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SYSTEMATIC REVIEW

Serious outcomes among emergency department patients with presyncope: A systematic review

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Abstract

Background: Syncope is transient loss of consciousness, and in presyncope, patients experience same prodromal symptoms without losing consciousness. While studies have extensively reported the risk of serious outcome among emergency department (ED) syncope, the outcome for patients with presyncope and their management are not well studied. We undertook a systematic review to assess the occurrence/identification of short-term (30-day) serious outcomes among ED patients with presyncope.

Methods: ED studies that enrolled patients with presyncope and reported any short-term serious outcome were included. Studies that enrolled patients without presyncope (e.g., hypoglycemia, seizure, and stroke) were excluded. We restricted our study to only English publications and searched the MEDLINE, Embase, Scopus, and Web of Science from the inception date to July 2023. We used SIGN 50 tool for assessment of risk of bias.

Results: In total, 1788 articles were screened by two reviewers and 32 articles were selected for full-text assessment. Five (four prospective and one retrospective) studies with 2741 presyncope patients were included. Four studies were from North America and the fifth one was from Europe. Included studies had weaknesses due to risk of bias, but all had acceptable quality. The prevalence of overall adverse outcome varied 4.4%–26.8% for all adults and 5.5%–18.7% among older patients; arrhythmia was the most prevalent (17.4% in one study), followed by anemia/hemorrhage as reported in different studies. Among older patients, myocardial infarction was the third most common serious outcome reported in one study.

Conclusions: The prevalence of short-term serious outcomes varies from 4% to 27% among ED patients with presyncope in our review, with arrhythmia being the most common serious outcome. Our review indicates that presyncope may carry a similar risk to syncope, and hence, the same level of caution should be exercised for ED presyncope management as syncope.

KEYWORDS
adverse outcomes, emergency department, presyncope, prognosis, syncope

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INTRODUCTION

Syncope is transient loss of consciousness due to global cerebral hypoperfusion with spontaneous complete recovery.[1] It constitutes about 1% of the emergency department (ED) visits and many, especially older patients, are being hospitalized.[2-4] While many patients have favorable outcomes, serious outcomes (e.g., cardiac adverse events, death) are encountered both in the ED and after ED discharge.[5] Presyncope (i.e., near fainting) is a condition in which the patient experiences prodromal symptoms similar to syncope (e.g., nausea, light-headedness, sweating, palpitations, pallor) but recovers without losing consciousness.[6] The pathophysiology of presyncope is less understood,[7] although it is commonly believed that syncope and presyncope represent the same disease spectrum. However, all contemporary published studies report a lower proportion of patients with presyncope hospitalized in comparison to those presenting with syncope indicating the treating physician belief that the risk among ED patients with presyncope is lower.[6,8,9] Additionally, the types of serious outcomes and their prevalence are widely varied in the reported studies. To our knowledge, no previous study has synthesized the literature regarding outcomes among ED patients presenting with presyncope. Such synthesis of the literature for short-term serious outcomes among ED patients with presyncope and comparing it to those reported among ED patients with syncope can aid in risk assessment and management. Hence, our objective was to undertake a systematic review to evaluate the risk of short-term serious outcomes to aid ED management of patients with presyncope. We hypothesized that syncope and presyncope are on the same spectrum of disease and carry the same risk of serious outcomes.

METHODS

In this study, we systematically reviewed the literature to determine outcomes of patients who presented with presyncope to the ED. This systematic review was registered in PROSPERO (CRD42023395172). We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline to report our systematic review.[10]

Study selection

We included original studies (observational and interventional) that enrolled adult patients who presented with presyncope and/or syncope to the ED. Studies must have reported outcomes among presyncope patients to be eligible for inclusion. We included only articles in English as previous studies have shown that generalizability of the results is probably not affected by this language restriction.[11] Non–peer-reviewed articles, letter to editor, and case reports were excluded. We searched the following databases from inception date to July 2023: Ovid MEDLINE, Embase (OvidSP), Scopus, and Web of Science (SCIE, SSCI, and ESCI). In addition, the reference lists of included studies were also reviewed. Studies were excluded if we were unable to obtain full-text articles after contacting the corresponding authors. Among the studies with full text available to be reviewed, we contacted the corresponding authors if the required data could not be retrieved. In both instances, corresponding authors were contacted at least twice before excluding the studies.

