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CLINICAL RESEARCH

Improving quality of care in patients with decompensated acute heart failure using a discharge checklist

L'utilisation d'une check-list de sortie améliore la prise en charge des patients hospitalisés pour décompensation d'une insuffisance cardiaque

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KEYWORDS
Acute heart failure;
Discharge checklist

Summary
Background. — The use of a discharge checklist may decrease heart failure readmission rate.
Aims. — We aimed to evaluate the usefulness of a checklist in patients hospitalized for heart failure, in terms of mortality, cardiovascular mortality and readmission rates, and quality of care, including therapeutic optimization and careplan planning.
Methods. — We prospectively used a discharge checklist in 103 patients hospitalized for heart failure between July 2015 and January 2016. Quality of care and outcomes were compared with a retrospective cohort of 137 patients with same inclusion criteria, hospitalized between

Abbreviations: ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; ARNI, angiotensin receptor-neprilysin inhibitor; ESC, European Society of Cardiology; HF, heart failure; HFpEF, heart failure with preserved ejection fraction; LVEF, left ventricular ejection fraction.

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June 2014 and December 2014. The primary endpoints were total and cardiovascular mortality and readmissions for heart failure at 6 months. The secondary endpoint was quality of care rendered, measured by evidence-based medications, appropriate medication uptitration and planned discharge care.
Results. — At 6 months, there were no differences between the checklist and control cohorts in the rates of all-cause mortality (10.7% vs. 13.1%; $P = 0.57$), cardiovascular mortality (8.7% vs. 10.9%; $P = 0.58$) and readmission (29.1% vs. 32.1%; $P = 0.62$). Follow-up after discharge was better planned in the checklist group. The use of the checklist yielded therapeutic optimization with a higher dose of beta-blockers and renin-angiotensin-aldosterone system blockers, especially in patients with a reduced left ventricular ejection fraction (< 50%) ($P = 0.03$ and $P = 0.02$, respectively).
Conclusions. — The use of a simple discharge checklist in patients with acute heart failure showed no benefit in terms of readmission and mortality rates; however, it yielded better quality of care, including therapeutic optimization and careplan planning.

MOTS CLÉS
Insuffisance cardiaque aiguë ;
Checklist de sortie d'hospitalisation

Résumé
Contexte. — L'utilisation d'une check-list de sortie pourrait diminuer les réhospitalisations pour insuffisance cardiaque aiguë.
Objectifs. — Évaluer l'impact de l'utilisation d'une check-list sur la mortalité, le taux de réhospitalisation pour insuffisance cardiaque, l'optimisation du traitement médical et la planification du suivi.
Méthodes. — Une check-list a été utilisée prospectivement chez 103 patients hospitalisés pour insuffisance cardiaque aiguë, entre juillet 2015 à janvier 2016. La prise en charge de ces patients et leur suivi ont été comparés à une cohorte rétrospective de 137 patients (juin à décembre 2014). Les critères de jugement principaux étaient la survenue d'un décès, d'un décès d'origine cardiovasculaire ou une réhospitalisation pour insuffisance cardiaque à 6 mois. Les critères de jugement secondaires étaient l'optimisation du traitement médical et la planification du suivi.
Résultats. — Il n'existe pas de différence sur la mortalité toutes causes, la mortalité cardiovasculaire et les réhospitalisations pour insuffisance cardiaque à 6 mois : respectivement, 10,7 % vs 13,1 %, $p = 0,57$; 8,7 % vs 10,9 %, $p = 0,58$; 29,1 % vs 32,1 %, $p = 0,62$, pour le groupe check-list versus groupe témoin. L'optimisation du traitement est meilleure dans le groupe check-list, en particulier pour les patients ayant une fraction d'éjection ventriculaire gauche altérée < 50 %, où les posologies de bêta-bloquants et d'inhibiteurs du système rénine-angiotensine-aldostérone sont significativement plus élevées ($p = 0,03$ et $p = 0,02$, respectivement).
Conclusion. — L'utilisation d'une check-list de sortie n'a pas permis de réduire la mortalité et les réhospitalisations pour insuffisance cardiaque. En revanche, son utilisation est associée à une optimisation des traitements et une meilleure utilisation des outils de suivi.

