CONSIDERING COGNITION: HOW HEALTHCARE PROFESSIONALS NAVIGATE SHARED TREATMENT DECISION-MAKING WITH PATIENTS WITH AORTIC STENOSIS

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Preface

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Thesis Abstract

Aortic stenosis (AS) is a cardiac condition that requires complex treatment decisions, particularly in older adults who may have cognitive impairment. Shared decision-making (SDM) is a collaborative process between healthcare professionals (HCPs). This thesis aimed to explore how HCPs consider cognition in SDM with patients with AS and their families. I conducted a secondary qualitative analysis using an interpretive description approach guided by the Interprofessional SDM Model and the Cognitive Continuum Theory. Four qualitative themes emerged: 1) Focus on cognition as a complication, not a comorbidity, 2) Cognitive expertise is sought on-demand, not part of the established heart teams, 3) Family members as a source of insight into cognition and SDM, and 4) Nursing expertise in detection of cognitive changes. Findings highlight gaps in integrating cognition into AS treatment decisions and can inform interventions to improve the care of people with AS.

List of Abbreviations

ACC/AHA	The American College of Cardiology/American Heart Association
ADL	Activity of Daily Living
APN	Advanced Practice Nurse
AS	Aortic Stenosis
AVR	Aortic Valve Replacement
AVI	Aortic Valve Intervention
CAD	Coronary Artery Disease
CGA	Comprehensive Geriatric Assessments
CCT	Cognitive Continuum Theory
CNS	Clinical Nurse Specialist
DRMT	Delayed Recall Memory Test
ESC	European Society of Cardiology
HCP	Healthcare Professional
ID	Interpretive Description
IP-SDM	Interprofessional Shared Decision-Making Model
IRMT	Immediate Recall Memory Test
PtDA	Patient Decision Aid
MCI	Mild Cognitive Impairment
MMSE	Mini Mental State Exam
MoCA	Montreal Cognitive Assessment
NP	Nurse Practitioner
OT	Occupational Therapist

PT	Physiotherapist
QOL	Quality of Life
SDM	Shared Decision-Making
SAVR	Surgical Aortic Valve Replacement
TAVI	Transcatheter Aortic Valve Implantation
TCPS2	Tri-Council Policy Statement 2
VHD	Valvular Heart Disease

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Chapter One: Introduction and Background to the Research Problem

Valvular heart disease (VHD) is a common cardiac condition characterized by the improper opening or closing of one of the heart's four valves, leading to impaired blood flow or backflow (Lewis et al., 2018). *Aortic stenosis* (AS) can affect people at any age for a variety of reasons, including congenital heart disease and rheumatic heart disease (Otto et al., 2021; Praz et al., 2025). However, it is commonly seen as an acquired VHD in older adults due to calcium buildup or scarring (Fleury & Clavel, 2021; Otto et al., 2021; Praz et al., 2025). VHD is anticipated to become the next healthcare epidemic, driven by an aging population, and increased prevalence among immigrants and minority groups - many of whom may have acquired rheumatic heart disease earlier in life (d'Arcy et al., 2011; Durr et al., 2025). Indigenous populations, who are disproportionately affected by cardiovascular conditions, are expected to experience an increasing burden of VHD (Durr et al., 2025). Further, due to evolving clinical practice guidelines and the rise in community-based echocardiogram screening programs, there is potential for earlier diagnosis and treatment of asymptomatic VHD, leading to an increased global prevalence (Kelemen-Dagg et al., 2025; Tsampasian et al., 2024).

Given that AS primarily affects older adults, it is reasonable to consider cognitive function and possible impairment during diagnosis, treatment planning, and treatment decision-making (Damluji et al., 2024; Otto et al., 2021; Praz et al., 2025). Furthermore, there is growing recognition of co-existing brain and heart conditions such as cognitive impairment and AS (van Nieuwkerk et al., 2023). Yet, there remains a limited understanding of how healthcare professionals (HCPs) consider cognition when making treatment decisions with patients who have severe AS (Heart and Stroke, 2019; van Nieuwkerk et al., 2023).

Aortic Stenosis and Treatment Landscape

AS is defined as progressive calcification of the aortic valve that causes limitation of the left ventricular outflow tract (Otto et al., 2021; Praz et al., 2025). It leads to compensatory changes in the left ventricle, resulting in inadequate cardiac output, decreased exercise capacity, and heart failure (Boskovski & Gleason, 2021). It affects up to 12.4% of older Canadians, making it the most frequently acquired VHD in Canada (Fleury & Clavel, 2021). Classic symptoms of AS include syncope, angina, and dyspnea, otherwise known as the SAD triad (Armstrong, 2025; Heart and Stroke Foundation of Canada, n.d.). Other signs and symptoms can include heart murmurs, fatigue, edema, palpitations, and dizziness (Heart and Stroke Foundation of Canada, n.d.). If left untreated, VHD can cause serious complications such as heart failure, stroke, arrhythmia, blood clots, pulmonary hypertension, impaired QOL (Quality of Life), and death (Otto et al., 2021; Praz et al., 2025).

In Canada, the journey of care for patients with AS often begins in primary care. Yet this can vary depending on the jurisdiction and geographical region, as well as on their established referral patterns and workflows within these contexts (Heart Valve Voice Canada, n.d.; Pibarot et al., 2022). When AS is suspected, patients are usually referred for a range of diagnostic tests to confirm the diagnosis and assess severity, with the echocardiogram as the gold standard (Heart Valve Voice Canada, n.d.). Once a diagnosis is confirmed, patients should promptly be referred to a heart valve specialist, ideally within a dedicated interprofessional heart valve clinic, to consider treatment options (Pibarot et al., 2022). Optimal care provides patients with a centralized point of contact to report changes in their condition, ask questions, and receive regular, reliable follow-up care (Heart Valve Voice Canada, n.d.; Pibarot et al., 2022).

Aortic valve intervention (AVI) is the only treatment for severe AS (Otto et al., 2021; Praz et al., 2025). Surgical aortic valve replacement (SAVR) and transcatheter aortic valve implantation (TAVI) are the two treatment options, each with their own risk/benefit profile, indicating a preference-sensitive decision. For some patients, AVI may not be an option, and a plan of care focused on symptom management and a supportive care approach may be preferred (Fleury & Clavel, 2021; Otto et al., 2021).

Over the past 10 to 15 years, physician-driven recommended treatment options for AS have shifted rapidly to more minimally invasive options as data have emerged across various surgical risk groups, including low, medium, and high. Yet the "best" treatment for this patient population should not be limited to surgical risk. Treatment decisions are best derived when made collaboratively between the interprofessional heart team and the patient and their important others, incorporating the patient's preferences and values alongside the best available evidence (Boskovski & Gleason, 2021).

Cognition, Cognitive Impairment, and Aortic Stenosis

There is growing evidence of the connections between brain and heart diseases, particularly in the multimorbidity aging populations (Edwards et al., 2026; van Nieuwkark et al., 2023). The exploration of cognition and AS falls within this broader context, which is the focus of this thesis. *Cognition* is defined as a way of knowing and awareness, such as perceiving, conceiving, remembering, reasoning, judging, imagining, and problem solving (American Psychological Association (APA), 2018). When there is disruption in learning, memory, language, or thinking abilities, cognitive impairment may be identified. Such disruptions can be detected using reliable and validated diagnostic tests for cognitive assessment, including the Mini-Mental State Examination (MMSE), the Montreal Cognitive Assessment (MoCA), and the

Clock Drawing Test (Wang et al., 2022). In healthcare, many terms are used to refer to cognitive impairment (Table 1). For the purpose of this thesis, I will use *cognitive impairment* as an umbrella term to refer to patients experiencing disruption in their cognitive abilities, as seen in varying types of dementia and mild cognitive impairment (MCI).

Table 1.1. *Key Terms and Definitions Related to Cognition and Cognitive Impairment*

Term	Definition
Cognition	A way of knowing and awareness, such as perceiving, conceiving, remembering, reasoning, judging, imagining, and problem solving.
Mild Cognitive Impairment	As adults with memory or thinking problems that can still independently care for themselves.
Dementia	The loss of cognitive functioning (thinking, remembering, and reasoning) to the extent that it interferes with a person's daily life. **Common Dementia Etiologies:** **Alzheimer's Disease:** Most common of dementia, typically characterized by progressive memory loss, although other cognitive domains are also commonly affected such as thinking and reasoning. **Vascular Dementia:** Refers to changes to memory, thinking, and behavior resulting from conditions that affect the blood vessels in the brain. **Lewy Body Dementia:** A progressive brain disorder that causes a decline in thinking, movement, behavior, and mood, often overlapping with symptoms of both Alzheimer's and Parkinson's disease due to protein deposits called Lewy bodies that develop in nerve cells in the brain.

Note. Definitions adapted from American Psychological Association (2018), Mayo Clinic (2024), National Institute on Aging (2022), National Institute on Aging (2023), National Institute on Aging (n.d.).

Dementia is defined as the loss of cognitive functioning (thinking, remembering, and reasoning) to the extent that it interferes with a person's daily life (National Institute on Aging, 2022). In Canada, the prevalence of dementia in adults aged 65 to 79 years is 43 per 1000 persons and rises with age to 212 per 1000 in Canadians aged 85 and older (Canadian Task Force on Preventive Health Care et al., 2016). Dementia is a general classification that includes many types, including Alzheimer's disease and vascular dementia (National Institute on Aging, 2021).

MCI is defined as adults with memory or thinking problems who can still independently care for themselves (Mayo Clinic, 2024). It can be caused by a variety of factors such as mental health conditions (e.g., depression, anxiety), vascular cognitive impairment, or neurodegeneration. Prevalence of MCI often varies due to factors such as the definitions used, the diagnostic tests employed, the scores given, and the length of follow-up (Mayo Clinic, 2024). Currently, there are no published Canadian prevalence rates for MCI; however, the authors of an international 2025 systematic review and meta-analysis estimate a global prevalence of 23.7% among geriatric populations (Salari et al., 2025). Another common cognitive impairment in this patient population is delirium, defined as the sudden onset of confusion and/or impaired awareness (Mayo Clinic, 2022). Although delirium is an important consideration in the context of AVR, particularly as a potential post-operative complication, it falls outside the scope of this thesis. This thesis focuses specifically on how pre-existing cognitive impairment may influence patients' ability to participate in treatment decision-making process, rather than on cognitive complications that may arise following the AVR.

