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Identifying a list of healthcare 'never events' to effect system change: a systematic review and narrative synthesis

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ABSTRACT

Background Never events (NEs) are patient safety incidents that are preventable and so serious they should never happen. To reduce NEs, several frameworks have been introduced over the past two decades; however, NEs and their harms continue to occur. These frameworks have varying events, terminology and preventability, which hinders collaboration. This systematic review aims to identify the most serious and preventable events for targeted improvement efforts by answering the following questions: Which patient safety events are most frequently classified as never events? Which ones are most commonly described as entirely preventable?

Methods For this narrative synthesis systematic review we searched Medline, Embase, PsycINFO, Cochrane Central and CINAHL for articles published from 1 January 2001 to 27 October 2021. We included papers of any study design or article type (excluding press releases/announcements) that listed NEs or an existing NE framework.

Results Our analyses included 367 reports identifying 125 unique NEs. Those most frequently reported were surgery on the wrong body part, wrong surgical procedure, unintentionally retained foreign objects and surgery on the wrong patient. Researchers classified 19.4% of NEs as 'wholly preventable'. Those most included in this category were surgery on the wrong body part or patient, wrong surgical procedure, improper administration of a potassium-containing solution and wrong-route administration of medication (excluding chemotherapy).

Conclusions To improve collaboration and facilitate learning from errors, we need a single list that focuses on the most preventable and serious NEs. Our review shows that surgery on the wrong body part or patient, or the wrong surgical procedure best meet these criteria.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Never events continue to occur, cause catastrophic patient harm and contribute to increased length of stay and hospital costs. There is great variability in which events are considered 'never events' and the language used to describe them.

WHAT THIS STUDY ADDS

⇒ This study identifies those events most frequently identified as a never event, and which ones are the most preventable.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ A standardised list of the most preventable never events will allow organisations to collaborate and learn from each other, leading to greater reductions in never event incidence.

INTRODUCTION

Never events (NEs) are a subset of patient safety incidents that are preventable and so serious that they should never happen.[1–3] Examples include operating on the wrong patient or incompatible blood transfusion. Dr Ken Kizer and the National Quality Forum (NQF) introduced the first list of 27 NEs in 2002 to standardise reporting[2] and identify patient safety priorities for hospitals.[4] Since then, additional lists have been developed in the USA and internationally. Despite the multitude of papers published on the topic, NEs and their resultant harms continue to occur[5 6]; in the UK, 168 NEs were reported from April to August 2022,[5] and in the USA 436 events were reported in the first 6 months of 2019.[6]

The purposes of the NE lists vary: providing patient safety guidance,[7] specifying how organisations should respond to NEs[8 9] or financially penalising institutions when the events occur.[9 10] As a result, the lists include different events (which include errors, complications and patient outcomes), use different terminology and have varying degrees of preventability. One example is patient falls. Not all lists include patient falls as NEs, and the terminology used to describe falls ranges from 'death or serious injury from a fall while being cared for in a health-care facility'[7 p4 11 p1 7 9] to 'falls from poorly restricted windows'[3] (p 12). One framework[10]

(p 1) includes them in a broader category of 'falls and trauma'. Most consider patient falls to be largely preventable, whereas some believe they are entirely preventable.[9] The lack of standardisation on what constitutes an NE can hinder our efforts to identify, report and manage them. It also impedes the ability of organisations to collaborate and learn from each other to reduce the occurrence of these events.[1]

This narrative synthesis systematic review aims to improve standardisation by answering two questions posed in our protocol[1]: Which patient safety events do organisations and researchers most frequently classify as NEs? Which ones are most commonly described as entirely preventable? Previous syntheses included versions of lists that are now out of date, looked at a narrow subset of NEs or did not address their perceived preventability. We will expand on previous work by identifying which events are consistently included as NEs to develop a core list for targeting collaborative improvement efforts.

METHODS

We used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 guidelines[12] to report this systematic review. The review was not registered with PROSPERO as it did not meet the criteria.