Search strategy

The search was directed by a medical librarian (RM) with expertise in systematic review search strategy development. Considering that many studies reported presyncope as a subgroup of syncope population, we considered all the studies which reported outcomes among patients with syncope and/or presyncope. Hence, we incorporated the keywords on syncope, presyncope, ED, and outcomes in our search strategy. The keywords were "emergency department," "syncope," "presyncope," "near syncope," "near faint," "faint," "prognosis," "adverse outcome," and "adverse event" (Appendix S1).

Data collection and processing

Two authors (HM and KG) screened the title and abstract of all articles identified by the search strategy for full-text review. Full texts of the selected studies were reviewed for inclusion independently by the two reviewers. Any disagreements in the above steps were resolved by a third reviewer (VT).

We extracted the following data from the included articles: first author of study, publication year, country, sample size, sex, mean age, inclusion criteria, exclusion criteria, and study design. We collected all reported outcomes in the included studies. The quality of the included studies was evaluated using the SIGN 50 tool.[12] This tool evaluates risk of bias in the areas of selection, performance, attrition, and detection using 14 domains: focus of the study, study population, recruitment, dealing with patients with outcomes at enrolment, lost to follow-up, comparing patients with and without follow-up, outcome definition, blinded assessment of outcome, dealing with unblinded outcome assessment, valid and reliable outcome assessment, inter-rater reliability of data collection, confounding, and reporting of results with confidence intervals (CIs). Each domain was rated as "yes," "no," or "can't say" if they partially met the criteria or could not be determined. Finally, the included study was assessed for acceptability (high quality, acceptable, or unacceptable) based on risk of bias or confounding and the evidence presented. We used the previously published standardized reporting guideline[13] to report the serious outcomes from the included studies and listed outcomes that are not in the guideline under "other" outcomes.

Data analysis

We report point estimates for outcomes and 95% CI for the estimates using margin of error for proportions. We present a descriptive analysis of our results displayed as a Forest plot as heterogeneity of clinical population and outcomes precluded us from undertaking a meta-analysis.

RESULTS

We identified 1880 articles by our search strategy after removal of duplicates. The title and abstract screening were performed by HM and KG. We requested additional information from authors of six abstracts; four sent full-text articles and two[14,15] indicated that their studies were never published. After screening, 32 articles were selected for a full-text review. Four articles provided upon our request were already among the studies selected for full-text review. We excluded 26 articles at this stage: 21 studies did not report outcomes among patients with presyncope and five studies included non-ED presyncope patients.[16-20] Of the six articles left, two articles reported outcomes from the same cohort of patients and, hence, only one was included.[8,21] We reviewed the references of all included studies and did not identify additional studies eligible for inclusion. Hence, there were five studies included in the systematic review. (Figure 1).

Table 1 shows the characteristics of the five studies (one retrospective and four prospective).[6,8,9,22,23] Included studies were published from 2009 to 2019 and assessed the prevalence of serious outcomes among 2741 ED patients with presyncope. Of note, two studies enrolled only older patients (age > 60 years), while others included all adult patients.