AS is the most common form of VHD in the elderly, and a significant portion of older patients with AS experience cognitive impairment on a wide spectrum with presentations of memory loss and executive dysfunction (Damluji et al., 2024). In various small clinic-based studies including patients with severe symptomatic AS scheduled for TAVI, cognitive impairment is prevalent in approximately one-third of patients (Khan et al., 2018; van Nieuwkerk et al, 2023). Hence, it is expected that interprofessional heart teams will assess and treat patients with varying degrees of cognitive impairment. In fact, emerging research has shown that untreated AS puts patients at higher risk of cognitive impairment due to decreased cerebral blood flow (Ghezzi et al., 2020; van Nieuwkerk et al., 2025). Moreover, cognition and

forms of cognitive impairment, both diagnosed and undiagnosed, are often factors in treatment planning, decision-making, and overall mortality (Skaar et al., 2021). Early detection of cognitive dysfunction may help minimize further impact of cardiac dysfunction and enhance treatment plans and recovery on both cardiac and cognitive fronts (van Nieuwkerk et al., 2023).

Shared Decision-Making for Aortic Stenosis

Makoul & Clayman (2006) define shared decision-making (SDM) as a collaborative process involving patients, families, and HCPs that integrates clinical evidence, patient values, needs, and preferences to guide healthcare decisions. The American College of Cardiology/American Heart Association (ACC/AHA) has endorsed SDM in their guidelines for patients with AS choosing between TAVI and SAVR (Otto et al., 2021; Praz et al., 2025). Patients themselves also want increased involvement in their treatment decisions (Driever et al., 2022; Lauck et al., 2021). Historically, the most common approach to treatment decision-making was a paternalistic model, in which physicians recommended treatment based on available evidence and clinical expertise (Emanuel & Emanuel, 1992). Over the last several decades, this model has lost prominence in favour of a more engaged SDM model due to the ethical imperative of involving people in their own care, the rise of complex illnesses, and mistrust in the healthcare system (Charles et al., 1997; Emanuel & Emanuel, 1992). As a model, SDM has the potential to improve patient outcomes, reduce decisional uncertainty, enhance patient-HCP relationships, and reduce cost to the healthcare system (Elwyn et al., 2016). Despite these benefits, the implementation of SDM remains limited globally in valvular heart disease, and AS specifically. (Lauck et al., 2025)

In the context of valvular heart disease, an SDM approach plays a critical role in the rapidly evolving nuances of choice. Current treatment options for severe AS include SAVR,

TAVI, and conservative medical or lifestyle management (Fleury & Clavel, 2021; Otto et al., 2021; Praz et al., 2025). Traditional SAVR treatment involves open-heart surgery to replace the aortic valve, where the old aortic valve is removed, and a new mechanical or biological valve is placed (Otto et al., 2021). SAVR offers long-term durability and symptom relief, but carries risks such as bleeding, arrhythmias (e.g., atrial fibrillation), and longer recovery times given the need for a sternotomy (Otto et al., 2021). TAVI is a less invasive alternative involving a new aortic valve inserted through a catheter, typically inserted through the groin (Otto et al., 2021). TAVI is associated with shorter recovery times and reduced perioperative risk but increased risk of vascular complications, pacemaker needs due to bradycardia arrhythmias, and unknown durability (Otto et al., 2021). Lastly, conservative management treatment often involves closely monitoring symptoms, consistent follow-up with the heart team/cardiologist, and controlling risk factors with medication and lifestyle changes (Otto et al., 2021). Conservative treatment is often reserved for patients who are not candidates for invasive procedures due to extreme frailty, comorbidities, or driven by patient preferences (Dharmarajan et al., 2017; Otto et al, 2021). Evidence-based tools such as patient decision aids (PtDAs) can be used to facilitate SDM in AS treatment by helping people contemplate these options (Lauck et al., 2025).

Since TAVI's introduction in 2011, the decision landscape for AS continues to evolve. Initially, TAVI was considered a suitable option solely for patients at high surgical risk due to concerns about surgical complications, valve durability, and limited long-term data on patient outcomes (Otto et al., 2021; Sepucha et al., 2024). Now, TAVI is well-suited for certain patients with intermediate to high surgical risk and older adults because evidence has demonstrated comparable outcomes to SAVR, with reduced recovery time, and more favourable early quality-of-life benefits (Asgar et al., 2019; Otto et al., 2021; Praz et al., 2025). As stated in the

AHA/ACC 2020 guidelines, SAVR is the standard treatment for patients at low surgical risk (Otto et al., 2021). The new 2025 European Society of Cardiology (ESC) guidelines recommend SAVR in patients < 70 years of age and low risk. Yet, surgical risk vs. age cut-offs should not be the only consideration. As endorsed by the guidelines, patient preferences and values should also play a role in treatment decision-making. However, there is limited published evidence on patients' preferences for TAVI versus SAVR. A systematic review by Heen et al. (2021) confirms these findings and calls for future studies to investigate patient values and preferences on key outcomes of valvular interventions. In a multicenter prospective observational cohort study of 407 patients with AS, Dharmarajan et al. (2017) reported that the most common physician-reported reason for selecting medical management of AS was patient preference. However, the same patients who did not undergo SAVR or TAVI interventions reported a greater likelihood of receiving insufficient information on treatment options and greater uncertainty about those choices (Dharmarajan et al., 2017). In addition, there remains little research on how co-morbidities such as cognitive impairment play a role in the SDM of AS treatment. This gap calls for increased research and implementation of SDM to enhance informed, values-based decision-making among this complex population.

SDM can be facilitated in several ways, including the use of patient decision aids (PtDAs) and SDM training, both of which have been shown to improve SDM outcomes (Joseph-Williams et al., 2021). However, the implementation of SDM remains limited and fragmented in valvular heart disease, despite its endorsement by Canadian and international heart valve disease guidelines (Asgar et al., 2019; Lauck et al., 2025; Sepucha et al., 2017). Frequently reported barriers to implementing SDM include time constraints, limited training availability, disagreement about the applicability of SDM to the AS population, and insufficient long-term

data on TAVI treatment options (Pel-Littel et al., 2021; Waddell et al., 2021). Given that the number of patients eligible for aortic valve replacement (AVR), especially TAVI, will increase in the coming years due to both the aging population and extension of TAVI eligibility to younger patients, HCPs should be engaging patients with AS in an SDM process when selecting treatment options to ensure high-quality care (Asgar et al., 2019; van Beek-Peeters et al., 2020).

Considerations for Shared Decision-Making in the Context of Aortic Stenosis and Cognitive Impairment

Older patients, caregivers, and HCPs often cite cognitive impairment as a barrier to SDM, due to difficulties understanding information, inability to express preferences, and information overload (Joseph-Williams et al., 2014; Pel-Littel et al., 2021; van Beek-Peeters et al., 2025). In patients with cognitive impairment, caregivers can help advocate on behalf of patients and ensure their voices are heard, and their values and preferences are respected (Pel-Littel et al., 2021). Additionally, in this patient population, it is important to remember that the best treatment for AS may not always be clear and should therefore align with individual patients' priorities and values (Pel-Littel et al., 2021). Overall, when used as intended, SDM can facilitate individualized discussion between HCPs and older patients with cognitive impairment when decisions must be made about treatment to enhance QOL, autonomy, and overall outcomes (Mattos et al., 2023).

Role of Healthcare Professionals in Facilitating Shared Decision-Making

As recommended by the ACC/AHA guidelines for the management of patients with valvular heart disease (2021), an interprofessional heart team is essential to providing patient-centered care and optimal SDM. The heart team for AS usually consists of a cardiologist, cardiac surgeons/interventionalists and nurses (Khan et al., 2022; Otto et al., 2021). Pharmacists and allied health professionals, such as occupational therapists (OTs) and physiotherapists (PTs) can

also be involved (Khan et al., 2022; Otto et al., 2021). Geriatricians and neurologists are not considered "traditional" members of the heart team but are sometimes consulted for complex cases involving older patients with cognitive impairment (Bell et al., 2015; Otto et al., 2021). Utilizing expertise from each profession enables effective management of the AS patient by combining available scientific evidence with the patient's preferences to optimize individualized care (Khan et al., 2022). In particular, nurses are at the forefront of patient care and can play a critical role in facilitating SDM. Their involvement in assessing patient status and supporting patients/families in understanding treatment options highlights their important role within the heart team and their advocacy for patients and families (Joseph-Williams et al., 2014; Pel-Littel et al., 2021).

However, although heart team members often feel they already use an SDM approach, research shows that their perception of SDM in practice is more aligned with basic patient education than with SDM (van Beek-Peeters et al., 2025). In providing patient education, the patient is a passive recipient of information rather than an active contributor to the decision-making process (United States Preventive Services Task Force et al., 2022). In contrast, SDM is a more active, relational, and collaborative process (United States Preventive Services Task Force et al., 2022). This emphasizes the need for a culture shift within healthcare organizations and greater investment in HCP training to foster a deeper understanding and consistent application of SDM, within the management of valvular heart disease (Elwyn et al., 2016; Joseph-Williams et al., 2021).

Overarching Purpose and Research Questions

Given the current prevalence of AS in the older adult population, projected rise of AS cases in the coming decades, and the emerging recognition of the coexistence of brain-heart

conditions, it is critical that we explore HCPs' perspectives on the complex and rapidly evolving management of care and treatment landscape in VHD, particularly as it relates to patients' cognition and cognitive function (d'Arcy et al., 2011; van Nieuwkark et al., 2023). This exploration has the goals of promoting greater understanding of how cognition ought to be assessed, considered, and managed in AS treatment decisions, as well as the roles and collaboration of the heart team members involved in these processes. It could also inform the development of SDM interventions to improve the care of people with AS.

