Title: Factors affecting healthcare provider referral to heart function clinics: A mixed-method study

Short Title: Provider Referral to HF clinics

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What's New?

- For the first time, factors that impact appropriate provider referral to heart failure clinics were investigated, highlighting the need for greater provider knowledge about clinics, as well as supports in patient communication and the referral process.
- While valid patient-related barriers (e.g., transportation, fatigue, amotivation) and capacity issues were at play, providers did value the role of clinics for medication titration and support in managing their complex patients.
- Cardiologists reported different factors impacting their referral practices than other providers; more education of emergency room and primary care physicians as well as nurse-practitioners is needed to support their appropriate referral.

ABSTRACT

Background: Heart failure (HF) care providers are gatekeepers for patients to appropriately access life-saving HF clinics.

Objective: To investigate referring providers' perceptions regarding referral to HF clinics, including the impact of provider specialty and the coronavirus disease pandemic.

Methods: An exploratory, sequential design was used in this mixed-methods study. For the qualitative stage, semi-structured interviews were performed with a purposive sample of HF providers eligible to refer (e.g., nurse-practitioners, cardiologists, internists, primary care and emergency medicine physicians) in Ontario. Interviews were conducted via Teams. Transcripts were analyzed concurrently by two researchers independently using NVivo, using a deductive-thematic approach. Then a cross-sectional survey of similar providers across Canada was undertaken via Research Electronic Data Capture (REDCap), using an adapted version of the Provider Attitudes Toward Cardiac Rehabilitation and Referral (PACRR) scale.

Results: Saturation was achieved upon interviewing seven providers. Four themes arose: knowledge about clinics and their characteristics, providers' clinical expertise, communication and relationship with their patients, as well as clinic referral process and care continuity. Seventy-three providers completed the survey. The major negative factors affecting referral were: skepticism regarding clinic benefit (4.1±0.9/5), a bad patient experience and believing they are better equipped to manage the patient (both 3.9). Cardiologists more strongly endorsed clarity of referral criteria, referral as normative and within-practice referral supports as supporting appropriate referral vs. other professionals (ps<.02), among other differences. One-third (n=13) reported the pandemic impacted their referral practices (e.g., limits to in-person care, patient concerns).

Conclusion: While there are some legitimate barriers to appropriate clinic referral, greater provider education and support could facilitate optimal patient access.

INTRODUCTION

Heart failure (HF) burden is rising exponentially globally.[1] It is associated with high mortality and morbidity, resulting in significant health care costs.[2] While there is no 'cure' for HF, early diagnosis and evidence-based care[3] can increase longevity and improve quality of life. However, care recommendations are complex, often requiring subspecialist physicians to support optimal guideline-directed pharmacotherapy, patient self-management across multiple health behaviors as well as candidacy assessment for device therapy, among other care.[4]

For this reason, guidelines recommend high-risk HF patients be referred to HF clinics.[3,5,6] While there is wide variation, HF clinics are outpatient sub-specialty centers offering rapid care access to prevent acute decompensation, and are staffed by a multidisciplinary team.[7] Robust evidence demonstrates that use of HF clinics is associated with significantly lower mortality and morbidity, and that they are cost-effective.[8,9] Despite these benefits, utilization is low (~20%[10,11]) and often inequitable.[12,13] For example, older, female patients and those with preserved ejection fraction less often receive clinic care. Thus, it is imperative that physicians and other advanced practice providers caring for patients with HF refer "appropriate"[3,5] patients to these clinics in a timely manner to optimize health outcomes. Given the need to balance provision of the appropriate level of specialist care and cost efficiency, guidelines generally recommend patients with an ejection fraction ≤35%, New York Heart Association class IIIB/IV, end-organ dysfunction, HF-related hospitalizations and/or issues related to guideline-directed medical therapy be referred, among other criteria.[14]

Although generalists and specialists play a key clinic referral gatekeeping role, there has been no quantitative study investigating factors affecting provider referral practices to our

knowledge.[5,15,16] Interviews with policy-makers, clinics and patients suggest limited capacity and hence long wait times, as well as variation and lack of clarity in clinic-specific inclusion criteria are paramount. Moreover, some providers who should refer HF patients have limited HF diagnostic and care knowledge impacting referral, and care-related barriers and preferences patients convey to their referring providers (including related to the coronavirus disease [COVID-19] pandemic) are influential as well.[16] Research in the area of the more general outpatient chronic disease management programs of cardiac rehabilitation suggest there are some legitimate provider challenges to referral,[17] and that factors impacting referral practices can vary by specialty.[18] Therefore, the aims of this study were to investigate the factors affecting healthcare provider referral to HF clinics, how this might differ by provider specialty, and was impacted by the COVID-19 pandemic.

METHODS

The study was approved by the institutional review boards of University Health Network (#19-6171) and York University, Toronto, Canada. All participants provided informed consent electronically. An eight-member expert panel was convened, comprised of a representative of an HF patient organization, an HF administrator, HF physician sub-specialists, an HF clinic provider, members of leading HF committees in the country, among others. Panelists supported development of the research questions, methods and interpretation of results.

Given the novelty of this work, a mixed-methods study was undertaken, using an exploratory, sequential design.[19] In the first stage of this study, semi-structured interviews of providers who treat patients with HF and are eligible to refer to HF clinics were performed, in order to understand their perceptions of factors affecting their referral to HF clinics. These results were used to inform the second stage of quantitative data collection, in which providers

meeting the same criteria were surveyed regarding their perceptions and attitudes in order to understand how common these factors were and how they related to referral decisions (case scenarios).

The methods were integrated by means of merging, such that results of both stages were brought together for analysis contiguously. Interpretation of the integrated results was performed narratively, including consideration of fit of the results from the two stages,[19] as well as with available literature and input from the Expert Panel.

