SHORT COMMUNICATION

NICE diagnostic heart failure pathway: screening referrals identifies patients better served by community-based management

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Abstract

Aims Evaluate whether UK National Institute for Health & Care Excellence (NICE) chronic heart failure (HF) guidelines can be safely and effectively refined through specialist referral management.

Methods and results All referrals to a UK centre 1/3/2019–30/5/2019 and 1/6/2020–31/7/2020 were reviewed by HF specialists. Patients were triaged to specialist assessment in HF clinic, according to the NICE HF diagnostic pathway [urgency based on N-terminal pro brain natriuretic peptide (NTproBNP) levels], or the referrer given remote Advice & Guidance (A&G), to aid primary care management. Standardized triage criteria for recommending primary care management were (i) presentation inconsistent with HF, (ii) competing comorbidity/frailty meant specialist assessment in clinic not in patient's best interests, (iii) recent assessment for same condition, or (iv) patient had known HF. Following triage patients managed in the primary care were categorized as low or high risk of adverse outcomes. Outcome measures were 90 day all-cause and HF hospital admission and mortality rates. Four hundred and eighty-six patients had the median age of 80 (74–86) years, and 253 (52%) were male. Two hundred and six (42%) had NTproBNP > 2000 pg/mL. Primary care management was recommended for 128 patients (26%): 105 (22%) A&G alone and 23 input from community HF nurse specialists. Primary care management was recommended due to the following: presentation inconsistent with HF 53 (42%), more important competing comorbidity/frailty 35 (27%), recent assessment 17 (13%), and known HF 23 (18%). Patients managed in primary care had higher rates of all-cause hospitalization (30% vs. 19%; $P = 0.018$) and death (7% vs. 2%; $P = 0.0054$) than those seen in HF clinic. Of those managed in primary care, 50 (39%) were determined to be at low risk and 78 (61%) at high risk. High-risk patients were older (87 vs. 80 years; $P = 0.0026$), had much higher NTproBNP (2666 vs. 697 pg/mL; $P < 0.0001$), and were managed in the primary care due to severe comorbidity (45%) or known HF (31%). They had extremely high rates of adverse outcomes: 35 all-cause hospitalization (45%), 12 HF hospitalization (15%), and 9 deaths (12%). Low-risk patients were usually felt not to have HF (86%) and confirmed to have low rates of adverse outcomes: three all-cause hospitalizations (6%; $P < 0.0001$ compared with high risk) and zero HF hospitalization ($P = 0.0033$) or death ($P = <0.012$).

Conclusions Incorporating specialist referral management into NICE HF diagnostic pathway reduces the demand on HF clinics and may improve the patient experience by facilitating community care. However, many of the patients identified for primary care management are at very high risk of adverse outcomes in the short term and are frequently hospitalized. Urgent implementation of alternative pathways and community-based care packages in parallel for these high-risk patients is extremely important.

Background

Heart failure (HF) is a growing public health burden with a poor prognosis.[1,2] Early identification and treatment represents an opportunity to improve outcomes. The UK National Institute for Health & Care Excellence (NICE) guideline recommends primary care use an algorithm to identify quickly patients who may have HF.[3] Individuals with a clinical suspicion of HF and raised natriuretic peptides are referred for specialist assessment and echocardiography. Patients are risk-stratified according to tiered N-terminal pro brain natriuretic peptide (NTproBNP) thresholds for review within 2 weeks (NTproBNP > 2000 pg/mL) or 6 weeks (NTproBNP 400–2000 pg/mL). Application of this diagnostic pathway identifies an elderly high-risk population.[4,5] The algorithm is deliberately simple to encourage utilization. However, because NTproBNP has modest specificity, many patients do not have HF.[4] Furthermore, the high and increasing prevalence of HF in an elderly population[1] means that many patients have severe competing comorbidity and/or frailty. In such cases, rigorous specialist investigation and assessment may not be in a patient's best interest, regardless of whether they have HF, and even though these patients are expected to have a poor prognosis.

Heart failure specialists have used the NICE pathway for around a decade allowing them to develop expert knowledge of these limitations. Experienced specialist evaluation at the point of referral may refine the NICE pathway, identifying patients who might be better managed in primary care. This approach may promote patient-centred holistic care, help safeguard the sustainability of specialist services, upskill primary care clinicians, and ensure that those who have most to gain are assessed rapidly. Modernizing services to manage rising demand for elective care services and avoiding the fiscal and environmental costs of unnecessary or inappropriate healthcare utilization are important objectives.

