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ORIGINAL RESEARCH ARTICLE

The prehospital patient pathway and experience of care with acute heart failure: a comparison of two health care systems

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Abstract

Aims This study aimed to analyse community management of patients during the symptomatic period prior to admission with acute decompensated heart failure (ADHF).

Methods and results We conducted a prospective, two-centre, two-country observational study evaluating care pathways and patient experience in patients admitted to hospital with ADHF. Quantitative and qualitative data were gathered from patients, carers, and general practitioners (GPs). From the Irish centre, 114 patients enrolled, and from the English centre, 50 patients. Symptom duration longer than 72 h prior to hospitalization was noted among 70.4% (76) Irish and 80% (40) English patients, with no significant difference between those with a new diagnosis of HF [*de novo* HF (dnHF)] and those with known HF [*established* HF (eHF)] in either cohort. For the majority, dyspnoea was the dominant symptom; however, 63.3% (31) of these Irish patients and 47.2% (17) of these English patients did not recognize this as an HF symptom, with no significant difference between dnHF and eHF patients. Of the 46.5% (53) of Irish and 38% (19) of English patients reviewed exclusively by GPs before hospitalization, numbers prescribed diuretics were low (11.3%, six; and 15.8%, three, respectively); eHF patients were no more likely to receive diuretics than dnHF patients. Barriers to care highlighted by GPs included inadequate access to basic diagnostics, specialist support and up-to-date patient information, and lack of GP comfort in managing HF.

Conclusion The aforementioned findings, consistent across both health care jurisdictions, show a clear potential to intervene earlier and more effectively in ADHF or to prevent the need for hospitalization.

Keywords Heart failure; Admission avoidance; Care pathways; Early intervention; Primary care; Patient experience

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Introduction

Heart failure (HF) is a chronic condition that places a heavy burden on health care systems. The prevalence of HF among the adult population in developed countries is ~1–2% and rises to >10% for those >70 years of age.[1] Despite advances in medical and device therapies for HF, admission rates remain high.[2,3] Not only does this result in increased morbidity, compromised life expectancy, and high financial cost, but also questions whether the care structure designed to help this patient cohort functions optimally.

Studies have shown that admission with acute decompensated HF (ADHF) is an independent risk factor for worse outcomes.[4–6] Accordingly, admission avoidance has now become a key focus in overall HF management. Several strategies have been employed including self-care advice to patients encouraging early reporting of emerging problems, community monitoring of metrics sensitive to emerging clinical dete-

rioration, and strategies to provide therapy escalation in the outpatient setting to reduce the need for admission.[7] Despite these efforts, admission remains a major challenge in HF care. This underlines the need for close analysis of the care pathway leading up to hospitalization. In doing so, this would provide a more comprehensive understanding of typical management strategies employed in this period, highlight deficiencies in care, and therefore allow strategies to be developed to deal with these issues. Furthermore, analysis of potential similarities in acute HF care between different national health care systems would provide insight as to whether any identified deficiencies in care are specific to certain countries or potentially applicable to the international arena.