A. Qualitative Stage

Setting and Participants

This phase of the study was conducted in Ontario. The healthcare system in Canada is administered provincially, so this ensured consistency in health system factors to enable in-depth investigation. HF clinic care is covered through government funding in Canada, although there are insufficient clinics, and those that exist are under-resourced.[20]

Ontario primary care and emergency medicine physicians, internists, cardiologists and nurse-practitioners who can make HF clinic referrals[20] were considered eligible for participation. Providers who did not treat patients with HF were excluded. Provider email addresses were purchased from a private company, by specialty (TargetNXT). We also searched faculty directories at medical schools in Ontario for addresses to email. To support purposive-sampling, emails were randomly selected across the specialties, with consideration of provider sex and region where email addresses conveyed such information. Selected providers were invited by email for qualitative interviews. As interviews progressed, Expert Panel members personally

contacted potential interviewees with unrepresented characteristics to ensure diverse representation of input. Sample size was determined based on saturation of themes.

Procedure

A semi-structured interview guide was developed to assess the views of referring providers regarding access to HF clinics (Appendix 1). It was informed by our previous literature reviews,[5,15] and input from the Expert Panel. It was pilot-tested prior to study initiation. Items related to the COVID-19 pandemic were added later in the study.

The interview guide was provided to consenting providers in advance, and shared on screen during interviews. The individual interviews were performed from February to June 2020 and then halted due to pandemic; they resumed in July through December 2022. The interviews were performed via Microsoft Teams online, due to the wide geographic range of the province and COVID-19. The interviews were conducted by a senior member of the team~~,~~ while a trainee observed to take notes and record non-verbal communication. Cameras of all parties were on for the duration of the approximately 30-minute interviews, and video-recorded with live auto-transcription; all participants also consented to video-recording.

Data Analysis

Transcripts were cleaned to be verbatim (i.e., correcting any errors from auto-transcription against video recording) and anonymized. NVivo (version 12) software was then used for data organization and coding, concurrently with interviews. A deductive-thematic approach was used for analysis, as outlined by Crabtree and Miller.[21]

To minimize bias, two researchers coded independently first, and then discussed the results. When no new information was emerging, data saturation was considered achieved.

To ensure credibility, themes with sub-themes were then shared with the Expert Panel to inquire whether they resonated and requesting any input.[22] Final consensus on the themes was reached upon discussion with the senior author.

B. Quantitative Stage

Design and procedure

A cross-sectional survey was administered online through REDcap (Research Electronic Data Capture) to health care providers eligible to refer to HF clinics across Canada. To optimize response rate, non-responders were re-sent the brief survey a maximum of 3 times, the third time often by a member of the Expert Panel. The survey was administered between March 2020 and April 2020, then from May 2022 to December 2022; recruitment was paused in the interim due to COVID-19. It was prefaced by an online consent form.

Participants

According to recent Canadian estimates, there are 38,013 family physicians, 1,011 emergency medicine doctors,[23] and 10,484 internal medicine specialists (some of whom treat patients with HF), including 1,485 cardiologists practicing in Canada.[24] In addition, there are 459,005 regulated nurse-practitioners working in Canada, although the number in cardiology specifically is not known.[25]

Healthcare providers (i.e., family and emergency room physicians, internists, cardiologists and nurse-practitioners) working in any setting (e.g., inpatient, outpatient) across Canada treating patients with HF were included. As outlined above, email addresses were purchased from TargetNXT. Overall, 2325 email addresses were acquired: 750 cardiologists (academic and non; all available emails), 200 family physicians, 200 emergency medicine

physicians, 200 internists (subspecialty unknown) and 435 nurse-practitioners (although specialty was not known; all available emails). In addition, faculty directories of relevant departments at medical schools in Canada were searched for email addresses to optimize generalizability.

Measures

The first part of the survey consisted of investigator-generated questions querying participant's sociodemographic and occupational characteristics. Next were 35 items assessing participant's perspectives regarding referral to HF clinics. The survey was developed based on our Provider Attitudes Toward Cardiac Rehabilitation Referral (PACRR) scale,[17] our previous reviews in the area,[5,15] and with input from members of the Expert Panel. Response options on a 5-point Likert-type scale ranged from 1 'strongly disagree' to 5 'strongly agree', or not applicable. Some items represented 'valid' reasons why a provider may not refer (i.e., based on local clinical practice guidelines[3]). Other items were reverse-worded to reduce acquiescence bias; these were reverse-coded to facilitate interpretation. Means of the (a) positive perception items, (b) valid referral barriers, and (c) negative attitude or perceptions were averaged to create a summary score.

There were two case scenarios in the survey (e.g., older female with HF with preserved ejection fraction, male with medication issues; see Appendix for details), developed with input of the Expert Panel. Providers were asked whether they would refer the hypothetical patient to an HF clinic (yes/no) and then to provide a description of why or why not (open-ended).

Finally, questions related to the impact of COVID-19 on clinic referral practices were added in 2022. Most items had forced-choice response options, and skip-logic was used to obtain more detail where applicable.

Statistical Analysis

IBM SPSS version 28 was used for quantitative analysis. All initiated surveys with any data were included. The number of responses for each question varied due to missing data (e.g., use of skip logic, COVID-19 items only administered after the pandemic); for descriptive analyses, percentages were computed with the denominator being the number of responses for a specific item. Open-ended responses were coded using content analysis.[26]

Given the attitudinal items were not normally distributed, Wilcoxon rank sum tests were performed to test the association of the attitudes and perceptions with provider specialty. A p-value <0.05 indicated significance, except when analyzing association with individual Likert items where a more conservative cut-off of 0.02 was used to minimize the potential of inflated error.

RESULTS

Qualitative Results

Ultimately, seven providers participated (6 post-pandemic). Their characteristics are presented in Table 1. Four main themes were identified, as illustrated in Figure 1. Exemplary quotes corresponding to associated sub-themes are shown in Table 2.