As mentioned above, the SIGN 50 tool was used for quality and risk-of-bias assessment for all articles. Of the included studies, two[6,23] did not compare outcomes of presyncope patients with syncope patients in their study and hence the domain comparing two groups was not applicable. We report prevalence of outcomes that were identified both in the ED and after ED discharge, and hence, the domain about outcome at the time of enrollment and blinding to the presyncope presentation were not applicable to included studies. Overall, although some included studies were found to have some weaknesses associated with bias, they were of acceptable quality and met most criteria. Results of the quality assessment are shown in Table 2. Of note, there are some limitations in individual studies that merit mentioning. The study by Sun et al.[23] was retrospective and hence there is a potential for inclusion bias given that presyncope is a difficult symptom to ascertain even prospectively. Grossman et al.[22] and Greve et al.[9] included conditions such as renal failure, carotid stenosis, repeat visits, and carotid stroke as serious outcome that are not related to presyncope as detailed in the standardized reporting guidelines for syncope.[13] In the study by Bastani et al.,[8] nearly half of the patients approached for enrollment declined which can lead to sampling bias.

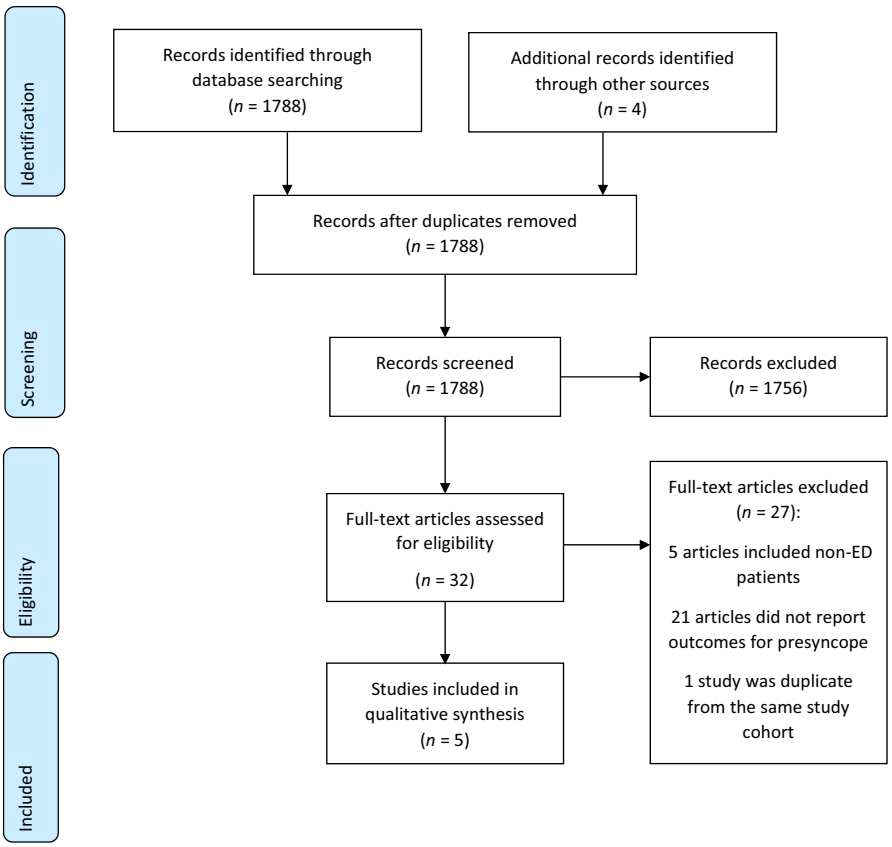


FIGURE 1 PRISMA flowchart of study selection. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

TABLE 1 Characteristics of included studies in the presyncope systematic review.