Remote specialist advice is a key method identified in the Elective Care Transformation Programme[6] component of the NHS Long Term Plan.[7] It is anticipated that providing specialist clinical input to primary care through Advice and Guidance (A&G) services will avoid up to a third of outpatient appointments. Healthcare digitization provides a means to deliver effective remote specialist services. More recently, COVID has been a catalyst to review services urgently and accelerate improvements to sustain services during the pandemic and to facilitate recovery from the adverse impacts of COVID.[8] However, there are no data on the application of these referral management methods for patients with suspected HF.

Aims

The aim of this study was to evaluate whether the NICE chronic HF diagnostic referral pathway can be safely and effectively refined through specialist management of referrals and identification of patients who are best managed in the primary care.

Methods

In collaboration with local primary care leaders, the NICE HF diagnostic pathway was modified for all patients. All referrals from primary care to a large established UK specialist HF service from 1/3/2019–30/5/2019 and 1/6/2020–31/7/2020 were included in this analysis. Two time periods were included due to NHS E-referral limitations and the impact of COVID.

Workflow is shown in *Figure 1*. Referrals were received via the national E-referral system on an agreed simple referral proforma. Every referral was reviewed by one of four experienced HF specialists who had access to relevant clinical information and electronic records.

Patients were triaged to specialist assessment including echocardiography in the HF clinic, in keeping with NICE, or the referrer given remote A&G via the E-referral system, to aid primary care management. Standardized criteria for recommending primary care management included the following:

- presentation more consistent with a condition other than HF
- competing comorbidity and/or frailty meant specialist input not in the patient's best interests (the clinical suspicion of HF may still have been high),
- recent specialist cardiac assessment (<1 year) for the same condition and repeat assessment unlikely to change diagnosis/management,
- known HF (sound historic diagnosis by a specialist including an echocardiogram), with referral redirected to community HF nurse specialists if appropriate.

Comorbidity/frailty diagnoses, including frailty assessment scores when available, recorded on the referral proforma, primary care summary record, and hospital correspondence were accepted as accurate. An expert judgement on whether competing comorbidity/frailty meant that primary care management was preferable was made based on the totality of the available information. Primary care could, however, re-request in clinic review if needed.

Patients in whom management in primary care was recommended were subsequently categorized as being at low or high risk for adverse outcomes. Adverse outcome measures were 90 day all-cause and HF hospital admission and mortality rates from date referral received.

This work was undertaken as part of our ongoing programme of quality improvement as required by the Department of Health.[9]

