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Decisional Needs and Patient Treatment Preferences for Heart Failure Medications:  
Scoping Review

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# Most Commonly Reported Decisional Needs

## Inadequate knowledge



Not knowing all the information necessary to make a decision

## Inadequate information



Lack of access to the information required to make and implement a decision

## Difficult decisional roles



Lack of clarity or a mismatch between the patient's preferred decisional role and their actual role

# Relative Importance of Treatment Attributes

## Consistently higher importance



- Symptom reduction
- Mortality
- Hospitalizations

## Consistently lower importance



- Pill burden
- Side-effects

## Inconsistent level of importance



- Cost (may vary depending on magnitude of cost and coverage)

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## Abstract

**Background:** Pharmacological management of heart failure with reduced ejection fraction (HFrEF) involves several medications. Decision aids informed by patient decisional needs and treatment preferences could assist in HFrEF medication choices; however, these are largely unknown.

**Methods:** We searched MEDLINE, Embase, and CINAHL, without language restriction, for qualitative, quantitative, and mixed-method studies that included patients with HFrEF or clinicians providing HFrEF care, and reported data on decisional needs or treatment preferences applicable to HFrEF medications. We classified decisional needs using a modified version of the Ottawa Decision Support Framework (ODSF).

**Results:** From 3996 records, we included 16 reports describing 13 studies (n=854). No study explicitly assessed ODSF decisional needs; however, 11 studies reported ODSF-classifiable data. Patients commonly reported inadequate knowledge or information, and difficult decisional roles. No study systematically assessed treatment preferences, but six studies reported on attribute preferences. Reducing mortality and improving symptoms frequently ranked as important, whereas cost importance varied, and adverse events generally ranked as less important.

**Conclusion:** This scoping review identified key decisional needs regarding HFrEF medications, notably inadequate knowledge or information, and difficult decisional roles, which could readily be addressed by decision aids. Future studies should systematically explore the full scope of ODSF-based decisional needs in patients with HFrEF, along with relative preferences among treatment attributes to further inform development of individualized decision aids.

## Introduction

Heart failure (HF) affects an estimated 64.3 million people globally, impairs quality of life, and has a lower survival than most common cancers.<sup>1-4</sup> Most HF medications target HF with reduced ejection fraction (HFrEF), which accounts for approximately half of all HF cases.<sup>2-5</sup> Guideline-directed HFrEF medications are underused in clinical practice despite high-quality evidence that they improve survival and quality of life.<sup>6-11</sup> Even when these medications are prescribed, they are seldom titrated to evidence-based doses,<sup>7-9</sup> and patient non-adherence is common.<sup>10,11</sup> Knowledge gaps, including inaccurate perceptions of benefits and harms, are commonly-reported barriers to HF care.<sup>12</sup> Decision aids can bridge this knowledge-to-practice gap and improve the integration of patients' preferences and values for patient-centred care. Despite renewed calls for novel shared decision-making (SDM) strategies to address the abundance of HFrEF pharmacotherapy options, the integration of SDM has been largely limited to decisions regarding device therapy and palliative care in patients with advanced HF.<sup>13-18</sup>

Decision aids based on the validated and widely-used Ottawa Decision Support Framework (ODSF) can address decisional needs, improve decision quality, and lead to better health outcomes.<sup>19-22</sup> The ODSF, updated in 2020, posits that decisional support interventions (including decision aids) that address decisional needs will increase decision quality and downstream outcomes,<sup>22</sup> as supported by empirical evidence from randomized controlled trials.<sup>19</sup> The ODSF includes 22 decisional needs, such as inadequate knowledge and inadequate support and resources, for patients to make decisions about medical treatments and tests.<sup>20</sup> Not all of these decisional needs manifest for every health decision, and it remains unclear which of these decisional needs are important in decisions regarding HFrEF pharmacotherapy. Several qualitative and quantitative studies have been performed in recent years exploring various aspects of decisional needs and treatment preferences; however, there have not been any scoping or systematic reviews to synthesize these data and identify evidence gaps.

The objectives of this scoping review were to identify, map, and synthesize the literature evaluating the decisional needs, treatment preferences, and values of patients with HFrEF regarding HFrEF medications.

## Methods

We conducted a scoping review of the decisional needs and treatment preferences of patients with HFrEF or clinicians caring for patients with HFrEF according to an *a priori* protocol<sup>23</sup> based on methodology outlined in the Joanna Briggs Institute Manual for Evidence Synthesis, and reported the findings according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR).<sup>24,25</sup>

### Eligibility criteria

#### *Design*

We considered qualitative, quantitative, and mixed-methods studies available as full-text articles or conference abstracts, as well as decision aids. We did not restrict eligibility by language. We excluded reviews, editorials, commentaries, protocols/design papers, and non-research letters.

#### *Participants*

We considered studies including patients with HFrEF or clinicians caring for patients with HFrEF. Reduced ejection fraction was defined as a left ventricular ejection fraction of 40% or less.<sup>26</sup> To account for changes in the definition of “reduced ejection fraction” over time, we also included studies that used alternative thresholds (less than 35% or less than 50%). We excluded studies limited to patients with advanced HF being considered for mechanical circulatory support or heart transplant, as well as studies focusing on palliative care, end-of-life care, or advanced-care planning.