The overarching aim of this thesis is to explore how HCPs consider cognition and cognitive function when making treatment decisions with patients with AS and their families.

Research objectives are:

1. To explore how a patient's cognitive status is considered and integrated into decision-making, from the perspective of HCPs working with patients with AS.
2. To explore the strategies HCPs use to assess and manage cognition when making AS treatment decisions.
3. To explore the role of the nurse in this process.

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Chapter Two: Literature Review

This literature review aims to explore how AS treatment, cognitive impairment, and decision-making intersect in research and clinical practice. The specific objectives of this literature review were to: 1) explore how cognition is identified, assessed, and considered in the context of AS and/or SDM, 2) identify who is involved in the care management and treatment of patients with AS with and without cognitive impairment, and 3) understand how AS treatment decisions are made in clinical practice.

Search

I conducted preliminary searches that utilized the concepts of AS, SDM, and cognition across four databases: CINAHL, Medline, PsycINFO, and Ageline. These initial searches yielded only two relevant articles: a prospective observational study and a state-of-the-art review. Unsatisfied with the yield, I completed three separate searches with varying combinations of AS, SDM, and cognition. The first search focused on SDM and AS, the second on SDM and cognition, and the third on cognition and AS (Appendix A). I collaborated with a University of Ottawa health sciences librarian to ensure appropriate database selection, effective search strategies, and the selection of management reference software. My literature review search took place from August 9, 2025-October 1, 2025.

Eligibility criteria

I used the SPIDER tool which stands for Sample, Phenomenon of Interest, Design, Evaluation, and Research Type, to guide article selection (Table 2) (Cooke et al., 2012).

Table 2.1. *Inclusion and Exclusion Criteria for the Literature Review*

SPIDER Component	Inclusion Criteria	Exclusion Criteria
Sample	Adult patients (≥18 years) diagnosed with aortic stenosis (AS) who are facing treatment decisions. Includes family members/caregivers and HCPs involved in the decision-making process.	Patients <18 years of age; patients with other comorbidities or cardiac conditions without specific mention of AS.
Phenomena of **I**nterest	Treatment decision making for patients with AS with or without mention of cognition; Connection between AS and cognition.	Clinician-controlled decision-making. Experiences of living with AS. Articles where AS, treatment decisions, or decision-making experiences are not addressed.
Design **E**valuation	Quantitative (e.g., surveys or questionnaires with closed-ended questions) Qualitative (e.g., interviews, focus groups) or Mixed Methods (e.g. chart reviews, surveys and interviews, focus groups).	
Research Type	Peer reviewed, primary studies, knowledge syntheses, English language. Published 2010-2025. Global North based studies.	Editorials, discussion papers, Commentaries or dissertations. Non-English language. Published < 2010. Global South based studies.

Although AS is a condition that predominately affects older adults, the age criterion was set at 18 years and older as congenital conditions can cause AS in young adults who could also be impacted by cognitive impairment not related to older age. Included studies were restricted to

publications after 2010 as the introduction of TAVI as a treatment option became more widely performed in the 2010s which completely revolutionized the treatment landscape for AS with multiple treatment options to consider. Lastly, only studies from the Northern hemisphere were included to ensure comparability in healthcare delivery, access to specialized valve services, and clinical decision-making pathways across included studies.

Screening and Extraction

I used Zotero for managing citations and Covidence software for screening at two levels (Corporation for Digital Scholarship, 2024; Veritas Health Innovation, 2024). I uploaded the search results of each search to Covidence, then completed a screening of each title and abstract by looking for key concepts: AS, SDM, or cognition. Those deemed relevant underwent a full text review to determine whether they met the inclusion criteria. Since I was seeking to sample literature on these topics and provide an overview of existing literature on these concepts (rather than comprehensiveness), I also arbitrarily assessed their relevance to this review (high, low). Relevance was determined based on whether the study addressed at least two intersecting key concepts of interest: AS, SDM, and/or cognition. I performed data extraction in Covidence to collect relevant information from the included studies. I extracted the concept addressed, first author, year of publication, country of origin, aim, methodology, study design, study setting, number of participants, and results.

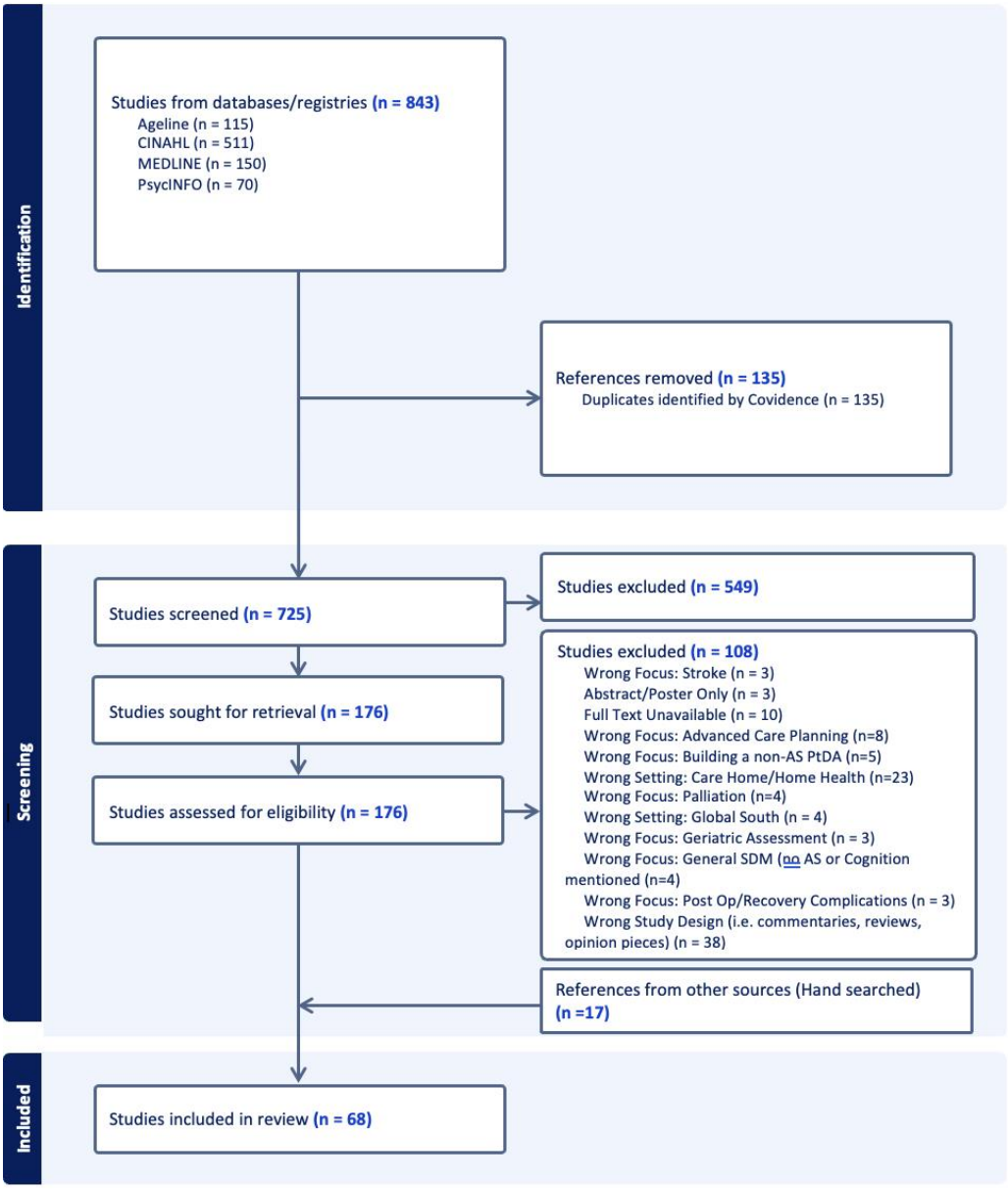
Analysis and Synthesis

I conducted a directed content analysis to examine the data that I extracted from the studies (Assarroudi et al., 2018). This approach was justified as I sought to provide an overview of existing literature on these concepts. The included studies were then grouped into categories informed by the key concepts related to my literature review objectives.

Literature Review Results

The three searches across four databases yielded 843 results, with 17 additional results from a reference list search (Figure 1). After 135 duplicates were removed, excluding 657 that did not meet the inclusion criteria, 68 articles remained. Twenty-five were considered highly relevant to my literature review and were included (Appendix A). Briefly, there were 12 quantitative, 4 qualitative, and 9 mixed methods, including 5 systematic reviews and meta-analyses. Systematic and meta-analysis articles were assessed using the AMSTAR 2 Checklist (Shea et al., 2017) (Appendix B). Scores varied from low to moderate, often due to missing an assessment of bias, justification of excluded studies, and/or protocol registration.

Figure 2.1. *PRISMA Diagram of Combined Searches*



In this literature review, I identified five categories of findings: 1) Heart Teams and SDM; 2) Caregiver Roles; 3) Incorporating Patients' Values, Preferences, and Goals in AS Treatment Options; 4) Patient Decision Aids to Support Informed and Values-Based Aortic Stenosis Treatment Decision-Making; 5) Cognitive Impairment and "Appropriateness" of AS Treatment Choice. Each are described below.

Heart Teams and Shared Decision-Making

Of the 25 included studies, 18 discussed the essential role of the heart team in the care management of patients with AS. Heart teams – also referred to as multidisciplinary teams (MDT) – are interprofessional groups of cardiovascular specialists who collaborate to care for patients with cardiac conditions (Coylewright et al., 2024; Otto et al., 2020). In the management of VHD, the heart team typically includes valve specialists (interventional cardiologists and surgeons), nurses, allied HCPs, patients, and family/caregivers (Coylewright et al., 2024; Otto et al., 2021). These interprofessional teams work collaboratively with patients to select the most appropriate treatment based on their clinical presentation and, ideally, patients' values, preferences, and priorities (Coylewright et al., 2024; Otto et al., 2021; van Beek-Peeters et al., 2025b).

