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## Geriatric Emergency Medicine Fellowship Journal Club: Syncope Risk Stratification & Geriatric-Specific Clinical Decision Rules

*Kyle R. Burton, MD, MPP, Phillip D. Magidson, MD, MPH*

### INTRODUCTION

Emergency medicine physicians use a range of clinical decision aids to improve diagnostic accuracy and limit unnecessary resource use.<sup>1</sup> While some aids are pathology-specific and others are population-specific, rarely do decision aids fit both categories. As we continue to discover the nuances of care for older patients through geriatric emergency medicine, we should expect the development of several tools to assist in this population's care.

When applied appropriately, clinicians can use clinical decision aids to overcome biases and make literature-supported conclusions about treatment and patient disposition. Unfortunately, unique patient characteristics and complex/overlapping disease processes influence presenting symptoms and diagnostic results, thus adversely affecting decision tool function.<sup>2</sup> Additionally, the many decision aids created/validated in studies that exclude older adults cannot be applied to this population in clinical practice. Despite these challenges, a number of decision aids have been shown to improve clinical care.<sup>3</sup> The best of these tools are simple to apply, use routinely collected information, inform a clinically important decision, and safely reduce resource use compared with clinician gestalt.<sup>4</sup> Clearly, clinical decision tools are most effective for pathology with a wide range of management approaches that often unnecessarily increase the cost of care delivery.<sup>5,6</sup>

Syncope, the transient loss of consciousness and postural tone, is a common presenting complaint that results in the hospitalization of many patients who ultimately have a benign clinical course. The population aged 65 and older experience disproportionately high hospitalization rates that increase by the decade of life, with 58% of those over 80 years of age admitted to the hospital when they present with the chief complaint of syncope.<sup>7</sup> Approximately 33% to 56% of syncope patients are discharged after a full hospital evaluation without a definitive diagnosis.<sup>7</sup> When unable to identify the specific etiology, a potential miss could be catastrophic. Even with infrequent diagnosis or therapy provided, syncope incurs a mean cost of \$5,400 per hospitalization.<sup>8</sup> Up to 60% of admitted syncope patients are discharged without receiving any therapeutic intervention for syncope.<sup>9</sup>

It is reasonable to think that a decision aid might improve resource use while identifying the subset of patients with life-threatening causes for their syncope warranting admission. In this journal club, we explore the additional benefit of a syncope risk stratification tool focused on delineating the management of the highest-risk older patient population. The first authors of the two risk stratification tools that were discussed both participated in this journal club.

## CASE

A 73-year-old woman with a history of poor healthcare engagement was brought into the emergency department by her family after having a witnessed episode of losing consciousness while at her daughter's baby shower. She is currently asymptomatic, and she reports feeling refreshed upon awakening with the party guests surrounding her. She has a benign exam and wants to return to her daughter's celebration.

**How do we evaluate whether or not this patient warrants further workup? What additional diagnostic tests would you order? How long of a monitoring period would you be most comfortable with?**

### Article 1

Thiruganasambandamoorthy V, Sivilotti MLA, Le Sage N, Yan JW, Huang P, Hegdekar M, Mercier E, Mukarram M, Nemnom MJ, McRae AD, Rowe BH, Stiell IG, Wells GA, Krahn AD, Taljaard M. Multicenter Emergency Department Validation of the Canadian Syncope Risk Score. *JAMA Intern Med.* 2020 May 1;180(5):737-744. doi: 10.1001/jamainternmed.2020.0288. PMID: 32202605; PMCID: PMC7091474.

### Presenters

Dr. Kyle R. Burton, Dr. Phillip Magidson, Dr. Venkatesh Thiruganasambandamoorthy

### What Question Did this Investigation Aim to Answer?

Can the Canadian Syncope Risk Score (CSRS) predict 30-day serious outcomes not evident during index ED evaluation? Can the CSRS help in decision-making for ED patients with syncope based on short-term serious outcomes?

