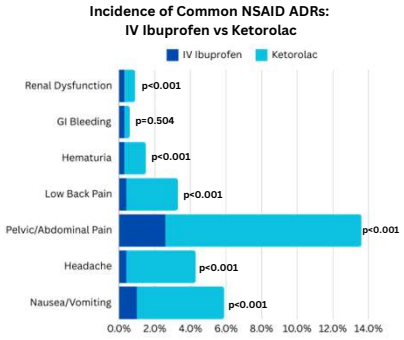
Age ≥ 18: 10,294,051	
Ibuprofen	31,046
Ketorolac	10,259,239
Both	3,766
Final Sample Size after Propensity Matching: ≥ 18	
Ibuprofen	31,046
Ketorolac	124,184





RENAL DYSFUNCTION 45% LOWER IN PATIENTS THAT RECEIVED IV-IBUPROFEN VS KETOROLAC





DISCUSSION

- >90% of all patients received a single dose in the setting of a surgical procedure
- **Patients with claims for IVIB had a reduction in major ADRs and HCRU compared to ketorolac**
- Nephrotoxicity and other common ADRs associated with NSAID use were significantly reduced in patients that received IVIB vs ketorolac
- The incidence in ADRs when comparing IVIB vs ketorolac may be attributable to the variations in degree of inhibition of COX-1 relative to COX-2. Greater inhibition of COX-1 isoenzymes increases the risk of ADRs (nephrotoxicity, GI bleeding). Ketorolac is the most potent inhibitor of COX-1 isoenzymes among all NSAIDs.
- HCRU comparison revealed shorter LOS, reduced outpatient follow up, and fewer ED visits in IVIB group vs ketorolac.
- Limitations of this study include inability to accurately evaluate specific costs due to the disparity in payer types, the use of hematuria as a surrogate for bleeding due to lack of ICD9/10 codes specific for bleeding, and not all data available for collection (ie weight). Claims data comes with inherent limitations including incorrect coding or diagnosis included as rule-out criteria rather than the actual disease

CONCLUSION

- This is the first real-world evidence study to compare IVIB and ketorolac. The results of this study highlight the potential for IVIB to improve patient care by offering a safer option compared to ketorolac, while also reducing the burden on healthcare systems.

1. Warner, M., et al., Drug poisoning deaths in the United States, 1980-2008. NCHS Data Brief, 2011(81): p. 1-8., 2. Johnson JA, et al. Drug-related morbidity and mortality: a cost-of-illness model. Arch Intern Med 1995; 155: 1949-56 3. Lucas, G.N.C., et al., Pathophysiological aspects of nephropathy caused by non-steroidal anti-inflammatory drugs. J Bras Nefrol, 2019. 41(1): p. 124-130., 4. Laine, L., GI risk and risk factors of NSAIDs. J Cardiovasc Pharmacol, 2006. 47 Suppl 1: p. S60-6.

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