Methods

This study was developed to analyse acute HF management and the patient journey during an episode of ADHF. It incorporated the prehospital period in the community and subsequent hospitalization through inpatient management and discharge. The study was designed as a two-centre, two-country, prospective, observational study involving patients who had an unplanned admission to a secondary care/district general hospital with a primary diagnosis of ADHF. The centres included in the study were in Dublin, Ireland, and in Portsmouth, UK. This report focuses on the prehospitalization phase of care. Patients were invited to participate in the study while they were inpatients, and quantitative data were collected by a research nurse via medical chart reviews from November 2014 to September 2016 in the Irish centre and October 2016 to February 2018 in the English centre. Qualitative data were also collected via two methods: questionnaires and semi-structured interviews. Qualitative questionnaires were administered to patients, their relatives, and, via mail, patients' primary care physicians [general practitioners (GPs)] in both jurisdictions. We also undertook semi-structured interviews with patients, their relatives, and health care professionals at the Irish centre involved in the study, St. Vincent's University Hospital in Dublin. These qualitative data provide a wider understanding of the patient experience prior to hospitalization as well as the community medical response to patients' symptoms and the GP's view on structures available to them to aid in the management of HF. The analysis presented in this paper focuses on the patient experience and management strategies employed in the community prior to hospitalization. A subgroup analysis was also performed to look at differences, if any, between those patients with a new diagnosis of HF [*de novo* HF (dnHF)] and those with an established background of HF [established HF (eHF)]. Ethical approval for this project was granted by the Ethics and Medical Research Committee, St. Vincent's Healthcare Group (Reference Number EI PROG Sept 14), and by the East Midlands-Leicester South Research Ethics Committee, Portsmouth Hospitals NHS Trust (Reference Number 16/EM/0305). All study participants gave informed consent prior to enrolment.

Statistical analysis

The data are presented using descriptive statistics. The χ^2 test and, where appropriate, Fisher's exact test were applied using SPSS Statistics (Version 25) to assess for any significant differences in the patient experience and care pathway between dnHF and eHF patients in each cohort. In cases where data were missing or unavailable for patients, these were excluded from the analysis. A P value < 0.05 was taken as statistically significant. The study sponsors had no role in the study design, data collection, analysis, or interpretation.

Results

A total of 114 patients were enrolled from the Irish centre, 57 of whom had dnHF and 57 of whom had eHF. A total of 50 patients were enrolled from the English centre, 16 of whom had dnHF while 34 had eHF. Median ages were 75 and 71 years for the Irish and English cohorts, respectively. Baseline demographics are outlined in *Table 1*.

Patient/family experience during worsening heart failure

Symptom recognition

There were several aspects of the patient response to symptoms evaluated during this analysis, the first of which was recognition of symptoms among patients and their primary carers (i.e. a patient's relative or main carer). As already mentioned, qualitative data were collected to give a more comprehensive understanding of the patient experience. These qualitative data were gathered via questionnaires administered to 70 patients (39 dnHF and 31 eHF) within the Irish cohort and 49 of the English cohort (19 dnHF and 30 eHF). Dyspnoea was the dominant symptom reported by 70% (49) of Irish patients and 73.5% (36) of English patients, as shown in *Table 2*. However, recognition of this as a symptom of HF was poor among these patients in both cohorts: 63.3% (31) and 47.2% (17) did not recognize dyspnoea as a symptom of HF, respectively. Strikingly, the same lack of recognition among eHF patients was observed in 52% (13) and 47.6% (10) in each cohort with no significant difference found between eHF and dnHF patients (P = 0.10 and P = 0.96, respectively). Furthermore, qualitative measures were gathered from 40 relatives of Irish patients and nine relatives of English patients regarding their

