Evaluation of a drug therapy safety algorithm for the detection of Triple Whammy prescriptions in inpatients at risk of acute kidney injury

Jana ***Schelshorn***[1,2], *Hendrike* ***Dahmke***[2,3], *Rico* ***Fiumefreddo***[4], *Philipp* ***Schuetz***[4], *Ali Reza* ***Salili***[5], *Francisco* ***Cabrera***[6], *Carla* ***Meyer-Massetti***[7,8], *Claudia* ***Zaugg***[2]

[1]*Department of Medicine, University of Bern;* [2]*Hospital Pharmacy, Kantonsspital Aarau;* [3]*Department of Pharmaceutical Sciences, University of Basel;* [4]*Department of Internal Medicine, Kantonsspital Aarau;* [5]*Pinmed Gemeinschaftspraxis;* [6]*Hospital Pharmacy, General University Hospital of Ciudad Real;* [6]*Clinical Pharmacology and Toxicology, Inselspital Bern;* [8]*Institute of Primary Health Care BIHAM, University of Bern*

Background: The term "**Triple Whammy**" refers to the **concomitant use** of **non-steroidal anti-inflammatory drugs**, **diuretics** and **angiotensin-converting enzyme inhibitors** or **angiotensin receptor antagonists**, which significantly increases the risk for **acute kidney injury** [1]. To prevent this severe complication, we have recently developed an **electronic algorithm**, which detects Triple Whammy prescriptions in patients with additional risk factors for acute kidney injury (e.g., such as reduced kidney function and older age [2,3]) via an intermediate assessment and feedback from clinical pharmacists.

The **aim** of this study was to investigate the **performance** and **usability** of this algorithm.

Methods: We performed a **retrospective study** of all patients who were admitted to our hospital in 2021. Clinical data was extracted from the hospital's electronic health records and all cases were reviewed to confirm the plausibility. The performance was assessed by determining the **compliance rate among physicians**, calculating the **sensitivity** and **specificity** of the algorithm, and assessing the **renal function in patients** triggering an alert. The usability was evaluated by conducting a **semi-structured interview among physicians** who recently received a Triple Whammy alert via the electronic algorithm.