Background

Despite recent breakthroughs in medical therapies and interventions, heart failure (HF) remains a major public health problem, with a significant medicoeconomic impact and a poor prognosis. The rates of 30-day readmission still vary from 11% to 18.5% [1,2], and nearly half of these hospitalizations occur before the first ambulatory visit [3]. It is estimated that up to 75% of these early readmissions could be avoided [4], and patients who are discharged from hospitals that have higher early follow-up rates have a lower risk of 30-day readmission [3]. As a consequence, the European Society of Cardiology (ESC) HF Guidelines recommend predischarge and long-term management to prevent early readmissions [5].

Rehospitalizations are perceived as a correctable source of poor quality of care, poor quality of life in patients with HF and excessive medical costs. Some checklists have been suggested as a tool to assist physicians in the management of discharge of patients with HF [6—10]. However, there are few data on the usefulness of these tools. Basoor et al. demonstrated that the use of a simple predischarge checklist in 48 patients with HF (among 1597 patients admitted with acute HF in the study period) led to better therapeutic optimization and decreased hospitalization rates when compared with 48 matched patients with HF without

checklist use [10]. An abstract reported a significant decrease in HF readmission rate using an HF discharge checklist in 4879 patients, but the full-text article has not been published [11]. As a consequence, there are no data about the usefulness of a discharge checklist as a daily-basis tool in the management of patients hospitalized for decompensated HF.

We aimed to design a discharge checklist to help physicians with therapeutic optimization and planning discharge coordination in patients with HF, and to evaluate its usefulness in improving quality of care and reducing rehospitalization and mortality rates in this population.

Methods

Checklist

Our checklist was designed according to previous ESC-HF Guidelines [12] in order to promote treatment optimization and the development of a careplan before discharge in patients with decompensated HF. The checklist includes simple clinical and paraclinical variables, as well as lifestyle advice, medication use and uptitration, and follow-up management (Fig. 1). We wanted the checklist to be simple and quick to use. A corrective action may be suggested if a particular point is not optimized.

Patient population

We sought to prospectively include all patients hospitalized for acute decompensated HF from July 2015 to January 2016 in our institution (checklist cohort, Fig. 2). Patients were included only if they were discharged home, whatever the left ventricular ejection fraction (LVEF). Heart failure with altered ejection fraction was defined as HF with either reduced or mid-range LVEF (< 50%) [5]. Exclusion criteria included planned cardiac surgery (coronary artery bypass and/or valve replacement), transcatheter aortic valve replacement, reversible causes of HF (e.g. Tako-Tsubo syndrome) and age < 18 years. During this period, recommendations on how to use the checklist were provided regularly to medical staff. The checklist had to be completed 1 or 2 days before the planned discharge, in order to allow therapeutic optimization or follow-up planning. Of course, the checklist was not intended to replace individual medical judgment or individual patient needs, and the attending physician was not enforced to use or follow it for all patients with HF.

A control cohort was included retrospectively in our institution from June 2014 to December 2014, with the same inclusion and exclusion criteria. The checklist was not used in the control cohort (Fig. 2). For each patient in this control cohort, a checklist was completed retrospectively, using medical records with the latest available data at the time of discharge.

Endpoints

The primary endpoints were rates of mortality, cardiovascular mortality and readmission for HF within 6 months of discharge. The secondary endpoint was quality of care rendered, measured by evidence-based medications, appropriate medication uptitration and planned careplan (e.g. telemedicine).

Statistical analysis

Quantitative variables are described as means ± standard deviations, and were compared using Student's *t*-test or the Wilcoxon rank sum test, as appropriate. Qualitative variables are described as number and percentage, and were compared using Fisher's exact test. Rates of adverse events were compared between groups using Fisher's exact test. We used propensity scores to assemble a matched cohort in which patients from the prospective cohort with a discharge checklist versus patients from the retrospective cohort without a checklist would be balanced on key measured baseline characteristics. A *P*-value < 0.05 was considered significant. All analyses were performed using R, version 3.4.4 (R Foundation for Statistical Computing, Vienna, Austria).

