

Comparison of 30-Day Serious Adverse Clinical Events for Elderly Patients Presenting to the Emergency Department With Near-Syncope Versus Syncope



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Study objective: Controversy remains in regard to the risk of adverse events for patients presenting with syncope compared with near-syncope. The purpose of our study is to describe the difference in outcomes between these groups in a large multicenter cohort of older emergency department (ED) patients.

Methods: From April 28, 2013, to September 21, 2016, we conducted a prospective, observational study across 11 EDs in adults (≥ 60 years) with syncope or near-syncope. A standardized data extraction tool was used to collect information during their index visit and at 30-day follow-up. Our primary outcome was the incidence of 30-day death or serious clinical events. Data were analyzed with descriptive statistics and multivariate logistic regression analysis adjusting for relevant demographic or historical variables.

Results: A total of 3,581 patients (mean age 72.8 years; 51.6% men) were enrolled in the study. There were 1,380 patients (39%) presenting with near-syncope and 2,201 (61%) presenting with syncope. Baseline characteristics revealed a greater incidence of congestive heart failure, coronary artery disease, previous arrhythmia, nonwhite race, and presenting dyspnea in the near-syncope compared with syncope cohort. There were no differences in the primary outcome between the groups (near-syncope 18.7% versus syncope 18.2%). A multivariate logistic regression analysis identified no difference in 30-day serious outcomes for patients with near-syncope (odds ratio 0.94; 95% confidence interval 0.78 to 1.14) compared with syncope.

Conclusion: Near-syncope confers risk to patients similar to that of syncope for the composite outcome of 30-day death or serious clinical event. [Ann Emerg Med. 2019;73:274-280.]

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INTRODUCTION

Syncope is a transient loss of consciousness followed by spontaneous and complete recovery.¹ It accounts for 740,000 emergency department (ED) visits and 250,000 hospital admissions in the United States annually.² Alongside syncope, there is a less well-defined cohort of patients who present with near-syncope. The true incidence of near-syncope is difficult to define, although it is commonly believed to represent an even larger group of patients than those who present with syncope.³ This likely stems from the nebulous nature of near-syncope, with patients describing a wide variety of possible chief complaints, including lightheadedness, dizziness, feeling hot or cold, or “spells.”

It is generally considered that syncope and near-syncope represent a spectrum of symptomatology. However, the relationship between these 2 presentations may not follow a linear pathophysiologic pattern. For example, a similar run of supraventricular tachycardia may result in either syncope or near-syncope, given each patient's underlying medical comorbidities, concurrent illness, and medications.⁴ Therefore, some clinicians recommend assigning near-syncope and syncope patients to similar levels of risk.⁵ However, the published literature on this topic is less consistent, with one study suggesting that near-syncope is associated with less risk compared with syncope.⁶ Other authors have described the rates of life-threatening

Editor's Capsule Summary

What is already known on this topic

Near-syncope and syncope are common reasons for emergency department (ED) visits.

What question this study addressed

Do rates of death or serious clinical events at 30 days differ between patients who present to the ED with near-syncope versus syncope?

What this study adds to our knowledge

Among 3,581 patients from 11 US EDs, rates of death or serious clinical events were similar for patients with near-syncope (18.7%) versus syncope (18.2%). Adjustment for other risk factors did not alter this finding.

How this is relevant to clinical practice

Near-syncope is as serious a presenting complaint as syncope and likely warrants a similar evaluation.

arrhythmias and disease to be equivalent between the groups.⁷ These studies have been limited by single-center methodology or relatively small sample sizes. Achieving a more complete understanding of the risk associated with near-syncope would inform clinical decisionmaking.

Our study objective was to compare rates of death and serious clinical events between these 2 related chief complaints. We analyzed data from a large multicenter observational cohort including patients enrolled from both academic and community hospitals.

MATERIALS AND METHODS

Study Design

We conducted a multicenter prospective cohort study. The study was approved by the institutional review boards at all sites, and study staff obtained written, informed consent from all participating subjects or their legally authorized representatives.

Selection of Participants

We conducted the study at 11 geographically distributed academic and community EDs in the United States between April 28, 2013, and September 21, 2016. We enrolled patients aged 60 years or older who presented with syncope or near-syncope as determined by the treating emergency physician. Syncope was defined as transient loss of consciousness, associated with postural loss

of tone, with immediate, spontaneous, and complete recovery. Near-syncope was defined as imminent sensation of syncope, but without loss of consciousness. Both near-syncope and syncope patients with a presumptive cause of loss of consciousness because of seizure, stroke or transient ischemic attack, or hypoglycemia were excluded.⁸ Patients who were intoxicated from alcohol or other drugs, hospice and do-not-resuscitate patients, patients requiring medial or electrical intervention to restore consciousness, and patients who were unable or unwilling to provide informed consent or follow-up information were also excluded.