Table 1 Baseline demographics

	Irish cohort			English cohort		
	Total	*De novo* HF	Established HF	Total	*De novo* HF	Established HF
Number of patients (%)	114	57 (50%)	57 (50%)	50	16 (32%)	34 (68%)
Age, median years	75	71	78	71	64	72
Gender, % male (*n*)	60.5% (69)	54.4% (31)	66.7% (38)	54% (27)	62.5% (10)	50% (17)
Years since diagnosis, median	—	—	3	—	—	5
Emergency department presentation/ hospitalization within previous 3 months	30.7% (35)	17.5% (10)	43.9% (25)	28% (14)	43.8% (7)	20.6% (7)
HF-related admission within previous 3 months	—	—	29.8% (17)	—	—	14.7% (5)
Attend GP at least once every 3 months	56.8% (63)	35.7% (20)	78.2% (43)	58% (29)	37.5% (6)	67.6% (23)
Lives alone	40.4% (46)	35.1% (20)	45.6% (26)	40% (20)	31.3% (5)	44.1% (15)
Daily contact with primary carer[a]	93% (106)	93% (53)	93% (53)	84% (42)	93.8% (15)	79.4% (27)
Median number of co-morbidities	3	3	4	3	4	3
• Ischaemic heart disease	46.9% (53)	35.1% (20)	58.9% (33)	30% (15)	25% (4)	32.3% (11)
• Atrial fibrillation	49.6% (56)	40.4% (23)	58.9% (33)	54% (27)	56.3% (9)	52.9% (18)
• Chronic obstructive pulmonary disease	23% (26)	15.8% (9)	30.4% (17)	16% (8)	12.5% (2)	17.6% (6)
• Hypertension	43.4% (49)	43.9% (25)	42.9% (24)	48% (24)	56.3% (9)	44.1% (15)
• Chronic kidney disease	25.7% (29)	17.5% (10)	33.9% (19)	24% (12)	18.6% (3)	26.5% (9)
• Diabetes	22.1% (25)	22.8% (13)	21.4% (12)	44% (22)	25% (4)	52.9% (18)
• Anaemia	13.3% (15)	8.8% (5)	17.9% (10)	14% (7)	12.5% (2)	14.7% (5)
• Cognitive impairment[b]	27.7% (18)	27% (10)	28.6% (8)	—	—	—
• Cancer	12.4% (14)	7% (4)	17.9% (10)	12% (6)	6.3% (1)	14.7% (5)
• Thyroid disease	8% (9)	5.3% (3)	10.7% (6)	14% (7)	12.5% (2)	14.7% (5)
• Arthritis	8.8% (10)	5.3% (3)	12.5% (7)	26% (13)	25% (4)	26.5% (9)
• Alcohol dependence	2.7% (3)	3.5% (2)	1.8% (1)	4% (2)	6.3% (1)	2.9% (1)
• Other co-morbidities	63.7% (72)	61.4% (35)	66.1% (37)	40% (20)	37.5% (6)	41.2% (14)
HF phenotype[c]						
• Reduced ejection fraction (rEF)	67.3% (76)	75% (42)	59.6% (34)	66% (31)	87.5% (14)	54.8% (17)
• Preserved ejection fraction (pEF)	32.7% (37)	25% (14)	40.4% (23)	34% (16)	12.5% (2)	45.2% (14)
Baseline HF medications for HFrEF patients[d]						
• ACEI/ARB/ARNI[e]	—	—	75% (32)	—	—	76.4% (13)
• Beta-blocker			75% (32)			88.2% (15)
• Mineralocorticoid Receptor Antagonist			37.5% (12)			64.7% (11)

ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin II receptor blocker; ARNI, angiotensin receptor-neprilysin inhibitor.
[a]Primary carer defined as the relative or carer who is most responsible for knowing about the patient's heart failure, caring for, and supporting the patient when needed in the community.
[b]Based on the Mini-Cog assessment. The Mini-Cog was administered during hospital admission and only to 65 Irish patients. A further 15 patients within the Irish cohort were unable to complete the assessment for a number of reasons including visual or hearing impairment, inability to hold a pen, early discharge, and in-hospital death.
[c]rEF defined as EF $< 50\%$, pEF defined as EF $\geq 50\%$. Ejection fraction unavailable for one patient in Irish cohort and for three patients in English cohort.
[d]Data unavailable for two patients in Irish cohort.
[e]As data collection initially began in 2014 in the Irish centre and 2016 in the English centre, there was little routine use of ARNI, and so patients taking ARNI were not categorized separately from those on ACEI or ARB during data collection.