Results

Population characteristics

During the inclusion period for the prospective cohort, 200 patients were hospitalized for decompensated HF. Twenty-four patients were excluded, and the discharge checklist was used in 103 patients (51.5%). We retrospectively included 137 patients in the control cohort. Baseline characteristics are depicted in Table 1. Patients in the checklist cohort were significantly older (80.3 ± 11.8 vs. 74.7 ± 12.3 years in the control cohort; $P < 0.001$). LVEF was higher in the checklist cohort (46.0 ± 12.6% vs. 41.0 ± 14.8%; $P < 0.01$). As a consequence, there were significantly more patients with altered LVEF in the control group (63.5% vs. 49.0%; $P = 0.02$). Baseline characteristics were more balanced when comparing propensity-matched cohorts (Table 1).

Checklist data

The checklist data results are depicted in Table 2. Systolic blood pressure was in the target range at discharge in 122 patients (89.1%) in the control cohort compared with 99 patients (96.1%) in the checklist cohort ($P = 0.04$). There was a non-significant trend for better control of heart rate in the checklist cohort ($P = 0.06$). There was no brain natriuretic peptide measurement at discharge in 70.1% of patients in the control group compared with only 8.7% in the checklist group ($P < 0.001$). There was a non-significant trend for a higher albumin concentration in the checklist cohort ($P = 0.06$).

Outcomes

During the 6-month follow-up period, 11 patients (10.7%) died in the checklist group compared with 18 (13.1%) in the control group ($P = 0.57$; Table 3). There was no reduction in cardiovascular death at 6-month follow-up in the checklist cohort ($n = 9$, 8.7%) compared with the control cohort ($n = 15$, 10.9%), even after adjustment using the propensity score (hazard ratio 0.66, 95% confidence interval 0.27—1.63;