Definitions

Consistent with our protocol,[1] our definition of NE was informed by Hegarty *et al*, whose systematic review[13] identified five dimensions of serious reportable events: preventable; identifiable and measurable; could reoccur; cause or can potentially cause avoidable death or injury; and have the potential for learning.

Eligibility criteria

We used the Sample, Phenomenon of Interest, Design, Evaluation, Research type (SPIDER) framework to guide the development of the inclusion and exclusion criteria. SPIDER was chosen as it does not require a study intervention or outcome and is more appropriate for reviews that use qualitative synthesis.[14]

Full details on our methods and eligibility criteria have been published previously[1] and are outlined in table 1. We included peer-reviewed and grey literature reports that discussed patient safety events that should never happen. If they used a term similar but not identical to 'never event' (eg, sentinel event), they also had to include language that said the events were largely or entirely preventable. Included papers had to either describe one or more individual NEs or reference an existing framework that could be obtained by the reviewers. If a framework had been updated and previous versions exist, the framework year also had to be stated. We included reports with any study design, and any article type except press releases and other announcements.

Data sources and search strategy

A health sciences librarian searched the following databases: Medline and Medline in Process via Ovid (1946 to 26 October 2021), Embase Classic+Embase via Ovid

Table 1 Inclusion and exclusion criteria by SPIDER framework category

SPIDER framework	Inclusion criteria	Exclusion criteria
(**S**) **S**ample	Articles describing patients interacting with the medical system.	► Any articles or reports that feature patient safety incidents that take place outside of the medical system (eg, dentistry). ► If events pertained exclusively to care provided outside acute or chronic care institutions. ► Articles published before 2001 (when the term was first introduced).
(**PI**) **P**henomenon of **I**nterest	Patient safety events that meet our definition of never events: ► Use the term 'never event' or one similar, such as 'serious reportable event' or 'sentinel event'. ► If a term other than never event was used, the article also had to indicate that the event is largely or wholly preventable, including similar terms such as 'unacceptable' or 'avoidable'.	Any articles or reports about patient safety events that do not specifically state which events are never events or did not use a pre-existing and obtainable list.
(**D**) **D**esign	Any study design, including peer-reviewed papers, regional/organisational guidelines and/or policies, or reporting papers.	None.
(**E**) **E**valuation	Any.	None.
(**R**) Research type	Peer-reviewed published literature (including empirical studies, literature reviews, commentaries, letters to the editor, reports and book chapters) and grey literature (including white papers and policy documents).	Press releases and other announcements.

(1947 to 26 October 2021), APA PsycINFO via Ovid (1806 to October week 4, 2021), Cochrane Central via Ovid (September 2021) and CINAHL via EBSCOHost (1947 to 27 October 2021). A search strategy was developed in Medline (online supplemental appendix A) and adapted for other databases. An information specialist peer reviewed the strategy using the Peer Review of Electronic Search Strategies guidelines.[15] All databases were searched from 2001, the year 'never event' was first coined, to 27 October 2021. There were no other publication restrictions. Additional sources were identified using backward searches of article bibliographies.

We conducted a search of the grey literature based on the strategy presented by Hegarty *et al*,[13] as well as website searches of organisations with known NE lists: international, federal or US state departments of health, US healthcare insurers and US healthcare accreditation or patient safety organisations. For organisations with updated lists, only the most recent policy was retained to avoid duplication.

We processed all references in EndNote (Clarivate Analytics, Philadelphia, USA) and removed duplicates using DistillerSR (DistillerSR, Ottawa, Canada), a widely used application to screen articles in a systematic review.[16]

Selection process

As outlined in our protocol,[1] four reviewers (CLB, RDG, JZ, CM) independently screened the titles, abstracts and full-text articles for eligibility in DistillerSR. To ensure consistent application of the eligibility criteria, all reviewers participated in calibration exercises. Inter-rater reliability was assessed using the kappa statistic in Distiller; the lowest acceptable score was 0.61, which is considered the low threshold for moderate reliability.[17] Title and abstract screening calibration included a minimum of 50 titles and abstracts and continued until the minimum kappa was reached. Similarly, full-text screening calibration involved a minimum of 15 full-text articles with the same kappa threshold. Two reviewers screened each article, resolving disagreements by consensus. If consensus was not reached among the two, the article was reviewed by the group of four.

