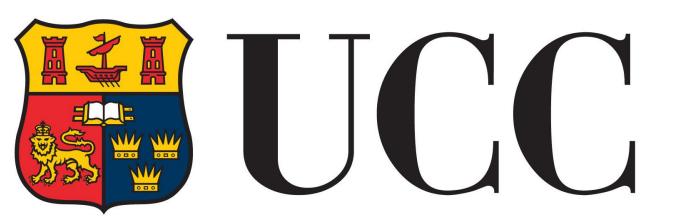


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# **In-Hospital Adverse Drug Reactions in Hospitalised Older Adults: A Systematic Review**

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#### Introduction

- Almost ten percent of older-adults experience an adverse drug reaction [ADR] associated with acute hospitalisation
- Individual studies suggest that up to 1 in 4

Records identified through	Additional records identified
systematic database search	through hand search
(n = 1,872)	(n = 58)
Records after duplicates (n = 1,779)	removed



### experience an ADR in hospital.

This systematic review [SR] aims to evaluate in-hospital ADRs in hospitalised older-adults; frequency, culprit drug classes, severity, and clinical consequence.

#### Methods

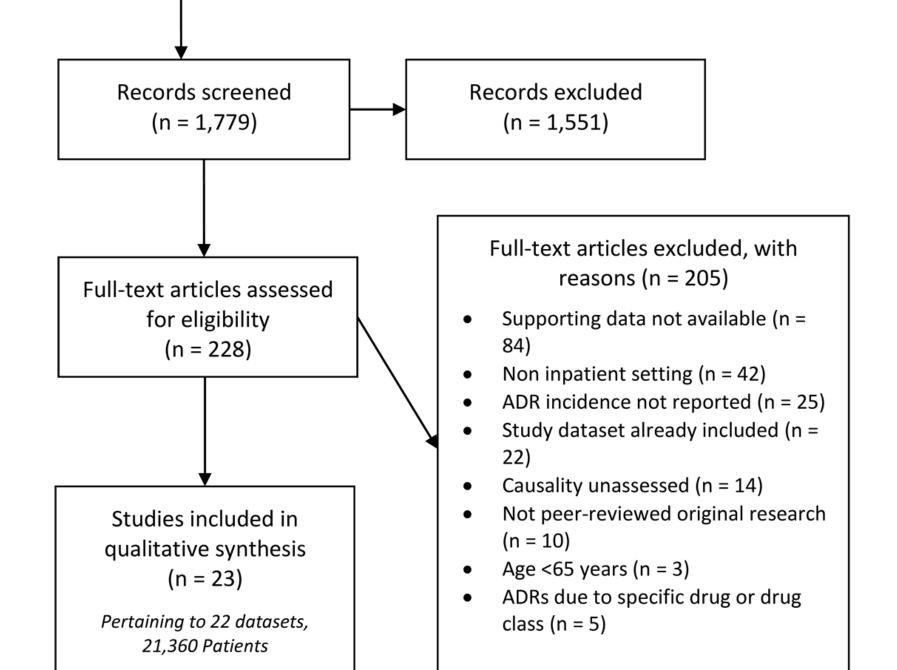
This SR was conducted Following the Preferred Reporting Items for Systematic Reviews and Meta (PRISMA) (Moher et al., 2009). Two Analyses researchers (EJ, KM) screened all papers for inclusion, risk of bias and data extraction independently.

#### Registration

• PROPSERO registration CRD42018079095

#### Search Strategy

- Databases electronic databases [PubMed, Embase and EBSCO-CINAHL, Cochrane Library] and libraryhosted academic sources, google scholar, and grey literature.
- Search term stems aged, ADRs, hospitalized, multimorbid, polypharmacy and hospital-acquired [search strategy available on request from author]
- Bibliographic hand searches of relevant editorials and systematic reviews.



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

#### **Figure 1.** PRISMA Flowchart outlining study selection

#### Results

#### Study selection – see PRISMA Diagram [Figure 1.]

1930 abstracts were identified, 1,779 were screened, 228 underwent fulltext screening. 23 papers reporting 22 studies were included <sup>[1-23]</sup> 11 ADRs in participants  $\geq$  65 years, 11 ADRs all age adults (extractable data for  $\geq$ 65 available in 5 studies, supplemental data provided by authors in 6 studies)

## ≥ 65 years experiences a clinically significant **ADR in-hospital**

## 11 commonly prescribed drug classes account for 85% of ADRs

Diuretics	22%
Anti-thrombotics     Vitamin-K antagonists 10%, Heparin 2%, Platelet aggregation inhibitors 2%	14%
Antimicrobials	12%
Opioids	11%

#### **Paper Inclusion/Exclusion**

- All languages.
- All dates up to and including the date of the final search [15/01/2018] were eligible.
- Any study that reported on ADRs either as a primary or secondary outcome in those aged 65 years or older that were hospitalised at time of ADR occurrence.
  - Review articles, systematic reviews, case reports and letters to the editor were subsequently excluded – their bibliography was hand searched for suitable studies.
- When data reported was for all ages, but there was evidence of  $\geq 65$  cohort the author was contacted requesting data for those aged 65 and over.
  - A template document for completion was provided.
  - Two attempts were made to the listed author, followed by an attempt to contact a co-author.

