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Discharge-ready volume status in acute decompensated heart failure: a survey of hospitalists

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ABSTRACT

Acute decompensated heart failure is the leading cause of hospitalization in older adults. Clinical practice guidelines recommend patients should be euvolemic at hospital discharge – yet accurate assessment of volume status is recognized to be exceptionally challenging. This conundrum led us to investigate how hospitalists are assessing volume status and discharge-readiness of patients hospitalized with heart failure. We collected audience response data during a didactic heart failure presentation at the 2019 Society of Hospital Medicine annual meeting. Respondents (n = 216), 76% of whom were practicing physician hospitalists caring for more than 20 acute heart failure patients per year, were presented six questions. Eighteen percent of respondents reported not being able to determine the completeness of decongestion on discharge and 32% reported that complete decongestion was not a treatment target. These findings suggest important differences between guideline recommendations and how hospitalists treat heart failure in current clinical practice.

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Acute heart failure; heart failure; volume status; discharge readiness

1. Introduction

Acute decompensated heart failure (ADHF) is the leading admitting diagnosis in patients 65 and older with >1 million hospitalizations per year in the USA alone [1]. Because patients discharged with signs of congestion, or fluid overload, are more likely to be re-hospitalized within 2 months or die within 6 months post-discharge [2], current clinical practice guidelines recommend careful evaluation for signs of congestion and attainment of complete decongestion, or removal of all excess fluid, prior to discharge. Specifically, the 2013 American Heart Association guidelines for the management of heart failure state, 'careful evaluation of all physical findings, laboratory parameters, weight change, and net fluid change should be considered before discharge.'[1] Similarly, the 2016 European Society of Cardiology Heart Failure guidelines recommend discharge 'when haemodynamically stable, euvolaemic, established on evidence-based oral medication and with stable renal function for at least 24 hours.'[3] However, evaluation of decongestion is inaccurate based on symptoms (e.g., orthopnea), physical examination (e.g., jugular venous distention), chest x-rays, and serum biomarkers (e.g., brain natriuretic peptide) [1,4]. Given the discrepancy between guideline recommendations for assessing euvolemia and the limited accuracy of traditional available bedside tools to detect it, we sought to evaluate how hospitalists assess volume status and discharge-readiness of patients hospitalized with acute decompensated heart failure.

2. Methods

During an interactive didactic session entitled, 'Is the tank drained? Discharge-Ready Volume Targets for Acute Heart Failure' at the Society of Hospital Medicine national conference in Washington, D.C. in March 2019, the session moderator (BPL) conducted a live survey using an audience response system. Eight multiple-choice questions were administered during the 40-min session, and 6 pertained to respondents' behaviors, beliefs, and attitudes regarding inpatient management of heart failure. Deidentified data on respondent characteristics were collected. Audience response results were displayed in real-time immediately after each question, and these results informed subsequent discussion. The Investigational Review Board determined this project did not qualify as human subjects research because it posed no risk to respondents. A summary of the questions and responses is displayed in Table 1, and a complete version is available in the Appendix.

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Table 1. Abbreviated survey questions and results.

Question #	Question	# of total respondents	Answer choice	# of respondents (%)
1	Type of provider	197		
			practicing physician	150 (76)
			practicing physician assistant	18 (9)
			practicing nurse	16 (8)
			physician in-training	11 (6)
2	# of Heart Failure patients respondent has care for	215		
			75 or more	99 (46)
			21 to 75	92 (43)
			1 to 20	19 (9)
3	How accurate is urine volume recorded	213		
			by more than 1 liter ('bad')	139 (65)
			by less than 1 liter ('not too bad')	72 (34)
			not applicable	2 (1)
4	Best measure of urine output	216		
			weight difference from previous day	79 (37)
			improvement in symptoms	76 (35)
			24-hour net urine output	33 (15)
			improvement of signs	24 (11)
5	% with dry weight	206		
			0%	59 (29)
			1 to 50%	113 (55)
			51% to 99%	22 (11)
			100%	1 (0)
			I don't know	11 (5)
6	3 most important measures of decongestion	201		
			resolutions of symptoms with activity	109 (52)
			physical exam	102 (49)
			weight loss since admission	101 (48)
7	Should decongestion be complete prior to discharge	152		
			Yes	88 (58)
			No	49 (32)
			I don't know	15 (10)
8	What % of patients are euvolemic on discharge	164		
			0%	1 (1)
			1 to 20%	2 (1)
			21 to 50%	37 (23)
			51 to 80%	69 (42)
			81 to 99%	24 (15)
			100%	2 (1)
			I cannot determine	29 (18)

3. Results

3.1. Respondent characteristics

Among all participating audience members, between 152 and 216 responded to each question. Demographics revealed 76% of respondents were practicing physician hospitalists, 9% were physician assistants, 8% were nurses (including nurse practitioners or advanced practice registered nurses), and 6% were physicians-in-training. Eighty-nine percent of respondents had cared for >20 patients with heart failure in an acute care setting in the prior year.