Table 2 Dominant presenting symptom

	Irish cohort ($n = 70$)			English cohort ($n = 49$)		
	Total	*De novo* HF	Established HF	Total	*De novo* HF	Established HF
Dyspnoea	70% (49)	61.5% (24)	80.6% (25)	73.5% (36)	78.9% (15)	70% (21)
Ankle swelling	10% (7)	15.4% (6)	3.2% (1)	16.3% (8)	10.5% (2)	20% (6)
Other[a]	20% (14)	23.1% (9)	16.1% (5)	10.2% (5)	10.5% (2)	10% (3)

[a]Most commonly non-specific symptoms such as fatigue, general malaise, and cough.

relatives' HF and their own understanding of this condition. These questionnaire responses revealed that 39.3% (11) from the Irish cohort of relatives and 66.7% (four) from the English cohort did not recognize their relatives' dyspnoea as a symptom of HF. However, it should be noted that the sample size is particularly small in each group.

Data from our qualitative interviews provide some understanding of a patient's assessment of their symptoms. Patients related their understanding of the symptoms they associated with heart disease to what they heard described in the mass media or by families and friends. They referred to 'heart palpitations' or 'pain' as indicators of heart disease:

symptoms they had not experienced. Rather, they described non-specific symptoms of feeling generally unwell, tired, or 'off their food' in the days and months leading up to their hospital admission, while breathlessness was often put down to pre-existing lung disease or a chest infection.

Duration of symptoms

With regard to duration of symptoms, the majority of patients in both Irish and English cohorts experienced symptoms for >3 days before presenting to hospital (70.4%, 76; vs. 80%, 40, respectively). This finding remained true when specifically looking at eHF patients, with no significant difference between eHF and dnHF patients in either the Irish cohort (64.2%, 34; vs. 76.4%, 42, respectively; $P = 0.17$) or English cohort (82.4%, 28; vs. 75%, 12, respectively; $P = 0.71$). At interview, patients did not describe a clear understanding of HF and often described waiting for their symptoms to disappear spontaneously or respond to their self-care actions before seeking professional help.

> I went from about eight days before this [hospital admission] feeling reasonably good, and I went very rapidly downhill. If I were to draw a graph it would be at 45 degrees down. (Diagnosed on admission)I couldn't breathe really at all. On and off really for days. (Diagnosed with HF more than 3 years ago)

Patient self-care

For patients with a known diagnosis of HF, daily weight monitoring is advised as a method of self-care to alert patients to possible evolving clinical deterioration. The adherence to and efficacy of daily weight measurement were evaluated as part of this study among all eHF patients. Adherence to weight monitoring was found to be suboptimal with 73.7% (42) of Irish and 57.6% (19) of English patients weighing themselves daily. Just over half of those monitoring their weight noticed a gain of ≥2 kg over 2 days (57.1%, 24; vs. 52.6%, 10, respectively). When these patients noticed this weight gain, the majority did seek medical advice. However, overall due to the suboptimal adherence to and the low sensitivity of weight monitoring, only 35.1% (20) of all Irish eHF and 24.2% (eight) of all English eHF patients sought medical advice earlier as a consequence of daily weight measurement. However, at interview many patients described non-specific symptoms of feeling generally unwell and undertaking general self-care actions.

Health care system response to the decompensating patient

Site chosen by patient for community care

There was a high number of patients seeking a medical assessment in the community prior to hospitalization across both cohorts: 67.5% (77) of Irish patients and 80% (40) of English patients. These medical assessments took place in a general cardiology clinic, an HF clinic, or a primary care practice. The breakdown of the different clinics attended is shown in *Table 3*.

The most common clinic visited prior to hospitalization was the GP practice. Data from our qualitative interviews describe patients' ease of accessing a GP for health care advice with many describing 'same-day' appointments in close geographical proximity. Patients perceived the GP as the gatekeeper to the emergency department and someone who therefore gave legitimacy to their presentation to the emergency department.

A small number of patients were reviewed both in a GP surgery and also in a cardiology or HF clinic. As it was often difficult to establish in which clinic certain therapies were prescribed, these patients, who attended more than one clinic type, were excluded from the analysis looking at therapies prescribed in the primary care setting in order to obtain a true reflection of acute HF management in the community among unsupported primary care physicians.