The heart team's interprofessional composition can facilitate the elicitation of patient preferences and values, thereby enhancing the quality of SDM (Coylewright et al., 2024). Despite this, a gap remains in effectively incorporating patient preferences into clinical practice. Compared with SDM led by a single clinician, the heart team approach offers broader expertise and multiple perspectives that may better support a holistic approach to treatment decisions. A survey of 101 heart team physicians found that SDM and patient education are not consistently implemented in a valvular heart context (Lindeboom et al., 2021). Although physicians agree on the importance of involving patients in treatment decisions, half leaned toward the heart team making the final decision. There was also limited use of PtDAs, with only about 43% reporting using them (Lindeboom et al., 2021). Supporting this from a patient's perspective, a descriptive exploratory mixed-methods study by van Beek-Peeters et al. (2025b) examined older patients' experiences and preferences regarding SDM and AS treatment. Only one-third of respondents

reported high levels of perceived SDM (van Beek-Peeters et al., 2025b). Additionally, only half indicated that HCPs inquired about their daily lives. From both HCP and patient perspectives, gaps in patient-centered care remain highlighting the need to consider and integrate individual patient characteristics and circumstances into SDM (Lindeboom et al., 2021; van Beek-Peeters et al., 2025b).

Among the 18 included studies discussing the heart team, only five mentioned the nursing role in supporting SDM within AS care/treatment. In these studies, nurses were considered core members of heart teams, and when they were involved, patients with AS had better outcomes (González-Cebrian et al., 2025; van Beek-Peeters et al., 2025b. One single-center retrospective observational study compared a TAVI program with standard physician run practice – or MD care – alone for 154 patients with severe AS (González-Cebrian et al., 2025). In this nurse coordinated TAVI program, the nurse was central to the patient journey with several key roles: patient and family education, comprehensive assessment and procedure planning, patient and family accompaniment, detection of complications during admission and follow-up, and evaluation of patient experience in the post-procedural period (González-Cebrian et al., 2025). Results showed that patients exposed to the TAVI program showed better functional class and had significantly fewer emergency department visits (11.8% vs. 31.3%), fewer hospital readmissions (1.2% vs. 23.4%), and significantly higher overall satisfaction with the process (9.8 vs. 8.9 scores) post TAVI (González-Cebrian et al., 2025). These findings suggest that a nurse-coordinated TAVI heart team with nursing preprocedural consultation, continuous of relationship throughout TAVI pathway and scheduled follow up is feasible and improves patient outcomes. This underscores the need to clarify the responsibilities of all heart team members, including

nurses. This would involve being clear about who might be best suited to elicit patient preferences, provide information on options, and lead discussions of risks/benefits on treatment.

The authors of these articles call on HCPs to engage with patients/caregivers to learn about what is most important to them and their personal circumstances, respect their perspectives on QOL and goals, to guide the most appropriate treatment for that individual (González-Cebrian et al., 2025; Lindeboom et al., 2021; van Beek-Peeters et al., 2025b). In an exploratory mixed-methods study, Lindeboom et al. (2021), reported HCP's desire to increase SDM and agreed that SDM training, leadership support, and tools designed to support SDM (PtDAs) were needed. Overall, my focus on the role of the heart team in SDM highlighted the need for collaborative, patient-focused approaches that leverage nurses' expertise in an era of increasingly complex, rapidly advancing treatments (Coylewright et al., 2024; Otto et al., 2021; van Beek-Peeters et al., 2025b).

Caregivers' Role

Five studies reported caregiver involvement in the AS care trajectory, noting that caregivers often serve as an additional member in SDM with the heart team and the patient (Bosco et al., 2019; Donnelly et al., 2021; Pel-Littel et al., 2021). Informal caregivers, such as family members or friends, often accompany older adults with multiple chronic conditions to medical appointments (Pel-Littel et al., 2021; Skaar et al., 2021). When caregivers are not involved in health-related decisions about their loved one, in particular when older adults are cognitively impaired, decisions can be poorly informed due to insufficient support (Donnelly et al., 2021; Pel-Littel et al., 2021).

Furthermore, several studies highlight how caregivers can facilitate SDM. Caregivers can support communication and share patients' values, which are particularly important in the context of cognitive impairment. Bosco et al. (2019) conducted a systematic review of 20 studies exploring agency experiences among people living with dementia. The authors discussed how caregivers can help retain a positive view of selfhood for the person with dementia by acknowledging the negative effects of cognitive decline, while finding opportunities for them to participate in care to the degree they are able (Bosco et al., 2019). Similarly, Pel-Littel et al.'s (2021) systematic review looked at 28 studies on the barriers and facilitators to SDM for older adults speaks to family/caregiver support to older adults. The authors acknowledge the range of support a caregiver can provide, depending on the patient's needs. Consistent across the included studies was the expectation that caregivers share information with patients, ask questions of HCPs, and ensure that patient preferences for the options are communicated (Pel-Littel et al., 2021). HCPs valued caregivers' participation in SDM when they assist in informing about functional status and the patient's priorities/goals of treatment (Pel-Littel et al., 2021).

These findings are further supported by Donnelly et al. (2021) who completed a qualitative study exploring HCPs' perceptions of barriers and facilitators for SDM with older adults with varied diagnoses in the acute hospital setting. Among the emerging themes was the need to build meaningful engagement with older people and their family in decision-making (Donnelly et al., 2021). The authors highlighted the caregivers/family's ability to provide insight into cognitively impaired patients' values and QOL as a facilitator of SDM, particularly when family meetings were offered (Donnelly et al., 2021).

However, consideration must also be given to how caregivers create barriers for autonomy with patients. This can occur when family/caregivers project their own preferences, or

there are conflicting opinions among members of the heart team (Bosco et al., 2019). Pel-Littel et al. (2021) further emphasize that the caregiver's role in SDM is not linear and may shift throughout the decision-making process as a patient's ability to participate in care fluctuates.

Only one study focused specifically on caregiver involvement in the AS decision-making process. Van Beek-Peeters et al. (2025a) conducted a mixed-methods study in which 99 informal caregivers completed a baseline questionnaire, 82 completed a 3-month follow-up questionnaire, and 10 participated in two focus groups exploring their experiences with SDM in AS treatment. Caregivers saw themselves in one of three roles during SDM: supporters, stimulators to clarify the patient's personal context, and SDM partners (van Beek-Peeters et al., 2025a). While 64% of informal caregivers reported preferring an active role in SDM, only a quarter reported experiencing the highest level of SDM, as measured by the CollaboRATE scale (van Beek-Peekers et al., 2025a). Caregivers report that during the decision-making process, HCPs often focus more on treatment options than on what matters most to patients, and opportunities to support patient decision-making are not always provided (van Beek-Peeters et al., 2025a). This can lead to caregiver decisional conflict, guilt, and regret, and at times, poor patient outcomes (van Beek-Peeters et al., 2025a). Overall, although the evidence and HCPs acknowledge the importance of caregiver involvement, it is not consistently implemented in practice.

Incorporating Patients' Values, Preferences, and Goals in Aortic Stenosis Treatment Options

A core component of SDM is the incorporation of patient values, preferences, and goals (Beishuizen et al., 2021; Col et al., 2022; Coylewright et al., 2016; Festen et al., 2021). Of the 25 studies included, eight discussed the importance of incorporating patient values, preferences, and/or goals in both AS treatment decision-making and cognitive contexts.

In an exploratory qualitative study, Lauck et al. (2016) examined factors influencing patients' decision-making to undergo TAVI through semi-structured interviews with 15 participants. Results showed that multiple intersecting factors, including biomedical, functional, social, and environmental considerations, influenced patients' decision to pursue evaluation for TAVI (Lauck et al., 2016). The authors emphasize that understanding a patient's reasons for seeking treatment can improve SDM and recommend that HCPs actively elicit patient preferences and goals through open conversations (Lauck et al., 2016; Lauck et al., 2021). Similarly, other authors have also suggested that using simple questions during clinic visits to start conversations about goals and values, such as "What do you hope to accomplish by having your valve replaced?", can help elicit patient preferences (Beishuizen et al., 2021; Coylewright et al., 2016).

Adding to this perspective, Beishuizen et al. (2021) explored 72 patients' expectations and goals before TAVI treatment and at six and 12 months post-procedure using mixed methods. For the majority of participants (n=33; 54.1%), the ability to engage in a specific activity or hobby post-intervention was most important, followed by reducing symptoms (n=19; 31.1%) (Beishuizen et al., 2021). Interestingly, 49 patients (66.2%) stated that their expectations and goals for TAVI had been met, despite only 23 patients (31.1%) showing functional improvement (Beishuizen et al., 2021). Additionally, Col et al. (2022) conducted a multi-center, mixed-methods study to identify patients' most important treatment goals and features. This was achieved using focus groups followed by multidimensional scaling and hierarchical clustering to create a visual map and groups of related ideas. The authors noted that patient-reported priority goals and values vary substantially, ranging from trust in the healthcare team to improving QOL, maintaining independence, and long-term procedural outcomes (e.g., mortality), which in turn

affect the treatment options selected (Col et al., 2022). In fact, as shown in multiple studies, most patients communicate their preferred treatment goals based on their ability to perform or engage in a specific activity, rather than on specific symptoms or clinical presentation (Beishuizen et al., 2021; Coylewright et al., 2016; Festen et al., 2021).

These studies emphasize that HCPs should help patients and caregivers clarify goals and preferences to ensure AS treatment is truly patient-centered, rather than focused solely on morbidity, mortality, and objective quality-of-life scores. While the latter are useful for assessing how a person's health condition and treatment affect their overall well-being and daily functioning, they do not encompass a person's preferences, values, and goals (Beishuizen et al., 2021; Col et al., 2022; Coylewright et al., 2016; Festen et al., 2021).