Data collection process and data items

Two reviewers (CLB, RDG) extracted data from eligible articles using a custom form in DistillerSR. One reviewer extracted the data and the second assessed it for accuracy, resolving differences by consensus. Extracted data included: country; existing framework(s) used in the paper; patient safety incident(s) classified as NEs; if the NE was currently in use (eg, in a framework or institution) or proposed; preventability of the NE (wholly, largely or not stated); discord between the frameworks and authors' assessment of preventability; medical specialty; article type; and study design.

Risk of bias and quality assessment

The articles were found not to be amenable to a risk of bias assessment, as most involved a study design which did not involve patient allocation. Therefore, no risk of bias assessment was conducted. Similarly, we did not conduct a quality assessment due to the large number of articles that did not involve a study (eg, narrative summaries, policy statements).

Synthesis methods and effect measures

Due to the heterogeneity in both article type and study design, we did not attempt a meta-analysis. Our primary outcome variables in this narrative synthesis were the frequency of papers reporting patient safety incidents as NEs and which events were considered entirely preventable. We developed our NE classification post hoc based on the categories found in the literature. We have presented our findings as frequencies (percentages) and descriptive text.

Patient and public involvement

No patients or members of the public were involved in the design, conduct, reporting or dissemination plans of our research.

RESULTS

Our search results contained 6992 unique citations after removing duplicates (figure 1). From them we excluded 6255 that did not meet our eligibility criteria. We excluded another 337 articles after reviewing the full-text citations largely because they neither identified individual NEs nor specified an existing framework (47%), or because they were non-scholarly (eg, media releases; 30%). Thus, our analyses were based on 367 articles.[3 4 7–11 18–377] A full list of these articles and the information we extracted from them are found in online supplemental tables 1 and 2.

Article frequency

Researchers in the USA and the UK contributed the majority of papers (n=314, 85.6%; table 2), with American authors writing almost half (n=179, 48.8%). More than half of the articles were peer reviewed (n=206, 56.1%; table 2). Conference abstracts and proceedings accounted for another 27.9% (n=102), and 10.8% of articles were grey literature, which included the majority of the existing framework documents.

Most papers were associated with a specific specialty (n=229, 62.4%; table 2) most commonly surgery (n=136, 59.4%) or anaesthesiology (n=18, 7.9%). Among surgical specialties, orthopaedics was most frequently reported (n=14, 10.3%). Papers from the UK were more likely to have an anaesthesiology focus compared with the USA (19.4% vs 3.2%, respectively) and less likely to have a surgery focus (59.7% vs 81.9%, respectively).

Frameworks

The majority of articles (n=301, 82.0%) used at least 1 of 12 identified NE frameworks (table 2). Seven of those