The first theme pertained to referring clinician knowledge about HF clinics and their characteristics. Sub-themes concerned: (a) knowledge of benefits of clinic use by patients; (b) knowledge regarding where the clinics are located (including those proximate to patient's homes) and their corresponding wait times (to ensure patient's can access care within a timeframe commensurate to clinical need); (c) knowledge of clinic-specific inclusion and

exclusion criteria and referral process (e.g., test results needed, requirement of a specialist); and (d) having two-way communication with clinics to facilitate this awareness.

The second main theme pertained to the referring healthcare provider's HF expertise. Sub-themes were two-fold: their ability to identify and diagnose HF (so they can identify patients to refer), and their comfort in complex HF patient care. This included their clinical knowledge about HF medication titration, as well as device and transplant candidacy for example. Some providers were comfortable managing patients on their own, while others relied on the HF clinics for this expertise.

The third main theme concerned the nature of their relationship with the patient, including their communication. Sub-themes pertained to: (a) perceived patient willingness to attend HF clinic appointments, considering also their potential barriers to attending; and (b) the impact of the COVID-19 pandemic on patient-provider communication.

The final theme related to making the HF clinic referral and care continuity. With regard to the former, logistical issues such as who is making the referral (and any support gathering needed information for example), mode of referral transmission (e.g., fax, electronic), and having the test results to send were paramount. Knowledge of clinical practice guideline recommendations regarding referral was also key. With regard to the latter, respondents spoke about the need to track receipt of patient care at the clinic, and to ensure all their clinical needs were addressed over time.

Quantitative Results

Of the 2325 email addresses, 432 bounced back as invalid, and 16 recipients emailed to state they did not treat patients with HF and hence were excluded. There were seventy-three

respondents who completed the survey (39 after COVID-19 pandemic onset); their characteristics are shown in Table 3. While 6 (8.0%) respondents did not report their province, responses by province are shown in Figure 2.

There were forty-nine (87.5%) providers who reported they would refer hypothetical patient 1, with reasons including: need more specialized care to manage this patient's HF / complexity (e.g., renal issues; n=33), medication titration is required (n=11), patient symptoms and quality of life (n=7), high-risk patient (n=6), and need for tests (n=4), among other responses. For hypothetical patient 2, thirty-seven (66.1%) providers reported they would refer the patient, with reasons including: requires medication titration (n=16), self or specialist can manage this patient, and would refer to HF clinic later if needed (n=14), patient needs more specialized care (n=10), consider candidacy for devices or advanced testing needed (n=7), patient needs clinic care given symptom burden, needs home monitoring or other support (n=5), among other responses (with 4 reporting referral to clinic was not needed for this patient).

As shown in Table 4, most attitudinal items were considered applicable (i.e., inapplicability ratings above 30% for items "variation in inclusion / exclusion policies across clinics renders it difficult to refer appropriate patients" and "we offer multi-disciplinary, chronic care in our practice, so referral to an HF clinic is unnecessary" only; range 13.7 to 31.5%, mean 15.7±3.2). The greatest positive factors affecting referral practices were: perceiving HF clinic is particularly valuable for complex patients, that all high-risk HF patients should be managed in specialized, multi-disciplinary clinics and acknowledging evidence of benefit of HF clinics to be very strong. The most important valid factors affecting referral practices were: only referring certain types of HF patients, that wait times to get in to the HF clinic were too long and being

unwilling to refer if the provider perceived that the patient would not follow through with the referral.

The greatest negative factors affecting referral practices were: being skeptical about clinic benefits, patients reporting a bad experience and believing that they are better equipped to handle patients with HF than HF clinics (Table 4). The greatest negative factors are shown by province in Figure 2. “Other” factors affecting referral of patients to HF clinics respondents listed included: patient-related barriers (e.g., fatigue, age, functional status, transportation, language; n=5), provider awareness and knowledge (n=4), medication titration (n=4), issues with available clinics (e.g., does not meet patient preference, does not consider comorbidities, no long-term management; n=3), only send specific patients to clinics (e.g., based on complexity, disease severity; n=3), and timeliness (n=2), among other factors.

Reponses to the attitudinal items were not normally distributed. Table 4 also displays the association of attitudes with provider profession. Cardiologists were more likely to strongly endorse that the HF clinic referral criteria were very clear, that they always refer patients with HF who meet the clinic referral criteria, that they refer most of their patients with HF to cardiac rehabilitation, and finally that there are processes or supports within their practice setting to automatically trigger an HF clinic referral or for HF clinic referral form completion and submission when it is indicated than other specialists. Cardiologists were less likely to endorse that they were not familiar with HF clinic sites outside their geographic area, and that the variation in inclusion / exclusion policies across clinics rendered it difficult to refer appropriate patients than other specialists. As shown, there were no significant differences in negative attitudes by specialty (but there was a trend regarding availability of multidisciplinary care within their practice).

Responses to COVID-related items are shown in Table 5. Over one-third reported the pandemic impacted their referral practices, most commonly because of limits to in-person care and patient concerns (~10% each). Approximately one-quarter of clinics communicated with referring providers about changes in care access. Most commonly these were related to: transition to phone calls / hybrid care (n=5); limited capacity and increased wait times (n=4), and limits to visits or patient acceptance (n=3), among other reasons. When asked what had changed regarding support for higher-risk HF patients in terms of accessible community care due to COVID-19, responses included: more virtual care (n=8), less access to care (n=7), and limits of virtual care (n=5), among other changes; 6 responded there were no changes. Finally, providers estimated less than 40% of their patients could accommodate virtual care visits, with the most common challenges being: lack of technological skills, no internet access, or limited language or cognitive abilities (Table 5).