Study	Year	Location	Study type	Number of patients with presyncope	Male[a]	Age (years)[b]	Inclusion	Exclusion	Outcomes definition	Outcome assessment time	Comment
Sun etal.[23]	2009	United States	Retrospective	83	—	—	≥60 patients	No clear syncope or near syncope, required treatment to regain consciousness, serious underlying cause was evident in the ED	Death, arrhythmias, MI, new structural heart disease related to syncope, PE, aortic dissection, stroke, intracranial hemorrhage, and hemorrhage or anemia requiring blood transfusion	30 days	Kaiser Permanente–Southern California database.
Grossman et al.[22]	2012	United States	Prospective	244	171 (70.08)	56.2 (±21)	≥18 patients	Persistent altered mental status, caused by alcohol or illicit drug, seizure, hypoglycemia, caused by head trauma	Death, cardiac arrest, PE, stroke, severe infection, arrhythmia, intracranial bleed, hemorrhage, MI, CHF, acute renal failure, or life-threatening sequelae of syncope, critical intervention	30 days	Compared syncope and presyncope.
Greve et al.[9]	2014	Germany	Prospective	153	97 (63)	63 (IQR 53.5–78)	≥18 patients	Progressive disorder of consciousness, caused by substances and loss of consciousness unrelated to syncope (e.g., hyperventilation, hypoglycemia, seizure)	Resuscitation, sudden death, MI, cardiac intervention, implantation of pacemaker/implantable defibrillator, cardioversion, severe valvular heart disease, dangerous arrhythmia, decompensated CHF, endoscopy with intervention, blood transfusion, aortic dissection, stroke, PE, severe infection, craniocerebral trauma, return visit in 1 month, severe electrolyte disorders, acute kidney failure, other	30 days and 6 months	Inter-rater agreement was assessed. The study compared syncope and presyncope.
Thiruganasambandamoorthy et al.[6]	2015	Canada	Prospective	881	389 (54.1)	55.5 (±21.2)	≥16 patients with presyncope in 24 h	Previously enrolled, mental status change from baseline, seizure, severe trauma, presyncope after head trauma, unreliable patient	Death, arrhythmia, MI, structural heart disease, aortic dissection, PE, severe pulmonary hypertension, SAH, significant hemorrhage, other serious condition, procedural intervention	30 days	Two tertiary care centers in Ottawa, inter-rater agreement was assessed
Bastani et al.[8]	2018	United States	Prospective	1380	1608 (50.6)	72.74 (±8.97)	≥60 patients	Intoxication, seizure, stroke, TIA, hypoglycemia, "do not attempt resuscitation" patients, intervention to restore consciousness, and unable to obtain consent or follow-up information	All-cause mortality, cardiac arrhythmia, MI, cardiac intervention, structural heart disease, stroke, PE, aortic dissection, SAH, cardiopulmonary resuscitation, internal hemorrhage/anemia, and major injury due to recurrent fall/syncope	30 days	Multicenter study which compared syncope and presyncope.

Abbreviations: CHF, congestive heart failure; MI, myocardial infarction; PE, pulmonary embolism; SAH, subarachnoid hemorrhage; TIA, transient ischemic attack.

[a]Data are reported as *n* (%).

[b]Data are reported as mean (±SD) unless otherwise specified.

TABLE 2 Quality assessment of included studies in the presyncope systematic review using SIGN 50 tool.

	Sun et al.[23]	Grossman et al.[22]	Greve et al.[9]	Thiruganasambandamoorthy et al.[6]	Bastani et al.[8]
Study addresses appropriate and clearly focused question	Yes	Yes	Yes	Yes	Yes
Two groups studied are selected from source populations that are comparable other than the factor under investigation	N/A	Yes	Yes	N/A	Yes
Study indicates how many of the people asked to take part did so	N/A	No	Yes	Yes	Yes
Likelihood that some eligible subjects might have the outcome at the time of enrollment is assessed	N/A	N/A	N/A	N/A	N/A
What percentage of individuals recruited into ach arm of the study dropped out before the study completion	Yes	Yes	Yes	Yes	Yes
Comparison is made between full participants and those lost to follow-up, by exposure status	Yes	N/A	Yes	Yes	No
Outcomes are clearly defined	Yes	Yes	Yes	Yes	Yes
Assessment of outcome is made blind to exposure status	N/A	N/A	No	N/A	Can't say
Where blinding was not possible, recognition that knowledge of exposure status could have influenced assessment of outcome	N/A	N/A	N/A	N/A	N/A
Measure of assessment of exposure is reliable	Yes	Yes	Yes	Yes	Yes
Evidence from other sources is used to demonstrate that the method of outcome assessment is valid and reliable	Yes	Yes	Yes	Yes	Yes
Exposure level or prognostic factor is assessed more than once	Yes	No	Yes	Yes	No
Potential confounders are identified and considered in design and analysis	Yes	Can't say	Yes	Yes	Yes
CIs are provided	Yes	Yes	Yes	Yes	Yes
How well was the study done to minimize bias/confounding and establish a causal relationship between cause and effect	Acceptable (+)	Acceptable (+)	Highly acceptable (++)	Highly acceptable (++)	Acceptable (+)