Patient Decision Aids to Support Values-Based Aortic Stenosis Treatment Decision-Making

Eight studies included in this literature review referred to PtDAs, evidence-based tools to facilitate SDM and support patients in making informed and values-based AS treatment decisions (Carulli et al., 2024; Coylewright et al., 2024; Harris et al., 2024). In the context of AS and cognitive impairment, PtDAs have promise in enhancing patient engagement, knowledge, and satisfaction with care (Pel-Littel et al., 2021; Coylewright et al., 2024; Harris et al., 2024).

Harris et al. (2024) conducted a systematic review of studies that reported the development or evaluation of PtDAs for AS or coronary artery disease (CAD). Results showed that patients are more likely to be better equipped to make an informed decision surrounding AS treatment when a PtDAs was used (Harris et al., 2024). However, the authors noted that many existing PtDAs do not meet the needs of patients with lower health literacy and are often not involved in their development (Harris et al., 2024). Harris et al. (2024) also called for greater

transparency regarding the certainty of treatment outcomes and the funding sources for PtDAs. Additionally, the included PtDAs do not address other comorbidities such as cognition.

Coylewright et al. (2024) conducted a prospective multi-site pilot cohort study to evaluate the effectiveness of an interactive, online PtDA named the Aortic Valve Improved Treatment Approaches (AVITA). The study included 30 patients who completed assessment surveys at three time points: just prior to receiving the AVITA intervention, immediately after using AVITA, and after the clinical encounter. Additionally, 14 HCPs were included and completed a single survey after each patient's clinical encounter. The primary outcome was the SDM process, measured from both the patients and HCPs perspectives with an adaptive version of the SDM Process scale. AVITA improved the quality of SDM, increased communication efficacy between HCPs and patients, empowered patients to ask questions and express concerns, and helped patients and clinicians arrive at a treatment that reflected patients' personal values and preferences (Coylewright et al., 2024). Similarly, Carulli et al. (2024) evaluated the TAVI SDM pathway, a PtDA for patients not deemed candidates for SAVR, who are contemplating TAVI vs. medical management. Results demonstrated a significant improvement in satisfaction with treatment choice (3.78 ± 0.30 in the pre-SDM group vs. 4.46 ± 0.14 in the post-SDM group; $P < 0.001$).

Currently underway is the IMPACT SDM cluster-randomized stepped-wedge trial (Sepucha et al., 2024). This trial aims to address the SDM implementation gap by evaluating whether a PtDA combined with clinician SDM training improves SDM, enhances decision quality for AVR, and increases the use of the PtDA and adoption of training (Sepucha et al., 2024). The engagement of patient partners on the research team, including a lead patient partner as co-investigator involved in proposal development, recruitment, and training of other patient

partners, toolkit video creation, and interpretation and presentation of the results, showcasing a research co-production approach (Sepucha et al., 2024).

These findings highlight the need to increase the uptake of SDM tools within clinical pathways to improve patients' understanding and awareness of options and overall satisfaction with the decision-making process within AS care (Carulli et al., 2024; Coylewright et al., 2024; Harris et al., 2024).

Cognitive Impairment and "Appropriateness" of Aortic Stenosis Treatment Choice

Cognitive Considerations and Outcomes within Aortic Stenosis Treatment. Seven studies and two knowledge syntheses discussed cognition in relation to treatment decision for patients with AS. As a cardiac condition that primarily affects older adults, AS often coexists with cognitive impairment. This coexistence has important implications for both prognosis and the range of feasible treatment options (Pel-Littel et al., 2021). The introduction of TAVI two decades ago has made treatment options for AS more broadly available to populations previously thought to be too high risk for surgery, including people with cognitive impairments (Hollenbeck et al., 2021; Otto et al., 2021). Despite this progress, significant debate continues over the appropriateness of treatment choices in this patient population (Hollenbeck et al., 2021; Olsson et al., 2017).

Olsson et al. (2017) conducted a single-center study comparing self-reported patient-reported outcomes after TAVI and SAVR, focusing on dependence, cognitive function, and health-related quality of life. Cognitive function measured using the MMSE showed median scores of 28 (out of 30) for TAVI and 29 (out of 30) for SAVR, with no changes or group differences at follow-up. Notably, HCPs' assessments were mainly influenced by age and chronic

illness, whereas patients' self-health-related quality of life assessments (SF-36 and EQ-5D) reflected their mental well-being and social circumstances (Olsson et al., 2017). These findings indicate that patients value subjective well-being more than functional status. Similarly, a retrospective cohort study conducted by Hollenbeck et al. (2021) examined TAVI outcomes in patients with Alzheimer's disease and related dementias (ADRD). Among those treated in 2016, the 1-year risk-adjusted mortality was 5.2% for patients with ADRD and 5.0% for those without, indicating similar survival regardless of cognitive status. These results align with those of Olsson et al. (2017), suggesting that no single "best" treatment approach exists for this vulnerable patient population.

Assessing Cognition and Frailty. Patients, caregivers, and HCPs identify cognitive and physical impairments as barriers to SDM (Pel-Littel et al., 2021). HCPs often find it challenging to apply disease-specific guidelines to frail older adults due to comorbidities and clinical uncertainties (Pel-Littel et al., 2021; Skaar et al., 2021). Several studies in this review recommend using tools such as comprehensive geriatric assessments (CGAs), the MoCA, and the MMSE to support cognitive evaluation in this population. Of the 25 studies included in this literature review, three used CGAs, three used MoCA, and six used MMSE, amongst others.

In a single-center prospective study, de la Rubia-Molina et al. (2025) highlighted the value of using the CGA in evaluating elderly patients with severe AS for TAVI. The CGA examines multiple domains, including comorbidities, nutrition, mobility, cognition (using the MMSE and other tools), and social support. Of the 142 patients who were considered suitable for TAVI, they had better CGA profiles, showing less cognitive impairment, suggesting potential bias against including cognitively impaired patients in such procedures. Bo et al. (2020) also

evaluated the role of CGA in patients receiving TAVI or SAVR. The authors reported that while older adults may be deemed low surgical risk, they may still have poor functional status, cognitive impairment, or frailty, which can affect post-procedural outcomes (Bo et al., 2020). These authors also highlighted the role of gait speed as predictor of mortality in older patients with AS undergoing valve-replacement. Both studies suggested that CGA could help identify low-risk patients who may benefit most from a less invasive procedure, such as TAVI.

A systematic review by Lai et al. (2015) aimed to examine what is known about cognitive changes in patients undergoing TAVI. Six studies that assessed cognition before and after TAVI using the MMSE were used. Lai et al. (2015) found that cognitive preservation or improvement may occur after TAVI, even among patients already experiencing age-related decline. Post-procedure assessments, conducted on average five days after the TAVI procedure (mean 10.7±4.9 days), showed no change in cognition (Lai et al., 2015). Of three studies with three-month follow-up, two reported significant improvement in MMSE scores after TAVI, while one did not (Lai et al., 2015). Lai et al. (2015) emphasized the need for more comprehensive and standardized cognitive assessment methods to better evaluate TAVI-related changes amidst existing predisposing factors.

There is currently no gold standard test for the cognitive evaluation of patients with AS (Auffret et al., 2016; Lai et al., 2015; Pel-Littel et al., 2021; Skaar et al., 2021). As such, the choice of assessment is left to the treating HCP, leading to inconsistencies and variation in practice (Auffret et al., 2016).

Long-term Cognitive Outcomes After Aortic Valve Intervention. Two studies and one meta-analysis focused on exploring long-term cognitive outcomes with TAVI. Abawi et al.

(2018) conducted a study in patients with severe AS scheduled for TAVI to assess cognitive function using validated cognitive tests at baseline (pre-TAVI) and 4 months post-operatively. At follow-up, there was a significant improvement in the Immediate Recall Memory Test (IRMT) (27± 5 vs. 30 ± 4, p = 0.016), with a trend toward improved Delayed Recall Memory Test (DRMT) (4 ±2 vs. 5 ±2, p = 0.079) (Abawi et al., 2018). Overall, Abawi et al. (2018) did not find a change in mean MMSE after TAVI; however, patients with lower baseline MMSE and DRMT improved significantly during follow-up (Abawi et al., 2018). Supporting these findings, Auffret et al. (2016) examined 51 patients who underwent TAVI and assessed cognitive function pre-TAVI, 30 days post-TAVI, and 1-year post-TAVI. Cognitive decline was measured by changes in mean scores and a rate using the practice-correct reliable change index. Results showed that in TAVI patients, there was an association with global improvement in cognitive status, which was more pronounced among those with cognitive impairment prior to TAVI (Auffret et al., 2016). However, it must be noted that early decline in some baseline complex cognitive functions was observed in one-quarter of TAVI recipients, persisting at one year in 10% of patients (Auffret et al., 2016).

Comparably, Khan et al. (2018) conducted a meta-analysis of 18 studies that summarized changes in cognitive performance among individuals with severe AS undergoing TAVI. Findings showed that despite the risks of postoperative cognitive decline in older adults with multimorbidity undergoing TAVI, factors such as greater cerebral blood flow may contribute to cognitive preservation after TAVI (Khan et al., 2018). Overall, results suggest that TAVI is not detrimental to postoperative cognitive function and call for further research (Khan et al., 2018).

Together, these studies demonstrate that long-term cognitive outcomes after TAVI are generally stable or improved, particularly in patients with pre-existing cognitive impairment. It is to be noted though, that a subset may experience early decline in specific cognitive functions that can persist over time. Further, the varied instruments used to measure cognitive functioning precludes being able to draw conclusions across studies.

Identified Gaps

From this literature review, several gaps have emerged. Although clinical practice guidelines recommend heart teams and SDM, the implementation of SDM across healthcare settings remains inconsistent (Coylewright et al., 2024; Otto et al., 2021). Notably, there is rarely mention of the specific specialists included on the heart team, such as a neurologist or geriatrician, despite the older patient population that they often serve. Similarly, although nurses are recognized as heart team members, their specific roles are often undefined, even though their involvement in valvular heart teams is associated with better patient outcomes.