Figure 1 Workflow incorporating specialist review of referrals to the heart failure (HF) clinic into the National Institute for Health and Care Excellence (NICE) HF guideline. Patients were felt to be better served by management in primary care were identified and subsequently classified as high or low risk for adverse outcomes. Ninety-day outcomes were collected for all patients in cohorts as shown.
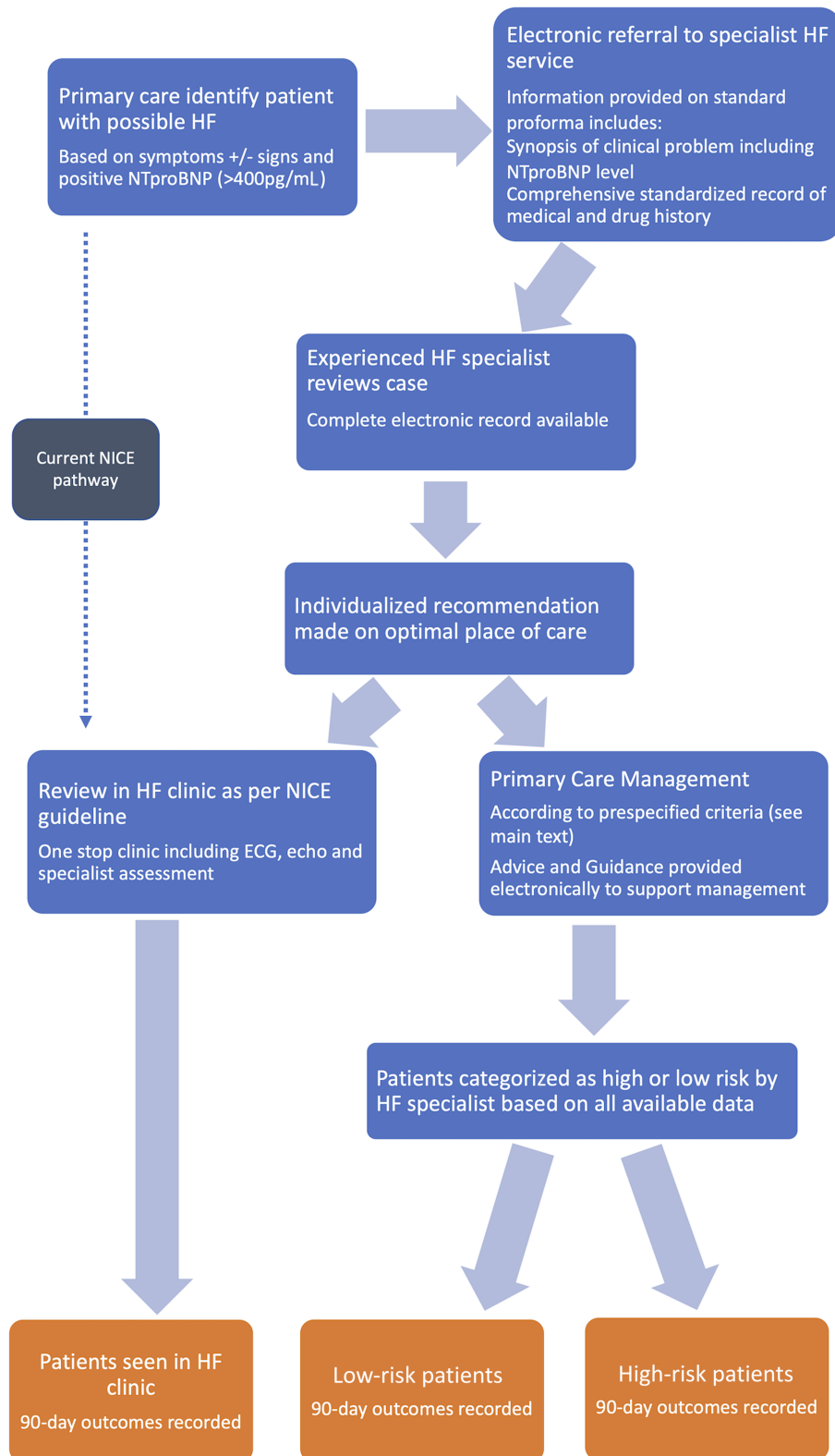
Figure 2 Reasons that management in the primary care was recommended by a heart failure specialist following review of the clinical data. Not HF: presentation not consistent with heart failure; Competing comorbidity: competing comorbidity/frailty meant specialist input was not in the patient's best interests; Recent assessment: specialist cardiac assessment performed for the same condition in the previous 1 year; Known HF: the patient had an established diagnosis of heart failure, and the referral may have been redirected to heart failure nurse specialists (refer to the text). HF, heart failure.
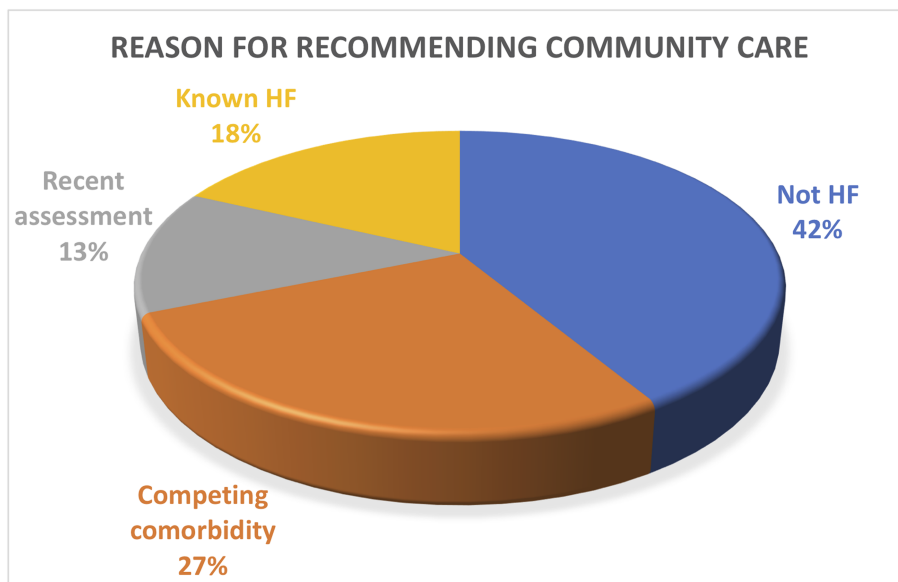