Abbreviation: N/A, not applicable.

The study by Greve et al.[9] was a single-center study and the study by Thiruganasambandamoorthy et al.[6] was a two-center study.

For accurate identification of the condition, presyncope, two studies reported inter-rater agreement (kappa statistic) between two emergency physicians; Thiruganasambandamoorthy et al.[6] reported a kappa of 0.88 and Greve et al.[9] reported a kappa of 0.77. Two studies reported physicians' gestalt for risk of serious outcomes after ED management. In one study, patients were assigned to vasovagal, orthostatic hypotension, cardiac, and unknown groups at the end of the ED visit. The prevalences of 30-day serious outcomes after ED disposition were similar among the four groups (1%–2%).[6] Interestingly, in another study by Bastani et al.,[8] the physicians' perceived risk was lower in the presyncope group in comparison to the syncope group. However, the observed proportion of patients with serious outcomes were similar in both syncope and presyncope.

All included studies assessed short-term outcomes (30-day) and only one study[9] reported serious outcome after 6 months. Three studies[6,8,23] used the standardized reporting guidelines for the syncope for reporting outcomes.[1,13,24] Among the studies that reported short-term serious outcomes, Thiruganasambandamoorthy et al.[6] defined "other outcomes" to potentially capture other serious conditions not identified in the syncope guideline. The short-term serious outcomes reported in the included studies are detailed in Table 3. Overall, different studies have reported serious outcomes ranging from 4.4% to 26.8% within 30 days, with cardiac serious outcomes being more common than noncardiac outcomes. Arrhythmia was the most common serious outcome in all age groups, accounting for up to 17.4% in one study. The arrhythmia subtypes identified were supraventricular tachycardia 5.0%–29.5%, sinus node dysfunction 9.7%–12.8%, new or uncontrolled atrial fibrillation 4.9%–15.0%, and ventricular arrhythmias 3.5%–7.3%. After arrhythmia, anemia/hemorrhage was the second most common outcome. According to Bastani et al. among the older patients, after arrhythmias and anemia/hemorrhage, myocardial infarction

TABLE 3 Frequency (%) of short-term serious outcomes among different presyncope studies included in the systematic review.