### *Concept and Context*

The concepts of interest for this scoping review were decisional needs, treatment preferences, and values regarding HFrEF medications, as well as decision aids developed to support HFrEF medication decisions. We also considered studies assessing decisional needs and preferences regarding other therapies for HFrEF, including medical devices, interventional procedures, and surgeries other than mechanical circulatory support or heart transplant, if the needs or preferences applied to HFrEF medication decisions (e.g. assessments of preferences around quality of life versus cost, assessments of decisional needs around information deficiency or overload).

### Information Sources and Search

We conducted detailed literature searches of the following databases from inception to May 10, 2022: MEDLINE, Embase, and CINAHL. We performed an initial limited search of MEDLINE to identify articles on the topic, and used words contained in the titles and abstracts of relevant articles, along with the index terms used to describe the articles, to develop a full search strategy. **Supplemental Table S1** outlines the full electronic search strategy for all databases. Sources of unpublished or grey literature included a manual search of bibliographies of included studies and relevant reviews, as well as searches of Web of Science ‘cited references’, cocites.com, clinicaltrials.gov, Epistemonikos, and the Ottawa Decision Aid Inventory (decisionaid.ohri.ca/AZinvent.php).

### Selection of Sources of Evidence

We uploaded search results to Covidence and removed duplicates. Two review authors (BJM and RDT) independently screened retrieved article titles and abstracts for inclusion, followed by full-text reviews for final inclusion. Disagreements were resolved by discussion and consensus, and by consulting a third reviewer (ARB) when necessary.

### Data Charting Process and Data Items

Two authors (BJM and RDT) independently extracted data from included articles and decision aids using a standardized data extraction form developed by the reviewers (**Supplemental Table S2**). We resolved any disagreements that arose through discussion, and by consulting a third reviewer (ARB) when needed.

The 2020 version of the ODSF includes 22 decisional needs, namely: (1) decisional conflict; (2) inadequate knowledge (not knowing all the information necessary to make a decision); (3) unrealistic expectations; (4) unclear values; (5) inadequate perceptions: others’ views/practices; (6) social pressure; (7) difficult decisional roles (lack of clarity or a mismatch between the patient’s preferred decisional role and their actual role); (8) inadequate experience; (9)

inadequate self-efficacy; (10) inadequate motivation; (11) inadequate skills; (12) inadequate information (lack of access to the information required to make and implement a decision); (13) inadequate advice; (14) inadequate emotional support; (15) inadequate instrumental help; (16) inadequate health/social service; (17) inadequate financial assistance; (18) difficult decisional type; (19) difficult decision timing; (20) unreceptive decisional stage; (21) personal needs; (22) clinical needs. However, to simplify the classification given the substantial overlap across categories, we combined the following categories (for a total of 15 categories): (9-11) inadequate experience/self-efficacy/motivation/skills; (13-15) inadequate emotional support/advice/instrumental help; (16-17) inadequate financial assistance/health/social services; (18-19) difficult decision type/timing; (21-22) personal/clinical needs.

In cases where pertinent information was not reported, we contacted study authors for additional information.

For decision aids, we extracted data on the developer/funder, year last updated, format, decision being made, options considered, and elements required to evaluate each decision aid using the International Patient Decision Aid Standards instrument.<sup>27</sup>

### Synthesis of Results and Critical Appraisal

We extracted study characteristics, patient demographics, decision aids utilized, and findings regarding decisional needs/treatment preferences. These results were formulated both narratively and in tabular form. Given the heterogeneous designs included in this review, we did not formally evaluate risk of bias or study quality; however, we did record reported limitations from each individual study. For decisional needs, we reported the number of studies assessing each individual decisional need or reporting data that could be classified into ODSF decisional needs. For treatment attributes, we reported those identified by patients and clinicians as relevant to decisions regarding HFrEF medications, along with preference relative weights, ratings, or rankings when available. We further categorized treatment attributes based on whether they pertained to efficacy, safety, practical considerations, or other considerations.

### **Results**

From 3996 records, we included 16 reports of 13 studies (**Figure 1**) with a total of 854 participants.<sup>28-43</sup> We contacted the corresponding author of one article for additional information about study participant characteristics, but did not receive a response.<sup>29</sup>

### Study and Participant Characteristics

Studies were conducted between 1993 and 2019, and most (9/13) took place in the United States (**Table 1**). Nine studies used qualitative methodology (eight interviews, one focus group), two used mixed-methods (one conducted a focus group with attribute preference ranking, one conducted interviews plus a quantitative survey), and two employed quantitative surveys. All 13 studies enrolled patients with HF (primarily from outpatient clinics), five were restricted to patients with HFrEF,<sup>29,30,35,37,38</sup> and three studies required patients to be taking cardiac or HF medications at enrollment.<sup>28,31,32,34</sup> The mean age of patient participants was 64 years, 33% were female, and most were white (mean 73%) or black (mean 23%) (**Table 2**). Among social determinants of health (**Table 2**), 65% of participants had at least some college education,<sup>29-33,39,42</sup> 56% were married,<sup>28,31,32,42</sup> 36% were in the lowest income bracket (e.g. household

<\$30,000-60,000/year),<sup>28-32,38</sup> and 45-90% had high self-reported health literacy and numeracy (health and numeracy assessments are described in **Supplemental Table S3**).<sup>29,30,38</sup>

Two studies also enrolled clinicians as participants; one qualitatively assessed to what extent patients and clinicians valued HFrEF medication cost discussions,<sup>33</sup> and the other quantitatively assessed patient and clinician treatment attribute preferences.<sup>34</sup>