Care provided in community by general practitioner

From each cohort, 46.5% (53) of Irish patients and 38% (19) of English patients were reviewed solely by a GP and were not seen in a cardiology or HF clinic before presenting to hospital. Among these patients, the numbers prescribed HF-directed therapies (defined as a new diuretic or alteration of an established diuretic regimen) by GPs were low across both cohorts: only 11.3% (six) of Irish patients and 15.8% (three) of English patients. These figures also remained low among eHF patients specifically, who were no more likely to receive HF-directed therapies from GPs than dnHF patients in either the Irish cohort (11.8%, two; vs. 11.1%, four,

Table 3 Types of medical assessments in the community

	Irish cohort ($n = 114$)			English cohort ($n = 50$)		
	Total	*De novo* HF	Established HF	Total	*De novo* HF	Established HF
General cardiology clinic	1.8% (2)	1.8% (1)	1.8% (1)	18% (9)	18.8% (3)	17.6% (6)
HF clinic	19.3% (22)	1.8% (1)	36.8% (21)	30% (15)	12.5% (2)	38.2% (13)
GP practice	50.9% (58)	63.2% (36)	38.6% (22)	62% (31)	56.3% (9)	64.7% (22)
GP practice exclusively[a]	46.5% (53)	63.2% (36)	29.8% (17)	38% (19)	37.5% (6)	38.2% (13)

GP, general practitioner.
[a]Patients who were seen exclusively in a GP practice and not in a cardiology/HF clinic.

respectively; $P = 0.49$) or the English cohort (15.4%, two; vs. 16.7%, one, respectively; $P > 0.99$). The breakdown of therapies prescribed during these GP assessments is outlined in *Figure 1*. Therapies prescribed from all prehospital medical assessments are outlined in *Tables 4 and 5*.

General practitioner opinion on care structure for heart failure in the community

A response was received from 46 GPs in Ireland and 21 GPs in the UK to a postal questionnaire (*Table 6*). The majority view of these GPs was that lack of access to basic diagnostics, specialist support, and up-to-date patient information were hindering their management of HF. Interestingly, 48.7% (19) of Irish GPs and 42.9% (nine) of English GPs agreed or strongly agreed that a lack of GP understanding of and comfort in managing HF was also a barrier to optimal HF care. During qualitative interviews, GPs also reported other factors which impacted their management of patients and the decision to refer these patients to the emergency department. These included having a low threshold for referring an anxious patient or one in need of social supports to the emergency department. GPs highlighted a wider issue within health care of inadequate social resources in the community to support such patients in their homes.

Discussion

The period leading up to hospitalization for ADHF is a poorly researched component of the patient pathway in HF. Although there have been studies evaluating management of HF in primary care, these have focused primarily on treatment of stable chronic HF patients and not on the period of emerging clinical deterioration. With the use of quantitative and qualitative techniques, this two-jurisdiction study was carried out to address these gaps in knowledge. Important observations have been made with respect to duration of symptoms, patient and family involvement in care, and the prehospital medical response to clinical deterioration. As observations were consistent across two health care systems, a potential exists to evolve more effective, widely applicable care strategies designed to manage emerging deterioration more effectively and avoid or reduce the need for hospitalization.

Patient and family/carer-supported self-care is a critical pillar of HF management. Its importance is underlined by the time devoted to patient/carer education by HF services and the excellent education tools provided by international HF societies.[8] In that setting, data presented herein on patient/carer understanding and involvement in self-care are somewhat concerning. Notably, in both jurisdictions, there was a disturbing failure to recognize worsening of dyspnoea as a potential indicator of a deterioration in HF status in many of those with eHF. It is noteworthy that a similar study focusing on self-care in the Irish centre almost two decades ago demonstrated similar problems.[9] However, it should be noted that during qualitative interviews, many patients also described general non-specific symptoms, which can limit the application of self-care. Adherence to weight management and reaction to weight change was also assessed as a

Figure 1 Therapies prescribed by general practitioner per patient group*. * Therapies prescribed to patients who were solely seen by a general practitioner (GP) prior to hospitalization broken down for each subgroup. † dnHF, *de novo* heart failure patients (i.e. patients with a new diagnosis of heart failure). eHF, established heart failure patients (i.e. patients with an established history of heart failure). § Non-HF therapies, all treatments not aimed at treating HF. These mainly consisted of antibiotics, steroids, inhalers, or beta-blockers. ‖ HF therapies, a new diuretic, or alteration to an established diuretic regimen.