DISCUSSION

To our knowledge, this is the first study investigating referring healthcare provider's perceptions and attitudes towards HF clinic referral – key considering a referral is required for patients to access these clinics, and that clinics are under and inequitably utilized despite their benefits.[11,13] While multi-level factors impede appropriate use of clinics,[16] healthcare provider encouragement facilitates patient attendance at clinic visits, underscoring the importance of referring providers for optimal patient access.[27] Major themes identified through qualitative interviews with various referring providers were knowledge about HF clinics and their characteristics, their clinical expertise, communication and relationship with their patients, as well as clinic referral processes and care continuity. Most providers would refer the hypothetical patients, for appropriate and valid reasons (e.g., need for advanced testing for device candidacy). Many cardiologists

appropriately recognized that many patients do not need the subspecialty clinic care upon diagnosis, and are capable of and comfortable with optimizing medical therapy. Facilitators to appropriate referral were identified such as perceiving value in clinic care for managing high-risk, complex patients. Moreover, legitimate barriers such as COVID-19, wait times, patient-related logistical barriers such as transportation were raised which need to be addressed. Finally, there were some negative attitudes expressed impeding appropriate referral (e.g., bad patient experience, skepticism of benefits) .

Many of the main factors impacting referral identified through the qualitative aspect of the study, the open-ended responses to the case scenarios as well as the adapted PACRR attitudinal item ratings were consistent with those reported in reviews on physician factors affecting cardiac rehabilitation referral,[28,29] results from PACRR rehabilitation studies,[30] as well as the qualitative research on system, clinic and patient level factors affecting appropriate HF clinic use.[16] For instance, prominent considerations in this literature comprise beliefs about the benefits of the clinics, awareness of clinic sites and referral processes, referral norms and within-institution supports for referral, perceived patient motivation and other patient-related logistical barriers (e.g., distance / transportation). Also consistent with previous cardiac rehabilitation literature were significant differences in referral issues by provider specialty.[18] In both cases, the primary care providers had greater challenges impeding appropriate referral, such as lack of familiarity with clinic locations and their referral processes, as well as clinic-to-clinic variability. COVID-19 complicated care access, as it did across many health conditions.[31]

There are several implications stemming from the findings. Some facilitators to appropriate and optimal use of HF clinics are proffered in our earlier qualitative work.[16] These included better integration across the continuum of care, clinic triage tools for the emergency

department,[32] clinic standardization as appropriate, clinic marketing to referrers in the catchment area, sufficient clinic resourcing to support their timely consideration of referrals and patient intake as well as communication with referring providers, in addition to optimizing hybrid, patient-centered care. Many of the facilitators identified directly address the issues raised herein. This includes wider dissemination of guideline recommendations on who should be referred to HF clinics (e.g., I-NEED-HELP[14]), particularly for the non-cardiologists. Indeed, a recent qualitative synthesis on general practitioners' perceptions on improving HF care identified that there is uncertainty about clinical practice guidelines and which one to follow is one of the major challenges.[33]

Clearly the within-institution referral processes and supports were major factors supporting referral, and this is supported in the cardiac rehabilitation field as well; there are reviews[34] and a randomized trial[35] showing the benefit of systematic/automatic referral on clinic utilization. This is more easily facilitated in the current era with the almost ubiquitous use of electronic medical records. A Cochrane review also demonstrated the importance of face-to-face provider encouragement of patients to attend the clinics in increasing their utilization.[36] A corresponding implementation tool is available, that may be adapted for HF clinics as well.[37,38] In addition to more health system-level considerations, patient-level barriers must continue to be addressed too.

Limitations

Caution is warranted in interpreting these results. First, representative generalizability is not established through qualitative research, so whole purpose sampling was used, and saturation was achieved, applicability of qualitative findings to other settings cannot be known. Second,

generalizability is limited due to the poor response rate to online surveys, particularly by physicians.[39] This also raises the possibility of selection bias. To optimize the survey response rate, components of Dillman's Tailored Design Method[40] were applied, including multiple contacts, personalized mailings and a short questionnaire. In a review of physician response to surveys,[41] the demographic characteristics of late respondents (considered a proxy for non-respondents) were similar to the characteristics of respondents to the first mailing. Moreover, physicians as a group are more homogeneous than the general population with regard to knowledge, training, attitudes and behavior, suggesting that non-response bias may not be as crucial in physician surveys as with the general population.[42] Furthermore, generalizability to other countries is unknown, particularly to jurisdictions with privately-funded healthcare systems, and those in low-resource settings.

Third, prior to and during the interviews, investigators worked to minimize socially-desirable responding and to ensure interviewer neutrality. Fourth, with regard to measurement, hypothetical case scenarios were used to assess referral practices. Previous research similarly using cases examining referral variation has suggested that physicians respond in a manner similar to how they respond to actual cases.[42] These justifications lend credence to the validity and generalizability of our findings to the Canadian context, however replication is warranted. Future research is needed to investigate provider attitudes and perceptions affecting their real-world HF clinic referral practices across a period of time. Also related to measurement, the survey administered was adapted from a psychometrically-validated tool,[17] due to unavailability of an applicable measure. Therefore, reliability and validity of the items cannot be substantiated. Applicability ratings of items supported face and content validity. Fifth, multiple comparisons were performed, which increases the chances of identifying spurious associations as significant;

a more conservative p-value was applied to mitigate this. Finally, given the design, causal conclusions cannot be drawn.

CONCLUSION

In this first study investigating perceptions and attitudes of healthcare providers regarding HF clinic referral, mixed-methods were used. The major themes regarding provider referral identified were knowledge about HF clinics and their characteristics, providers' clinical expertise, their communication and relationship with their patients, as well as clinic referral processes and care continuity. The greatest positive factors affecting referral decisions were perceiving clinics to be valuable for the management of complex, high-risk patients; the greatest negative factors included skepticism regarding clinic benefit and a bad experience with a clinic. Non-cardiologists may require more supports to facilitate optimal clinic referral. There are several means by which some of the factors identified can be mitigated, but ultimately the system needs to be well-resourced and patients supported to optimally self-manage their condition and care journey.