### Decision Aid

We identified a single decision aid, entitled “A Decision Aid for Renin-Angiotensin Inhibitor Drug Options for Patients with Heart Failure”, which was developed as part of Venchuk et al. and evaluated in Dickert et al.<sup>33,38,44</sup> Funded and developed in partnership with the American College of Cardiology and last updated in 2017, it is formatted as a static, 4-page written handout that addresses the decision of continuing an angiotensin-converting enzyme inhibitor or angiotensin-receptor blocker versus switching to sacubitril-valsartan. It met 23/37 of the International Patient Decision Aid Standards instrument criteria, primarily limited by lack of elicitation of patient values (0/4) and missing information on outcome probabilities (5/8) (**Supplemental Table S4**). It was developed collaboratively with feedback from patients, clinicians, and the manufacturers of sacubitril-valsartan. Per recommendations from patients (but in opposition to clinician and manufacturer feedback), the bulk (1.5 pages) of this decision aid focuses on the potential for high out-of-pocket cost of sacubitril-valsartan relative to an angiotensin-converting enzyme inhibitor or angiotensin-receptor blocker.

### Decisional Needs

Eleven studies reported on 10 of the 15 modified ODSF decisional needs (**Figure 2**).<sup>29-33,35-38,40-42</sup> Supporting quotes for all classifications are available in **Supplemental Table S5**.

The two most commonly reported patient decisional needs were inadequate knowledge (10 studies) and inadequate information (8 studies).<sup>28-32,35-38,40-42</sup> Studies also reported on difficult decisional roles (6 studies),<sup>28-32,36,37,42</sup> decisional conflict (4 studies),<sup>30-32,40,41</sup> inadequate emotional support, advice, or instrumental help (2 studies),<sup>29-32</sup> unrealistic expectations (1 study),<sup>35</sup> inadequate perceptions (1 study),<sup>31,32</sup> inadequate experience, self-efficacy, motivation, or skills (1 study),<sup>35</sup> inadequate financial assistance, or health or social services (1 study),<sup>38</sup> and difficult decision type/timing (1 study).<sup>29,30</sup> Five modified ODSF decisional needs were not described in any included study: unreceptive decisional stage, unclear values, information overload, social pressure, and personal/clinical needs.

The only decisional needs ascertained by clinicians were inadequate knowledge and information, as they expressed skepticism towards the value of medication cost discussions, which notably contrasted with responses by patients participating in the same study, who requested to receive cost information.<sup>33</sup>

### Treatment Values and Preferences

Six studies reported on patient treatment preferences (**Figure 3**).<sup>28-30,34,37-39</sup> Details regarding the weightings of these attributes are available in **Supplemental Table S6**. The total number of studies assessing preference for each attribute was as follows: Mortality (6 studies),<sup>28-30,34,37-39</sup> cost (6 studies),<sup>28-30,34,37-39</sup> pill burden (5 studies),<sup>28,34,37-39</sup> adverse effects (4 studies),<sup>28,37-39</sup> hospitalization (4 studies),<sup>28-30,37,38</sup> symptoms (2 studies),<sup>28,34</sup> quality of life (2 studies),<sup>37,39</sup>

concerns regarding unknowns (2 studies),<sup>29,30,37</sup> clinician recommendation (2 studies),<sup>28–30</sup> function (1 study),<sup>37</sup> slowing/stopping disease (1 study),<sup>34</sup> drug interactions (1 study),<sup>28</sup> and kidney function (1 study).<sup>34</sup>

Improved mortality was regarded as the most or second most important treatment attribute across the three studies that provided relative rankings.<sup>28,34,37</sup> Rector et al. was the only study to evaluate the impact of the magnitude of survival gain on preferences, along with trade-offs such as changes in quality of life and cost.<sup>39</sup> Among included patients, 71% reported being willing to take a medication (with no adverse effects or cost) if it provided a 2% chance of living  $\geq 1$  additional year, which decreased to 48% if the medication cost \$60 per month. This increased to 86% willing to take the medication for a 4–8% chance of living  $\geq 1$  additional year, and 99% for a  $\geq 10\%$  chance of living  $\geq 1$  additional year.

Symptom reduction was ranked as the most important attribute in both studies that reported on it.<sup>28,34</sup> Quality of life was rated as the fourth most important attribute (out of 18) in Trinkley et al.<sup>37</sup> Additionally, Rector et al. assessed the number of patients willing to take a medication (with no adverse effects or cost) depending on how much it improved the Minnesota Living With Heart Failure score (a HF-specific quality of life instrument with scores ranging from 0 [best] to 105 [worst]).<sup>39</sup> Among included patients, 71% were willing to take a medication for a 5-point improvement in quality of life, 87% for a 10-point improvement, and 99% for a 15-to-20-point improvement. Rector et al. also assessed quality of life trade-offs with either drug-induced death or cost.<sup>39</sup> Any risk of drug-induced death was unacceptable to 8% of patients, whereas 49% were willing to accept a 1% risk of drug-induced death in exchange for a 20-point improvement in quality of life. This decreased to 40% willing to accept a  $\geq 5\%$  risk of drug-induced death in exchange for a 5-point improvement, and further decreased to 38% willing to accept a 10% risk in exchange for a 5-point improvement. For a medication that provided a 5-point improvement, 71% were willing to take the medication without cost, which decreased to 51% with a cost of \$60 per month.