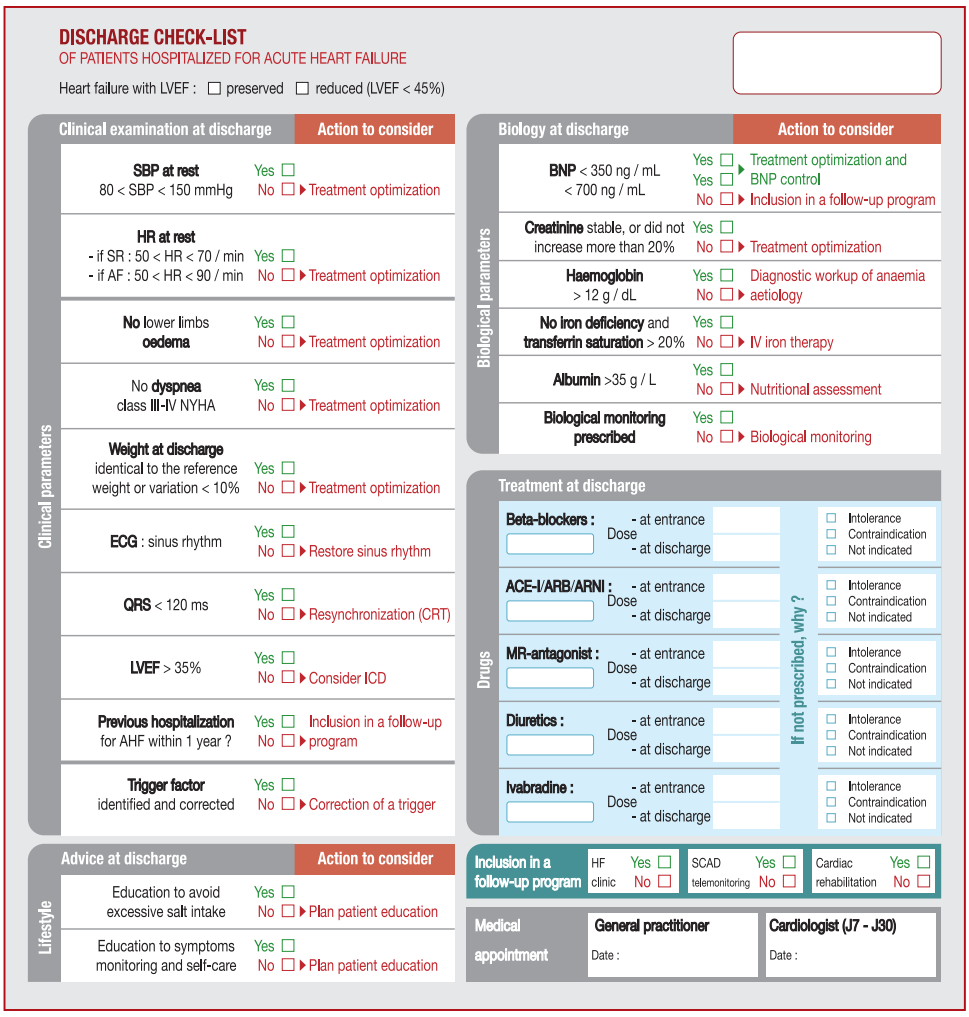

Figure 1. Discharge checklist. The cut-off value between preserved and altered left ventricular ejection fraction (LVEF) was set to 45% (see checklist) during the inclusion period (until February 2016), but analyses were performed with a 50% cut-off level. AHF: acute heart failure; ACE-I: angiotensin-converting enzyme inhibitor; ARB: angiotensin receptor blocker; ARNI: angiotensin receptor-neprilysin inhibitor; BNP: brain natriuretic peptide; CRT: cardiac resynchronization therapy; ECG: electrocardiogram; HF: heart failure; HR: heart rate; ICD: implantable cardioverter defibrillator; IV: intravenous; MR: mineraloreceptor; NYHA: New York Heart Association; SBP: systolic blood pressure; SCAD: Suivi Clinique A Domicile.

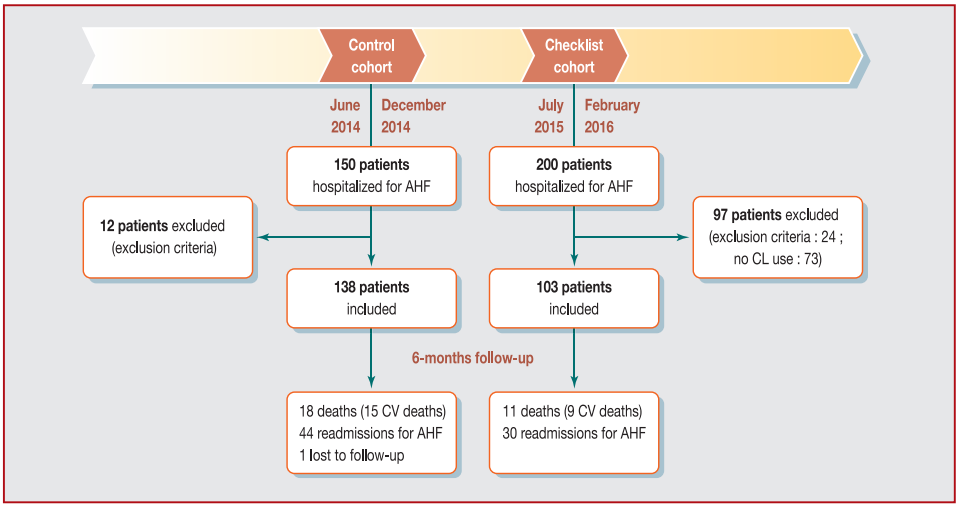

Figure 2. Flow chart of enrolment and 6-month outcomes. AHF: acute heart failure; CL: checklist; CV: cardiovascular.

Table 1 Baseline characteristics.

	Checklist cohort ($n = 103$)	Control cohort ($n = 137$)	Standardized difference	P	Propensity-matched checklist cohort[a] ($n = 102$)	Propensity-matched control cohort[a] ($n = 102$)	Standardized difference	P
Age (years)	80.3 ± 11.8	74.7 ± 12.3	0.47	< 0.001	80.2 ± 11.8	78.2 ± 10.7	0.18	0.21
Male sex	51 (49.5)	84 (61.3)	−0.24	0.07	50 (49.0)	59 (57.8)	−0.18	0.26
LVEF (%)	46.0 ± 12.6	41.0 ± 14.8	0.37	< 0.01	46.0 ± 12.6	44.9 ± 13.5	0.08	0.38
LVEF < 50%[b]	50 (49.0)	87 (63.5)	−0.30	0.02	49 (48.0)	57 (55.9)	−0.16	0.33
Heart rate (bpm)	74 ± 15	76 ± 16	−0.14	0.29	74 ± 15	75 ± 14	−0.07	0.76
Systolic BP (mmHg)	123 ± 20	120 ± 23	0.12	0.27	123 ± 20	123 ± 22	0.01	0.88
Creatinine (μmol/L)	121.0 ± 52.3	117.3 ± 47.1	0.08	0.56	121.1 ± 52.6	119.1 ± 47.6	0.04	0.40
GFR (mL/min per 1.73 m^2)	50.2 ± 19.5	54.7 ± 19.8	−0.23	0.08	50.1 ± 19.6	52.4 ± 19.3	−0.12	0.18

Data are expressed as mean ± standard deviation or number (%). BP: blood pressure; GFR: glomerular filtration rate; LVEF: left ventricular ejection fraction.