	Sun et al.[23]	Grossman et al.[22]	Greve et al.[9]	Thiruganasambandamoorthy et al.[6]	Bastani et al.[8]
Total	35/801 (4.4%)	47/244 (20.1%)	41/153 (26.8%)	40/881 (4.5%)	258/1380 (18.7%)
Death	—	0 (0)	1 (2.4)	2 (5)	13 (5.0)
Cardiac presyncope					
Supraventricular tachycardia	—	3 (6.4)[a]	6 (14.6)	2 (5.0)	76 (29.5)
New/uncontrolled atrial fibrillation	—	—[a]	2 (4.9)	6 (15.0)	—
Sinus node dysfunction	—	6 (12.8)[b]	—	5 (12.5)	25 (9.7)[c]
Mobitz II atrioventricular heart block	—	—	—	—	4 (1.6)
Complete atrioventricular block	—	—	—	4 (10.0)	5 (1.9)
Myocardial infarction	—	1 (2.1)	2 (4.9)	2 (5.0)	32 (12.4)
Ventricular arrhythmia	—	3 (6.4)[d]	3 (7.3)	1 (2.5)	9 (3.5)[e]
Implantable cardioverter defibrillator malfunction	—	3 (6.38)[f]	—	1 (2.5)	1 (0.39)
Pulmonary embolism	—	1 (2.1)	3 (7.3)	2 (5)	19 (7.4)
Serious structural heart disease	—	1 (2.1)[g]	—	1 (2.5)	14 (5.4)
Aortic dissection	—	0 (0)	0 (0)	0 (0)	0 (0)
Cardiac intervention		—	1 (2.4)	0 (0)	54 (20.9)[h]
Other serious outcomes					
Anemia/significant hemorrhage with transfusions	—	5 (10.6)[i]	3 (7.3)	5 (12.5)	64 (24.8)[j]
Sepsis	—	10 (2.3)	5 (12.2)	2 (5.0)	—
Stroke	—	1 (2.1)	1 (2.4)	1 (2.5)	14 (5.4)
Other					
Other	—	13 (27.7)[k]	14 (34.1)[l]	6 (15.0)[m]	8 (3.1)[n]

Note: Only short-term serious outcomes are included in the above table.

[a]Atrial dysrhythmia treatment (including SVT and atrial fibrillation with rapid ventricular response; three patients).

[b]Symptomatic bradycardia.

[c]Symptomatic bradycardia (16 patients) and sinus pause > 3 s (nine patients).

[d]Ventricular dysrhythmia treatment.

[e]Including three patents with nonsustained symptomatic ventricular tachycardia.

[f]ICD placement/adjustment (one patient).

[g]Valvular disease management (one patient).

[h]Pacemaker or defibrillator placement, coronary artery revascularization.

[i]Gastrointestinal bleeding.

[j]Internal hemorrhage/anemia.

[k]Alterations in antidysrhythmic therapy (five patients), acute kidney injury (five patients), carotid stenosis and endarterectomy, acute abdomen, congestive heart failure (each one patient).

[l]Craniocerebral trauma and electrolyte disorders (each one patient), repeat presentation < 30 days (four patients), congestive heart failure, acute kidney injury, and other life-threatening events (two patients each).

[m]Brain tumor, appendicitis, iliopsoas abscess, and brain metastasis (one patient each), orthostatic hypotension (two patients).

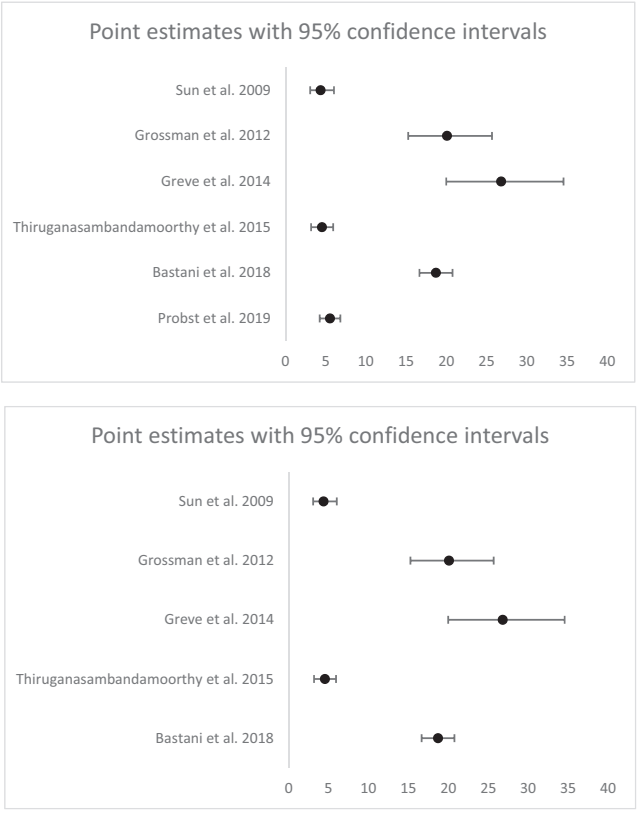
[n]Subarachnoid hemorrhage (one patient), major injury (three patients), resuscitation (four patients).