All patients underwent standardized history, physical examination, and ECG testing by study protocol. ECGs were abstracted by study physicians ($\kappa=0.8$).⁸ An initial ECG result was considered abnormal in the presence of nonsinus rhythms (including paced rhythms), multiple premature ventricular contractions (>1), sinus bradycardia (<41 beats/min), left or right ventricular hypertrophy, left or right axis deviation, short P-R interval (<100 ms), first-degree AV block (>200 ms), complete right or left bundle branch block, Brugada's pattern, delta waves, prolonged QRS interval (>120 ms), prolonged QTc interval (>450 ms), or Q/ST-T changes consistent with acute or chronic ischemia. We also collected in real time the overall emergency physician's predicted 30-day risk of mortality or adverse cardiac event in both cohorts. This variable had a range from 0% to 100% and served as a surrogate for the treating physician's subjective level of concern about the potential for a short-term adverse outcome.

Any additional diagnostic testing and management was performed at the discretion of the treating providers. Trained research assistants collected data variables consistent with reporting guidelines for ED-based syncope research, and patients directly reported symptoms.⁹ We abstracted objective quantitative data, such as laboratory test results, from the electronic medical record. We collected data on all other variables from the treating physician (eg, comorbidities, medications). All data were compiled in a structured online database (REDCap) by trained research personnel.¹⁰ Any missing or incomplete data were flagged by the database and resolved locally by the site investigator and coordinating center, where possible. Direct patient telephone contact and chart review 30 days after the index ED visit were performed either by the local research staff or centrally by the Oregon Health & Science University research team. Furthermore, study staff obtained outside hospital records if the patient had a visit to a facility different from that visited during the index ED visit.

Outcome Measures

Our primary composite outcome included 30-day all-cause mortality or serious clinical events. We used the 2017 American College of Cardiology/American Heart Association/Heart Rhythm Society guidelines to define serious clinical events, which included cardiac arrhythmias (ventricular fibrillation, ventricular tachycardia [>30 seconds or symptomatic], sick sinus disease with altered mental status, sinus pause >3 seconds, Mobitz type II atrioventricular block, complete heart block, symptomatic supraventricular tachycardia, symptomatic bradycardia, and pacemaker and implantable cardioverter/defibrillator malfunction), myocardial infarction, cardiac intervention (pacemaker or defibrillator placement, or coronary artery revascularization), new diagnosis of structural heart disease (eg, critical aortic stenosis), stroke, pulmonary embolism, aortic dissection, subarachnoid hemorrhage, cardiopulmonary resuscitation (CPR), internal hemorrhage or anemia, and recurrent fall or syncope resulting in major injury.¹¹

The exposure of interest was whether a patient experienced syncope or near-syncope. The exposure was based on the determination of the treating emergency physician. Additionally, we collected data on potential predictors of serious outcomes identified in a previous meta-analysis.¹² These included selected demographic characteristics, symptoms associated with syncope, comorbidities, physical examination findings, and initial ECG result.

Primary Data Analysis

We generated baseline characteristics of the patient cohort, stratified by syncope versus near-syncope. To compare patients who experienced near-syncope with those who experienced syncope, we performed a multivariate logistic regression predicting 30-day serious clinical events, adjusting for sex, race, history of congestive heart failure, history of coronary artery disease, history of arrhythmia, abnormal ECG result, dyspnea, physician risk assessment, and hypotension. All statistical analyses were performed with R.¹³

RESULTS

There were 6,930 subjects who met inclusion and exclusion criteria, of whom 3,686 (53.2%) consented and were enrolled in the study. The final cohort of 3,581 patients available for analysis excluded 105 who were lost to follow-up or withdrew after consent (Figure). Subjects had a mean age of 72.8 years (SD 9.0 years), 1,848 (51.6%) were men, and 2,974 (82.7%) were white. Characteristics of the study population, separated across both cohorts, are