[a] There were 102 patients in each cohort with propensity score matching because exact LVEF was not available in one patient.

[b] Checklist cohort ($n = 102$); control cohort ($n = 137$).

$P = 0.37$). There was no difference between groups regarding HF readmission rate: 30 patients (29.1%) in the checklist group compared with 44 (32.1%) in the control group.

Considering only patients with an LVEF < 50%, six (12.0%) died in the checklist group vs. 11 (12.6%) in the control group ($P = 0.92$; Table 3). There was no reduction in cardiovascular death at 6-month follow-up: five patients (10.0%) in the checklist cohort compared with nine patients (10.3%) in the control cohort. Finally, there was a non-significant decrease in HF readmission rate: 10 patients (20.0%) in the checklist group compared with 29 (33.3%) in the control group; hazard ratio 0.50, 95% confidence interval 0.22–1.14; $P = 0.10$, and $P = 0.17$ after adjustment using the propensity score.

Quality of care (Table 3)

Regarding medications, uptitration of beta-blockers and angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs) or angiotensin receptor-neprilysin inhibitor (ARNIs) was better in the checklist group than in the control group: respectively, 67.0% vs. 60.6% ($P < 0.01$ for beta-blockers) and 51.5% vs. 40.1% ($P < 0.001$ for ACEIs/ARBs or ARNIs). The same results were observed in patients with altered LVEF ($P = 0.03$ and $P = 0.02$, respectively). Some patients in the checklist cohort with altered LVEF were not treated with beta-blockers (12 patients, 24%) or with ACEIs/ARBs or ARNIs (12 patients, 24%) at discharge. The main reasons were contraindications (e.g. cardiac amyloidosis or acute renal failure), but there was no explanation in two patients (4%) in each case. There were also more patients treated with diuretics at discharge in the checklist cohort (92.2% vs. 75.9%; $P < 0.001$). However, there was no difference regarding mineraloreceptor antagonist uptitration. Follow-up after discharge was better planned in the checklist group, as demonstrated by a medical appointment in the next 30 days in 81.6% vs. 32.8% in the control group ($P < 0.001$). Referral to telemedicine was also significantly higher (35.9% vs. 15.3%; $P < 0.001$).

Discussion

We did not demonstrate a reduction in mortality or HF readmission rates using our discharge checklist. However, the predischarge use of a quality-improvement HF checklist leads to a higher proportion of patients taking evidence-based and uptitrated therapies.

Our population had a high rate of readmission for HF at 6 months (30.8%), which is higher than in the ESC-HF-LT registry, which included 4052 patients hospitalized for decompensated acute HF from 2011 to 2015 [13]. This registry reported a 1-year all-cause death rate of 27.2% and a 1-year rehospitalization rate of 29.91%. In this registry, 34.9% of patients were aged > 75 years, and the mean LVEF was 37.3% (18.5% of patients had HF with preserved [> 50%] LVEF [HFpEF]). Our patients were older (mean age: 77 years) and were more likely to have HFpEF (43%). HFpEF is usually associated with significant co-morbidities and older age, and this may explain in part the high rate of readmission we observed.

The present study did not demonstrate that the use of a standardized discharge checklist improves outcomes in patients hospitalized for decompensated acute HF. Previously, Basoor et al. [10] showed that the use of a discharge checklist decreased 6-month readmission rates (23% in the checklist group compared with 42% in the control cohort).

Table 2 Checklist data.

