

Identifying inpatients at high risk of adverse drug events: Systematic review of predictive risk scores

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BACKGROUND

- Up to one third of hospitalised patients experience an adverse drug event (ADE) (Fig 1)¹.
- This increases mortality, morbidity, length of stay and health care costs.
- An emerging approach for early identification of high risk inpatients is the use of ADE predictive risk scores.

AIM

To critically appraise studies of risk scores for predicting the risk of ADEs in adult hospital inpatients.

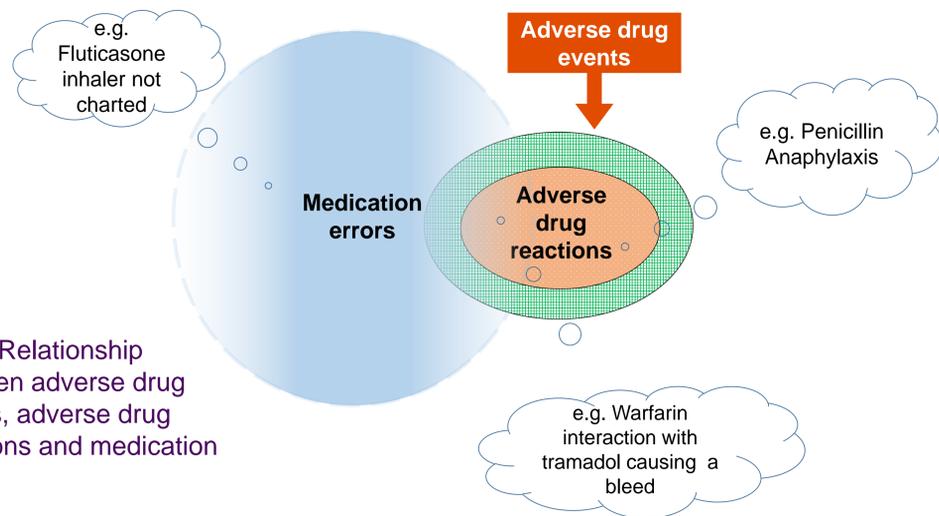


Fig 1. Relationship between adverse drug events, adverse drug reactions and medication errors

METHOD

A systematic review of studies that used multivariable logistic regression, to develop a model or score to predict risk of inpatient ADEs. Terms related to in-hospital ADEs and predictive risk scores were used to search EMBASE, PubMed, CINAHL and Scopus.

Eligible studies were appraised using CHARMS (Checklist for Critical Appraisal and Data Extraction of Risk Prediction Modelling Studies). This included evaluation of:

- Risk score development (outcome definition and measurement, sample size, risk criteria, statistical modelling methods).
- Performance measures (accuracy, area under the receiver operative curve and calibration).
- Validation (internal vs. external).

RESULTS

- Discrimination between high and low risk patients ranged from 0.63 (poor performance) to 0.81 (good performance).
- Criteria in final scores' included number of medications, high risk medications (e.g. anticoagulants), co-morbidities (e.g. heart failure) and laboratory test results (e.g. renal function).
- The BADRI (Brighton Adverse Drug Reaction Risk) Model² and Trivalle's ADR risk score³ used robust development and validation methods (Table 2).

Table 1. Trivalle and BADRI risk scores

Author (year)	Final Model	Score Development		Validation
Tangiisuran et al. BADRI (2014)	Number of medication (≥8) Length of stay (≥ 12 days) Use of anti-diabetic agents Hyperlipidaemia High WCC on admission	Outcome: ADRs = 12.5% 5 variables in risk score Simplified scoring 1 point per variable Risk score range: 0-5 points		External 4 European hospitals Internal bootstrap
		Outcome: ADEs = 39%		
Trivalle et al. (2011)	Number of medications Class 1 to 4 Antipsychotic use Anticoagulant use	Risk Factor	Score	
		Number of medications		
		7-9	+6	
		10-12	+12	
		≥13	+18	
Antipsychotic use	+9			
Anticoagulant use	+7			
Risk score range	0-34			

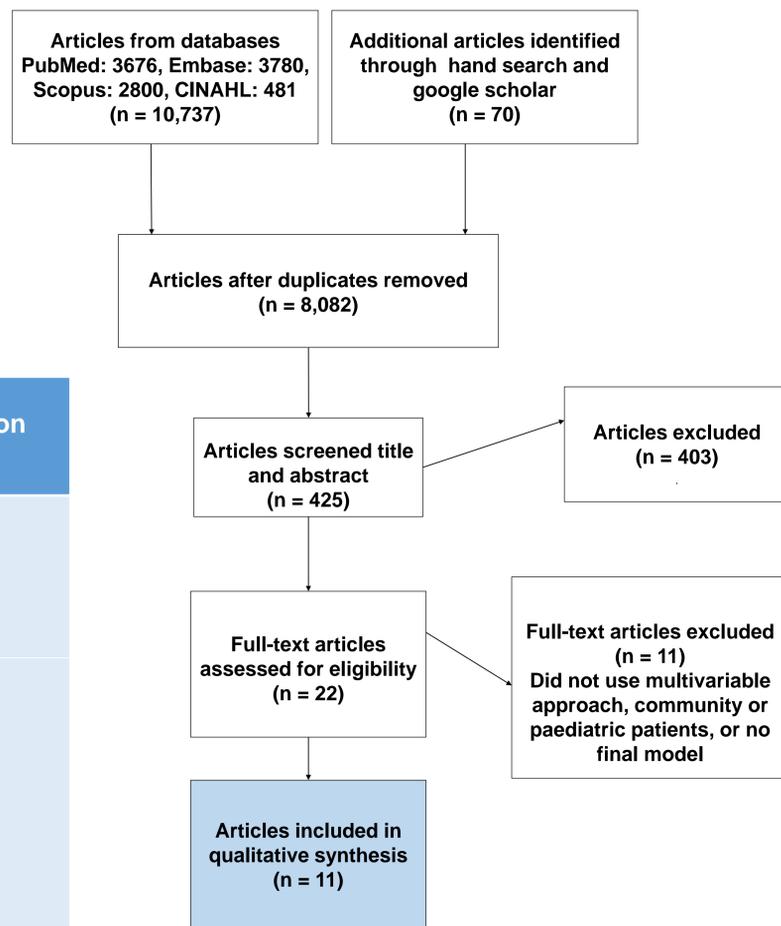


Fig 2. Article selection flow diagram

CONCLUSION

- Two risk scores may have utility in an Australian hospital setting to identify inpatients at high risk of ADEs and will be evaluated in 2018.
- Identifying individuals' at high risk of ADEs offers the potential to provide early and targeted interventions to high risk hospital inpatients, improving safety and optimising health outcomes.