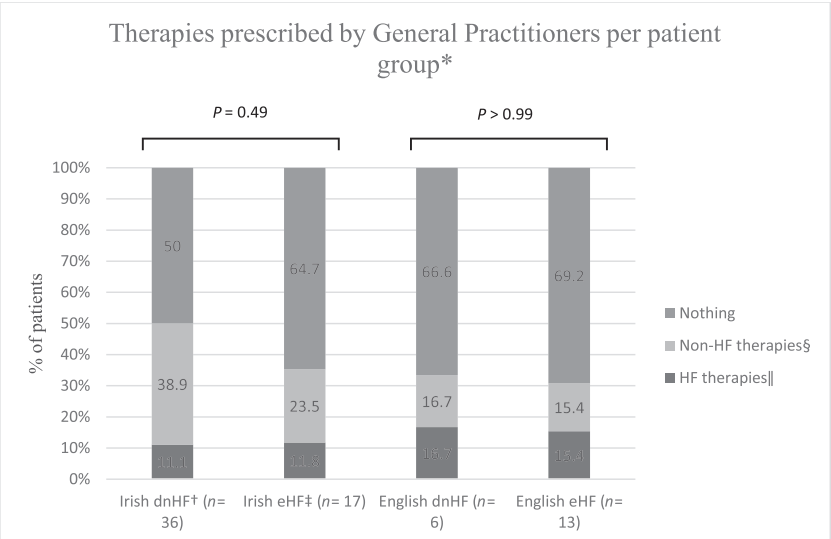

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Table 4 Therapies prescribed during prehospital medical assessments—Irish cohort

	Total	*De novo* HF	Established HF
General cardiology clinic (n = 2)			
• HF therapies[a]	0% (0)	0% (0)	0% (0)
• Non-HF therapies[b]	0% (0)	0% (0)	0% (0)
• Nothing	100% (2)	100% (1)	100% (1)
HF clinic[c] (n = 22)			
• HF therapies	59.1% (13)	0% (0)	61.9% (13)
• Non-HF therapies	13.6% (3)	0% (0)	14.3% (3)
• Nothing	27.3% (6)	100% (1)	23.8% (5)
GP practice[d] (n = 58)			
• HF therapies	13.8% (8)	11.1% (4)	18.2% (4)
• Non-HF therapies	36.2% (21)	38.9% (14)	31.8% (7)
• Nothing	50% (29)	50% (18)	50% (11)
GP practice exclusively[e] (n = 53)			
• HF therapies	11.3% (6)	11.1% (4)	11.8% (2)
• Non-HF therapies	34% (18)	38.9% (14)	23.5% (4)
• Nothing	54.7% (29)	50% (18)	64.7% (11)

[a]HF therapies, a new diuretic, or alteration to an established diuretic regimen.
[b]Non-HF therapies, any therapy not directed towards treating acute heart failure; most commonly antibiotics, steroids, inhalers, beta-blockers, or a combination of these.
[c]Includes five patients who were also seen in a GP practice prior to hospitalization.
[d]Includes all patients who were seen in a GP practice prior to hospitalization; five of these patients were also seen in a heart failure clinic.
[e]Includes only those patients who were seen exclusively in a GP practice prior to hospitalization and not those who were also in seen in either a cardiology or heart failure clinic.