	Checklist cohort		Control cohort		P[a]
	Overall(n = 103)	LVEF < 50%(n = 50)	Overall(n = 137)	LVEF < 50%(n = 87)	
Target systolic BP	99 (96.1)		122 (89.1)		0.04
Target heart rate	77 (74.8)		87 (63.5)		0.06
Trigger factor for acute HF[b]					0.03
Cardiovascular	48 (46.6)		76 (55.5)		
Rhythm disorders	16 (15.6)		36 (26.3)		
ACS	8 (7.8)		16 (11.7)		
Non-compliance with diet	12 (11.7)		9 (6.6)		
Hypertension	12 (11.7)		23 (16.8)		
Non-cardiovascular	26 (25.2)		19 (13.4)		
Unknown	29 (28.2)		42 (30.7)		
BNP[c]					0.29[d]
< 350 ng/mL	51 (49.5)		15 (10.9)		
350—700 ng/mL	20 (19.4)		12 (8.8)		
≥ 700 ng/mL	23 (22.3)		14 (10.2)		
Not available	9 (8.7)		96 (70.1)		
Haemoglobin > 12 g/dL	63 (61.2)		82 (59.9)		0.83
Albumin > 35 g/L	58 (56.3)		60 (43.8)		0.06
Treatments at discharge[b]					
Beta-blocker					< 0.01/0.03
None	32 (31.1)	12 (24.0)	33 (24.1)	14 (16.1)	
Dose decreased	2 (1.9)	1 (2.0)	21 (15.3)	14 (16.1)	
Dose increased	69 (67.0)	37 (74.0)	83 (60.6)	59 (67.8)	
ARB/ACEI/ARNI					< 0.001/0.02
None	34 (33.0)	12 (24.0)	75 (54.7)	41 (47.1)	
Dose decreased	16 (15.5)	7 (14.0)	6 (4.4)	6 (6.9)	
Dose increased	53 (51.5)	31 (62.0)	55 (40.1)	39 (44.8)	
MRA	12 (11.7)	8 (16.0)	24 (17.5)	19 (21.8)	0.21/0.40
Diuretics	95 (92.2)		104 (75.9)		< 0.001
Ivabradine	2 (1.9)		7 (5.1)		0.20
Planned follow-up[b]					
HF clinic	4 (3.9)		16 (11.7)		0.03
Telemedicine	37 (35.9)		21 (15.3)		< 0.001
Cardiac rehabilitation	11 (10.7)		21 (15.3)		0.28
Medical appointment in < 30 days	84 (81.6)		45 (32.8)		< 0.001

Data are expressed as number (%). ACEI: angiotensin-converting enzyme inhibitor; ACS: acute coronary syndrome; ARB: angiotensin receptor blocker; ARNI: angiotensin receptor-neprilysin inhibitor; BNP: brain natriuretic peptide; BP: blood pressure; HF: acute heart failure; MRA: mineraloreceptor antagonist.

[a] When two P values are displayed, the first compared the two overall populations and the second compared only patients with LVEF < 50%.

[b] Percentages may add up to > 100% because of multiple trigger factors or follow-up careplans.

[c] Percentages may not add up to 100% because of rounding.

[d] Only patients with an available BNP measurement were compared.

Some explanations can be advanced to explain this difference. First, the population was different from ours, as the mean LVEF was 40% in the checklist group compared with 46% in our checklist cohort. Patients with preserved or mid-range LVEF tend to be older and have more co-morbidities. Our checklist and the checklist by Basoor et al. were built in order to avoid cardiovascular triggering factors of acute HF, such as arrhythmias or non-compliance with diet. There are more evidence-based data about the treatment of patients with HF with reduced LVEF than with HFpEF [5], as no randomized clinical trial has shown better survival in patients with HFpEF. As a consequence, a discharge checklist may be less effective in patients with HFpEF. It may be useful to include items about non-cardiovascular triggering factors, frailty and co-morbidities in this specific population. Second, our discharge checklist was used in a significant proportion (51.5%) of patients hospitalized for decompensated acute HF during the period of inclusion. This result is significantly higher than in the study by Basoor et al., where the checklist was used in 48 patients randomly selected from 1597 patients (3%) admitted with decompensated acute HF [10]. We aimed to design a simple checklist that could be used in all patients hospitalized for acute HF. Our physicians were encouraged, but not enforced, to use the checklist

Table 3 Outcomes at 6 months.