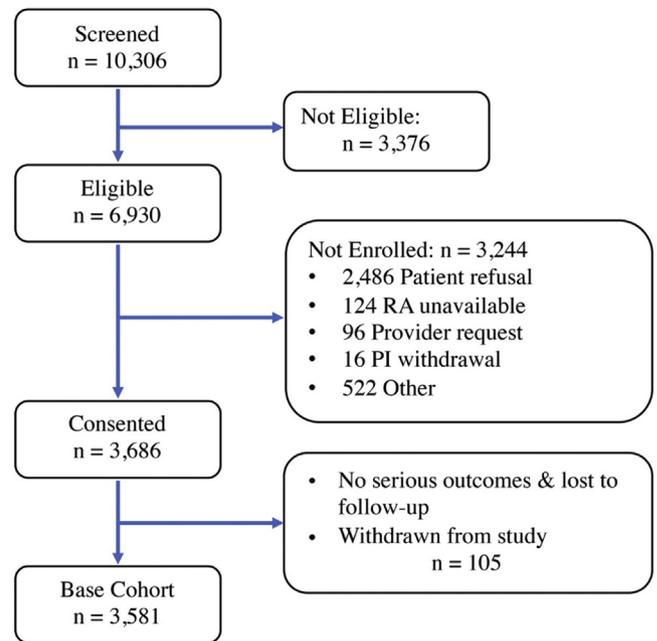


Figure. Enrollment diagram. RA, Research associate; PI, principal investigator.

described in Table 1. Patients with a history of congestive heart failure, coronary artery disease, or arrhythmia and patients with complaints of dyspnea were more prevalent in the near-syncope group. In the syncope cohort, patients were more likely to be white and had a higher subjective risk assessment assigned to them by the emergency physician (9.8% versus 8.2%). There was no difference in the groups in regard to age, sex, initial ED ECG abnormality, or hospital length of stay.

All 30-day serious clinical outcomes are described in Table 2. A total of 658 30-day serious outcomes (18.4%) were present within the study cohort. This percentage was not different between the near-syncope and syncope groups, at 18.7% and 18.2%, respectively. There were no differences in major categories of serious clinical events (eg, arrhythmias) between the 2 groups. Certain serious clinical events are the prerequisite for other serious clinical events, such as a dysrhythmia leading to pacemaker or automatic implantable cardioverter-defibrillator placement. The overall number of these events was both infrequent and similar between both cohorts.

In the multivariate logistic regression analysis, we found no difference between near-syncope versus syncope (odds ratio 0.94; 95% confidence interval [CI] 0.78 to 1.14) (Table 3). History of arrhythmia, abnormal ECG result, and presence of dyspnea remained the highest predictors of 30-day serious clinical events, with odds ratios of 2.06 (95% CI 1.68 to 2.53), 1.74 (95% CI 1.42 to 2.15), and 1.78 (95% CI 1.44 to

Table 1. Study cohort characteristics.

Variable	Overall Cohort (n=3,581), No. (%)	Syncope (n=2,201), No. (%)	Near-Syncope (n=1,380), No. (%)
Demographics			
Age, mean (SD), y	72.8 (9.0)	72.9 (9.04)	72.6 (8.9)
Age, y			
60–69	1,539 (43.0)	926 (42.1)	613 (44.4)
70–79	1,156 (32.3)	720 (32.7)	436 (31.6)
80–89	729 (20.4)	449 (20.4)	280 (20.3)
≥90	157 (4.4)	106 (4.8)	51 (3.7)
Men	1,848 (51.6)	1,147 (52.1)	701 (50.8)
Race			
White	2,974 (83.5)	1,860 (84.9)	1,114 (81.4)
Black	478 (13.4)	271 (12.4)	207 (15.1)
Asian	41 (1.2)	26 (1.2)	15 (1.1)
Other	67 (1.9)	35 (1.6)	32 (2.3)
History			
Congestive heart failure	449 (12.5)	249 (11.3)	200 (14.5)
Coronary artery disease	979 (27.4)	575 (26.1)	404 (29.3)
Arrhythmia	803 (22.4)	458 (20.8)	345 (25.0)
Dyspnea	747 (21.4)	384 (17.9)	363 (26.8)
Hypotension	382 (10.7)	220 (10.0)	162 (11.7)
Abnormal ECG result	1,948 (55.4)	1,180 (54.4)	768 (56.9)
Physician risk assessment, mean (SD)	9.2 (13.2)	9.8 (13.6)	8.2 (12.5)
Length of stay, h			
Admitted, mean (SD)	96.4 (110.2)	98.4 (119.3)	92.5 (90.5)
Observed, mean (SD)	36.4 (38.5)	36.9 (38.0)	35.6 (39.4)
Discharged, mean (SD)	9.0 (40.3)	12.0 (55.3)	5.6 (3.7)

2.19), respectively. Physician risk assessment for the possibility of a serious clinical event remained predictive in the multivariate analysis, with an odds ratio of 1.03 (95% CI 1.02 to 1.03).