The cost of medications was inconsistently valued by patients across studies. It was ranked among the least important attributes in two studies<sup>29,34</sup> and ranked as the seventh (out of 18) most important attribute in another.<sup>37</sup> However, patients in three studies qualitatively reported that they valued the inclusion of cost in the decision-making process.<sup>30,33,38</sup> As noted above, Rector et al. demonstrated reduced willingness to take a medication if it incurred out-of-pocket costs.<sup>39</sup> Smith et al. assessed the effects of cost on patient preference for switching to sacubitril-valsartan (see **Supplemental Table S7**).<sup>29</sup> The following 2-year benefits of switching to sacubitril-valsartan served as context for these choices: a 3% reduction in mortality, a 3% reduction in hospitalization, and a 5% reduction in the composite of mortality or hospitalization. With no cost information, 72% of patients would definitely or probably want to switch to sacubitril-valsartan. However, if the medication cost \$5 per month and it was recommended by a physician, this proportion increased to 92%. This proportion decreased to 43% if the cost increased to \$100 per month. Amongst those who declined or were unsure regarding switching at the cost of \$100 per month, the median reported willingness-to-pay was \$15 per month.

Pill burden was ranked by patients as the least important attribute in two studies,<sup>28,34</sup> and the ninth (out of 18) most important in another.<sup>37</sup> Hospitalization was tied for second most important in one study<sup>28</sup> and fifth most important (out of 18) in another.<sup>37</sup> Adverse effects ranked as sixth (out of nine) most important in one study<sup>28</sup> and tied for least important in another (tied with eight

other attributes out of 18).<sup>37</sup> Adverse effect importance was also assessed by Dickert et al. which evaluated the choice of switching to sacubitril-valsartan (see **Supplemental Table S7**).<sup>38</sup>

Through the use of a decision aid, patients were informed this switch would entail an increased chance of dizziness (no magnitude provided) as well as a 3% reduction in both mortality and hospitalization over two years. In response to this information, 60% reported they would definitely or probably want to switch to sacubitril-valsartan, 15% did not know what they would prefer, and 20% would probably or definitely not want to switch (5% of results missing).

Only Hopper et al. reported on clinician treatment preferences (in addition to reporting patient preferences).<sup>34</sup> Clinician preferences were concordant with patient preferences with regard to HF symptoms being most important, prolonging survival or slowing symptoms being important, and the number of medications and cost of medication being least important. Clinicians were less concerned about kidney function than patients.

### Critical Appraisal within Sources of Evidence

Quotations supporting all author reported study limitations can be found in **Supplemental Table S8**. Generalizability concerns were the most commonly reported limitation, being noted in 12 studies.<sup>28-41</sup> Limitations with regards to sample size were mentioned in five studies<sup>29-33,38,40</sup> and three studies also noted that salient demographic features were not recorded (e.g. educational attainment levels).<sup>28,36,37</sup>

### **Discussion**

In this scoping review of 13 studies evaluating patients with HF and their clinicians, we identified 10 decisional needs and 12 treatment attributes relevant to decision-making regarding HF/EF medications. The most commonly reported decisional needs were inadequate knowledge, inadequate information, difficult decisional roles, and decisional conflict. Five decisional need categories (unreceptive decisional stage, unclear values, information overload, social pressure, and personal/clinical needs) were not described in any of the included studies. The list of evaluated treatment attributes was comprised of effectiveness (including mortality, hospitalization, symptoms/quality of life/function, slowing or stopping disease progression), safety (including adverse effects, drug interactions, impact on kidney function), practical considerations (including cost, pill burden), concerns regarding unknowns, and clinician recommendations.

Among the included studies, inadequate knowledge and information were the most frequently reported ODSF decisional needs relevant to HF/EF medication decisions, consistent with a recent systematic review addressing decisional needs across various health and social decisions.<sup>20</sup> This is despite participants in the included studies generally achieving a high level of education and having high self-reported health literacy or numeracy, and as such, these needs may be even more prevalent among patients with lower education attainment, health literacy, and numeracy. The third commonly reported decisional need was difficult decision roles. Notably, within this domain, several patients noted patronizing treatment wherein treatment decisions were made entirely by their clinicians without their involvement.<sup>28,31,32,42</sup>

These key decisional needs can provide guidance on future SDM initiatives. Promisingly, decision aids developed for various other health decisions have been effective at improving patient knowledge about their condition, treatment options (along with the benefits and harms of

each choice), and in helping patients feel properly informed about available options.<sup>19,45</sup> However, decision aids can facilitate – but do not ensure – SDM, which requires a discussion between patients and their clinicians. Notably, decision aids alone cannot change patients' roles in decision-making or resolve all decisional conflict reported by patients; these require active engagement of both patients and clinicians, and changes to the power dynamic during the clinical encounter. Interventions aimed at increasing patient engagement may further facilitate changes in decisional roles. For instance, the Electronically Delivered, Patient-Activation Tool for Intensification of Medications for Chronic Heart Failure with Reduced Ejection Fraction (EPIC-HF) trial demonstrated that a simple, electronically-delivered patient activation tool resulted in greater optimization of guideline-directed medical therapy compared with usual care in patients with HFrEF.<sup>46</sup>