Patients can articulate their personal care goals when prompted (Beishuizen et al., 2021; Col et al., 2022; Coylewright et al., 2016). Caregivers often support SDM, but their involvement with patients and HCPs is inconsistent (Bosco et al., 2019; Van Beek-Peeters et al., 2025a; Pel-Littel et al., 2021). Enhancing patient and caregiver engagement may require training HCPs to elicit patients' preferences and goals effectively (Coylewright et al., 2016; Lindeboom et al., 2021). While PtDAs can support this process, existing AS PtDAs do not address cognition and are inconsistently implemented.

As it relates to cognitive assessment, there is no gold standard test, protocol, or designated HCP on the heart team to evaluate cognition in this population (Auffret et al., 2016).

This leads to variation in how cognition is assessed, often left to the discretion of the treating HCP (Auffret et al., 2016). While most studies in this review indicate that cognitive function may improve after SAVR or TAVI, there remains a limited understanding of underlying pathophysiology, relevant risk factors, and the influence of comorbidities (Auffret et al., 2016; Khan et al., 2018; Lai et al., 2015). Increasing patient awareness of potential cognitive outcomes post-procedure is essential to support more informed decision-making and effective SDM.

Conclusion

The intersection of AS, cognition, and SDM is complex and multifaceted. The heart team, with nurses able to take on lead roles, can facilitate SDM, ensuring that patients and caregivers are informed and actively engaged and invited to express what is most important to them, thereby guiding patient-centered quality decisions. Although evidence linking AS and cognitive outcomes is emerging, it remains limited. Overall, there is a need for greater clarity in heart team roles, increased team-based HCP training in SDM, and standardized cognitive assessments.

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Chapter Three: Methodology

This chapter outlines the methodology and methods I used to investigate how HCPs consider cognition when making treatment decisions with patients with AS. First, I will describe the study design, followed by the theoretical underpinnings for the thesis. Following this, I will provide details on the study setting, data collection sources and methods, data analysis plan, and ethical considerations. Each of these aspects will be elaborated in the subsequent paragraphs.

Study Design

I conducted a secondary analysis using data from interviews of HCPs involved in the treatment decision-making of patients with AS in larger primary study. The primary study, entitled *Shared Decision Making for Aortic Stenosis (SEEK-AS)*, aims to explore HCPs' and patients' perspectives on the facilitators and barriers to integrating SDM in the journey of care of patients facing treatment decisions for AS (Lewis et al., 2025). This secondary data analysis offered an opportunity to dive deeper into the incorporation of cognitive functions and cognitive impairment in treatment decision-making to support SDM, building on the findings from the primary study.

A secondary analysis is justified for the following reasons: 1) there is a need to explore if and how cognition is considered and discussed with patients facing treatment decisions about AS, to best inform SDM approaches and interventions, and 2) the time constraints of HCPs make it difficult for them to dedicate time to be interviewed, hence it is advantageous to use their valuable insight for multiple uses (Lindeman et al., 2020).

I followed Thorne's (2025) Interpretive Description (ID) approach, which was specifically developed to generate practical insights into clinically relevant phenomena, making it particularly valuable for informing nursing practices and the practice of other applied health disciplines (Thompson Burdine et al., 2021; Thorne, 2016; Thorne, 2025). ID is grounded in

interpretivism, which emphasizes understanding the social world through the subjective experiences of individual people (Thorne, 2016; Thorne, 2025). At its epistemic core, ID holds constructivist views, meaning knowledge is co-constructed by the researcher and participants rather than passively discovered (Thorne, 2016; Thorne, 2025). Thorne's (2025) approach is a flexible qualitative method that "borrows" from tradition rather than being led by it and seeks to uncover patterns and experiences. As an iterative process, researchers can identify emerging themes/patterns during data collection and analysis (Thorne et al., 2004; Thorne, 2016; Thorne, 2025). Healthcare requires research approaches that are context-specific, relevant, and actionable (Thompson Burdine et al., 2021). For these reasons, ID aligns with this study's aims to investigate HCPs' experiences with assessment of cognition in practice. This methods section is structured and reported in accordance with the SRQR guidelines for qualitative research (Appendix C).

Researcher Characteristics and Reflexivity

I undertook this Master of Nursing thesis as a practicing registered nurse with five years clinical practice experience across two inpatient cardiology units. I entered this thesis process with the belief that patients deserve the right to participate in their healthcare in any capacity they choose and strongly support a SDM approach to healthcare. From a clinical standpoint, I am a new learner in VHD treatment, with limited bedside experience caring for these patients and minimal involvement in SDM in this context. However, I have had an introduction to VHD care through a 12-week advanced practice nurse placement at St. Paul's Hospital, working with two clinical nurse specialists (CNS). From this experience, I was able to observe the patient journey through heart valve rounds, visits to the heart valve clinic, and view a TAVI procedure during my time as a student. From a research standpoint, I have been involved in two projects as a

research assistant, participating in qualitative thematic analysis and codebook development. Currently, I am also a research assistant on the SEEK-AS primary study and, therefore, familiar with the data I relied on for my thesis from a broader perspective. While embedded in this project, I engaged in ongoing reflexive practice to critically examine how my dual role as an insider and outsider within this research context may influence data collection, data analysis, and interpretation (Holmes et al., 2020). To promote reflexibility throughout the research process, I maintained a reflexive journal, which allowed me to document personal assumptions, reactions, and evolving insights throughout the research process. Additionally, discussions with my supervisor, thesis committee members, and research team served as a space to challenge assumptions, explore potential biases, and ensure interpretations remain grounded in the data.

Co-Production Approach

A co-production approach was adopted throughout this thesis. Within my thesis committee, a nurse practitioner (NP) in a Canadian aortic valve program (CW) was actively involved, who was able to provide insightful knowledge into AVR treatment and heart team dynamics as experienced in her daily work. This perspective was particularly important given that all study participants were all HCPs involved in AS care and treatment. Additionally, my second thesis committee member (SBL), holds deep expertise in both clinical and research aspects of AS treatment and SDM, providing a wealth of experience and knowledge to this study.

Scaffolding and Theoretical Underpinnings

Within ID, the scaffolding method is used to engage in inductive reasoning and construct a framework (Thorne, 2016; Thorne, 2025). Scaffolding allows themes and patterns to emerge from the data and facilitates the development of clinically relevant findings grounded in participants' experiences (Thorne, 2016; Thorne, 2025). There are two significant components to

scaffolding: the first is a review of the literature, which establishes what we already know about the topic, how it has been studied to date, and the gaps that remain (Thorne, 2016; Thorne, 2025) (see Chapter 2). The second part of scaffolding involves situating's oneself as the researcher within the chosen field and the theoretical framework(s) that inform it (Thorne, 2016; Thorne, 2025). This must be based on a clear understanding of the relationships between the research question, the study design and methods, and the chosen theoretical or conceptual framework(s) (Thorne, 2016). Two theories/frameworks/models have been chosen to guide this work: The Interprofessional Shared Decision-Making Model (IP-SDM) (Légaré et al., 2011) and the Cognitive Continuum Theory (CCT) (Hammond, 1996).

Interprofessional Shared Decision-Making Model

The IP-SDM Model serves as a framework to conceptualize how interprofessional SDM can be operationalized in clinical practice (Légaré et al., 2011). The authors define an interprofessional team in healthcare as the process by which professionals from diverse disciplines collaborate to provide comprehensive patient care (D'Amour et al., 2005; Légaré et al., 2011). An interprofessional approach to SDM has the potential to minimize silos by bridging the gap between multiple HCPs and patients and families (Légaré & Stacey, 2014). The model spans the three levels of the healthcare system: micro (individual level), meso (healthcare teams), and macro (policies and social context). This recognition enables the unification of SDM across different healthcare system settings, various HCPs, patients, and families (Légaré et al., 2011). The IP-SDM model guided this study by providing a structured lens through which to examine how HCPs engage in decision-making processes at both the individual and team levels. The model guided exploration of how HCPs, together with patient and family as team members, deliver SDM individually and collectively in interprofessional teams to incorporate cognitive

considerations into treatment planning within AS care. By applying the IP-SDM model, this study can also identify factors that facilitate or hinder effective collaboration and patient-centered decision-making, particularly in the context of cognitive impairment.

The Cognitive Continuum Theory

CCT addresses considerations of cognition, central to my research question, as it relates to the patient's cognition and the way in which HCPs navigate the treatment decision-making process. CCT states that human cognition lies along a continuum from intuition to analysis (Hammond, 1996). Within this cognitive continuum, judgment task structure ranges from intuitive to analytical. With an ill-structured task (example included below), decision-making is likely to be driven by intuition, defined as a rapid form of cognition that relies on pattern recognition and experience, without conscious reasoning (Cader et al., 2004; Hammond, 1996). For example, an HCP may quickly base a conservative treatment recommendation for a frail older patient on personal practice beliefs or previous experience, without considering patient preference or individual context. On the other hand, the more structured a judgment task is, the more analytically driven the decision-making process (Cader et al., 2004; Hammond, 1996). For instance, an HCP may consider treatment decisions for AS by reviewing clinical guidelines, clinical data, quality-of-life/frailty scales, and/or anatomical considerations. Between these two distinct types of tasks lies a blend of intuitive and analytical cognitive processes used together in decision-making (Cader et al., 2004; Hammond, 1996).

Effective SDM falls within this when HCPs engage patients in the decision-making process through a variety of approaches, such as reviewing clinical guidelines and the evidence, personal practice experiences, patient preferences and values, and individual context. In healthcare, where interprofessional HCPs collaborate under pressure and uncertainty, CCT is

valuable for analyzing how different professionals approach clinical reasoning (Parker-Tomlin et al., 2017). In this study, I considered the type of reasoning HCPs use in SDM in the context of cognition and AS along this continuum (intuitive, analytical, quasi-rational). The CCT provided a lens to examine how HCPs' reasoning contributes to interprofessional decision-making when interpreting patient preferences, individual context, and relevant diagnostic results.