was the third most common serious outcome. Since included studies were heterogeneous as they had different and even conflicting inclusion and exclusion criteria, we did not pool the data. Figure 2 is a Forest plot of prevalence of adverse outcome in different studies. One study that reported outcomes at 6 months, identified that 26.8% in the presyncope subgroup suffered serious outcome, of whom 5% died during this period.[9]

DISCUSSION

Our study showed that the occurrence/identification of 30-day serious outcomes among ED patients with presyncope varied from one in four to one in 20 in both all age groups and among older patients. Arrhythmia was the most common serious outcome in all age groups with supraventricular tachycardia, sinus node dysfunction, and new

or uncontrolled atrial fibrillation being the common subtypes. While ventricular arrhythmias were less common than supraventricular arrhythmia, they did occur in an important proportion of patients, approximately 4%–7%. Anemia/hemorrhage was the most common serious outcome after arrhythmia. Hence, a cautious approach to ED management of patients with presyncope is needed taking into consideration the risk of short-term serious outcomes, specifically arrhythmias not evident during the index ED visit.



Study	Point estimate (95% CI)
Sun et al. 2009	4.4% (3.1% - 6.0%)
Grossman et al. 2012	20.1% (15.2% - 25.7%)
Greve et al. 2014[a]	26.8% (20.0% - 34.6%)
Thiruganasambandamoorthy et al. 2015	4.5% (3.2% - 5.9%)
Bastani et al. 2018	18.7% (16.6% - 20.8%)

FIGURE 2 Forest plot for short-term (30-day) serious outcome with 95% CI. [a]Only short-term serious outcomes are included in this figure.

A systematic review of ED syncope literature showed that 11.6% of patients experience serious outcome in a 30-day period.[25] This figure can be compared with 5%–25% in presyncope population in our included studies. While differences in inclusion/exclusion criteria and the health care system (e.g., Greve et al. speculated that because of Germany's two-tiered health care structure would have led to patients with milder symptoms not presenting to the ED) could have contributed the variation, we believe the primary reason is due to the list of conditions included in the serious outcome definition. Grossman et al. and Greve et al. reported a higher prevalence of serious outcomes due to inclusion of conditions not detailed in the standardized reporting guidelines and not related to presyncope. Grossman et al.[22] reported a high proportion of patients (10 of 47 patients) with sepsis in their study. It is also believed that presyncope as a symptom may be challenging to identify and has a potential for misclassification with conditions such as anxiety or peripheral vertigo.[7,26] However, two studies[6,9] reported agreement for presyncope identification which was good or very good.[27]

While it is commonly believed that presyncope and syncope are on the same disease spectrum, our review indicates that presyncope is generally perceived less severe than syncope probably due to the absence of complete loss of consciousness, which poses a patient safety risk. As a result, patients with presyncope often have a shortened ED observation period, undergo less ED workup and have a lower proportion of patients hospitalized. (Table 4).[6,9,22] While in syncope, there is evidence pertaining to the accuracy of physicians' prediction,[28] in presyncope it is not the case. Published studies and our systematic review indicate that the type of short-term serious outcomes are similar for ED patients with syncope and presyncope.[6,8]

Two of our included studies reported were on presyncope in the older patients. Among them, only Bastani et al. reported outcome details in presyncope population and compared it to syncope patients in their cohort. In this study, patients with syncope had cardiac comorbidities (e.g., congestive heart failure, arrhythmia) more than presyncope patients at the baseline. Despite such baseline differences, a similar proportion of patients with syncope and presyncope suffered serious outcomes. A previously published systematic review reported that 7% of ED patients with syncope died at 1 year, which is similar to the 5% at 6 months for

TABLE 4 Comparison of the proportion of ED patients with presyncope versus syncope who were hospitalized.

