

The Adverse Inpatient Medication Event and Frailty Model (AIME-Frail) to Predict Patients at high-risk of Medication Harm during Hospitalisation

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Introduction

- Medication harm affects approximately 7% of patients, with approximately half considered preventable.
- The AIME prediction model was developed to guide patient prioritisation for targeted review.
- Frailty is a known predictor for poor patient outcomes (e.g. falls and readmissions), however a relationship has not been established with medication harm

Aim To evaluate the predictive performance of the AIME model after incorporating frailty, in a cohort of geriatric and general medical patients.

Methods

- Retrospective cohort study of general medical and geriatric inpatients at two tertiary Australian hospitals between 1st January and 31st April 2020.
- Medication harm identified by ICD-10 Y-codes and senior pharmacist review of medical records.
- The Hospital Frailty Risk Score (HFRS) was applied retrospectively to quantify frailty for each patient.
- Logistic regression used to construct a modified AIME model¹, along with new variables thought to be clinically important, i.e. PINCHA medications, renal function, frailty.



Results

- 3944 patients with median (IQR) age of 67 (28) years and mean (SD) HFRS 6.2 (+/-5.9). 187 (4.7%) experienced one or more medication harm events (total 208 events). Top 5 medication harm classes implicated shown in Table 1.
- AIME-Frail AUC = 0.79 (95% CI: 0.76-0.83).
- Specificity 81%, Sensitivity 69%.
- Final AIME-Frail model shown in Table 2.

Table 2: The Adverse Inpatient Medication Event and Frailty Model

Variables	Odds Ratios	95% CIs	P value
Intercept	0.00	0.00 – 0.01	<0.001
1. Length of Stay > 14 days	3.01	2.11 – 4.29	0.001
2. Frailty:			
Moderate	1.67	1.11 – 2.55	0.016
High	3.92	2.41 – 6.42	0.001
3. Anticoagulants	2.23	1.30 – 4.11	0.006
4. Antipsychotics	1.46	1.08 – 2.08	0.043
5. Immunosuppressants	2.27	0.95 – 4.91	0.049
6. Antiarrhythmics	2.21	1.52 – 3.16	0.001
7. Opioid analgesics	1.45	1.03 – 2.05	0.034
8. Insulin	1.83	1.29 – 2.58	0.001
9. Antibiotics	1.45	0.99 – 2.17	0.064

Table 1: Top 5 Medication Harm Classes and Signs and Symptoms

Top 5 Medication Classes with harm	Patient Signs and Symptoms	Cases %
Cardiovascular	Hypotension, AKI, dyspnoea, deranged electrolytes, bradycardia, dizziness	25
Antibiotics	LFT derangement, nausea and vomiting, rash, anaphylaxis, <i>Clostridium difficile</i>	17
Insulin & oral antidiabetics	Hypoglycaemia, severe hyperglycaemia, DKA, severe diarrhoea	13
Opioids	LOC, nausea, vomiting, confusion, rash, constipation, respiratory depression	12
Anticoagulants	GI/ PR bleed, melaena, haematoma	9

Conclusion

- The new AIME-Frail model, with the inclusion of frailty, demonstrated good predictive performance.
- Screening patients using AIME-Frail tool could provide an efficient approach to identify those at high-risk.

References

- 1. Falconer N, Barras M, ...Cottrell N. Development and validation of the Adverse Inpatient Medication Event model (AIME). *Brit J Clin Pharm.* 2021.87(3):1512-1524.

Acknowledgements

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