Setting

The primary study recruited HCP across Canada from seven academic hospitals with aortic valve programs. Each program was unique, with their own intake procedures, referral patterns, and established patient pathways from referral to treatment decision. The primary aim of the larger parent study was to gain a robust understanding of the current culture of SDM in AS care nationwide from the perspectives of both patients and HCPs. For this secondary analysis, I used data collected from HCPs only, primarily to ensure the feasibility of completing my Master's thesis within permitted timelines. Further, patient recruitment was still ongoing at the time my thesis began. And in fact, including only HCPs allowed for a more in-depth analysis of professional expertise within this focused area, providing insight into how cognition and cognitive function is considered in treatment decision-making across individuals and programs.

Participants

In the primary study, the research team recruited participants from two groups: HCPs and patients/caregivers. The research team used purposeful sampling to recruit HCP across all sites, ensuring the selection of participants who could provide rich information on the research problem. Inclusion criteria for healthcare professionals were the following: (1) physicians (e.g., interventional cardiologists and cardiac surgeons), registered nurses, NPs, allied health professionals directly involved in the care and treatment decision of patients and families with

AS. Inclusion criteria for patients or caregivers of patients were: (1) severe symptomatic AS, treated or awaiting treatment; (2) >18 years; (3) able to give informed consent; 4) fluent in English. The primary study team recruited 24 HCPs who work directly with patients facing AS treatment decisions.

Participant Recruitment

The research team employed several strategies to recruit eligible participants. Team members with established professional relationships directly contacted HCPs, and additional participants were identified through snowball sampling within the same institutions. Heart Valve Voice[1] aided in the recruitment of patients, and caregivers through an email broadcast to its members.

Data Collection

The data for the primary study was collected through focus groups and individual semi-structured interviews, which varied in duration between 30 and 40 minutes.

Interview Guide Development

The interview guide for the primary study focused on the factors influencing the implementation of SDM in AS treatment decisions. The primary study team relied on the Ottawa Model of Research Use, which assesses how research becomes integrated into practice across three levels: factors (i.e., barriers and enablers) related to the innovation (SDM and PtDAs), the potential adopters, and the practice environment in which implementation takes place (Logan & Graham, 1998). The interview guide opens with an introduction to the aim of this primary study before moving to the current process (individual, team, and outer setting), the characteristics of

[1] Heart Valve Voice is a patient-led Canadian non-profit organization that helps to bring awareness and resources to heart valve disease. For more information, please visit: https://www.heartvalvevoice.ca/

SDM implementation, and other questions/concerns (barriers and facilitators to SDM, value of SDM, etc.). There were open-ended questions built into the guide that are of particular interest for this secondary analysis and focused on the assessment of cognitive function among other brain-related conditions, which are listed in Table 3.

The interview guide was piloted and updated based on feedback before being used in formal interviews and focus groups with HCPs (Appendix D).

Interviews and Focus Groups

Each individual interview and two focus groups (one physician group and one nursing group) was facilitated by one or two research team members and audio recorded. Participants were invited to provide demographic data via a survey that included variables such as age, sex, HCP role, years in role, years worked with AS patients. (Appendix E). All interviews and focus groups followed a similar structure, starting with a brief introduction to SDM in the context of AS, then proceeding to open-ended questions about individual and group approaches to SDM and its implementation

Table 3.1. *Cognitive-Based Interview Questions*

Specific Cognitive-Based Interview Questions
• Do you integrate content about stroke, cognitive impairment, and delirium in your conversations with patients? • How do you and your team consider or raise a patient's cognitive status when discussing AS treatment options? • What other members of the healthcare team are typically involved in these conversations?

Data Analysis

For this secondary analysis, we analyzed HCP participants' demographic data descriptively, using counts and proportions. The primary researcher (MM) analyzed all transcripts, and the role of the second reviewer was split amongst two other researchers (CC and SG). We met over a series of online meetings and emails to discuss out findings and create a codebook. We used Braun and Clarke's (2006) six-step approach for thematic analysis. This approach involves identifying patterns or themes within qualitative data (Braun & Clarke, 2006; Braun & Clarke, 2022), and is usually not tied to a particular epistemological or theoretical perspective, making it highly flexible and well-suited to ID. The six steps are as follows: 1) become familiar with the data, 2) generate initial codes, 3) search for themes, 4) review themes, 5) define themes, and 6) write-up (Braun & Clarke, 2006). To assist with the secondary data analysis across steps two to four, I developed an analysis tool grounded in the IP-SDM and CCT (Légaré et al., 2011; Makoul & Clayman, 2006; Parker-Tomlin et al., 2017). Following integration of the team's feedback into the tool, we then used it during analysis to identify the concepts of interest that would help answer the research questions (Appendix F). The analysis used a combination of deductive and inductive approaches. The IP-SDM and CCT frameworks informed the development of the data analysis tool and guided the analysis, while allowing for the identification of findings, patterns, and concepts emerging from the data that were not captured by the existing frameworks.

In step 1, members of the research team became familiar with the data, by immersing themselves in the interview transcripts through multiple readthroughs and taking informal notes as thoughts occurred. In step 2, we generated initial codes by building a codebook in Excel from patterns that I/we drew from the transcripts. In steps 2 and 3, we identified themes by grouping

created codes into larger, connected groups as they were identified. Step 4 involved both the researchers (CC, MM, and SG) and thesis committee members (CW, KBL, SL) in reviewing the themes, which allowed us to consider, validate, and refine codes. Step 5, defining the themes, involved developing concise definitions describing it. The final step was to write the manuscript. I ensured that the writing process was contextually grounded and offered actionable suggestions for future research and/or practice, as intended with the ID qualitative approach.

To close, a key component of data analysis with ID is that it is an iterative process involving constant reflection, asking questions such as "*Why am I seeing this*?", and returning to the data multiple times for review and refinements (Thorne, 2016; Thorne, 2025). Within Braun and Clarke's (2006) thematic analysis approach, it is also acknowledged that analysis is not a linear process. Instead, it is a recursive process in which circling back and forth through phases is anticipated and encouraged. This was achieved through reviewing the themes with the broader research team, including my thesis supervisor (KBL), and thesis committee members (SL, CW) throughout the data analysis process.

Ethical Considerations

Research involving human participants is subject to the ethics principles outlined in Tri-Council Policy Statement 2 (TCPS2) (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, & Social Sciences and Humanities Research Council of Canada, 2022). The TCPS2 (2022) outlines the obligations that researchers must meet when engaging human participants in research studies, including protecting respect for persons, concern for welfare, and justice. We obtained ethics approval from the University of British Columbia Research Ethics Board (#H-26-0014) and the University of Ottawa Research Ethics Board (# H-12-25-12399) specifically for this secondary analysis.

Participants recruited into the primary study provided written consent. Participants were aware that participation was entirely voluntary and could withdraw their consent at any time during the interview process. Written consent was obtained prior to conducting the interviews/focus groups. Participants in the focus group interviews were asked to keep the discussions confidential and not discuss the names of other participants or their experiences outside the room. I was given access to de-identified transcripts and demographic data, storing the documents on password-protected files. These were accessed from a shared uOttawa OneDrive.

Rigour and Trustworthiness

Rigour in qualitative research is important to ensure consistency and enhance credibility, enabling reliable interpretations of results. Thorne (2025) suggests that researchers adopting an ID approach show credibility and trustworthiness through *epistemological integrity*, *representative credibility*, *analytic logic*, and *interpretive authority*. Epistemological integrity refers to the extent to which all elements of a study, including the research question, methodology, methods, and interpretations, are aligned with the chosen epistemological stance (Thorne, 2016; Thorne, 2025). In this study, epistemological integrity was maintained by aligning with a constructivist epistemological stance, recognizing that knowledge is co-constructed through the experiences of the HCP participants and the researchers' personal views. Representative credibility refers to the extent to which the sample and data adequately represent the phenomenon being studied (Thorne, 2016; Thorne, 2025). The primary study's recruitment was limited to HCPs from seven Canadian sites, and, in accordance with the study's eligibility criteria, all had relevant lived experience related to the topic of interest. *Analytic logic* is a systematic, transparent reasoning process that guides the researcher as they move from raw data

to findings in a way that is logical, traceable, and justifiable (Thorne, 2016; Thorne, 2025). I took care to ensure inductive logic, through pattern recognition and generalization, was followed in coding, theme development, and the construction of the codebook across several versions. Lastly, *interpretive authority* is defined as ensuring that findings are grounded in the data rather than solely shaped by a researcher's biases or assumptions (Thorne, 2016; Thorne, 2025). As a researcher, I sought to recognize my own experiences and values as described in my positionality/reflexivity statement through open discussions with the team and maintaining a reflective journal.

Relevance and Potential Impact

The goal of this study was to provide valuable information on the current state of HCPs' understanding and approaches to SDM in the context of cognitive impairment or suspicion of cognitive impairment. The findings may identify future directions for research in this area and inform the development and implementation of interventions to support an SDM culture for co-existing brain and heart conditions.

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Chapter Four: Results

Exploring cognitive considerations in shared treatment decision-making for aortic stenosis: A qualitative study

This chapter is formatted for submission to the European Journal of Cardiovascular Nursing

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Abstract

Aims: Aortic stenosis (AS) is a progressive cardiac condition that often requires complex treatment decisions, particularly in older adults who may have cognitive impairment. Shared decision-making (SDM) is a collaborative process between healthcare professionals (HCPs) and patients that supports evidence-informed decisions that align with patient values and preferences. Given the prevalence of cognitive impairment in older adults with AS, understanding its role in SDM is important. However, few studies have examined how cognition is considered in AS treatment decision-making. We aimed to explore how HCPs consider cognition and cognitive function when making treatment decisions with patients with AS and their families.

Methods: We conducted a secondary qualitative analysis using an interpretive description approach guided by the Interprofessional Shared Decision-Making (IP-SDM) Model and the Cognitive Continuum Theory (CCT). We re-analyzed 16 individual interviews from a primary study and two HCP focus group transcripts to examine how cognition is considered in AS treatment decisions. We analyzed the data thematically, following Braun and Clarke's six-step approach.