Table 5 Therapies prescribed during prehospital medical assessments—English cohort

	Total	*De novo* HF	Established HF
General cardiology clinic (n = 9)			
• *HF therapies*[a]	44.4% (4)	33.3% (1)	50% (3)
• Non-HF therapies[b]	22.2% (2)	33.3% (1)	16.7% (1)
• Nothing	33.3% (3)	33.3% (1)	33.3% (2)
HF clinic[c] (n = 15)			
• *HF therapies*	46.7% (7)	0% (0)	53.8% (7)
• Non-HF therapies	20% (3)	100% (2)	7.7% (1)
• Nothing	33.3% (5)	0% (0)	38.5% (5)
GP practice[d] (n = 31)			
• *HF therapies*	25.8% (8)	22.2% (2)	27.3% (6)
• Non-HF therapies	22.6% (7)	33.3% (3)	18.2% (4)
• Nothing	51.6% (16)	44.4% (4)	54.4% (12)
GP practice exclusively[e] (n = 19)			
• *HF therapies*	15.8% (3)	16.7% (1)	15.4% (2)
• Non-HF therapies	15.8% (3)	16.7% (1)	15.4% (2)
• Nothing	68.4% (13)	66.7% (4)	69.2% (9)

[a]HF therapies, a new diuretic or alteration in established diuretic regimen.
[b]Non-HF therapies, any therapy not directed towards treating acute heart failure; most commonly antibiotics, steroids, inhalers, beta-blockers, or a combination of these.
[c]The heart failure clinic in the English centre was a nurse-led clinic.
[d]Includes all patients who were seen in a GP practice prior to hospitalization; 12 of these patients were also seen in either a cardiology or heart failure clinic prior to hospitalization.
[e]Includes only those patients who were seen exclusively in a GP practice prior to hospitalization and not those who were also in seen in either a cardiology or heart failure clinic.

metric of self-care. While not robustly sensitive for clinical change, it is still advised as a tool of self-care for its use as an indicator of deterioration and also as a non-specific prompt to other aspects of self-care including medication adherence. Again, among the patient cohorts with eHF, there was a concerning failure to adhere to this aspect of care. Collectively, these observations suggest that additional or alternative strategies to support individuals in self-care are required. In addition, more precise definition of what type of patient is not recognizing symptoms or adhering in general to self-care may allow for supplemental strategies, including telehealth methods,[10] to be applied in these sub-populations.

A further important observation of this study was the confirmation that in the majority of cases, again in both jurisdictions, symptoms of clinical deterioration were present for >72 h before hospitalization. As one of the main goals of this

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Table 6 General practitioner questionnaire responses

	Irish GP responses (n = 46)	English GP responses (n = 21)
% who agree or strongly agree that better access to the following would improve diagnosis and management of HF:		
• Natriuretic peptide	95.6% (44)	94.7% (18)
• Echocardiography	95.6% (44)	94.7% (18)
• Chest X-ray	85% (34)	89.5 (17)
• Same-day HF services	95.1% (39)	78.9% (15)
• Virtual consultation	76.9% (30)	60% (12)
% who agree or strongly agree that the following are barriers to optimal HF care:		
• Lack of community HF nurses	70% (28)	90.5% (19)
• Patient lack of understanding of HF	82.55 (33)	85.7% (18)
• Level of knowledge of HF among GPs	48.7% (19)	42.9% (9)
• Lack of HF clinics	67.5% (27)	70% (14)
% who lack up-to-date patient information[a]		
• Frequently	26.8% (11)	14.3% (3)
• Sometimes	26.8% (11)	47.6% (10)
• Rarely	41.5% (17)	38.1% (8)
• Never	4.9% (2)	0%

[a]Defined as new prescriptions, alterations to medications, or recent clinic or discharge letters.

project is to define new methods of community care to reduce the need for hospitalization, this relatively long time-window of emerging symptoms underlines the potential to intervene effectively in the community. Limited data indicate that the capacity to meaningfully intervene is available,[7] but the challenge will be twofold: addressing the issue of self-care outlined earlier to get the critical early warning from the patient/carer and then to be able to react at the medical level to this warning.

