INCIDENCE AND PREVENTABILITY OF ADVERSE EVENTS REQUIRING INTENSIVE CARE ADMISSION

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CONTEXT

Adverse events are unintended patient injuries or complications that arise from healthcare management resulting in death, disability or prolonged hospital stay. Adverse events that require critical care are a considerable financial burden to the healthcare system, but also their global impact on patients and society is probably underestimated.

PROBLEM

Despite the awareness that a substantial number of adverse events are detected among **unexpected admissions to intensive care units** (ICU), little is known about the epidemiology of these events. Therefore, understanding system specific organisational characteristics of adverse events that require a higher level of care might be important in setting up preventive interventions to reduce unexpected intensive care (re-)admissions.

OBJECTIVES

. To estimate the **incidence** and **preventability of adverse events requiring unplanned ICU (re-) admission**.

. To assess the **types** and **consequences** of these events including mortality rates, length of ICU stay and direct medical costs.
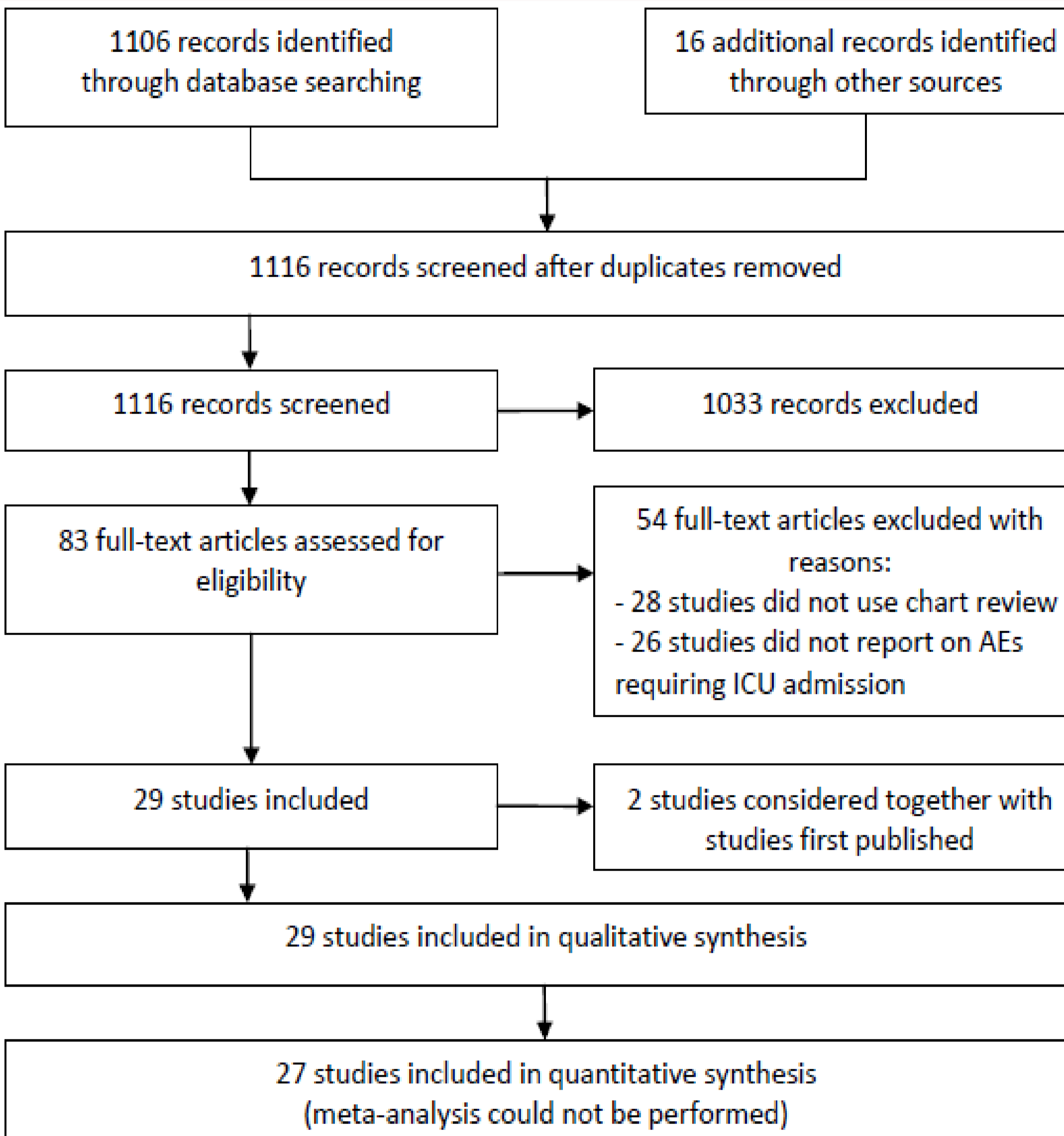
METHODS

. A **multidisciplinary review team** was composed

. Search strategy:
  . MEDLINE (from 1966 to present), EMBASE (from 1974 to present) and CENTRAL (version 1 - 2010) were searched for studies reporting on unplanned admissions to ICUs.
  . Several other sources were searched for additional studies.

. Inclusion criteria:
  . Only quantitative studies that used chart review for the detection of adverse events requiring intensive care admission were considered eligible.
  . ICUs were defined as specialized hospital facilities which provide continuous monitoring and intensive care for acutely ill patients.

. Study selection:
  . Two reviewers independently selected the studies, extracted data and assessed the methodological quality of the included studies.
  . Any discrepancies between reviewers were resolved by discussion.