Table 1 The main determining conditions in patients managed in primary care due to severe comorbidity/frailty

Comorbidity	Number of patients ($n = 35$)
Frailty	27
Severe cardiovascular disease	12
Severe lung disease	7
Severe anaemia	7
Severe neurological disease	6
Severe renal disease	4
Advanced cancer	2

This is not an exhaustive list of comorbidity, but most patients had >1 condition of equal importance; therefore, the total number of conditions is greater than the number of patients. Cardiovascular disease, for example, severe inoperable valvular or coronary heart disease/peripheral vascular disease. Severe anaemia = Hb < 10 g/L (male) or <9 g/L (female). Severe neurological disease includes significant dementia. Severe renal disease—eGFR <30 mL/min/1.73 m^2.

Table 2 Comparison of the reasons for having recommended management in primary care in patients subsequently judged to be at high and low risk of adverse outcomes

Reason for recommending primary care management	Low-risk patients, n (%)	High-risk patients, n (%)
Not HF	43 (86%)	10 (13%)
Competing comorbidity	0	35 (45%)
Recent assessment	7 (14%)	9 (12%)
Known HF	0	24 (31%)

HF, heart failure.
Not HF: presentation not consistent with heart failure; Competing comorbidity: competing comorbidity/frailty meant specialist input was not in the patient's best interests; Recent assessment: specialist cardiac assessment performed for the same condition in the previous 1 year; Known HF: the patient had an established diagnosis of heart failure, and the referral may have been redirected to heart failure nurse specialists (refer to the text).

Continuous data are presented as median (interquartile range). Two-tailed Mann–Whitney U and Fisher's exact were used to compare continuous and binary data respectively (two groups) and χ^2 (three groups) at a significance level of 0.05.

Results

There were 497 consecutive referrals to HF clinic (2019 = 296; 2020 = 201). Eleven patients were excluded due to

incomplete data; therefore, 486 patients were included in final analyses.

Effectiveness of referral management

Referral management identified a high proportion of patients where specialist assessment in HF clinic was not felt to be required or in the patient's best interests. Primary care management was recommended in 142 patients (29%). Twenty-one of these were subsequently referred back from

Table 3 Patient characteristics according to place of care after specialist review of clinical data

	All patients	Patients seen in HF clinic (*n* = 358)	Patients managed in the primary care (*n* = 128)			
			All patients (*n* = 128)	Low risk (*n* = 50)	High risk (*n* = 78)	*P*
Age	80 (74–86)	79 (72–84)	86 (77–89)	80 (72–89)	87 (80–91)	0.0026
Male	253 (52%)	190 (53%)	63 (49%)	23 (46%)	40 (51%)	0.59
NTproBNP	1561 (796–3201)	1576 (837–3026)	1343 (687–3461)	697 (503–1102)	2666 (1414–4541)	<0.0001
2 week pathway (NTproBNP > 2000)	206 (42%)	154 (43%)	52 (41%)	4 (8%)	48 (62%)	<0.0001
6 week pathway (NTproBNP 400–2000)	280 (58%)	204 (57%)	76 (59%)	46 (92%)	30 (38%)	<0.0001

HF, heart failure; NTproBNP, N-terminal pro brain natriuretic peptide.
P values refer to comparisons between patients managed in the primary care determined to be at low vs. high risk of adverse outcomes.

Table 4 Outcome data 90 day after referral from primary care according to place of care after specialist review of clinical data

	Patients seen in HF clinic (*n* = 358)	Patients managed in primary care			
		All patients (*n* = 128)	Low risk (*n* = 50)	High risk (*n* = 78)	*P*
Hospital admission—all cause	69 (19%)	38 (30%)	3 (6%)	35 (45%)	<0.0001
Hospital admission—heart failure	22 (6%)	12 (9%)	0	12 (15%)	0.0033
Death	6 (2%)	9 (7%)	0	9 (12%)	0.012

HF, heart failure.
P values refer to comparisons between patients managed in the primary care determined to be at low vs. high risk of adverse outcomes.

primary care: 14 were reviewed in clinic and the other 7 given further A&G. Consequently, 128 patients (26%) were ultimately managed in primary care: the majority, 105 (22%), by supporting the GP with A&G alone and 23 referred on directly to the community HF Nurse Specialists.