Study[a]	Proportion with presyncope hospitalized	Proportion with syncope hospitalized
Grossman et al.[22b]	49% (95% CI 43%–55%)	69% (95% CI 63%–74%)
Greve et al.[9c]	71.2%	86.4%
Thiruganasambandamoorthy et al.[6d]	4.7%	12.9%

[a]Patients with syncope and presyncope were recruited as part of the one prospective study during the same study period.

[b]95% CI as reported in the study.

[c]Comparison of the two proportions reported as statistically significant in the study ($p < 0.001$).

[d]The proportion of syncope patients hospitalized obtained from a separate publication that recruited patients through a multicenter study in the same country around the same study period.[29]

TABLE 5 PRIMSA checklist.

Section and topic	Item No.	Checklist item	Location where item is reported (page No.)
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for abstracts checklist.	3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	4
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	5
Information sources	6	Specify all databases, registers, websites, organizations, reference lists, and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	5
Search strategy	7	Present the full search strategies for all databases, registers, and websites, including any filters and limits used.	5
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	6
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	6
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g., for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	6
	10b	List and define all other variables for which data were sought (e.g., participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	6
Study risk-of-bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	6
Effect measures	12	Specify for each outcome the effect measure(s) (e.g., risk ratio, mean difference) used in the synthesis or presentation of results.	—
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g., tabulating the study intervention characteristics and comparing against the planned groups for each synthesis[Item 5]).	6
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	—
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	—
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	7
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g., subgroup analysis, meta-regression).	—
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	—

TABLE 5 (Continued)

Section and topic	Item No.	Checklist item	Location where item is reported (page No.)
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	—
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	—
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	7
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	7
Study characteristics	17	Cite each included study and present its characteristics.	8
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	7
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g., confidence/credible interval), ideally using structured tables or plots.	7
Results of syntheses	20a	For each synthesis, briefly summarize the characteristics and risk of bias among contributing studies.	—
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g., confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	—
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	—
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	—
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	—
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	—
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	9
	23b	Discuss any limitations of the evidence included in the review.	11
	23c	Discuss any limitations of the review processes used.	12
	23d	Discuss implications of the results for practice, policy, and future research.	12
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	5
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	—
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	—
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	2
Competing interests	26	Declare any competing interests of review authors.	2
Availability of data, code, and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	—

Abbreviation: PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

presyncope reported in one study included in our systematic review.[9]

We systematically reviewed the literature for outcomes among ED patients with presyncope. We used a sensitive search strategy and followed rigorous methodology and reporting standards (Table 5, PRISMA checklist) for this study. To our best of knowledge, this is the first literature synthesis to report short-term serious outcomes among ED patients with presyncope. In contrast to the current practice, which is more in keeping with the belief that presyncope is benign in nature in comparison to syncope, this systematic review shows that presyncope carries a risk similar to that of syncope. Our systematic review reports the risk of the serious outcome subtypes and highlights the challenges associated with ED presyncope management. Future studies reporting the accuracy of the validated risk tools such as the Canadian Syncope Risk Score specifically in the presyncope population can provide additional evidence for risk assessment and ED management of presyncope.

LIMITATIONS

Our study does have some limitations; the included studies were very heterogeneous with different and even conflicting inclusion and exclusion criteria. As a result, we were not able to pool the results and draw a firm conclusion. In addition, we did not search gray literature for this systematic review.

CONCLUSIONS

In conclusion, the prevalence of short-term serious outcomes among ED patients with presyncope ranges from one in four to one in 20, with arrhythmia being the most common serious outcome. Our review indicates that presyncope may carry a similar risk to syncope, and hence, the same level of caution should be exercised for ED presyncope management as that of ED syncope.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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