	Checklist cohort	Control cohort	HR (95% CI)	*P*
Overall population[a]				
All-cause death	11 (10.7)	18 (13.1)	0.79 (0.36—1.76)	0.57
Cardiovascular death	9 (8.7)	15 (10.9)	0.78 (0.33—1.86)	0.58
With propensity score			0.66 (0.27—1.63)	0.37
Rehospitalization for HF	30 (29.1)	44 (32.1)	0.87 (0.50—1.51)	0.62
With propensity score			0.91 (0.50—1.66)	0.76
LVEF < 50% population[b]				
All-cause death	6 (12.0)	11 (12.6)	0.94 (0.33—2.72)	0.92
Cardiovascular death	5 (10.0)	9 (10.3)	0.96 (0.30—3.05)	0.95
With propensity score[c]			0.68 (0.20—2.32)	0.54
Rehospitalization for HF	10 (20.0)	29 (33.3)	0.50 (0.22—1.14)	0.10
With propensity score[c]			0.53 (0.21—1.32)	0.17

Data are expressed as number (%) unless otherwise indicated. CI: confidence interval; HF: heart failure; HR: hazard ratio; LVEF: left ventricular ejection fraction.

[a] Checklist cohort ($n = 103$); control cohort ($n = 137$).

[b] Checklist cohort ($n = 50$); control cohort ($n = 87$).

[c] There were 49 patients in each cohort with propensity score matching as exact LVEF was not available in one patient.

for all patients with HF. The proposed correcting action was not mandatory, and there was some checklist failure, as about 8% of patients with altered LVEF had neither a beta-blocker nor an ACEI/ARB or ARNI at discharge, without clear reason. Despite being simple and taking approximately only 5 minutes per patient discharge to complete, the use of such a tool may be too time-consuming in a daily setting.

We demonstrated a higher use of beta-blockers and renin-angiotensin-aldosterone system blockers at discharge in the checklist group (68.9% and 67%, respectively) compared with the control group, especially in patients with HF with reduced LVEF. Tuppin et al. showed that 57.7% and 71.4% of patients aged between 70 and 79 years were treated with beta-blockers and renin-angiotensin-aldosterone system blockers, respectively, 1 month after discharge [14]. Patients have to leave hospital with the most optimized HF treatment possible, as there is little improvement in medications between discharge and follow-up consultation [15]. Moreover, it has been demonstrated that adherence to HF process measures for treatment is significantly associated with survival in outpatients with HF [16]. Finally, diuretics were more often prescribed at discharge in the checklist group (92.2% vs. 75.9% in the control group; $P < 0.001$). We observed in our control cohort that diuretics were often suspended because of worsening of renal function, and were not resumed at the time of discharge. However, this treatment improves congestion, and is the only therapy recommended in patients with HF with preserved or mid-range LVEF in order to alleviate symptoms and signs [5]. This mistake in the careplan of patients could be easily prevented by the use of a simple tool like a checklist.

We observed a higher referral to telemedicine and a higher proportion of patients with a planned medical appointment at discharge in the checklist group. This is particularly important, as most HF readmissions occur within 30 days of hospitalization [17]. Also, the American Heart Association has emphasized the importance of effective handover care from inpatient to posthospital providers in the careplan of patients with HF [18].

Study limitations

Our study has some limitations. First, it was a single-centre observational study with a relatively small number of patients, and thus residual confounding may persist, despite propensity score matching. It is likely that the sample size was unpowered for the detection of a significant difference in readmission and mortality endpoints. Second, we compared a cohort of patients with a previous one from the same centre, which may have led to different therapeutic approaches. Third, we did not assess if the use of the checklist led to specific modification of therapies or the careplan for a given patient. This point is important, as it may differentiate between a checklist where a corrective action is mandatory (e.g. the WHO's Safe Surgery Saves Lives programme [19]) and a reminder. It is also possible that as inclusions occur, practitioners may become accustomed to verifying the checklist variables. However, the use of a checklist may be useful even in a trained team, in order to maintain a high level of skill and to standardize performance (e.g. the use of aircraft checklists by flight crews [20]). A multicentre randomized approach where the beginning of the use of the checklist in all patients is random from one centre to another could help to limit these biases and to assess the changes in the behaviour of the HF team. Fourth, the checklist was not used in all patients admitted for decompensated acute HF, as physicians were not enforced to use it. Fifth, the checklist was used in an overall heterogeneous HF population, including patients with mid-range or preserved LVEF. In these patients, there are still no clear guidelines about therapeutic optimization, and readmissions may be more difficult to prevent.