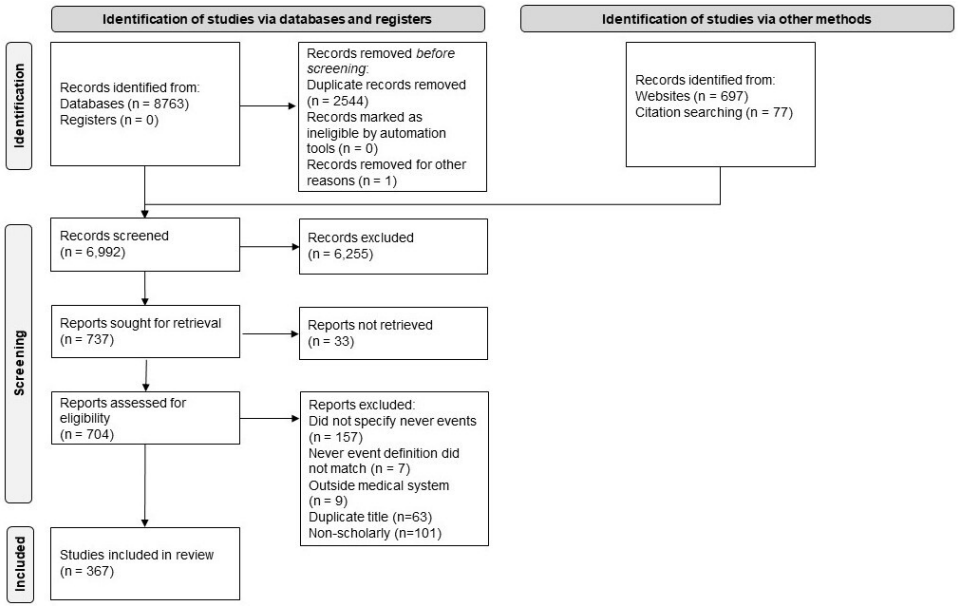

Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart.

frameworks were developed by US-based organisations, representing national patient safety groups, hospital accreditation organisations and healthcare insurers. These US frameworks were included in 59.7% of the articles. Two frameworks originated in the UK and were included in 113 (30.8%) papers. Among these, all but one cited the National Health Service's (NHS) NE list. All frameworks but one identified events that could take place in different clinical settings (eg, surgery, obstetrics, inpatient care). The remaining framework[262] only identified NEs related to medication. Frameworks from the NHS,[3] The Joint Commission (TJC),[8 330–333] Centers for Medicare & Medicaid Services (CMS)[10 67] and the NQF[7] were included in more than 50 articles each (range: 56–112). The other eight frameworks[9 35 60 77 85 146 262 321] were referenced less than 10 times each.

The terminology used to describe NE included: never event (n=8),[3 9 60 77 85 146 262 321] sentinel event (n=2),[35 331] serious reportable event (n=1),[7] hospital-acquired condition (n=1)[10] or preventable surgical error (n=1).[67] Two organisations have more than one list of NEs. CMS has identified both preventable surgical errors[67] and hospital-acquired conditions.[10] TJC has a list of sentinel event alerts[330–332] as well as National Patient Safety Goals.[8 333] For each organisation we considered the two lists as a single framework.

Never events

The 367 papers included 125 unique NEs (table 3, online supplemental appendix B), comprising medical errors, complications and patient outcomes. Four NEs were included in more than 100 papers each, all of which were errors: surgery on the wrong body part (n=165), wrong surgical procedure (n=141), unintentionally retained foreign objects (URFO; n=137) and surgery on the wrong patient (n=135). Of the remaining NEs, those included in the 10 most frequently reported were not limited to errors: incompatible blood transfusion or organ transplant (n=75), patient falls (n=70), hospital-acquired pressure ulcer (n=65), fires or burns (n=60), maladministration of insulin/issues with blood sugar control (n=59) and intravascular air embolism (n=58). A full list of the NEs can be found in online supplemental appendix B. These 125 NEs were collectively described with 263 alternative terms, which ranged from 1 to 14 alternative terms per event (online supplemental appendix C).

Twelve NEs have been removed from at least one of the frameworks (table 3). Two of these events, intravascular air embolism and maladministration of insulin or issues with blood sugar control, are among our 10 most common events. Four of these events remain active in other frameworks: administration of the wrong gas, air embolism, electric shock and hypoglycaemia/issues with blood sugar control. A fifth event, wrongly prepared high-risk injectable medication, is similar to the NQF 'medication error' NE, which includes wrong preparation but is not specific to 'high risk injectable' medications. Four events were proposed as NEs but do not appear to be used by organisations or researchers: maladministration of antibiotics; entrapment of a foreign body in the airway and oesophagus during thoracic surgery; infant death or injury after multiple attempts with multiple instruments to effect an operative vaginal birth; and infant death or injury after prolonged periods of repetitive coached second-stage labour pushing efforts during a non-reassuring fetal heart rate pattern.