Two key themes emerged among treatment preferences. First, positive attributes (benefits of medications) were generally ranked as more important than negative attributes; however, this depended on the magnitude of effect. For example, in Rector et al. trade-offs between death and quality of life depended on the magnitude of risk of death.<sup>39</sup> Similarly, fewer patients in the study by Smith et al. were willing to switch to sacubitril-valsartan when the monthly cost was \$100 compared with a cost of \$0 (consistent with full insurance coverage) or \$5 per month (typical copay for many public and private plans).<sup>29</sup> Second, the importance of cost varied across studies. Cost ranked as one of the least important concerns in Hopper et al. and Samsky et al., yet influenced willingness to take a medication in the studies by Rector et al. and Smith et al.<sup>28,29,34,39</sup> In Samsky et al. less than 25% of participants were aware of more expensive therapy options (e.g. sacubitril-valsartan), and they may have therefore based their preference on their awareness of the cost of more familiar and affordable medications (e.g. beta-blockers).<sup>28</sup> Moreover, the study by Hopper et al. was conducted in Australia,<sup>34</sup> which has universal drug coverage and a maximum copay by patients of approximately \$30 per prescription.<sup>47</sup> Conversely, the studies by Rector et al. and Smith et al. were both conducted in the United States and showed cost-sensitive preferences.<sup>29,39</sup> As such, differing healthcare systems and awareness of the cost of available options may have accounted for these observed differences.

### Implications for Future Research and Practice

This research has several implications for clinical practice. Notably, given that a consistent set of treatment preferences across patients was not identified, it remains necessary to engage patients in preference elicitation. Furthermore, as preferences were shown to be magnitude-sensitive, these conversations should feature information quantifying benefits and harms of available treatment options. Of note, since preferences related to cost were especially variable, it would be valuable to incorporate cost tolerance discussions as a routine aspect of care from the first clinical encounter. Cost should also be discussed during subsequent encounters when considering the initiation of more expensive options (e.g. sacubitril-valsartan) and to identify when patients' financial or coverage status has changed (e.g. retirement, unemployment, disability, or change in coverage). These conversations regarding decisional needs and attribute preferences can be systematized by using decision aids. While not available for all clinical decisions, at least one has been identified pertaining to the initiation of sacubitril-valsartan for HFrEF,<sup>44</sup> and more are in development.

Ideally, guidelines should provide the resources necessary to facilitate these conversations, which could include bespoke decision aids or links to trusted decision aid resources when

available, or evidence summaries on the benefits and harms of treatment options to facilitate shared decision-making. Contemporary guidelines – particularly those developed using GRADE methodology – are starting to provide these evidence synopses, such as the 2022 Canadian Cardiovascular Society guideline for the use of GLP-1 receptor agonists and SGLT2 inhibitors for cardiorenal risk reduction.<sup>48</sup> While the evidence synopsis for this guideline did not provide timeframe, adverse effect, or cost information, it is nonetheless an important step towards better facilitation of shared decision-making, and guideline authors should seek to build upon such efforts.

The gaps in knowledge and paucity of decision aids for HF<sub>r</sub>EF medication decisions identified in this review also have implications for future research in this area. First, future efforts should systematically evaluate the decisional needs and attribute preferences of patients with HF<sub>r</sub>EF using an established framework, such as the ODSF, which could in turn inform the development of decision aids and other decision support interventions. Second, any further needs assessment should recruit patients from across the spectrum of social determinants of health, health literacy, and numeracy to ensure that results are broadly applicable and actionable in practice. Specifically, future research should include populations that have been underrepresented in studies to-date, such as patients with advanced age (70 years or older), women, non-white race, without post-secondary education, lower income, and/or lower health literacy and numeracy. Third, a study using stated-preference methodology could systematically elucidate patient preferences regarding medications or medication attributes.<sup>45</sup> This stated-preference methodology could be especially valuable because, as previously illustrated, patient preferences may be sensitive to magnitudes of trade-offs. Fourth, another area for future initiatives is regarding clinician judgement of decisional need relevance. The sole study reporting on this represented clear discordance between patients, who felt knowledge/information regarding cost was important, and clinicians, who were skeptical about the inclusion of this information. Studies conducted in other conditions have demonstrated important differences in preferences and priorities between patients and clinicians,<sup>49</sup> and these should be further elucidated in decisions about HF therapies. Additionally, this suggests a need for educating clinicians regarding the importance of, and best approach to, eliciting patient values and preferences. Finally, the present review identifies key gaps in how to best present options and their effects, along with the most appropriate time and location to implement SDM regarding HF<sub>r</sub>EF medications that should be the target of future investigation.

### Limitations

Limitations of the review methodology, as well as in the included literature, warrant consideration. First, social determinants of health were not consistently reported, and available data from included studies indicated underrepresentation of underserved populations. These factors may influence decisional needs and treatment preferences, as well as how to best address these with decisional support interventions. For example, previous studies have indicated that older patients with HF were more likely to value quality of life over survival than younger patients.<sup>51,52</sup> Included studies did not provide further subgroup analyses based on these patient factors. Since 9 of the 13 studies took place in the United States, there was limited representative data from other countries, including no study conducted in Canada. Second, none of the studies explicitly used the ODSF or any other framework for the evaluation of decisional needs and preferences. Consequently, included studies did not systematically ascertain decisional needs, with several of these being seldom or never reported in patients with HF. Therefore, subjective

judgements were necessary to classify decisional needs into categories comparable across studies. Although this process was conducted independently among reviewers who discussed disagreements, misclassifications may still have occurred. Similarly, included studies did not include a comprehensive list of treatment attributes, which limits conclusions regarding the relative importance of these attributes across studies. Fourth, we aimed to focus on decisions regarding HFrEF medications; however, only five of the 13 studies restricted enrolment based on ejection fraction, and these results more broadly reflect the general heart failure population rather than just those with HFrEF. Fifth, the proportion of patients expressing each decisional need could not be extracted from most studies. Finally, we identified only one decision aid that addressed a single HFrEF medication choice.