LIMITATIONS

There are some limitations in our study that need to be addressed. First, approximately half of eligible patients declined to participate in our study, introducing the potential for sampling bias. By including 11 geographically diverse sites into what is to our knowledge the largest study of syncope and near-syncope in the elderly in the United States to date, we hoped to mitigate the effects of any such bias. Second, the presence of near-syncope was assigned by the treating physician. We did not assess interrater reliability of this assignment, and inconsistent assignment may introduce measurement bias. However, a previous study reported high interrater reliability ($\kappa=0.88$) in the determination of near-

syncope.⁷ Finally, our study was limited to older adults and should be replicated in other populations.

DISCUSSION

In our multisite observational cohort of older adults, we found that patients with a presentation of near-syncope had 30-day clinical event rates similar to those with syncope. Furthermore, the specific event types were similar between both groups. Also, despite a higher prevalence of cardiac comorbidities and dyspnea associated with a presentation of near-syncope, treating physicians generally assigned a lower risk to patients with near-syncope. Our findings suggest that emergency physicians should manage older adults with near-syncope or syncope in a similar fashion.

Traditionally, the management of patients who present with a chief complaint of near-syncope encapsulates all the nuances and challenges within

Table 2. Serious clinical events outcomes stratified by near-syncope.

Outcome	Overall Cohort (n=3,581), No. (%)	Syncope (n=2,201), No. (%)	Near-Syncope (n=1,380), No. (%)
Any 30-day serious outcome	658 (18.4)	400 (18.2)	258 (18.7)
30-day death	44 (1.2)	31 (1.4)	13 (0.9)
Serious cardiac arrhythmias			
Any arrhythmia	308 (8.6)	188 (8.5)	120 (8.7)
Ventricular fibrillation	8 (0.2)	7 (0.3)	1 (0.1)
Ventricular tachycardia (>30 s)	15 (0.4)	10 (0.5)	5 (0.4)
Symptomatic ventricular tachycardia (<30 s)	17 (0.5)	14 (0.6)	3 (0.2)
Sick sinus disease with alternating sinus bradycardia and tachycardia	23 (0.6)	16 (0.7)	7 (0.5)
Sinus pause >3 s	14 (0.4)	12 (0.5)	2 (0.1)
Mobitz II atrioventricular heart block	12 (0.3)	8 (0.4)	4 (0.3)
Complete heart block	23 (0.6)	18 (0.8)	5 (0.4)
Symptomatic supraventricular tachycardia	149 (4.2)	73 (3.3)	76 (5.5)
Symptomatic bradycardia	45 (1.3)	29 (1.3)	16 (1.2)
Pacemaker or implantable cardioverter-defibrillator malfunction with cardiac pauses	2 (0.1)	1	1 (0.1)
Other serious outcomes			
Myocardial infarction	69 (1.9)	37 (1.7)	32 (2.3)
Cardiac intervention	162 (4.5)	108 (4.9)	54 (3.9)
New diagnosis of structural heart disease	36 (1.0)	22 (1.0)	14 (1.0)
Stroke	29 (0.8)	15 (0.7)	14 (1.0)
Pulmonary embolism	34 (0.9)	15 (0.7)	19 (1.4)
Aortic dissection	0	0	0
Subarachnoid hemorrhage	2 (0.1)	1	1 (0.1)
CPR	8 (0.2)	4 (0.2)	4 (0.3)
Internal hemorrhage/anemia	169 (4.7)	105 (4.8)	64 (4.6)
Recurrent syncope/fall resulting in major injury	12 (0.3)	9 (0.4)	3 (0.2)

emergency medicine. The difficulty begins with the definition of near-syncope, also referred to as presyncope.⁷ Near-syncope is typically described as the sense of “lightheadedness derived from feeling an

Table 3. Multivariable logistic regression model predicting 30-day composite serious outcomes.