#### Study Quality / Risk of Bias Assessment

Included studies were assessed for risk of bias and study quality.

- Cochrane for randomised controlled trials
- STROBE checklist for case cohort studies
- Newcastle-Ottawa Scale for non-randomised studies

#### Data Extraction

#### **Characteristics of Included Studies**

21,306 patients were included in the 22 studies; 15,769 (74%) were aged ≥65 years. 50% male, 50% female (reported in 18 studies). Polypharmacy (reported as a mean/median  $\geq$ 5 medications at baseline) was reported and present in 12 studies. Multi-morbidity (reported as a mean/median number of diagnoses  $\geq$ 3 at baseline) was reported in 9 and present in 8 studies.

#### **ADR Rates**

22 Studies reported ADR incidence – 2186 patients  $\geq$  65 years experienced ADRs in-hospital. Median 19.77% [IQR 10.44 – 25.35] Min 4.95% Max 42.19%.

#### **Reported ADR Presentation**

16 studies reported on ADR presentation (n = 13,217, 1,403 ADR presentations). 20% (283) metabolism and nutritional disorders; 17% (246) nervous system disorders; 15% (210) cardiac disorders; 13% (185) gastrointestinal disorders; 10% (148) renal and urinary disorders; 6% (80) blood and lymphatic system disorders.

#### ADR Drugs

ADR associated drugs were extractable in 15 papers (1528 reported drugs in 1253 ADR patients). 85% of ADRs were associated with 11 commonly prescribed medications.

#### ADR Severity

14 studies reported severity (n = 13,171; reported ADRs = 1,947). 72% of reported ADRs were at least of moderate severity. 29% (560 ADRs) were severe.

#### **ADR** Preventability

5 studies assessed preventability (n = 3602, reporting 672 ADRs), 69% of reported ADRs were preventable.

Psycholeptics	6%
Drugs used in diabetes Insulin 3%, oral hypoglycaemic agents 1%	4%
CACE-I, ARBs	4%
Systemic corticosteroids	3%
Drugs for obstructive airway disease	3%
Cardiac glycosides	3%
Anti-hypertensives	3%



We extracted data to assess percentage of study cohort  $\geq$  65 that experienced an ADR, reported presentation of ADRs, Drugs deemed accountable, ADR severity, ADR preventability, any measured outcomes.

#### **Outcomes**

5 papers reported on post ADR outcomes [3 length of stay [LOS], 1 LOSdeath, 1 functional decline].



### **Conclusion:**

- There is a *lack of consistency* in methodologies used for *ADR* identification, assessment and *reporting in the literature*.
- Incident ADRs occurring in-hospital in older adults (2 65 years) are *common*, occurring in *1 in 5 hospitalised* older adults.
- 11 commonly prescribed drug classes account for 85% of all ADRs.
- 1 in 4 of ADRs are severe.
- 2 of 3 ADRs could be preventable.
- Despite this, there is *under-reporting* of measurable clinical outcomes associated with ADRs.
- Development of *drug based* ADR *prediction* tools may lead to better ADR *prevention*.

#### References

- Ayub MN, Da Silva D, Martinbiancho JK, Dal-Pizzol TS. Adverse Drug Reactions in Patients Hospitalized in the Intensive Care Unit of a University Hospital in Southern Brazil. Lat Am J Pharm. 2010 Aug;29(5):688-93.
- Bowman L, Carlstedt BC, Hancock EF, Black CD. Adverse drug reaction (ADR) occurrence and evaluation in elderly inpatients. Pharmacoepidemiology and drug safety. 1996;5(1):9-18.
- Calderon-Ospina C, Bustamante-Rojas C. The DoTS classification is a useful way to classify adverse drug reactions: a preliminary study in hospitalized patients. Int J Pharm Pract. 2010 Aug;18(4):230 Conforti A, Costantini D, Zanetti F, Moretti U, Grezzana M, Leone R. Adverse drug reactions in older patients: an Italian observational prospective hospital study. Drug Healthc Patient Saf. 2012;4:75-80.
- Corsonello A, Pranno L, Garasto S, Fabietti P, Bustacchini S, Lattanzio F. Potentially inappropriate medication in elderly hospitalized patients. Drugs & aging. 2009;26 Suppl 1:31-9.
- Davies EC, Green CF, Taylor S, Williamson PR, Mottram DR, Pirmohamed M. Adverse drug reactions in hospital in-patients: a prospective analysis of 3695 patient-episodes. PloS one. 2009;4(2):e4439
- Fernandez-Regueiro R, Fonseca-Aizpuru E, Lopez-Colina G, Alvarez-Uria A, Rodriguez-Avila E, Moris-De-La-Tassa J. Inappropriate drug prescription and adverse drug effects in elderly patients. Revista Clinica Espanola
- 2011 Sep;211(8):400peva J, Gancheva D, Hristakieva E. A study of adverse drug reactions in hospitalized patients in relation to age. European journal of clinical pharmacy: atención farmacéutica. 2016;18(3):154
- Author contact: elmjennings@gmail.com