The commonest reason for recommending primary care management was that the presentation was more consistent with another condition or that patients had more important competing comorbidity, *Figure 2*. Presentations inconsistent with HF commonly included isolated oedema with another identifiable cause, for example, calcium channel blocker therapy. Competing comorbidity/frailty is shown in *Table 1*.

Of the patients managed in primary care, 50 (39%) were determined to be at low risk and 78 (61%) at high risk. *Table 2* shows the reasons for recommending primary care management according to the risk of adverse outcomes (as subsequently determined by the reviewing specialist). Patients with severe competing comorbidity were all felt to be at high risk. Those with a presentation inconsistent with HF made up most of the low-risk group. However, these patients could also be at high risk, for example, due to severe undiagnosed anaemia or disseminated malignancy.

Three specialists reviewed >80 referrals each, and initially recommended primary care management in 26%, 29%, and 31% cases suggesting a consistent approach (*P* = 0.75 for difference).

Patient characteristics

High-risk patients managed in primary care were older and had a significantly higher NTproBNP than low-risk patients. Most low-risk patients had NTproBNP < 2000 pg/mL (6 week NICE pathway) *Table 3*.

Patient outcomes

In keeping with previous reports, the pathway identifies patients at high risk of adverse outcomes[4,5] within a short follow-up period, *Table 4*. Patients managed in primary care had higher rates of all-cause hospitalization (*P* = 0.018) and death (*P* = 0.0054) than those seen in the HF clinic, but there was no difference in HF admissions (*P* = 0.29).

Low-risk patients managed in the primary care had low rates of adverse outcomes: 3 non-HF admissions (1 TIA, 1 stroke, 1 mechanical fall) and no deaths. High-risk patients had extremely high rates of adverse outcomes, in particular non-HF hospitalization (over two-thirds of all admissions).

Conclusions

Incorporation of specialist referral management and remote A&G resulted in a recommendation that community-based

management was appropriate in approximately one quarter of patients identified by the NICE HF diagnostic pathway. The primary purpose of referral management is to proactively select the pathways most appropriate for individual patients rather than to exclude them from in-person assessment. Digitization of healthcare facilitates this by allowing specialists to provide timely support for primary care. Referral management therefore has the potential to improve patient experience and the efficiency and sustainability of stretched HF services. COVID has underlined the importance of prioritizing high-risk patients, delivering healthcare in the most appropriate settings, avoiding unnecessary hospital attendances, and utilizing innovative remote healthcare systems.

Within the cohort of patients identified as best managed in primary care, it is possible to identify patients who are at low risk of adverse outcomes. These patients predominantly have modest elevation in natriuretic peptide levels. However, those identified as high risk have very high rates of adverse outcomes, in particular hospital admissions in the short term. This is a major concern on an individual patient and system level. It might be inferred that referral management does not meet necessary safety standards. However, these patients are very elderly and frequently have severe competing comorbidity and/or frailty. It is also noteworthy that most hospitalizations were not due to HF—consistent with previous data.[4] Therefore, despite these poor outcomes, it does not follow that reviewing these patients in HF clinics is in their best interests. There will usually be more appropriate alternative strategies. This may include other secondary care pathways but in many cases is likely to involve community-based treatment and frequently palliative care. These findings underline the need for urgent communication between healthcare professionals, the patient and their families with a goal of rapid intervention and implementation of appropriate individualized care packages to minimize unnecessary admissions and distress. It is likely that this would result in many (although not all) of these admissions being avoided.

This is a single-centre study. The broad approach used, however, is not centre-specific and is consistent with national recommendations and supported by the British Society for HF.[10] The NHS Long Term Plan is general, and providing evidence to build standardized referral management systems for HF and other services is crucial. Admissions to other hospitals were not collated so reported rates may be an underestimate, but this is unlikely to represent large numbers of events due to organization of healthcare locally and the population involved.

Digitization of healthcare has many potential benefits, but there is a risk in this system of excluding patients and thus an erosion of shared decision-making and a loss of nuance in discussions between clinicians. Ongoing review and refinement of systems and publication of service evaluation is vital.

Active referral management of NICE diagnostic HF pathways can improve effectiveness and potentially patient care. However, implementation of urgent community-based care packages for the most vulnerable patients in parallel is also necessary.

Conflict of interest

None declared.

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