Systematic Reviews in the Prevention of Research Waste in Emergency Medicine Randomized Controlled Trials

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INTRODUCTION

Research waste is a growing concern in medical research. Remarkably, an estimated 85% of wasted medical research results in billions of research dollars wasted each year due to design flaws, bias, or not researching relevant questions. (Chalmers and Glasziou, 2009).

Systematic reviews — which synthesize data from multiple studies — are a well-recognized methodology for mitigating research waste, owing to their ability to highlight research questions that have not been previously addressed.
Studies have shown that a portion of randomized controlled trials in medicine have not used SRs properly.

A 2018 study revealed that only 56% of 622 RCTs from the top eight anesthesiology journals included a SR , and of that 56%, only 20% cited SRs as justification to start their new trial. (Elkar, Cavar, Puljak, 2018).

These results imply that other areas of medicine may not be using SRs correctly - wasting millions of dollars in medical research funding. In the field of emergency medicine, there has been no studies conducted over this problem.

OBJECTIVES

This study's goal is to find out if randomized controlled trials in emergency medicine research included a SR, and to see if those trials that did include SRs used them as justification for their study.

METHODS

Study Design and Setting:.We included RCTs from the top ten peer-reviewed Emergency Medicine journals, included studies were published between 01/01/2014 and 12/31/2017

Interventions:

We conducted a pubmed search and The search produced a total of 615 articles. Bibliographic records (including titles, journal names, author names) of these 615 articles were then exported to a Google spreadsheet

Measurements:

Two Authors, MTA and BJ screened the excel sheet created by MTS to verify the inclusion of the studies based on the criteria that each study was truly an RCT.
Upon screening of included studies, MTA and BJ then proceeded with data extraction independently.
Once data extraction was completed, MTA and BJ met to compare data extraction results and resolve any disputes.
Our primary outcome was citation of an SR, with number of SRs cited. Our secondary outcome was the number of SRs cited in different sections of RCTs.

Analysis:

Following the resolution of disputes on the included data, author MTS conducted the data analysis. Descriptive data were calculated and presented as percentages and frequencies. Data analysis was conducted using Microsoft Excel.

RESULTS

Our search string returned a total of 615 studies between 2014- 2017 from the top ten journals in emergency medicine. Of these studies, 275 RCTs met our inclusion criteria.

Study Characteristics:

Of the 275 studies included, only (60.36%) reported a funding source. Majority of the interventions in RCTs were related to drug efficacy (29.45%), followed by procedures (26.18%), other (24.73%), and medical device coming last at (19.64%). Majority of the trials were conducted using the parallel group study design (69.09%), with cluster randomised design only used in (3.64%). Majority of our included studies came from *The American Journal of Emergency Medicine*, while journals like Clinical Toxicology and Current Opinion in Critical Care had no included study. Of the included studies, (65.82%) had positive outcomes.

Usage of Systematic Reviews in Introduction:

Of the 275 analyzed studies, 95 studies (34.55%) cited a SR in their introduction. Of these 95 studies, SRs were cited as a justification for the trial in 77 (28%) studies. The SRs were cited verbatim as a justification for the trial by 40 (14.55%) and justification was only inferred by 37 (13.45%) studies.

Usage of Systematic Reviews in Methods:

Of the 275 analyzed studies, 15 studies (5.45%) cited a SR in their methods section. Of these 15 studies, SRs were cited as a justification for the trial in six (2.19%) studies. The SRs were cited verbatim as a justification for the trial by four (1.45%) and justification was only inferred by two (0.73%) studies.

Usage of Systematic Reviews in Discussion:

Of the 275 analyzed studies, 73 studies (26.55%) cited a SR in their discussion section. Of these 73 studies, SRs were cited as a justification for the trial in 56 (20.36%) studies. The SRs were cited verbatim as a justification for the trial by 26 (9.45%), justification was only inferred by 30 (10.91%) and justification was unclear in one (0.36%) study.

Usage of Systematic Reviews in the Entire Manuscript

Of the 275 analyzed studies, 135 studies (48.36%) cited a SR anywhere in their manuscript. Of the 135 studies, SRs were cited as justification for the trial in 106 (78.52%) studies.

Table 1: Characteristics of RCTs

Characteristic		N	Frequency
Funding Type			
	Not reported	109	39.64%
	Government	56	20.36%
	Nonprofit	31	11.27%
	No funding	28	10.18%
	Hospital / University	27	9.82%
	Industry	15	5.45%
	Combined nonprofit and industry	5	1.82%
	Self-funded	3	1.09%
Type of Intervention			
	Drug	81	29.45%
	Procedure	72	26.18%
	Other	68	24.73%
	Medical Device	54	19.64%
Type of Trial			
	Parallel Groups	190	69.09%
	Crossover	72	26.18%
	Cluster Randomized	10	3.64%
	Unsure	3	1.09%
Mean Sample Size			
		294	

Table 2: Citation of SRs

Section	Trials that Cited SRs		Trials that Cited SRs as Justification for Trial	
	N	Frequency	N	Frequency
Introduction	95	34.55%	77	28.00%
Methods	15	5.45%	6	2.18%
Discussion	73	26.55%	56	20.36%
Entire Manuscript	135	48.36%	106	38.55%

CONCLUSION

Only 39% of emergency medicine RCTs in our study used SRs properly. Proper SR use in RCTs are recognized as a way to prevent research waste. The lack of proper use of SRs discovered in our study suggests that funding in emergency medicine research is wasted. This discovery is concerning because 50% of our included RCTs were funded by a known source. Emergency medicine research requires a commitment from every physician-scientist to follow clinical research guidelines that call for proper systematic review use. Emergency medicine — a area of medicine where patients' lives are at risk — cannot afford inefficient research.

REFERENCES

1.Berge E, Al-Shahi Salman R, van der Worp HB, Stapf C, Sandercock P, Sprigg N, Macleod MR, Kelly PJ, Nederkoorn PJ, Ford GA; European Stroke Organisation Trials Network Committee.. Increasing value and reducing waste in stroke research. Lancet Neurol. 2017 May;16(5):399-408. doi: 10.1016/S1474-4422(17)30078-9. Review. PubMed PMID: 28414653.Cited in PMC

1.Chalmers I, Glasziou P. Avoidable waste in the production and reporting of research evidence. Obstet Gynecol. 2009 Dec;114(6):1341-5. doi: 10.1097/AOG.0b013e3181c3020d. PubMed PMID: 19935040. Cited in PMC

1.Clarke M. Doing new research? Don't forget the old. PLoS Med. 2004 Nov;1(2):e35. Epub 2004 Nov 30. PubMed PMID: 15578106; PubMed Central PMCID: PMC529424. Free full text Cited in PMC

1.Engelking A, Cavar M, Puljak L. The use of systematic reviews to justify anaesthesiology trials: A meta-epidemiological study. Eur J Pain. 2018 Nov;22(10):1844-1849. doi: 10.1002/ejp.1280. Epub 2018 Jul 24. PubMed PMID: 29978522.