- 9. Ganeva M, Gancheva T, Troeva J, Kiriyak N, Hristakieva E. Clinical relevance of drug-drug interactions in hospitalized dermatology patients. Advances in clinical and experimental medicine: official organ Wroclaw Medical University 2013;22(4):555-63.
- 10. Ganeva M, Gancheva T, Lazarova R, Tzvetanova Y, Hristakieva E. A prospective study of adverse drug reactions in a dermatology department. Methods Find Exp Clin Pharmacol. 2007 Mar;29(2):107-1
- 11. Gonzalez-Martin G, Yanez L, Valenzuela E. [Adverse drug reactions among hospitalized elderly patients. Prospective study]. Revista medica de Chile. 1997 Oct;125(10):1129-30
- L2. Harugeri A, Parthasarathi G, Ramesh M, Guido S, Basavanagowdappa H. Frequency and nature of adverse drug reactions in elderly in-patients of two Indian medical college hospitals. Journal of postgraduate medicine. 2011 Jul-Sep;57(3):189-95
- 13. 13. Lavan A, Eustace J, Dahly D, Flanagan E, Gallagher P, Cullinane S, et al. Incident adverse drug reactions in geriatric inpatients: a multicentred observational study. Therapeutic advances in drug safety. 2018;9(1):13-23.
- 14. 14. Leach S, Roy SS. ADVERSE DRUG REACTIONS: AN INVESTIGATION ON AN ACUTE GERIATRIC WARD. Age and ageing. 1986;15(4):241-6. Mohebbi N, Shalviri G, Salarifar M, Salamzadeh J, Gholami K. Adverse drug reactions induced by cardiovascular drugs in cardiovascular care unit patients. Pharmacoepidemiology and drug safety. 2010;19(9):889-94 16. 16. Mugoša S, Bukumirić Z, Kovačević A, Bošković A, Protić D, Todorović Z. Adverse drug reactions in hospitalized cardiac patients: characteristics and risk factors. Vojnosanitetski pregled. 2015;72(11):975-81.
- 17. O'Connor MN, Gallagher P, Byrne S, O'Mahony D. Adverse drug reactions in older patients during hospitalisation: Are they predictable? Age and ageing. 2012;41(6):771-6.
- 18. O'connor MN, O'sullivan D, Gallagher PF, Eustace J, Byrne S, O'mahony D. Prevention of hospital-acquired adverse drug reactions in older people using screening tool of older persons' prescriptions and scree right treatment criteria: A cluster randomized controlled trial. Journal of the American Geriatrics Society. 2016;64(8):1558-6 19. Onder G, Petrovic M, Tangiisuran B, Meinardi MC, Markito-Notenboom WP, Somers A, et al. Development and validation of a score to assess risk of adverse drug reactions among in-hospital patients 65 years or older:
- erontoNet ADR risk score. Archives of internal medicine. 2010;170(13):1142-8.
- 20. O'Sullivan D, O'Mahony D, O'Connor MN, Gallagher P, Gallagher J, Cullinan S, et al. Prevention of adverse drug reactions in hospitalised older patients using a software-supported structured pharmacist intervention: a clust andomised controlled trial. Drugs & aging. 2016;33(1):63-73.
- 21. REICHEL W. Complications in the care of five hundred elderly hospitalized patients. Journal of the American Geriatrics Society. 1965;13(11):973-8
- 22. Tangiisuran B, Graham Davies J, Wright JE, Rajkumar C. Adverse Drug Reactions in a Population of Hospitalized Very Elderly Patients. Drugs & aging. [journal article]. 2012 August 01;29(8):669-79
- 23. Tangiisuran B. Scutt G. Stevenson J, Wright J, Onder G, Petrovic M, et al. Development and validation of a risk model for predicting adverse drug reactions in older people during hospital stay: Brighton Adverse Drug Reactions Risk (BADRI) model. PloS one. 2014;9(10):e111254