### Conclusions

This scoping review identified a paucity of studies examining patient and clinician decisional needs and preferences regarding HFrEF medication choices. The most commonly reported patient decisional needs were inadequate knowledge, inadequate information, and difficult decisional roles. Among treatment attributes, mortality and symptom reduction frequently ranked as highly important, cost was variably important, and adverse effects tended to rank as being of lesser importance. Future research should systematically evaluate decisional needs and relative preferences between treatment attributes for specific interventions to facilitate the development of individualized decision aids.

**Figure Legend.**

**Figure 1. PRISMA flow diagram**

**Figure 2. Factors Described as Decisional Needs in  $\geq 1$  Study**

Caption: No studies provided any data for the following decisional needs in patients with heart failure with reduced ejection fraction: Unreceptive decisional stage, unclear values, information overload, social pressure, personal/clinical need

**Figure 3. Treatment Attribute Reporting and Relative Importance When Assessed**

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**Table 1. Characteristics of included studies**

Study	Objectives Related to Review	Country (years)	n	Methodology	Patients	Patient Recruitment
<b>Dickert 2020</b>	To understand the views of patients with heart failure on a decision aid and examine preferences regarding treatment attributes	US (2018-2019)	20	Qualitative Structured interviews with thematic analysis	≥ 18 years old with HF <sub>r</sub> EF without ESRD	Via clinics or inpatient services
<b>Ekman 2017</b>	To explore the meaning and expectations associated with medication use in high-risk patients with heart failure who are non-adherent	US (2008-2009)	44	Qualitative Semi-structured interviews with content analysis	Primary diagnosis of HF, NYHA III-IV for at least 6 months before the acute admission, and screening positive for poor adherence	Via inpatient center
<b>Field 2006</b>	To examine the decisional needs of patients with heart failure as they relate to medication knowledge	UK (2003)	37	Qualitative Interviews with thematic analysis	All stages of HF <sub>r</sub> EF	Via GPs, cardiologists, specialist nurses, or patient support groups
<b>Granger 2012</b>	To explore the theoretical linkages between symptom experiences and meaning associated with medication adherence	US (NR)	10	Mixed-methods Structured interviews Quantitative questionnaire	≥ 18 years old, HF with NYHA Class II-IV symptoms, admitted for HF exacerbation	Via inpatient center
<b>Hopper 2016</b>	To examine the treatment characteristic preferences among patients with heart failure and clinicians	Australia (NR)	85	Quantitative Survey	HF and taking ≥ 5 cardiac medications	Via clinics or a heart transplant center
<b>Ivynian 2020</b>	To understand the decisional needs of patients with heart failure as they relate to medication knowledge and comprehension	Australia (2015-2016)	15	Qualitative Interviews with thematic analysis	HF with NYHA Class II-III symptoms and at least one HF-related hospitalization (excluding current admission)	Via inpatient center
<b>Meraz 2020</b>	To understand the decisional needs of older patients with heart failure	US (2016)	11	Qualitative Semi-structured interviews with structural analysis	≥ 65 years old, taking at least 2 medications for HF, self-administering medications, lived experienced taking a HF medication differently than prescribed, living independently	Via flyers at board-approved recruitment sites
<b>Rector 1995</b>	To survey the treatment preferences among patients with heart failure as they relate to risks of drug-induced death compared to	US (1993-1994)	101	Quantitative Stated-preference experiment	Primary medical problem of HF	Via clinics

	improvements in quality of life					
<b>Rogers 2002</b>	To explore patients' understanding of their heart failure symptoms and treatment	UK (1998-1999)	27	Qualitative Open-ended interviews	HF with NYHA class II-IV symptoms and hospitalized for HF within previous 20 months	Via clinics or inpatient centers
<b>Samsky 2020</b>	To survey patients with heart failure regarding decisional needs and treatment attribute preferences	US (2018)	429	Quantitative Online survey	≥ 18 years old, self-reported HF, taking HF medications	Via a probability-based online panel
<b>Smith 2019/Rao 2020</b>	To understand the decisional needs and treatment preferences among patients with heart failure as they relate to medication cost	US (2017)	49	Qualitative Structured interview with thematic analysis	≥ 18 years old with HF with an EF <40%, eligible for sacubitril/valsartan without a history of heart transplant, inotrope dependence, mechanical circulatory support, or dialysis dependence	Via clinics or inpatient center
<b>Trinkley 2020</b>	To examine the decisional needs and treatment attribute preferences of patients with heart failure	US (NR)	13	Mixed-methods Semi-structured focus groups with thematic analysis Attribute-preference ranking exercise	Adults with HFrEF	Via established clinical relationships with study investigator
<b>Venechuk 2020</b>	To examine the perspectives of clinicians and patients with heart failure regarding a decision aid	US (2017)	13	Qualitative Semi-structured interviews (patients) Email feedback (clinicians)	HF patients eligible for or currently taking an Angiotensin Receptor-Nepriylsin Inhibitor (ARNI)	Via clinics or patient advisory panel