The CSRS, a previously derived clinical risk stratification tool, calculates a risk score between -3 and 11.<sup>10</sup> **See table 1.**

Category	Points
<b>Clinical Evaluation</b>	
Predisposition to vasovagal symptoms	-1
History of heart disease	1
Any systolic pressure reading <90 or >180 mmHg	2
<b>Investigation</b>	
Elevated troponin level (>99 <sup>th</sup> percentile of normal population)	2
Abnormal QRS axis (<-30° or >100°)	1
QRS duration > 130ms	1
Corrected QT interval > 480 ms	2
<b>Diagnosis in the Emergency Department</b>	
Vasovagal syncope	-2
Cardiac syncope	2
Total score (-3 to 11)	

### What Study Design Did the Authors Choose?

The authors conducted this prospective multicenter cohort study at 9 EDs across Canada including consecutive patients 16 years and older who presented to EDs within 24 hours of syncope from March 2014 to April 2018. Subsequently, a multistep approach was used to ascertain 30-day outcomes.

*Readers are encouraged to see the original paper and appendix for further details on the selection of studies, data extraction, and data synthesis.*

### How did the Authors Interpret the Results?

3,819 patients were included in this study with a mean age of 53.9 years. Of included patients, 139 (3.6%) experienced 30-day serious outcomes including both arrhythmic serious conditions (those requiring pacemaker/defibrillator insertion or

cardioversion) as well as non-arrhythmic serious conditions (myocardial infarction, serious structural heart disease, aortic dissection, pulmonary embolism, severe pulmonary hypertension, significant hemorrhage, subarachnoid hemorrhage or other serious condition causing syncope). The serious 30-day outcome during the validation study was 3.64% (95% CI, 3.09% - 4.28%) compared with the model predicted probability of 3.17% (95% CI, 2.66% to 3.77%). As the CSRS risk category increased, there was a significant increase in serious outcomes with none of the very low-risk and low-risk patients having died or having experienced ventricular arrhythmias. At a CSRS of -1, the sensitivity and specificity for 30-day serious outcome was 97.8% (95% CI, 93.8%-99.5%) and 44.3% (95% CI, 42.7%-45.9%) respectively.

Very low-risk and low-risk patients can generally be discharged, while brief hospitalization can be considered for high-risk patients. The CSRS was successfully validated, and its use is recommended to guide ED management of patients when serious causes are not identified during index ED evaluation. CSRS implementation has the potential to improve patient safety and healthcare efficiency.

**Discussion / How Might this Study Affect your Clinical Practice in the Emergency Department?**

A stepwise approach to management, with emphasis on only resorting to risk stratification once completing the prior necessary steps, is important with syncope patients. For this patient population, this includes a thorough history and physical exam with an emphasis on a complete understanding of the circumstances leading up to the episode in question. The most important aspect in the clinical management of syncope is history. Specifically focus on the characterization of the episode. Then think of possible serious underlying etiologies that could have caused this episode. Only after serious underlying causes have been ruled out should one apply risk stratification with the CSRS to determine the risk of poor outcomes. According to Dr. Thiruganasambandamoorthy, most of the risk tools assess similar factors. However, with the external validation of the CSRS, he is most confident in using this tool to assess patients for risk of 30-day serious adverse events. Based on the percent risk, clinicians can make an informed decision on how to manage the patient. Each provider will have a different threshold of comfort (and different resources to work, along with patient shared decision making) with outpatient risk management. It should be noted that this study did not focus on older adults (included all adults above 16 years of age, mean age 53.9 years of age), so the relevance to older adults seems less clear.