3.2. Assessing changes in volume status

Sixty-five percent of respondents estimated that the recorded 24-h net fluid output recorded likely differed from the true value by >1 l in their practice setting. When queried about the most important finding used in their practice setting to assess day-to-day changes in net fluid removal, approximately one-third (37%) reported using changes in weight, one-third (35%) reported using changes in symptoms, and smaller proportions reported using 24-h net urine output (15%) or improvement in physical exam findings (11%).

3.3. Assessing for completeness of decongestion

When asked about the most important findings used to assess the adequacy of decongestion, the most frequently reported were resolution of symptoms of congestion with activity (52%), resolution of signs of congestion (49%), weight loss since admission (48%), resolution of symptoms of congestion at rest (39%), achievement of a known dry weight (37%), cumulative net urine output (22%), worsening renal function (20%), target reduction in natriuretic peptides (11%), metabolic alkalosis (6%), and point-of-care ultrasound findings (4%).

3.4. Discharge-readiness

When asked whether decongestion should be 'complete' prior to discharge, 58% of respondents responded 'yes' while 32% responded 'no' and 10% responded 'I don't know.'

When asked what percentage of patients they discharged had achieved 'complete' decongestion prior to discharge, 18% responded they could not determine the completeness of decongestion, 23% responded between 21% and 50% of patients, 42% responded between 51% and 80% of patients, and 15% responded between 81% and 99% of patients.

4. Discussion

The results of our audience polling revealed considerable practice variation among hospitalists with regard to the assessment of pulmonary vascular decongestion, volume status, and attitudes toward the importance of attaining complete decongestion prior to discharge. Our data reveal a broad distribution of responses about the most important parameters for assessing decongestion and volume status without a clear preference among most respondents. Additionally, a large proportion of respondents reported routinely discharging patients prior to attaining complete decongestion and indicated that attainment of complete decongestion was not a goal of hospitalization. To our knowledge, this is the first survey of hospitalists from multiple institutions evaluating approaches and attitudes toward the management of congestion and discharge-readiness based on the volume status of patients hospitalized for heart failure.

When asked to estimate the proportion of patients that achieved complete decongestion prior to discharge, one-fifth of hospitalists responded that they were unable to assess whether complete decongestion had been achieved. Indeed, hospitalist providers reported the three most commonly used findings to determine whether adequate decongestion was achieved were symptoms with activity, resolution of signs, and weight loss since admission. However, the traditional approach of using symptoms and physical exam findings to assess the severity of congestion due to heart failure is unreliable [5]. Because congestion at the time of hospital discharge is associated with readmissions and death, identifying a more accurate diagnostic approach to detect and monitor congestion is considered a research priority by the National Heart, Lung, and Blood Institute [6] and is an active area of inquiry [7]. One tool that has demonstrated superior sensitivity relative to traditional tools in multiple cohorts is point-of-care ultrasound (POCUS) [8–10]. Two recent randomized controlled trials demonstrated the use of point-of-care lung ultrasound both decreased length of stay and number of urgent visits in patients recently hospitalized for heart failure [11,12]. Further, lung ultrasound is a relatively easy POCUS application for to learn [13] and perform [14]. Although POCUS has become more readily available in all hospitals over the past 25 years, only 4% of respondents indicated POCUS was among their most useful bedside tools, suggesting a provider training gap exists and should be a focus of future quality improvement efforts.

Most striking, almost half of respondents did not believe attainment of complete decongestion was a goal of hospitalization and reported a large proportion of patients were discharged with signs of congestion. These findings are in contrast to recommendations in the 2013 American Heart Association guidelines [1] and the European Society of Cardiology guidelines for the management of acute and chronic heart failure [3]. These findings also require further validation in a larger study sample. If validated, further study would be warranted to determine the underlying reason for this discrepancy. Lack of knowledge of guideline recommendations, inability to determine or achieve complete decongestion due to disease severity, or competing priorities, such as length of stay, may all be contributing factors.