Figure 1: SEMI-STRUCTURED INTERVIEW AMONG PHYSICIANS

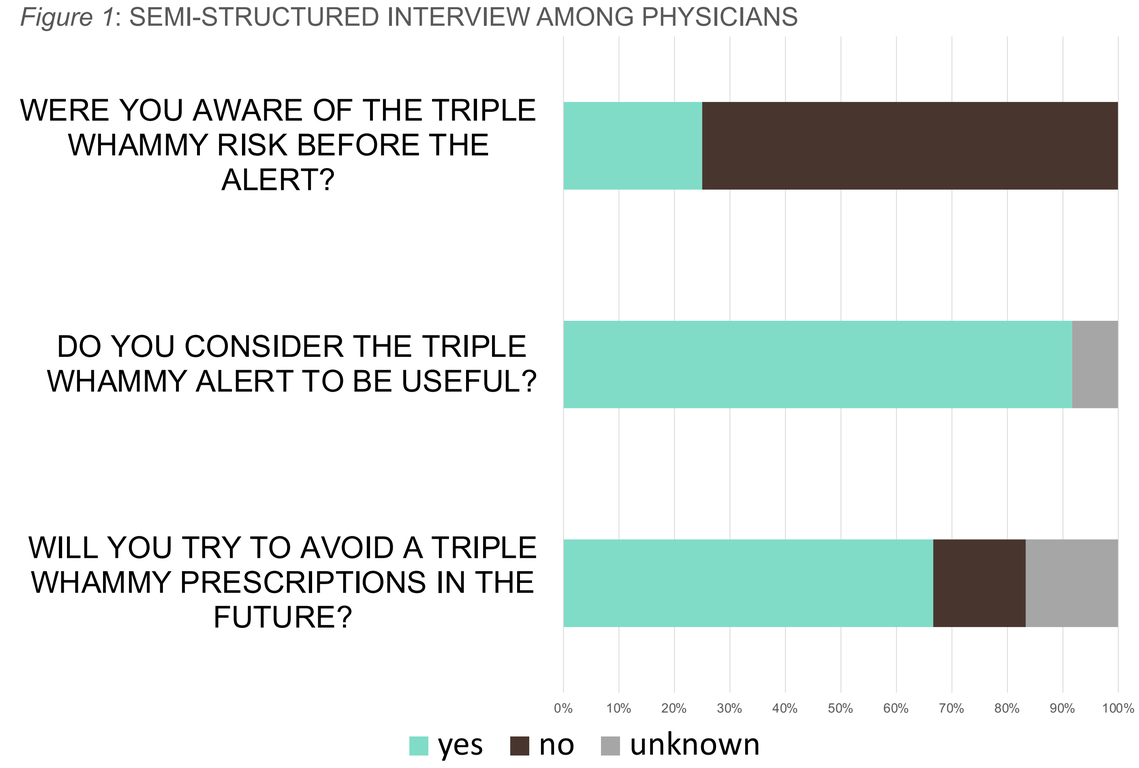
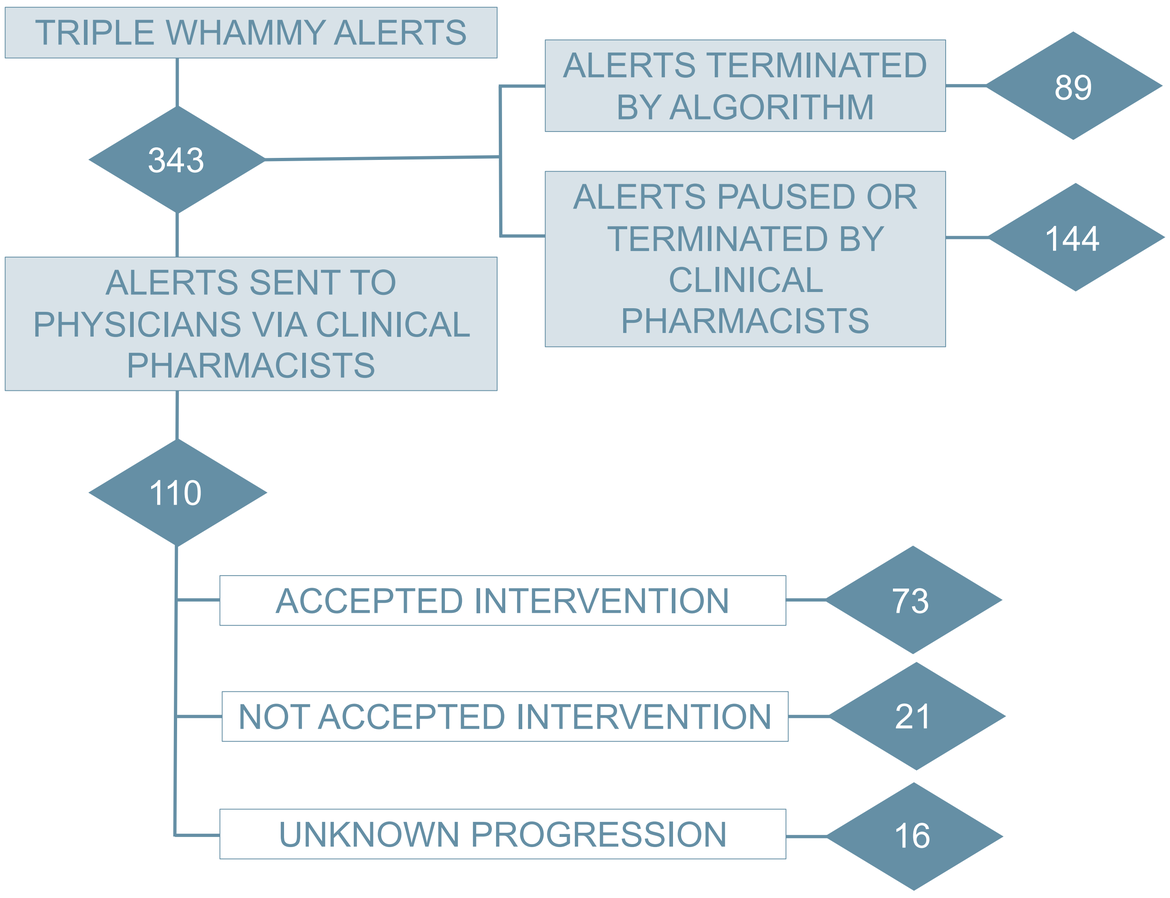


Figure 2: FLOWCHART TRIPLE WHAMMY ALERTS DURING 2021



Results: Among 21'326 patients, 216 (1.0%) received at least one Triple Whammy alert. In total, 110 alerts were forwarded to the physicians and for 94 alerts a follow-up could be performed. Seventy-three alerts led to a change in medication or additional renal monitoring, corresponding to a **compliance rate of 77.7%**. The algorithm had a **sensitivity of 88.3%** and a **specificity of 99.7%** in detecting inpatients with a Triple Whammy prescription in need of an intervention. We identified **17 patients** with Triple Whammy prescriptions who **experienced acute kidney injury**. Of those, 15 patients were detected by the algorithm. Two patients were not detected because they had no risk factors. Most interviewed physicians (75%, n = 9 out of 12) were **previously unaware of the Triple Whammy risk**, and they **unanimously approved of the algorithm**.

Conclusion: The Triple Whammy alert is **highly sensitive** and **specific** in detecting patients at risk of acute kidney injury, with **high compliance rates among physicians** and may **help to prevent such adverse events** in the future. Further research is needed to improve the algorithm to reduce the risk of kidney injury also in patients that experienced this event despite being detected by the algorithm.

References

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