**Article 2**

Probst MA, Gibson T, Weiss RE, Yagapen AN, Malveau SE, Adler DH, Bastani A, Baugh CW, Caterino JM, Clark CL, Diercks DB, Hollander JE, Nicks BA, Nishijima DK, Shah MN, Stiffler KA, Storrow AB, Wilber ST, Sun BC. Risk Stratification of Older Adults Who Present to the Emergency Department With Syncope: The FAINT Score. *Ann Emerg Med.* 2020 Feb;75(2):147-158. doi: 10.1016/j.annemergmed.2019.08.429. Epub 2019 Oct 23. PMID: 31668571; PMCID: PMC6981063.

**Presenters**

Dr. Kyle R. Burton, Dr. Phillip Magidson, Dr. Marc Probst, Dr. Venkatesh Thiruganasambandamoorthy

**What Question Did this Investigation Aim to Answer?**

Can we derive a novel risk-stratification tool to predict 30-day serious cardiac outcomes?

**What Study Design Did the Authors Choose?**

The authors chose a multicenter, prospective, observational study of older adults aged 60 years or older who presented to an ED with unexplained syncope or near syncope from April 28, 2013, to September 21, 2016. Clinical and laboratory data on all patients were collected, and the primary outcome was 30-day all-cause mortality or serious cardiac outcome. *Readers are encouraged to see the original paper and appendix for further details on the selection of studies, data extraction, and data synthesis.*

### How did the Authors Interpret the Results?

A total of 3,177 older adult patients with either unexplained syncope or near syncope were enrolled with an average age of 73 years. The incidence of the primary outcome, 30-day all cause death or serious cardiac outcome (defined as significant cardiac arrhythmia, myocardial infarction, a new diagnosis of significant structural heart disease or placement of a pacemaker, automated internal defibrillator, coronary artery bypass graft, percutaneous transluminal coronary angioplasty or other invasive cardiac surgery) was 5.7% (95% CI, 4.9% to 6.5%). Using logistic regression, the authors derived the FAINT score (see table 2). A FAINT score of 0 compared to a FAINT score of  $\geq 1$  had a sensitivity of 96.7% (95% CI, 92.9% to 98.8%) and specificity 22.2% (95% CI 20.7% to 23.8%) respectively. Additionally, the FAINT score statistically significantly outperformed physician judgment with an area under the curve of 0.704 and 0.63 respectively (95% CI 0.589 to 0.670).

Question	Points
History of heart failure?	Yes = 1; No = 0
History of arrhythmia?	Yes = 1; No = 0
Initial ECG result abnormal?	Yes = 1; No = 0
Elevated NT-proBNP?	Yes = 1; No = 0
Elevated hs-troponin T?	Yes = 1; No = 0

Among older adults with syncope/near-syncope of potential cardiac etiology, a FAINT score of zero has a reasonably high sensitivity for excluding death and serious cardiac outcomes at 30 days. If externally validated, this tool could improve resource utilization for this common condition.

### Discussion/How Might this Study Affect your Clinical Practice in the Emergency Department?

There is significant overlap in the variables that end up being put into risk stratification tools. The FAINT score variables are similar to risk stratification tools that have previously been created and published, however unique in that it focuses on care for patients 60 years of age and older. The older syncope patient has the potential for higher resource-saving due to the higher perceived risk and higher incidence of syncope.

There has been a healthy discussion among those who create risk stratification tools about whether to include physician judgment variables or to instead only focus on the very objective and very simple clinical, laboratory, or EKG variables. With physician judgment, there may be some disagreement in interpretation, allowing for greater variability in risk assessment. The FAINT score limits the possibility of variability.

A FAINT score of 0, suggests a very low risk and the recommendation is for the patient to be discharged. The authors of this paper suggest using the FAINT score similar to the Pulmonary Embolism Rule Out Criteria or PERC score. The team is not recommending admission if the patient does not have a FAINT score of 0, but instead, the recommendation is for additional consideration of the risk features rather than clearing the patient for discharge.