Conclusions

The use of a simple discharge checklist yielded a better quality of care in patients hospitalized for decompensated acute HF, despite showing no significant improvement in readmission and mortality rates.

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Disclosure of interest

The authors declare that they have no competing interest.

References

[1] Arora S, Patel P, Lahewala S, et al. Etiologies, trends, and predictors of 30-day readmission in patients with heart failure. Am J Cardiol 2017;119:760—9.
[2] Fudim M, O'Connor CM, Dunning A, et al. Aetiology, timing and clinical predictors of early vs. late readmission following index hospitalization for acute heart failure: insights from ASCEND-HF. Eur J Heart Fail 2018;20:304—14.
[3] Hernandez AF, Greiner MA, Fonarow GC, et al. Relationship between early physician follow-up and 30-day readmission among Medicare beneficiaries hospitalized for heart failure. JAMA 2010;303:1716—22.
[4] Desai AS, Stevenson LW. Rehospitalization for heart failure: predict or prevent? Circulation 2012;126:501—6.
[5] Ponikowski P, Voors AA, Anker SD, et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: the Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC). Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. Eur Heart J 2016;37:2129—200.
[6] Target: HF strategies and clinical tools. Discharge checklist. http://www.heart.org/en/professional/quality-improvement/target-heart-failure/strategies-and-clinical-tools [accessed date: 24th October 2018].
[7] Cowie MR, Lopatin YM, Saldarriaga C, et al. The Optimize Heart Failure Care Program: initial lessons from global implementation. Int J Cardiol 2017;236:340—4.
[8] Groupe Insuffisance Cardiaque et Cardiomyopathies of the French Society of Cardiology. Discharge checklist. https://www.medecin.giccardio.fr/index.php/fr/outils/check-list-de-sortie [accessed date: 24th October 2018].
[9] Mebazaa A, Tolppanen H, Mueller C, et al. Acute heart failure and cardiogenic shock: a multidisciplinary practical guidance. Intensive Care Med 2016;42:147—63.
[10] Basoor A, Doshi NC, Cotant JF, et al. Decreased readmissions and improved quality of care with the use of an inexpensive checklist in heart failure. Congest Heart Fail 2013;19:200—6.
[11] Frederick SR, Wai C, Ly H, et al. Using a discharge readiness checklist to reduce heart failure readmissions. Heart Lung 2016;45:378—9.
[12] McMurray JJ, Adamopoulos S, Anker SD, et al. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012: the Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012 of the European Society of Cardiology. Developed in collaboration with the Heart Failure Association (HFA) of the ESC. Eur Heart J 2012;33:1787—847.
[13] Chioncel O, Mebazaa A, Harjola VP, et al. Clinical phenotypes and outcome of patients hospitalized for acute heart failure: the ESC Heart Failure Long-Term Registry. Eur J Heart Fail 2017;19:1242—54.
[14] Tuppin P, Cuerq A, de Peretti C, et al. Two-year outcome of patients after a first hospitalization for heart failure: a national observational study. Arch Cardiovasc Dis 2014;107:158—68.
[15] Cohen Solal A, Leurs I, Assyag P, et al. Optimization of heart FailUre medical Treatment after hospital discharge according to left ventricUlaR Ejection fraction: the FUTURE survey. Arch Cardiovasc Dis 2012;105:355—65.
[16] Fonarow GC, Albert NM, Curtis AB, et al. Associations between outpatient heart failure process-of-care measures and mortality. Circulation 2011;123:1601—10.
[17] Desai AS. Intensive management to reduce hospitalizations in patients with heart failure. Circulation 2016;133:1704—7.
[18] Bradley EH, Curry L, Horwitz LI, et al. Hospital strategies associated with 30-day readmission rates for patients with heart failure. Circ Cardiovasc Qual Outcomes 2013;6:444—50.
[19] Haynes AB, Weiser TG, Berry WR, et al. A surgical safety checklist to reduce morbidity and mortality in a global population. N Engl J Med 2009;360:491—9.
[20] Clay-Williams R, Colligan L. Back to basics: checklists in aviation and healthcare. BMJ Qual Saf 2015;24:428—31.