All of the four most common NEs (surgery on the wrong body part, wrong surgical procedure, URFO and surgery on the wrong patient) were included in all current versions of the four major frameworks (NHS, TJC, CMS, NQF; table 4). However, none of the remaining 10 most

Table 2 Descriptive characteristics of included reports (n=367)

Characteristic	n (%)
Country	
USA	179 (48.8)
UK	135 (36.8)
France	10 (2.7)
Australia	7 (1.9)
Not specified	16 (4.4)
Other*	20 (5.4)
Type of article	
Peer reviewed	206 (56.1)
Conference abstract	102 (27.9)
Grey literature	40 (10.8)
Other†	19 (5.2)
Study design	
Descriptive (including root cause analysis)	134 (36.5)
Narrative summary	100 (27.3)
Quality improvement/quasiexperimental	69 (18.8)
Editorial or opinion	38 (10.4)
Other‡	26 (7.1)
Never event framework incorporated§	
National Health Service (UK)	112 (30.5)
The Joint Commission (USA; includes sentinel events and National Patient Safety Goals)	82 (22.3)
Centers for Medicare & Medicaid Services (USA)	73 (19.9)
National Quality Forum (USA)	56 (15.3)
Agence nationale de sécurité du médicament et des produits de santé (France)	9 (15.3)
Australian Sentinel Events	5 (1.4)
Leapfrog (USA)	5 (1.4)
Other¶	9 (2.4)
No existing framework used	66 (18.0)
Specialty**	
Surgery	136 (59.4)
Anaesthesiology	18 (7.9)
Intensive care	8 (3.5)
Obstetrics and gynaecology	6 (2.6)
Ophthalmology	6 (2.6)
Infectious diseases	5 (2.2)
Radiology	5 (2.2)
Other††	46 (12.5)
No specialty noted	138 (37.6)

Continued

Table 2 Continued

Characteristic	n (%)

*Other countries include: Brazil, Canada, Germany, Egypt, Italy, Korea, Denmark, Malta, South Africa, Spain, Switzerland and a collaboration of 30 low-income countries.
†Other article types include: thesis, book chapter, pamphlet, preprint and peer-reviewed magazine article.
‡Other study designs include: case series/study/report, cohort, Delphi survey, clinical guidance, letter to the editor, panel session, policy, qualitative and toolkit.
§Papers could incorporate >1 framework, thus totals may not equal to 100%.
¶Other frameworks include: Canadian Patient Safety Institute, Cigna, Hawaii Medical Service Association (HMSA) Blue Cross Blue Shield, UK General Practice Group and Colorado Medicaid.
**Papers could involve more than one specialty, thus totals may not equal to 100%.
††Other specialties include: blood management, burn unit, cardiology, critical care, dermatology, emergency medicine, gastroenterology, general medicine, geriatrics, inpatient acute care, neonatology, neurology, oncology, organ transplantation, otolaryngology, pain management, palliative care, paediatric intensive care unit, paediatrics, respiratory medicine, rheumatology, trauma and urology.

common events were included in all major frameworks. Incompatible blood transfusions, patient falls, pressure ulcers and fires or burns were included in three of the major frameworks. Air embolism and issues with blood sugar control were included in two of the major frameworks. Fourteen papers (3.8%) included NEs which the authors incorrectly said were in an existing framework.[26 82 113 119 120 122 193 216 217 223 301 303 366 372]

Preventability of events

The existing frameworks differed on how preventable they claim NEs are, with three frameworks declaring that their NEs are entirely preventable. Of the remaining lists, five stated NEs are largely preventable, three failed to identify the level of preventability and for one (TJC) the preventability depends on the individual NE. The NHS framework has changed its view of preventability over time from largely to wholly[3 7 8] and back to 'eminently' preventable.[3]