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FIGURES

Figure 1: Main themes from qualitative interviews

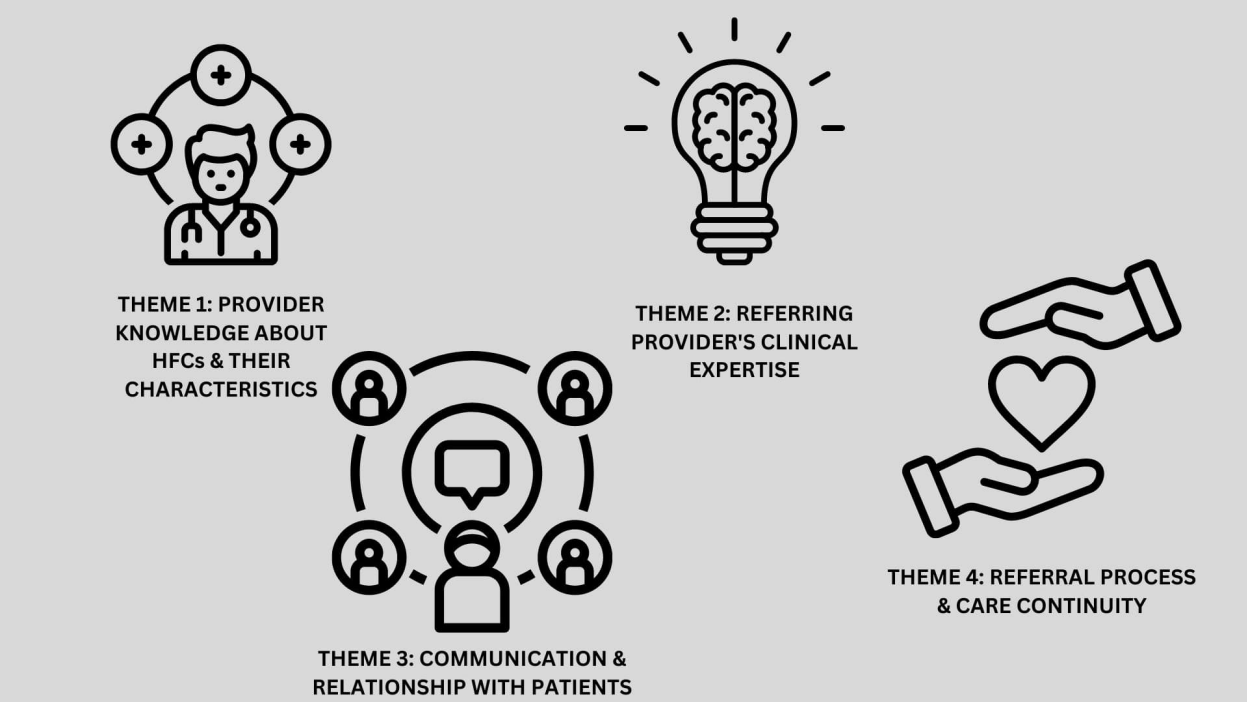
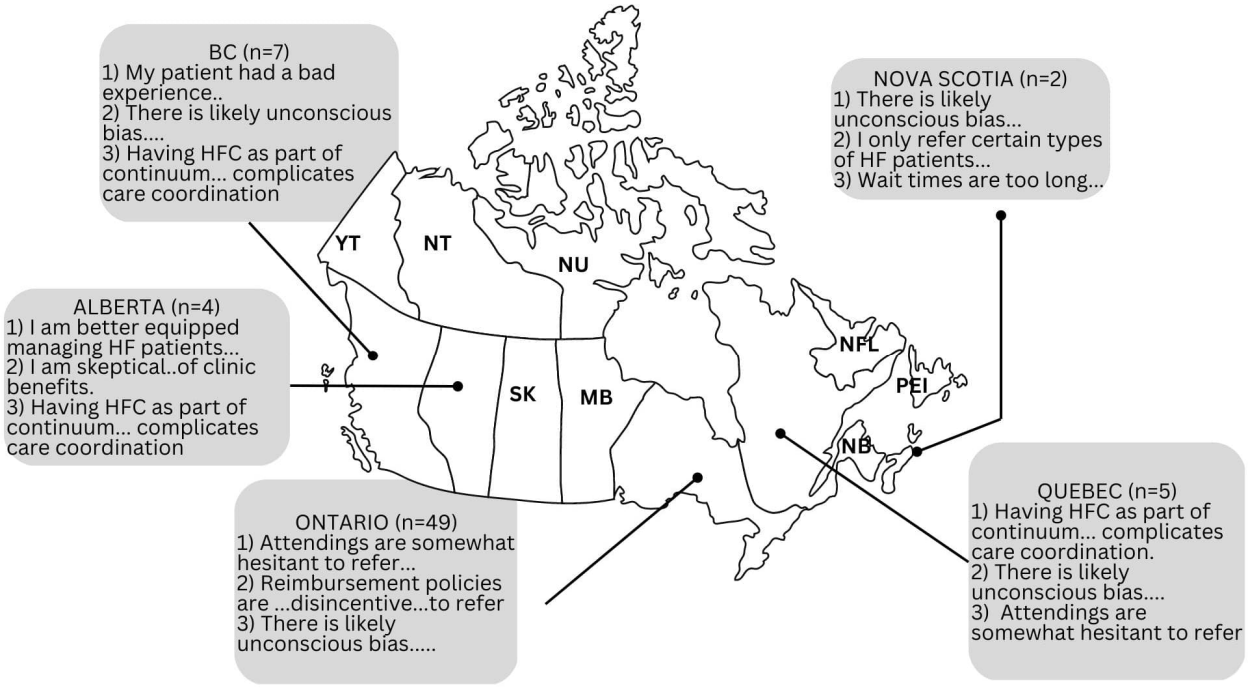


Figure legend: HFCs, heart function clinics.

Figure 2: Survey Response and Greatest Negative Factors Affecting Heart Function Clinic Referral by Canadian Province



MB, Manitoba; NB, New Brunswick; NFL, Newfoundland and Labrador; NT, Northwest Territories; NU, Nunavut, PEI, Prince Edward Island; SK, Saskatchewan; YT, Yukon Territories.

Note: No known survey responses from NB, NT, NU, PEI and YT (PEI and NU have no heart function clinics), although province was not recorded in six surveys. Top negative factors not shown in provinces with only 1 response (i.e., MB, NFL).