Limitations of our data include a small sample size and selection bias since the practice of hospitalist providers at a national conference may not represent hospitalists generally. Additionally, responses were shared in real-time among the audience, and subsequent responses may have been influenced by previous responses. Finally, the phrasing and order of questions may have introduced framing or anchoring bias [15,16].

In conclusion, these data highlight the variability among hospitalists in the management of patients hospitalized with acute decompensated heart failure and reveal the need for more accurate bedside tools to assess decongestion. Our finding that a large proportion of respondents do not consider the attainment of complete decongestion a goal of hospitalization suggests an important gap between the current clinical practice of hospitalists and guideline recommendations for a condition that is the most common cause of hospitalization in older adults. Although these data should be verified in a larger study sample of hospitalists, we suspect our findings will be confirmed due to the inaccuracy of traditional bedside tools for assessing decongestion in heart failure.

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Appendix Survey questions and results

Question 1: What kind of health care provider are you?

Select single-best description	n	(%)
practicing physician	150	(76)
practicing physician assistant	18	(9)
practicing nurse (including NP or APRN)	16	(8)
physician in-training (intern or resident)	11	(6)
medical student	1	(1)
other	1	(1)
nurse in-training	0	(0)
physician assistant in-training	0	(0)
	197	

Question 2: In the last year, how many patients with acute heart failure have you managed in an acute care setting, such as a hospital, emergency department, observation unit, or short stay unit? Your role in management can be as a primary provider or as an extender to the primary provider(s).

Select single-best estimate	n	(%)
75 or more	99	(46)
21 to 75	92	(43)
1 to 20	19	(9)
0	1	(0)
I am not sure	4	(2)
	215	

Question 3: At your own hospital what is your best estimate for how much reported 24-h net urine outputs might differ from true (actual) 24-h net urine outputs? (For this and all remaining questions, if you work at more than one hospital, choose the hospital where you see more patients over the course of a year.)

Select single-best estimate	n	(%)
by more than 1 liter ('bad')	139	(65)
by less than 1 liter ('not too bad')	72	(34)
not applicable	2	(1)
	213	

Question 4: What is the most important finding that you use at your own hospital to determine if a patient is undergoing net negative fluid removal from day to day?

Select single most important finding	n	(%)
weight difference from previous day	79	(37)
improvement in symptoms	76	(35)
24-hour net urine output	33	(15)
improvement of signs	24	(11)
laboratory values	2	(1)
other	2	(1)
patient's own perception of urine produced	0	(0)
	216	

Question 5: What proportion of heart failure patients at your own hospital have a retrievable established dry weight?'Established dry weight' is a weight that was recorded when a patient was known to be 'euvolemic'. This weight is intended to be used as a baseline for comparison. 'Retrievable' means that a health-care provider would be able to find the dry weight in the medical record within 2 minutes.

Select single-best estimate	n	(%)
0%	59	(29)
1 to 50%	113	(55)
51% to 99%	22	(11)
100%	1	(0)
I don't know	11	(5)
	206	

Question 6: What are the 3 most important findings that you use at your own hospital to determine if a patient is adequately decongested (euvolemic)?

Select TOP 3 most important findings	n	(%)
resolution of symptoms of congestion (difficulty breathing, body swelling) with activity	109	(52)
resolution of signs of congestion (JVP, rales, edema)	102	(49)
weight loss since admission	101	(48)
resolution of symptoms of congestion (difficulty breathing, body swelling) at rest	82	(39)
achievement of a known dry weight	77	(37)
cumulative net urine output	46	(22)
worsening renal function (increase in BUN and/or serum creatinine)	41	(20)
target reduction in BNP or NT-proBNP	23	(11)
metabolic alkalosis (increase in serum bicarbonate)	13	(6)
point-of-care ultrasound (IVC and/or lung)	8	(4)
other	2	(1)
hemoconcentration (change in hemoglobin or hematocrit)	1	(0)
	605	

Question 7: Should decongestion be 'complete' prior to discharge?

Select best answer	n	(%)
Yes	88	(58)
No	49	(32)
I don't know	15	(10)
	152	

Question 8: What proportion of heart failure patients that are discharged by you (as a primary provider or as an extender to a primary provider) achieve 'complete' decongestion prior to discharge?

Select best estimate	n	(%)
0%	1	(1)
1 to 20%	2	(1)
21 to 50%	37	(23)
51 to 80%	69	(42)
81 to 99%	24	(15)
100%	2	(1)
I cannot determine the completeness of decongestion	29	(18)
	164	