The FAINT score author emphasizes that this risk stratification tool is meant to inform, not replace, clinical judgment while potentially decreasing cognitive load for clinicians. To compare the FAINT score with unaided physician gestalt, researchers prospectively collected unstructured physician risk assessment by asking the treating ED attending physician to estimate the probability that the patient would experience cardiac death or serious cardiac event at 30 days (0% to 100%). Although challenging for any physician to make a percentile projection, we found it impressive that this decision aid outperformed physician judgment.

Our journal club desired to take a systematic approach to appraise the FAINT clinical decision rule. Dr. Andrew Worster of McMaster University developed a unique system of creating high-quality, clinically relevant and evidence-based content called the Best Evidence in Emergency Medicine (BEEM.) His team of practicing emergency physicians with post-graduate training in epidemiology, evidence-based medicine, and knowledge translation assess the literature using the appropriate BEEM appraisal instrument.<sup>13</sup> Journal club attendees used the BEEM instrument developed by Dr. Worster to appraise this paper.

*Please find the results of attendee participation below:*

FAINT Score Clinical Decision Rule		Appraiser	Appraiser	Appraiser	Appraiser	Appraiser	Appraiser	Appraiser	Appraiser	Appraiser	Appraiser
<b>BEEM Critical Appraisal CDR Quality Checklist</b>											
1	The clinical problem is well defined.	Yes	Yes	Yes	Yes	Yes	Maybe	Yes	Yes	Yes	Yes
2	The study population represents the target population that would normally be tested for the condition included.	Yes	Yes	Yes	Yes	Yes	Maybe	Yes	Yes	Yes	Yes
3	The study population included or focused on those in the ED.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	The study patients were recruited consecutively.	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe
5	The diagnostic evaluation was sufficiently comprehensive and applied equally to all patients.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	All diagnostic criteria were explicit, valid and reproducible.	Yes	Maybe	Yes	Yes	Yes	Yes	Yes	Yes	Maybe	Yes
7	The reference standard was appropriate.	Yes	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Yes	Maybe	Yes
8	All undiagnosed patients underwent sufficiently long and comprehensive followup.	Yes	Maybe	Yes	Maybe	Yes	Yes	Yes	Yes	Yes	Yes
9	The likelihood ratio(s) of the test(s) in question is presented or can be calculated.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	The precision of the measure of diagnostic performance is satisfactory.	Maybe	Maybe	Maybe	Maybe	Maybe	Yes	Maybe	Maybe	Maybe	Yes

  

Key	
Satisfactory	Yes
Indifferent	Maybe
Unsatisfactory	No

## CASE CONCLUSION

This journal club sought to explore the utility of syncope risk stratification guidance focused on the highest risk older patient population. We first assessed the clinical application and impact of a widely accepted and internationally externally validated CSRS. We then discussed whether an age-specific syncope risk stratification tool, in the FAINT score, could provide any additional clinical decision guidance. While overall optimistic about how the FAINT score focuses on helping predict adverse outcomes in the highest risk population, especially with outperformance of clinician judgment, we desire external validation prior to use in the emergency department. Fortunately, external validation of the FAINT score, with an observational prospective cohort [NCT04533425] of 1,270 participants, is set to complete in March 2025. We look forward to discussing the implications of future older age-specific clinical decision aids as we continue to discover the nuances of geriatric emergency medicine.

## KEYWORDS

Syncope, Risk Stratification, Clinical Decision Rules, Geriatrics, Geriatric Emergency Medicine

## AUTHOR AFFILIATIONS

Kyle R. Burton, MD, MPP	Johns Hopkins University, Baltimore, MD
Phillip D. Magidson, MD, MPH	Johns Hopkins Hospital & Johns Hopkins Bayview Medical

## CORRESPONDING AUTHOR

Kyle R. Burton  
 kburto13@jh.edu

## AUTHOR CONTRIBUTIONS

Kyle R. Burton was the principal author responsible for the conceptualization, writing, and revision of this article. Phillip D. Magidson, the senior author, provided oversight for the project.

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## CONFLICTS OF INTEREST

Authors have no conflicts to report.

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