TABLES

Table 1: Characteristics of referring providers who participated in qualitative interviews (N=7)

Participant ID	**Sex**	**Institution Type (has HF clinic)**	**Specialty**
1	M	Yes	Cardiologist
2	M	Yes	Cardiologist
3	M	Yes	Internal Medicine
4	M	Yes	Cardiologist
5	M	Yes	Family Physician
6	F	Yes	Cardiologist
7	F	Yes	Cardiologist

HF, heart failure; M, male; F, female.

Table 2: Themes and sub-themes emerging from the referring HF provider interviews, with exemplar quotes.

Themes	Sub-themes	Selected Illustrative Quotes (participant identification number)
Provider knowledge about HF clinics and their characteristics	Know benefits of clinics	"I feel patients really benefit from subspecialized care even when they're relatively routine cases because the subspecialist has the infrastructure around them." (4) "But you know, the issue is if the HF clinic is gonna say the same things that I'm already doing. It [often] does. It's not a value add to the patient or the system to send to an HF clinic." (3) "On discharge, right… so we admit a patient with HF. They don't have good follow-up. They don't have a cardiologist or they don't have someone who knows them. So, we refer them to the HF clinic." (3)
	Know where clinics are located, their wait times	"HF clinics aren't one of those top things that we think about. So, if you were to ask me 'where are all your HF clinics?' I don't think a lot of our primary care doctors would know… We don't know where the HF clinics are and we don't know when to refer as opposed to a normal cardiologist." (5) "I know there's one at [XXX] and [YYY] and [ZZZ] obviously…. One of the issues [is] access and capacity. So you know, often we will be worried about a patient and wanna see them more frequently .. [as] sounds like they're heading towards decompensation; But there's just not space to bring them in." (2) "Well there's a capacity [issue], so they can only see a certain number of patients on certain days. So if I wanted the patients seen tomorrow, that's probably not gonna happen." (1) "Now, I'd love to learn, but as far as I know, there's no repository of… HF clinics in the [region]. I don't know of a resource like that. That would be awesome... I don't think that exists." (3)
	Know clinic referral criteria with regard to patient clinical characteristics, etc.	"Yes, the clinics I mentioned also vary in the type of patients they receive. For example, at [XXX], they only accept patients with an EF less than 30. It is different for [YYY] and other clinics." (1)

		"Patients that I encounter either in [XXX] practice or on my inpatient work at [YYY] hospital... if they've been admitted with a diagnosis of HF or if HF is a big part of their clinical syndrome, then I'm pretty liberal, pretty quick to refer them." (4) "…In other words, it's not clear when we should be referring to HF clinic. When should we? If they're on all the drugs? If they're still having shortness of breath, then I'll [refer] them out." (5) "…basically the criteria is on the referral [form]. So, it's specifically says you have to have a diagnosis of HF [for six months] and you have to have a recent hospitalization or [be at] high risk." (7)
	Two-way communication with clinic, accessibility	"I usually fax and then if urgent I will send an email... But the traditional ways of referring patients, a fax, those are the real barriers.... " (1) "I would say the main barrier is time and like the lack of physical space and people to see the patients quickly." (1) "And the truth is when I need a HF clinic, I kind of need it yesterday. I don't need it in four weeks from now. And so, my window of who I refer to HF clinic is a little bit narrower than maybe a family doctor or someone who doesn't see HF on a regular basis." (3) "So, we're a close type of group… It will almost always be a direct personal conversation and an e-mail, and [referral] form as well to make sure that documentation is there ... And almost always if you add that personal approach, they say yes." (4) "We used to have a nurse navigator, an HF nurse in hospital, which was excellent. She would also provide contact information .. liaise with patient's primary care practitioner. Unfortunately, she got sick, and the hospital has decided not to replace her, which is quite unfortunate." (2) "One of the very real [barriers] is, when you do know the people working in the HF clinic quite well and know how stretched and overworked they are, then you actually feel

		reluctant to add to their misery by sending another patient." (4) "I think ease of access is critical…. Patients have to [access] the [clinic] every two to three weeks if they need to avoid those hospitalizations and avoid those ER visits. Otherwise, what's the point?" (3)
Referring provider's clinical expertise	Ability to identify / diagnose HF	"We're still having a hard time figuring out if it's HF or not [in the primary care setting]. I know that sounds kind of weird, but patients don't complain a lot, they just do less and less. They get shorter of breath… Is it chronic obstructive pulmonary diseases? Angina? It's not so clear. It's not like I have a whole bunch of HF patients that I am sitting on.. more like HF hidden inside these patients, and I may or may not be able to pick it out. Because … we're not doing echo[cardiogram]s on all these people." (5) "A lot of these patients are actually very frail and very comorbid. HF might be one of the things, and you know, they present with shortness of breath. But geez, they've got chronic obstructive pulmonary diseases, you know like it's like is that really HF?" (6) "Even a flight of stairs; like 3 steps. He's short of breath, but he doesn't complain because he just keeps lowering what he's doing. So, I think that's one of the problems: patients don't realize that they're getting worse… so I think that awareness needs to be there." (5)
	Comfort in complex HF patient care / clinical knowledge regarding medications, devices, transplantation	"So, I only refer HF patients who I feel uncomfortable looking after, and those who I think will have event... who I'm in need of help with and who are sort of younger HF patients [who need] surgical interventions …" (3) "I see my own HF patients. The only reason for me to refer a patient would be if I think they needed a transplant…I only refer the advanced, late-stage patients and so that's a very tiny proportion I see in total." (1) "But you know, an HF clinic is a relatively precious resource; HF is a very common condition. If every patient who met guidelines for referral to a HF clinic [was referred], we would have to build a whole bunch more HF clinics and --like I said --I am comfortable managing, so…" (3)

