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EDITORIAL

Acute heart failure management in the silver Tsunami era

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Emergency physicians often think of acute heart failure (AHF) as a patient in extremis with oxygen saturation levels in the 70s, blood pressures that are through the roof and florid pulmonary edema on clinical assessment. A more common reality, however, is that as our population ages, AHF presentations to the emergency department involve a complex and nuanced interplay between clinical variables, frailty, social supports, and follow-up options for those who may be discharged from the ED. The acute assessment and management of heart failure has changed little in 30 years of emergency care. What has changed, however, is an appreciation of how scarce our inpatient resources are as well as the potential risks of hospitalizing a frail elder with AHF. After responding to initial therapy many may actually prefer to return home, even if at a considerable risk of an ED revisit.

The decision to discharge or admit an AHF patient may be among the most important decisions that an ED physician can make for these patients. It can have important implications for the patient's trajectory and their quality of life as well as for caregivers and family. Clinicians and hence their patients would benefit from an efficient decision rule that informs and supports safer disposition decisions. The HEARTRISK6 instrument developed by Stiell et al. is a succinct list of variables intended to provide guidance for AHF disposition decisions. It was derived in a multicenter Canadian study and the validation was presented at the 2022 SAEM meeting [1, 2]. The HEARTRISK6 consists of clinical data (history of valvular disease, heart rate, and the need for non-invasive ventilation), key investigations (creatinine and troponin), and a reassessment 2–6 h after ED treatment. A high-risk score points to admission including abnormal resting vital signs and poor oxygen saturation or the inability to successfully complete a 3 min walk test (Fig. 1). This study's primary objective was to predict short-term serious outcomes (SSOs) including mortality, myocardial infarction, intubation, non-invasive ventilation, a major cardiac event within 30 days, or return to the ED within 14 days.

While ED revisits for AHF are generally something to be avoided, and their inclusion among SSOs is justified, in a real-world context, physicians engaging in a shared decision-making approach may identify patients and families who would prefer admission avoidance with some acceptable risk over the sometime equivalent or greater perils associated with hospital admission. This could be especially true among the frail elderly who can encounter a range of complications when hospitalized including delirium, falls, and deconditioning to name a few.

The analysis published in this month's journal by Poliwoda et al. showed that increased rates of SSOs correlate with a HEARTRISK6 score of > 2 [3]. Both admitted and discharged patients experienced a high rate of poor outcomes, in whom 16.2% of discharged patients developed SSOs and 21.2% of those sent home after AHF care returned to the ED within 14 days. The rate of SSOs in the admitted group was nearly twice as high at 29%. HEARTRISK6 comes with the advantages of face validity and simplicity without the need for complex calculations to arrive at a final score.

Do ED-based AHF interventions that rely on risk stratification improve outcomes? In the current Canadian context, the COACH trial offers important insight [4]. COACH is an ED-based cluster-randomized trial that stratified AHF patients according several criteria, using

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Fig. 1 HEARTRISK6 acute heart failure risk scale

Items	Points
1. Initial Assessment	
a. History of valvular heart disease[1]	(1) ___
b. Heart rate	
i. ≥ 100 bpm to < 120 bpm	(2) ___
ii. ≥ 120 bpm	(3) ___
c. Treated with non-invasive ventilation[2]	(2) ___
2. Investigations	
a. Creatinine	
i. ≥ 150 µmol/L to < 300 µmol/L	(2) ___
ii. ≥ 300 µmol/L	(3) ___
b. Troponin	
i. ≥ 3x or 4x Upper Reference Level	(1) ___
ii. ≥ 5x Upper Reference Level *(initial or repeat, local hospital assay)*	(2) ___
3. Fails reassessment after ED treatment (2-6 hours)	(1) ___
a. Resting vital signs abnormal *(SaO_2 < 90% on room air or usual O_2, or HR ≥ 110, or RR ≥ 28)* **OR**	
b. Unable to start or complete 3-minute walk test *(vital signs become abnormal during walk)*[3]	
Total Score (0 – 12): ____	

Heart Failure Risk Categories for Short-term Serious Outcomes

Total Score	Absolute Risk	Category
0	6.4%	Low
1	8.5%	
2	11.3%	Medium
3	14.9%	
4	19.4%	
5	24.8%	
6	31.2%	High
7	38.3%	
8	46.0%	
9	53.9%	
≥10*	61.6%	

** No patient had a score >11.*

[1] *History of Valvular Heart Disease: Moderate or severe valvular heart disease*
[2] *Treated with non-invasive ventilation: BiPAP within one hour of initial assessment*
[3] *Unable to start or complete 3-minute walk test (vital signs become abnormal during walk test): Score if patient's O2 drops below 90%, HR ≥ 110, RR ≥ 28 during walk test; or if patient is unable to complete due to fatigue or dyspnea*

1) Age
2) Arrival by EMS
3) Triage systolic blood pressure
4) Triage heart rate
5) Triage oxygen saturation
6) Potassium concentration
7) Creatinine concentration
8) Troponin elevated
9) Active cancer
10) Metolazone
11) BNP value
12) Any ST depression
13) Does the patient have BBB, LVH with strain, or Ventricular Paced Rhythm?

Fig. 2 EHMRG30-ST risk scale

the EHMRG30-ST risk score (Fig. 2). Investigators sought to predict the co-primary outcome of all-cause mortality or hospitalization at 30 days due to cardiovascular causes; arguably, a limited set of important outcomes. During the intervention phase, low- and low-intermediate-risk patients were discharged and high- and intermediate-high-risk patients were admitted. They concluded that the application of EHMRG30-ST score along with elements of clinical judgement and rapid outpatient follow-up led to lower rates of serious outcomes while maintaining safe discharge from the ED [5]. A considerable limitation of the EMERG30-ST is the reliance on brain natriuretic peptide (BNP) as a key predictor which may not be available at many non-urban and non-academic sites in Canada. Importantly, the benefits seen in the COACH appear to be contingent on the existence of a short-term follow-up clinic that can ensure that patients with more tentative discharge plans are monitored closely.

As emphasized by Poliwoda et al. and supported by an emerging literature, it is clearer that a comprehensive and holistic approach to risk stratification and decision-making in AHF will depend on timely and preferably multidisciplinary outpatient follow-up [3, 5] since readmission often occurs within a few days after hospital discharge. While EDs are the safety net for patients with AHF when decompensation of their chronic heart failure, it is worth considering what works well in keeping patients from presenting to the ED in the first place. A Canadian-focused Health Technology Assessment showed that clinics specifically focused on HF patients were cost effective to reduce hospitalization [6]. In a systematic review and meta-analysis, heart failure clinics resulted in a lower incidence of all-cause mortality which was also observed in patients with mean ejection fraction ≤ 30% (OR, 0.39; $P = 0.02$) or patients with recent hospitalization for HF (OR, 0.51; $P = 0.0001$) [7].

Overall, it seems that key to improved outcomes in AHF patients who may be considered for discharge from the ED is the availability of early follow-up with HF clinics or equivalents to determine stability and adjust medications. For clinicians, patient frailty, response to ED treatment, opportunity to optimize outpatient therapy, as well as patient and family values and preferences may be among the ultimate variables driving admission decisions for elderly patients. As we witness increasing strain on both primary care and acute care resources in Canada, EDs will be at the forefront of the silver tsunami of AHF presentations covering a wide spectrum of severity. Decisions related to admission and optimized follow-up can now be informed by validated risk stratification tools, shared decision-making principles, and knowledge of what works best in the post-ED care context.

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Declarations

Conflict of interest ED and MB report no conflict of interest.

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