Overall, 60.2% of the NEs recorded were deemed largely preventable and 19.4% wholly preventable by the authors. However, the preventability varied by NE (table 3). For another 20.4%, the preventability was unclear. In these cases, the authors either used the term NE without specifying the preventability, or they incorporated multiple lists that included both entirely and largely preventable events. Surgery on the wrong patient (48.1%), wrong surgical procedure (46.8%) and surgery on the wrong body part (44.8%) were most likely to be presented as entirely preventable (table 3). Maladministration of a

Table 3 The 25* most frequently cited never events and their stated preventability

Never event	Preventability				
	Wholly	Not wholly	Unclear	Total citations	% wholly preventable†
Surgery on the wrong body part‡	56	69	40	165	44.8
Wrong surgical procedure§	52	59	30	141	46.8
Unintentionally retained foreign object	29	67	41	137	30.2
Surgery on the wrong patient	51	55	29	135	48.1
Transfusion or transplantation of incompatible blood, blood products/components or organs	13	45	17	75	22.4
Patient fall	6	55	9	70	9.8
Hospital-acquired pressure/decubitus ulcer	5	49	11	65	9.3
Fires or burns	8	41	11	60	16.3
Maladministration of insulin or issues with blood sugar control¶	7	40	12	59	14.9
Intravascular air embolism¶	4	43	11	58	8.5
Catheter-associated urinary tract infection (CAUTI)	0	42	6	48	0.0
Vascular catheter-associated bloodstream infection	0	40	6	46	0.0
Electric shock¶	4	32	5	41	11.1
Misplaced nasogastric or orogastric tube	7	21	12	40	25.0
Suicide, attempted suicide or self-harm in a patient	8	19	8	35	29.6
Deep vein thrombosis/pulmonary embolism	0	31	4	35	0.0
Entrapment in bedrail or injury from use of restraints	7	19	7	33	26.9
Surgical site infection/mediastinitis following coronary artery bypass graft	0	30	2	32	0.0
Unspecified medication error	6	16	7	29	27.3
A line designated for oxygen or other gas contains no gas, the wrong gas or is contaminated¶	6	16	4	26	27.3
Patient abduction or release to unauthorised person	5	15	6	26	25.0
Device misuse or malfunction	6	15	4	25	28.6
Crushing injury	0	24	1	25	0.0
Intraoperative or immediate postoperative death in an ASA class 1 patient	5	16	4	25	23.8
Wrong-route administration of medication (excluding chemotherapy)	7	10	7	24	41.2

*A full list of never events can be found in online supplemental appendix B.
†The denominator included wholly and not wholly preventable events.
‡Includes wrong-side nerve block and wrong-level surgery.
§Includes wrong implant/prosthesis.
¶Removed from ≥1 existing framework.
ASA, American Society of Anesthesiologists.

Table 4 Citation frequency of the top 10 never events involving the major existing frameworks*†

Never event	All papers (n=367)	Centers for Medicare & Medicaid Services 2021 (n=73)‡	National Health Service 2021 (n=113)	National Quality Forum 2011 (n=56)	The Joint Commission 2022 (n=82)§	No framework specified (n=67)
Wrong body part¶	165 (45.0)	26 (35.6)	53 (47.3)	38 (67.9)	63 (76.8)	9 (13.6)
Wrong procedure**	141 (38.4)	25 (34.2)	44 (39.3)	38 (67.9)	53 (64.6)	5 (7.6)
Unintentionally retained foreign object/surgical instrument	137 (37.3)	40 (54.8)	44 (39.3)	33 (58.9)	16 (19.5)	21 (31.8)
Wrong patient	135 (36.8)	25 (34.2)	33 (29.5)	33 (58.9)	55 (67.1)	10 (15.2)
Transfusion or transplantation of incompatible blood, blood products/components or organs	75 (20.4)	36 (49.3)	22 (19.6)	19 (33.9)	N/A	5 (7.6)
Patient fall	70 (19.1)	43 (58.9)	13 (11.6)	21 (37.5)	N/A	3 (4.5)
Hospital-acquired pressure/ decubitus ulcer	65 (17.7)	46 (63.0)	N/A	20 (35.7)	5 (6.1)	5 (7.6)
Fires or burns	60 (16.3)	37 (50.7)	N/A	22 (39.3)	6 (7.3)	6 (9.1)
Maladministration of insulin or issues with blood sugar control	59 (16.1)	31 (42.5)	16 (14.3)	N/A	N/A	3 (4.5)
Intravascular air embolism	58 (15.8)	37 (50.7)	N/A	21 (37.5)	N/A	1 (1.5)