		My practice is that if they're pretty robust, not frail, I'm fairly comfortable with medication titration at my office. And I have a bit more flexibility in terms of how often I can see them in the office. So, if it is just a new diagnosis [with] reduced EF, then I don't think the patient necessarily needs to be [referred to] the HF clinic." (2)
Communication and relationship with the patients	Perceived patient willingness to attend, or reported barriers to attend	"So they have to have emails and it's all online, and a lot of the older people doesn't know technology but the son or the daughter [knows] … they [help] connect up and have a sort of face-to-face assessment." (5) "And so, there are some patients .. a phenomenon of medical fatigue… They see a lot of doctors, they go for a lot of tests. You know, you can often sense who these people are … They express an extreme reluctance to add any new medications, or modify the dose of existing medications … I know it's probably not that much point in getting them in front of a different doctor, [who] is gonna add three more drugs. So I do factor that in." (4) ".. some of these patients are in long-term care homes. So it's hard to have them assessed, because again, of the way their care is done in long-term care." (6)
	Impact of COVID-19	"Like, of course, COVID had an impact… like HF is not in general something that can be done virtually. You can do some virtual. .. automated vital signs systems [online], where you can … track people's vital signs, medications all on a computer. But you gotta listen to people's lungs .... measure the Jugular venous pressure ... It's not always easy to do it virtually. And you know, you can always throw more diuretics at a patient. But, without seeing them, you don't really measure the impact." (3) "I pivoted very much to virtual care ..very early in the pandemic… Patients have some difficulties ... if they're elderly, but .. some adult children would take a 1/2 day off work..." (4) "It's probably more impact on patients who need tuning up periodically but can't get access, because either they have COVID or their doctor's not seeing patients. So, I think it has been a negative impact on people seeking care and getting their care." (3)

		"So, I think COVID-19 was very scary for people with HF 'cause we thought that they're all gonna die … " (5)
Referral process & care continuity	Referral process (e.g., who is responsible to make the referral, needed test results to send)	"It would be nice if there's a single standardized province wide referral form… kind of the way we had for cardiac cath[eterization] for many years." (4) "So I have my admin support team chase that [referral] down to make sure that it happened" (3)
	Clinical guideline recommendations for HF clinic referral	"I recall we have a like a figure posted in the CCS HF guidelines that suggested … when you should send the patient … But to be honest, I'm not really sure, I am not aware of, specific guidelines" (2) "… And so, I think guidelines [need to be] more transparent about what HF clinics want to see …Would be helpful." (3) "The problem is for people who don't meet that criteria, but still would benefit from an HF clinic" (4)
	Care continuity (tracking patient care and transition between clinic and referring provider)	"You have to be tight on your own systems, right? For example, if you don't keep track of things, you'll lose… We have a separate file for pending consults, received consults. Do you have a system to track who's waiting for what? I mean, as the doctor, I can't be chasing referrals on." (3) "Most of the time if patients have been to a HF clinic, anything to do with their heart, they think it's for that place … because they figure that, that's where their care is going to be.... So, the linkage is not that great in terms of 'here are the things that you need to do and here's what primary care is gonna do. And here's what the HF clinic is going to do'." (5) "So, I continue to manage [after] their referral … What often happens is that you make the referral and the patients clinical situation changes; they get sick. So they bounce back to the ER or they bounce back to my outpatient clinic..." (3) ".. The loop is hard to close, right? So, you stand there for [clinic acceptance]… So, then you have to chase, right? There's no immediate gratification. Like when I order a delivery on Amazon, I know that delivery has been accepted. I get an e-mail right away … 'order is in process';

		Another e-mail when the thing is being shipped … I can track my shipment. I can't do any of that [here].” (3) “It happens a lot… I think they're rejecting people who are out of catchment” (3)

CCS, Canadian Cardiovascular Society; COVID, Coronavirus disease 2019; EF, ejection fraction; ER, Emergency room/ department; HF, Heart failure;

Table 3: Sociodemographic, occupational, and institutional characteristics of clinic-referring provider survey respondents (N=73)

	n (%) or mean ± SD
Sex	
Female	25 (35.2%)
Male	45 (63.4%)
Profession	
Physician	63 (91.3%)
Nurse-practitioner	6 (8.7%)
Years of practice	22.5 ± 11.3
Type of institution	
Hospital	58 (82.9%)
Outpatient-only	12 (17.1%)
Primary specialty	
Cardiologist	34 (54.8%)
Internal medicine	17 (27.4%)
Emergency medicine	7 (11.3%)
Family physician	4 (6.5%)
Institution has an HF clinic (% yes)	60 (85.7%)
Province of practice	
Ontario	49 (71.0%)
British Columbia	7 (10.1%)
Alberta	5 (7.2%)
Quebec	5 (7.2%)
Nova Scotia	2 (2.9%)
Newfoundland and Labrador	1 (1.4%)

HF, Heart Function; SD, Standard Deviation;

Table 4: Referring providers' perceptions and attitudes about referral to Heart Function Clinics (N=73)

Item	mean ± SD*	Not applicable (n, %)	Association with specialty (Cardiology vs other)§	p
<u>Positive Attitudes or Perceptions</u>				
I find referral to HF clinics is particularly valuable for my complex patients (e.g., multimorbidity)	4.2 ± 0.9	16 (21.9%)	736.5	0.19
All high-risk HF patients should be managed in specialized, multi-disciplinary clinics.	4.0 ± 1.1	13 (17.8%)	904.5	0.86
The evidence of benefit of HF clinics is very strong.	3.9 ± 1.1	16 (21.9%)	862.5	0.89
Patient preferences are considered when making referral decisions.	3.8 ± 0.9	15 (20.5%)	783.0	0.19
My colleagues generally refer their appropriate patients to HF clinics	3.7 ± 0.9	13 (17.8%)	798.5	0.16
I am satisfied with the communication from the HF clinic summarizing the patient care which they provided.	3.6 ± 1.0	20 (27.8%)	681.0	0.37
HF clinics are very valuable for addressing end-of-life issues with my HF patients.	3.5 ± 1.2	14 (19.2%)	728.5	0.07
HF guidelines in Canada are clear on referring patients to HF clinics.	3.3 ± 0.9	13 (17.8%)	830.5	0.39
I am more inclined to refer my patients with systolic dysfunction.	3.2 ± 1.3	14 (19.2%)	867.5	0.61
The criteria for referral to HF clinics is very clear to me	3.2 ± 1.2	13 (17.8%)	716.0	<0.01
I always refer my HF patients who meet the clinic referral criteria.	2.9 ± 1.0	16 (21.9%)	644.5	<0.01
I refer most of my HF patients to cardiac rehabilitation	2.6 ± 1.2	15 (20.5%)	691.5	<0.02