NR: Not reported

**Table 2. Characteristics of Study Participants, Including Social Determinants of Health\***

Determinant	Dickert 2020	Ekman 2017	Field 2006	Granger 2012	Hopper 2016	Ivynian 2020	Meraz 2020	Rector 1995	Rogers 2002	Samsky 2020	Smith 2019/Rao 2020	Trinkley 2020
<b>n</b>	20	44	37	10	85	15	11	101	27	429	49	13
<b>Mean age, y</b>	64	60	64	67	61	55	81	56	69	68	57	67
<b>Female</b>	45%	48%	-	50%	27%	33%	45%	25%	26%	29%	43%	0%
<b>Race/ethnicity</b>												
White	65%	27%	84%	-	-	-	100%	92%	78%	75%	57%	77%
Black	30%	73%	3%	-	-	-	0%	4%	-	10%	41%	23%
Hispanic	10%	0%	-	-	-	-	0%	2%	-	10%	2%	-
Other†	5%	0%	5%	-	-	-	0%	2%	-	5%	0%	0%
<b>Educational level</b>												
High school or less	25%	70%	-	-	-	-	9%	-	-	31%	39%	-
Some college	30%	30%††	-	-	-	-	18%	-	-	38%	25%	-
College graduate or more	45%	-	-	-	-	-	73%	-	-	31%	37%	-
<b>Income</b>	<u>Annual</u> <\$25,000: 35% \$25,000-50,000: 35% \$50,000-100,000: 5% \$100,000-200,000: 5% >\$200,000: 10%	-	-	-	-	-	<u>Household</u> <\$30,000: 18% \$30,001-60,000: 18% \$60,001-80,000: 9%  \$80,001-100,000: 9% >\$100,000: 36% Do not wish to answer: 9%	-	-	<u>Household</u> <\$60,000: 55% ≥\$60,000: 45%	<u>Annual</u> <\$25,000: 37% \$25,000-100,000: 33% \$100,000-200,000: 14% >\$200,000: 6% Declined to answer: 10%	-
<b>Marital status</b>	-	Married: 43% Not	-	-	-	-	Married: 64% Widowed: 18% Divorced: 18%	-	-	Married: 62%	-	-

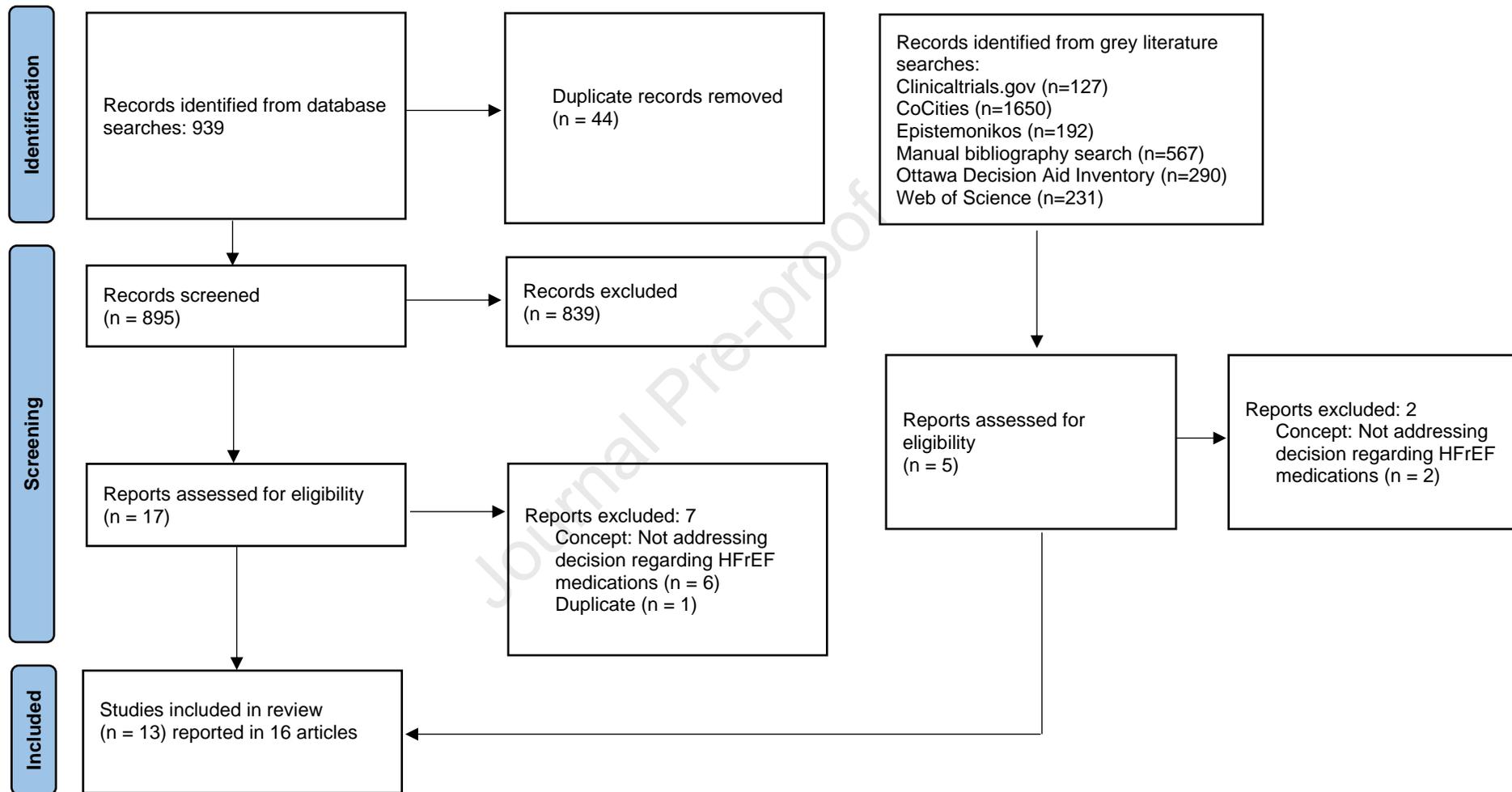
		married: 57%										
<b>Self-reported health literacy</b> (confidence in filling out medical forms by oneself)	Extremely 50% Quite a bit 40% Somewhat 5% A little bit 0% Not at all 5%	-	-	-	-	-	-	-	-	-	Extremely 45% Quite a bit 25% Somewhat 18% A little bit 6% Not at all 6%	-