Variables	OR	95% CI
Near-syncope	0.94	(0.78–1.14)
Male sex	1.19	(0.98–1.44)
Race (not white)	0.75	(0.57–0.97)
History of congestive heart failure	1.37	(1.05–1.78)
History of coronary artery disease	0.99	(0.80–1.23)
History of arrhythmia	2.06	(1.68–2.53)
Abnormal ECG result	1.74	(1.42–2.15)
Dyspnea	1.78	(1.44–2.19)
Physician risk assessment	1.03	(1.02–1.03)
Hypotension	1.65	(1.26–2.15)

OR, Odds ratio.

impending loss of consciousness.” The vagueness of this definition results in a wide variety of presenting complaints that must be sifted through to determine whether a patient’s “lightheadedness,” “dizziness,” “not feeling right,” or “unsteadiness” can definitively be categorized as a near-syncopal event.¹⁴ Even standard emergency medicine reference material is ambiguous about where to present a discussion of near-syncope, placing it under the categories of vertigo, syncope, seizure, and dysrhythmia.¹⁵ In contrast to near-syncope, the presence or absence of a syncopal event is usually more definitive. This results in the apparent alignment of near-syncope and syncope across a spectrum of disease, with near-syncope appearing definitionally less malicious than syncope.

Our study’s results should recalibrate the emergency physician’s intuitions in regard to the expected risk of 30-day serious clinical events for near-syncope patients. Although certain outcomes, such as symptomatic supraventricular tachycardia, appear to occur more

frequently in near-syncope versus syncope (5.5% to 3.3%), there is very little difference across all major outcomes in this older population. Previous studies have reported conflicting results, and near-syncope has been considered inherently difficult to study, given the nebulous nature of the presentation. Traditionally, the literature in regard to the risk assessment was extrapolated from authors studying syncope and secondarily reporting on their near-syncope outcomes.^{16,17} For example, in 2001 Krahn et al¹⁸ studied patients with unexplained syncope who received implanted loop recorders. They noted that patients who continued to experience syncope were more likely to have an arrhythmia identified than those who reported near-syncope (64% versus 25%). Although the difference between these groups appears definitive, the ED patient does not typically provide this level of pretest probability for disease (ie, repeated episodes of unexplained syncope stable enough to be evaluated in the outpatient setting).

Some of the literature has attempted to evaluate near-syncope more directly. In 2009, Sun et al⁶ conducted a chart review of 2,871 ED patients across 3 hospitals and identified that near-syncope was associated with lower risk compared with syncope. In contrast, in 2012 Grossman et al⁵ studied 244 patients at a single site and found similar outcomes between patients with near-syncope and syncope. These authors observed that despite similar outcome rates, near-syncope patients were discharged more frequently. Finally, in 2015 Thiruganasambandamoorthy et al conducted a prospective observational study of 881 near-syncope patients and assessed for 30-day serious outcomes.⁷ They noted that 5.1% of their patients had serious outcomes and that 1.7% of their cohort had serious outcomes occurring outside of the hospital. Notwithstanding their low serious adverse event rate because of broader inclusion criteria (5.1% versus 18.1%), the authors confirmed that emergency care providers have difficulty in risk stratifying near-syncope patients. Emergency physicians had difficulty in predicting whether near-syncope patients would experience a serious outcome (area under the receiver operating characteristic curve 0.58).⁷

This tendency to underappreciate the risk of short-term serious clinical events in near-syncope patients was evident in our own analysis. Even after correcting for other variables, the emergency physicians' subjective assessment in regard to the likelihood of 30-day serious adverse events undervalued the risk of near-syncope. Our study attempted to clarify near-syncope's role as alongside rather than behind syncope in predicting 30-day serious clinical events. Following the guidelines laid

out by the First International Workshop on Syncope Risk Stratification in the Emergency Department, we conducted the largest multicenter prospective observational study of near-syncope and syncope patients to date, to our knowledge.¹⁹ The results of this analysis erode any meaningful difference in patient risk afforded by either chief complaint. Also, the individual risk to any single patient cannot be determined by the broad nature of the claims made through this study. The emergency physician, as always, must evaluate each patient according to his or her unique clinical situation.

In summary, there was no significant difference in the 30-day composite outcome of death or serious clinical events between older patients presenting to EDs with either near-syncope or syncope. Clinicians should consider using a similar risk-stratification and management approach to both near-syncope and syncope.

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All authors attest to meeting the four [ICMJE.org](http://www.icmje.org) authorship criteria: (1) Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND (2) Drafting the work or revising it critically for important intellectual content; AND (3) Final approval of the version to be published; AND (4) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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