. Details of the predefined criteria to conduct this systematic review are available in the **review protocol: www.joannabriggs.edu.au**

. 27 studies were reviewed

RESULTS

Flow Diagram of study selection (based on PRISMA Statement, 2009)

. Meta-analysis of the data was not appropriate due to methodological and statistical heterogeneity between studies.

. Subgroup analyses based on population, country and methodological quality of the studies could not clarify heterogeneity. Therefore, results are presented in a descriptive way.

. The percentage of surgical and medical **adverse events** that required ICU admission ranged from **1.1%** to **37.2%**.

. **ICU readmissions** varied from **0%** to **18.3%**.

. The **preventability** of the adverse events varied from **17%** to **76.5%**.

. Consequences of the adverse events included a **mean length of ICU stay** that ranged from **1.5 days** to **10.4 days** for the patient's first stay in ICU.

. **Mortality** percentages varied between **0%** and **58%**.

RECOMMENDATIONS

. To decrease adverse events that necessitate ICU admission, several systems are recommended such as **early detection of patients with clinical instability** on general wards and the implementation of **rapid response teams**.

. **Step-down** or **intermediate care units** could be a useful strategy for patients that require monitoring to avoid ICU readmissions. However the effectiveness of such systems needs to be investigated.

LIMITATIONS

. This review only includes studies that used the investigation of adverse events through chart review.

. Our strict inclusion criteria potentially may have caused us to exclude interesting studies with prospective study designs or studies addressing incident reporting.

LESSONS FOR OTHERS

. There is a need for further studies on the detection of adverse events. Planning of future studies should aim to **standardize terminology and measures of outcomes** (standard taxonomy) and to apply more **explicit study designs** in order to allow for comparisons across studies. This area of research is important in order to identify and explain failure of healthcare systems leading to patient harm, with the ultimate aim to improve the quality and safety of care.

REFERENCES

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Primary and secondary outcomes*

Authors	Participants		Sample size		Unplanned ICU admissions	ICU discharges	Primary outcomes			Secondary outcomes	
	Provider (population)	Surgical procedures/ hospital admissions (study period)	Records reviewed	ICU admissions (study period)			AEs requiring ICU readmissions	AEs requiring ICU admission	Preventable AEs	Mean length of ICU stay (days) for AEs	Mortality
Barnes and Havill [26]	A	83 173 procedures	110	1929	110	–	–	110 (5.7)	–	–	12 (10.9)
Cullen et al. [29]	A,S	17 093 procedures	71	–	71	63	0	71	–	1.5	8 (11.3)
Downey and O'Connell [30]	P-A	14 970 procedures	35	640 (P-A)*	35	–	–	35 (5.5)	7 (20)	4.2	1 (2.9)
El Shobary et al. [33]	S	–	250	83	7	–	–	7 (8.4)	–	–	0 [0]
Gupta et al. [36]	S	–	202	–	26	–	–	26	–	–	–
Haller et al. [22]	S	44 130 procedures	188	5552	201	–	–	183 (3.3)	140 (76.5)†	–	22 (10.9)
Hayes et al. [37]	S	2 444 procedures	23	–	23	–	–	23	–	10.4	3
Heisler et al. [38]	S-G	903 procedures	736	–	7	–	–	7	–	–	0 [0]
Kurowski and Sims [40]	P-A	55 196 procedures	358	420	76	–	–	76 (18.1)	–	–	–
Okafor [43]	S, A	6 581 procedures	26	497	26	–	–	26 (5.2)	–	3.2	8 (30.8)
Piercy et al. [44]	A	–	165	–	165	–	–	165	28 (17)	–	24 (14.6)
Satyawan et al. [45]	S	13 170 procedures	76	204	76	48	–	76 (37.3)	–	–	28 (36.8)
Swann et al. [47]	S	18 555 procedures	265	679	34	–	–	34 (5)	7 (20.6)	1.5	0 (0)
Yehia et al. [50]	S	–	17	–	–	–	–	2	–	–	–
Buist et al. [27]	GW	19 853 admissions	112	515	75	40	4	7 (14.6)	–	5 ± 6.9	35 (46.7)
Darchy et al. [23]	GW	24 555 admissions	623	623	68	521	–	68 (10.9)	35 (51.5)	6.9 ± 9.3	9 (13.2)
Dunn et al. [31]	P	103 255 admissions	1612	–	1066	–	–	207	–	–	48 (23.2)
Kafy et al. [39]	G	–	1792	–	6	–	0	6	–	–	–
Lehmann et al. [41]	S, M, P	–	64	5727	64	–	–	64 (1.1)	22 (34.4)	3	8 (12.5)
McGloin et al. [42]	GW	15 635 admissions	563	–	98‡	–	11	98‡	31 (31.6)	3.5‡	43 (50)
Wolff [48]	GW	5 115 admissions	497	–	–	–	–	14	–	–	–
Wolff [49]	GW	–	1465	–	24	–	–	24	–	–	–
Chaboyer et al. [28]	ICU	–	300	507	–	–	–	8	–	–	–
Durbin and Kopel [32]	ICU (M,S)	–	82	–	–	1803	83	–	–	8.3 ± 16.1 (firststay)	34 (41)
Endacott et al. [34]	ICU	–	388	–	388	71	–	–	–	–	–
Franklin and Jackson [35]	MICU	–	299	512	–	365	–	36§	15 (41.6)	11§	18 (58)§
Stewart and Voss [46]	CCU	–	44	1776	–	–	–	44	15 (34.1)	13.3§	4 (9.1)

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