*To avoid small cell counts, only frameworks with 10 or more papers were included.
†All values presented as frequency (per cent).
‡Includes both hospital-acquired conditions and preventable surgical errors.
§Includes largely and entirely preventable events from their National Patient Safety Goals and sentinel event alerts.
¶Includes wrong-side nerve block and wrong-level surgery.
**Includes wrong implant/prosthesis.
N/A, not available.

potassium-containing solution and wrong-route administration of medication (excluding chemotherapy) were also considered entirely preventable in at least 40% of the articles.

The progression of NEs

When the term was coined in 2001, NEs were considered only largely preventable. The purpose of the original 2002 framework was to identify rare but serious events for standardised reporting.[2] In the decade after that, eight additional frameworks were released. Neither of the first two subsequent frameworks used 'never event' officially, instead using terms such as 'sentinel event'. In 2006, the first framework by a US health insurer was released,[9] which was also the first to officially use 'never event' and the second to deem them wholly preventable. It also introduced a punitive component to their policy and did not reimburse hospitals where NEs occurred. Of the remaining five frameworks that were released in the first decade, four used 'never event'. All five contained financial penalties in their policies, although only one positioned NEs as wholly preventable. Three of these five were private US health insurers, and the remaining two were national organisations with the ability to apply financial penalties.

In the second decade three new frameworks were released. All used the term 'never event' formally, and one positioned them as wholly preventable. As mentioned previously, one of the frameworks introduced in the first decade changed its position on preventability from largely to entirely,[3 7 8] and back to largely preventable.[3] New NEs were also more common in the second decade. Where 39 NEs not included in the original framework were introduced in the first decade, 63 were introduced in the second. While the original purpose was to standardise the reporting of 27 rare but serious events, in 2021 there were 114 NEs. The 12 frameworks existing at that time each had a unique reporting structure, and five additionally applied financial penalties to involved facilities.

DISCUSSION

Our systematic review included 367 articles and reports published between 2001 and 2021 that discussed healthcare NEs. Most of the research came from the USA and the UK. These articles identified 125 unique NEs, the most common being surgery on the wrong body part, the wrong surgical procedure, URFOs and surgery on the wrong patient. Researchers usually classified NEs as 'largely preventable' (60.2%). The events most likely to be considered wholly preventable were surgery on the wrong patient, wrong surgical procedure, surgery on the wrong body part, maladministration of a potassium-containing

solution and wrong-route administration of medication (excluding chemotherapy).

The use of the term NE is mired in confusion.[244] Organisations that use it have differing purposes and standards, resulting in a variety of events (which include errors, complications and outcomes), terms and data capture practices.[4 211] Our results quantify this inconsistency. NEs vary both across and within frameworks. Only the four most cited NEs were found in all four major frameworks, and no event was in all 12 frameworks. While the four most common NEs involved only medical errors, the remaining events comprised all three types of events. Additionally, 12 events have been removed from previous versions of frameworks, but some (eg, air embolism, hypoglycaemia) remain in current versions of other frameworks. The terminology of events found in multiple frameworks also varies. For example, wrong-site surgery can encompass any wrong surgery (body part, patient or procedure), or only the wrong part of the body, or only the wrong spinal level. Additional variation comes from the sources of NE data, which include hospital incident reporting systems,[157] electronic health records,[4] central reporting bodies such as government or patient safety agencies[4 288] or malpractice claims.[4 227 231 288]