The capacity to react at a medical level is a further important analysis point of this project. The high number of patients who sought medical assessment in the community, again noted in both jurisdictions, illustrates a clear opportunity to potentially intervene earlier in the disease process. However, the low frequency of diuretic prescribing by GPs during these assessments shows that this opportunity is being underutilized. The number of co-morbidities seen in patients in this study and in the 'typical' HF population can make it difficult to differentiate the cause of new, often non-specific symptoms in this patient cohort. However, there is also a clear lack of comfort and knowledge in managing HF among GPs, particularly in light of the finding that eHF patients were no more likely to receive diuretics than dnHF patients during their assessment in primary care. This is supported by GP questionnaire responses, wherein almost half of those responding agreed that their level of HF knowledge was a barrier to optimal care. These findings add to similar results in a recent study evaluating initial investigation and management of dnHF patients in primary care, which showed a significant delay in diagnosis and often failure to follow guideline-supported investigation and referral pathways.[11] Further compounding the issues highlighted in primary care management are the inadequate structures in place to support GPs in diagnosing and treating HF in the community, with lack of access to specialist input, basic diagnostics, and up-to-date patient information highlighted by GPs as obstacles to better care. Although similar difficulties have been illustrated in previous studies from the early 2000s,[12,13] it is telling that they continue to present significant constraints to community management of HF to this day as evidenced by both our data and recent publications.[14]

Possible solutions to these outlined issues could be aimed at both individual and systems levels. At an individual level, improving patient and relative self-care education is crucial. In particular, education of relatives or carers should play an important role given the relatively advanced age and the prevalence of cognitive impairment among HF populations.[15] Improving public awareness of HF and its symptoms could also prove beneficial as seen in other areas of medicine such as stroke.[16,17] In addition, more precise definition of what type of patient is not recognizing symptoms or adhering in general to self-care may allow for additional strategies, including telehealth methods,[10] to be applied in these specific subgroups.

At a systems level, improving how primary care and specialist services interface is a necessity. The first aspect of this is improving data transfer and access to up-to-date patient information across all sectors of health care. Secondly, streamlined access to specialist input and support is also needed in aiding primary care physicians, for example, by ensuring dedicated timeslots for same-day referrals in HF clinics. Other methods of streamlining specialist input with the use of online forums could also be explored. One such example would be a virtual consultation clinic. This has been shown to increase GP comfort in managing HF and to reduce the need for referrals to conventional, hospital-based outpatient clinics with often lengthy waiting lists.[18] Finally, universal access to basic diagnostics, in particular, natriuretic peptide

(NP) measurement, would also improve community-based management of HF.

The main limitation of this study is sample size; however, the fact that similar findings were seen across both health care systems gives weight to the findings highlighted in this study. A further limitation was the need to exclude a proportion of GP assessments when evaluating the therapies prescribed in the primary care setting, the reasoning for which has been previously outlined earlier. Data pertaining to the availability of NP measurement among GPs and the source and timing of referral to hospital, none of which were included in the dataset, would also have aided in interpretation of the findings outlined in this study. Finally, the Irish and English health care systems, while not exactly the same, are quite similar; and a comparison of two systems with more obvious differences may have provided additional or alternate observations.

Despite the aforementioned limitations, it is the belief of the authors that this study provides a thorough insight into the prehospital period and exposes deficiencies in this phase of care. Owing to the two-centre, two-country design, it is also reasonable to assume a degree of generalizability of the findings across the international arena. Furthermore, the incorporation of both quantitative and qualitative data provides a more comprehensive and rounded understanding of the patient experience and the care pathway during this time period. From this analysis, it is clear that there is both time and opportunity to implement earlier HF intervention in an attempt to prevent further deterioration and admission to hospital. However, improved patient and public awareness of HF, continued medical education, and better infrastructure supports for primary care physicians are needed to improve the standard of HF care in the community.

Conflict of interest

None.

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