Primary care providers should be referring to HF clinics.	2.6 ± 1.2	11 (15.1%)	864.0	0.10
I only refer my patients who have been to the emergency department to an HF clinics.	2.3 ± 1.0	17 (23.3%)	826.0	0.99
Mean subscale score	3.5 ± 0.4		858.0	<0.02
<u>Valid Barriers to Referral</u>				
I only refer certain types of my HF patients to clinics	3.7 ± 1.2	14 (19.2%)	855.5	0.80
The wait times for patients to get in to the HF clinic are too long	3.3 ±1.2	12 (16.4%)	887.5	0.27
I will not refer a patient if I believe the patient will not follow through with the referral	3.2 ± 1.2	15 (20.5%)	754.0	0.10
I do not always refer patients who meet the referral criteria, as sometimes they report barriers to attending, such as lack of transportation	3.2 ± 1.1	17 (23.3%)	683.5	0.13
I do not always refer patients who meet the referral criteria, because there are not enough HF clinics	3.1 ±1.3	20 (27.4%)	671.0	0.94
I am not familiar with HF clinic sites outside my geographic area, so cannot readily refer my appropriate patients who come from afar.	3.1 ±1.3	18 (24.7%)	626.0	<0.02
There is so much variation in HF clinics, it is difficult to be certain what each one has to offer or delivers.	3.1 ±1.2	20 (27.4%)	725.5	0.94
Variation in inclusion / exclusion policies across clinics renders it difficult to refer appropriate patients.	3.0 ± 1.2	23 (31.5%)	587.0	0.04
Patients seem to have so many barriers to going to HF clinics	3.0 ± 1.1	10 (13.7%)	977.5	0.50

There are processes within our practice setting to support HF clinic referral completion and submission	2.7 ±1.4	13 (17.8%)	765.5	<0.02
I only refer my high-risk patients to HF clinics	2.6 ± 1.3	14 (19.2%)	898.0	0.97
Some of my patients would benefit from HF clinics, but there are no clinics within their geographical area, so I cannot refer them.	2.4 ± 1.2	21 (28.8%)	620.0	0.18
There are processes within our practice setting to automatically trigger an HF clinic referral when it is indicated	2.2 ± 1.2	15 (20.5%)	578.0	<0.001
Mean subscale score	2.9 ± 0.3		940.5	0.25
Negative Attitudes or Perceptions‖				
I am skeptical about the benefits of HF clinics.	4.1 ± 0.9	14 (19.2%)	810.5	0.13
My patients have had a bad experience with a HF clinic	3.9 ±1.0	17 (23.3%)	759.0	0.49
I believe I am better equipped to handle my HF patients than HF clinics	3.9 ± 0.9	17 (23.3%)	680.0	0.28
We offer multi-disciplinary, chronic care in our practice, so referral to an HF clinic is unnecessary	3.8 ± 1.1	23 (31.5%)	577.5	0.07
Reimbursement policies are a financial disincentive to HF clinic referral	3.8 ± 1.0	20 (27.4%)	653.0	0.15
Having HF clinics as part of the continuum of care for HF patients can often complicate care coordination.	3.6 ± 1.1	12 (16.4%)	912.0	0.78
Attendings are somewhat hesitant to refer patients to HF clinics	3.5 ± 0.9	15 (20.5%)	798.0	0.34

There is likely some unconscious bias in referral of patients to HF clinics at our organization (e.g., sex, socioeconomic status)	3.3 ± 1.2	14 (19.2%)	819.0	0.42
Mean subscale score	3.7 ± 0.7		980.0	0.86

*items are scored from 1 “strongly disagree” to 5 “strongly agree” and higher values indicate more positive sentiments.
‖with the reverse-scoring of these items, higher values indicate more positive sentiments.
HF, heart failure; SD, standard deviation.
§Wilcoxon rank-sum test values.

Table 5: Perceived impact of COVID-19 pandemic on heart function clinic referral process (N=39)

	n (valid %)
1. Has COVID-19 impacted your referral of patients to HF clinics? (% yes)	13 (33.3%)
1a. I am more likely to refer as I know some of the clinics have technology to better monitor patients remotely, thus reducing physical contact within the healthcare system.	2 (3.8%)
1b. I am less likely to refer as I am unsure how they would safely take on new patients given attempts to limit in-person patient care.	5 (9.4%)
1c. I am consulting with patients more regarding whether they feel safe being referred.	5 (9.4%)
1d. Other	2 (3.8%)
2. Have HF clinics where you refer patients been in communication with you regarding any changes in care access or referrals given COVID-19?	10 (25.6%)
3. Do you perceive your patients would be able to have virtual specialty HF outpatient care visits?‖	
3a. Yes, mostly	20 (37.7%)
3b. Quite a few patients have no internet access, but could do phone visits	17 (32.1%)
3c. Quite a few patients have unreliable or slow internet access	9 (17.0%)
3d. Quite a few patients do not have sufficient technological skills to do a virtual care visit, without assistance	21 (39.6%)
3e. Quite a few patients do not have sufficient language or cognitive abilities to do a virtual care visit	12 (22.6%)
3f. Other	2 (3.8%)

‖respondents directed to check all that apply.
HF, heart failure; COVID-19, Coronavirus disease 2019.
Note: affirmative responses shown.