The preventability of NEs also differs. At a framework level, none of the four major frameworks claim they are entirely preventable. Three propose that NEs are largely preventable, and in the fourth (TJC) preventability varies by event. The NHS has changed its stance on preventability twice: from largely to entirely preventable, and back to largely preventable. Within individual publications, authors disagree on which events are preventable or if the degree of preventability matters.[4 342] Some have argued that NEs may continue to happen because healthcare takes place in an increasingly complex system.[2 4 62 82 160 238 241] Additionally, one paper demonstrated a statistical random element to NEs, which suggests they are not entirely preventable.[239] Regardless of whether the goal is zero, or continuous improvement[342] to get as close to zero as possible,[62 73 339] the best way to achieve this is to collaboratively focus on those events that have the best chance of being prevented.

Learning from errors is an important means of preventing avoidable harm, both within and across organisations.[4 7 13 62 64] Within organisations, NE data can be used for quality improvement activities.[4] This can help organisations move beyond individual provider contributing factors to those at the system level, which may lead to greater reductions in NEs.[116 119 135 141 198 223 376] Documentation and dissemination of quality improvements at a national level are needed to allow healthcare providers to learn from each other.[62] One means of achieving this is with standardised, centralised and robust reporting systems.[2 7 13 227 288] NEs are rare[60 62 239 373]; standardisation and central reporting may facilitate the identification of common root causes[7 22 227] and highlight opportunities to collaborate.[2 22 41] Additionally, data can be aggregated and may become large enough to calculate accurate incidence rates[2 4 41 227] and statistical significance.[2] However, the need for standardisation must be balanced with the need for flexibility. While legislating the reporting of NEs has benefits, it can also be restrictive and difficult to update.[13] Furthermore, a culture of safety is needed to encourage compliance.[41 62 141 155] In these organisations reporting systems are used for quality assurance, emphasising system change rather than disciplining individual providers.[211 379–381]

Some scientists have argued that healthcare would benefit from having one NE list.[4] Others further suggest that we should focus on the most preventable[13 60] and serious events.[13] A common list of NEs generated through collaboration and consensus would allow organisations to address issues promptly and comprehensively[13] and facilitate the creation of a reporting system that is standardised and robust. It could also enhance learning between organisations, leading to improved collaboration. With education, improved team communication and environmental and administrative tools to reduce human error, we could reduce NEs to as close to zero as possible.

Limitations

There are important limitations to our study. Whenever possible, we used the author's own wording for NE terms. For papers involving more than one framework, we had to use our judgement on which wording to include. The large proportion of grey literature in our study introduced challenges in verifying information or locating other papers, as many URL links were inactive. Similarly, one of the major frameworks (TJC) removes all information for retired sentinel events from their website, which prevented us from verifying if they mentioned preventability. Finally, we made no attempt to differentiate between errors (eg, surgery on the wrong patient) and complications (eg, device malfunction) or outcomes (eg, intraoperative or immediate postoperative death in an American Society of Anesthesiologists class 1 patient). We also did not evaluate the validity of a complication or outcome being classified as an NE or the degree of preventability assigned by the authors to any given NE. This systematic review only reports what other organisations or researchers have identified as an NE and its preventability, and as such should not be used to define any incident as an NE or to assess its preventability.

CONCLUSION AND RECOMMENDATIONS

It has been 20 years since the NQF published the first list of NEs. After two decades we have failed to eliminate these events and in some cases the incidence has increased.[30 62 90 131 229 241 288 310 315 326 362 369] The lack of consensus in NEs, reporting structures, terminology and preventability impedes our ability to learn from each other and collaborate to reduce their occurrence. To achieve change and improve patient safety, we must work towards a common list of the most serious and preventable NEs.[4 13 60] The events in our review that clearly meet

these criteria are surgery on the wrong body part or patient, and the wrong surgical procedure. They were the most frequently reported NEs and most commonly assessed as entirely preventable.

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