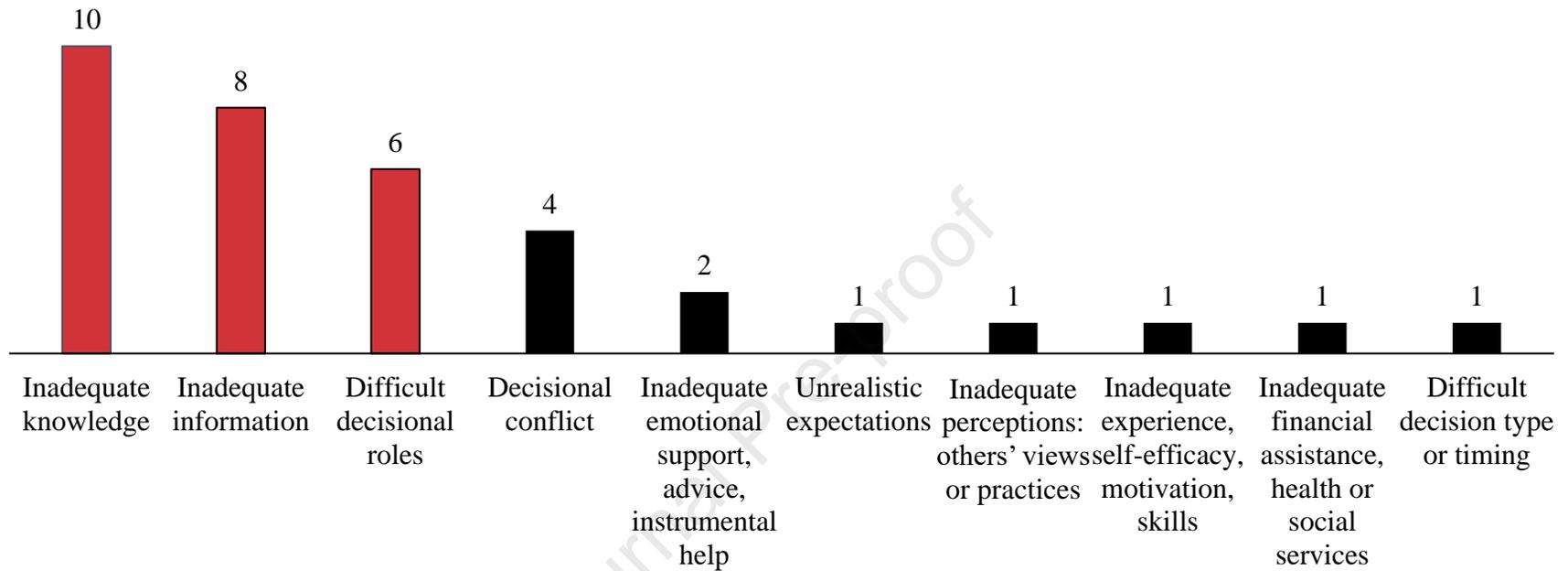
UK: United Kingdom; US: United States.

\*Not included: Venechuk 2020 (no social determinants of health reported)

†Other races by study: Dickert: Cajun Indian 5%; Ekman: Non-white 67%; Field: Arab 5%; Rector: Asian 2%; Samsky:  $\geq 2$  races 4% and "other race" 1%.

Figure 1. PRISMA flow diagram.



**Figure 2. Factors Described as Decisional Needs in  $\geq 1$  Study**

Studies	Efficacy						Safety			Practical Considerations		Other	
	Symptom Reduction	Mortality	Function	Slowing or stopping disease	Quality of life	Hospitalization	Kidney function	Drug interactions	Side-effects	Cost	Pill burden	Clinician recommendation	Concerns regarding unknowns
<b>Studies that provide ranking (1=most important)</b>													
Hopper 2016	1	2		2			2			3	3		
Samsky 2020	1	2				3		5	6	8	7	4	
Trinkley 2020		1	2		3	4			7	5	6		7
<b>Studies that described attributes as important without ranking/rating relative importance</b>													
Dickert 2020		✓				✓			✓	✓	✓		
Rector 1995		✓			✓				✓	✓	✓		
Smith 2019/Rao 2020		✓				✓				✓		✓	✓