Results: We identified four overarching qualitative themes: 1) Focus on cognition as a complication, not a comorbidity, 2) Cognitive expertise is sought on-demand, not part of the established heart teams, 3) Family members as a source of insight into cognition and decision-making, and 4) Nursing expertise in early detection of cognitive changes.

Conclusion: In patients with AS, there remains a gap in the consideration of cognition in treatment decisions. Further research should examine the role of nursing and other HCPs in SDM through a holistic brain–heart approach to AS care.

Background

Aortic stenosis (AS) is the most commonly acquired v*alvular heart disease* (VHD) in North America and Europe, affecting up to 5%–10% of patients 65–74 years old and 10%–20% of those older than 75 years.[1,2,3,4] As a progressive cardiac condition, it leads to compensatory changes in the left ventricle that result in inadequate cardiac output, decreased exercise capacity, heart failure, and cognitive changes.[5]

As the most common form of VHD in the elderly, AS is frequently accompanied by cognitive impairment on a wide spectrum of memory loss and executive dysfunction.[3,6] In various small clinic-based studies including patients with severe symptomatic AS awaiting TAVI, cognitive impairment is present in approximately one-third of patients.[7,8] Emerging research suggests that untreated AS increases patients' risk of cognitive impairment due to decreased cerebral blood flow, inflammation, and microvascular damage.[6,9,10] In this study, the term *cognitive impairment* is used as an umbrella term for disruptions in cognitive abilities, as seen in various types of dementia and mild cognitive impairment (MCI).[11,12]

Traditionally, AS heart teams consist of a cardiologist, anesthesiologist, cardiac surgeons-interventionalists, nurses, and other allied health professionals.[13,14] Expertise from each profession allows for holistic management of the AS patient.[13] In particular, nurses are at the forefront of patient care and play a critical role in leading assessments and providing education to AS patients.[15] Their proximity to patients and families can help to elicit patients' preferences, support patients/families in understanding treatment options, and prepare them for decision-making.[16]

Currently, there are three treatment options for AS: surgical aortic valve replacement (SAVR), transcatheter aortic valve implantation (TAVI), and conservative medical

management.[14,17] Each option has its own risk/benefit profile, with features of options that people value differently, indicating a preference-sensitive decision. Selecting the most appropriate option is best derived when made collaboratively through a shared decision-making (SDM). Such a process considers the best available evidence on the condition and options, patient values, needs and preferences, and the patient's personal circumstances.[5,18,19]

Given the prevalence of AS in the older adult population, projected rise of AS cases in the coming decades, and the emerging recognition of coexistence of brain-heart conditions, it is critical that we explore healthcare professionals' (HCPs') perspectives on the complex and rapidly evolving management of care and treatment landscape in VHD, particularly as it relates to patients' cognition[2,8,18]As a result, interprofessional heart teams, defined as collaborative efforts involving two or more professional disciplines, are expected to engage with patients with varying degrees of cognitive impairment in AS treatment decisions.[20] Early detection of cognitive dysfunction may help minimize further impact of cardiac dysfunction and enhance treatment plans and recovery on both cardiac and cognitive fronts.[8] Despite this, there remains limited understanding of how HCPs consider patients' level of cognition when facing decisions about treatment options for severe AS, and to what extent it is a SDM process[8,21,22,23]

In this study, we explored how HCPs consider patients' cognition and cognitive function when making treatment decisions with them and their families. The objectives were to explore: (1) how a patient's cognitive status is considered and integrated into the decision-making process, from the perspective of HCPs working with patients affected by AS; (2) the ways in which HCPs assess and manage cognition when making AS treatment decisions; and (3) the role of the nurse in this process.

Methods

Study Design

We conducted a qualitative secondary analysis study using Thorne's (2016) interpretive descriptive (ID) approach.[24]The primary study, entitled *Shared Decision Making for Aortic Stenosis (SEEK-AS)*, aimed to explore HCPs' and patients' perspectives on the facilitators and barriers to integrating SDM into the care journey of patients facing treatment decisions for AS.[25] For this secondary analysis, we used only data collected from HCPs to allow for a more in-depth examination of HCP expertise in this focused area. A secondary analysis is justified for the following reasons: 1) there is a need to explore if and how cognition and cognitive function is considered and discussed with patients facing treatment decisions about AS, to best inform SDM approaches in this context particularly as prevalence continues to rise in the ageing population, and 2) due to time constraints in the healthcare system, HCPs dedicating time to research participation can be difficult. Hence, it is beneficial to use their valuable insight for multiple uses.

We obtained ethics approval from the University of British Columbia Research Ethics Board (#H-26-0014) and the University of Ottawa Research Ethics Board (# H-12-25-12399). This study was reported according to the Standards for Reporting Qualitative Research (SRQR) guidelines.[26]

Theoretical Underpinnings

This study was conceptually guided by the Interprofessional Shared Decision-Making (IP-SDM) Model and the Cognitive Continuum Theory (CCT). [20,27] The IP-SDM Model served to conceptualize how interprofessional SDM is operationalized within AS heart teams, specifically at the micro (individual) and meso (healthcare teams) levels. [20] We used the IP-SDM

to explore if and/or how HCPs engage with their patients in SDM and how they collaborate with one another within interprofessional heart teams. The CCT helped conceptualize how HCPs navigate the AS treatment decision-making process. CCT states that human cognition exists along a continuum between intuition and analysis, where judgment task structure ranges from intuitive to analytical. [27,] In healthcare, where interprofessional HCPs collaborate under pressure and situations of uncertainty, CCT is valuable for analyzing how different HCPs approach clinical reasoning.[29] In our study, the type of reasoning HCPs use in SDM in the context of cognition and AS was considered on this continuum through a CCT lens by applying both the IP-SDM model and the CCT theoretical underpinnings, we identified themes that conceptualize (or hinder) effective collaboration and patient-centered decision-making among AS patients with cognitive impairment.

Researchers Characteristics and Reflexivity

The research team included a graduate student and cardiovascular nurse (MM), a PhD candidate and cardiovascular nurse (CC, SG), cardiovascular nurse researchers (SBL, KBL), and a nurse practitioner (NP) in a Canadian aortic valve program (CW). Team members' expertise included SDM (SBL, KBL), VHD (SBL, CW), and the clinical implications of navigating cognition in this context (SBL, CW).

Setting

The primary study recruited participants across Canada at seven academic hospitals with aortic valve programs, representing four provinces (British Columbia, Manitoba, Nova Scotia, and Ontario), each with its own team composition, intake procedures, referral patterns, and established patient pathways from referral to treatment decision.

Participants and Sample Size

In the primary study, the research team used purposeful sampling to recruit HCPs across all sites, ensuring the selection of participants who could provide rich information on the research problem. Inclusion criteria for HCPs were the following: (1) physicians, registered nurses, and allied health professionals directly involved in the care and treatment decisions of patients and families with AS. In this secondary analysis, we included all 24 HCPs interviewed in the primary study. Consistent with Thorne's ID approach, the sample size was determined by achieving depth and richness of data related to the research question rather than numeric goals[24]

Recruitment Procedures

Several strategies were employed to recruit eligible HCP participants in the primary study. Research team members with established professional relationships contacted eligible HCPs within their network. Additional participants were identified through snowball sampling within the same institution. Upon agreeing to participate, participants were informed of research aims, estimated interview/focus group participation time (30-45 minutes), secured data storage, and their right to withdraw from the study at any time.

Data Collection

Participants provided written informed consent as part of the primary study. The interview guide was developed by the primary study's research team and focused on the factors influencing implementation of SDM for AS treatment decisions at the levels of the intervention, the people involved, and the practice environment. [30] The interview guide was piloted and revised for flow and clarity prior to formal use in interviews and focus groups.

Each focus group and/or interview was facilitated by one to two research team members (CC, SBL, or KBL) and was audio-recorded. All interviews followed a similar structure, starting with a brief introduction to SDM in the context of AS, then moving to open-ended questions about individual and group approaches to SDM and implementation. The open-ended questions of particular interest for this secondary analysis are listed in Table 1; however, responses to any question asked during the interview were eligible for analysis. Participants were invited to provide their demographic data via a survey that included variables such as age, sex role, and years of work. Audio-recorded interviews were initially transcribed using the software Temi, then verified by a research team member (CC) with identifiers removed.

Table 4.1. *Cognitive-Based Interview Questions*

Specific Cognitive-Based Interview Questions
"Do you integrate content about stroke, cognitive impairment, and delirium in your conversations with patients? *"How do you and your team consider or raise a patient's cognitive status when discussing AS treatment options?"* *"What other members of the healthcare team are typically involved in these conversations?"*

To promote reflexivity throughout the research process, the primary author (MM) maintained a reflexive journal, documenting personal assumptions, reactions, and evolving insights as transcripts were read and analyzed.

Data Analysis

We followed Braun and Clarke's (2006) thematic analysis six-step approach.[31] First, three research team members (CC, MM, SG) became familiar with the data by immersing themselves in the interview transcripts. Each transcript was independently read and analyzed by two team members. One reviewer (MM) reviewed all transcripts, and two reviewers (SG and CC) divided the task of being the second reviewer on all transcripts. Second, we generated initial

codes, which were captured in a preliminary codebook in Microsoft Excel. Third, we identified themes by grouping created codes into connected larger themes as they emerged in the story. Fourth, we reviewed the themes, which allowed us to consider, validate, and refine codes and to reflect on missing perspectives or internal bias. Fifth, we defined each theme with an operational definition to provide clarity. Lastly, we wrote up our results, supported with participant quotations. To support data analysis across steps one through four, team members involved in the analysis (MM, CC, SG, KBL) co-developed an analysis tool grounded in the IP-SDM and CCT with the intent to help locate the concepts of interest: AS, cognition, and SDM and any combination thereof. [20,29,32] During the analysis, team members met biweekly to discuss the findings, explore differences, and assure quality coding. We analyzed HCP participants' demographic data from the primary study descriptively, using counts and proportions.

Results

Participant Characteristics

From April 2024 to April 2025, 24 HCPs were recruited across seven Canadian hospitals. Among the 15 physicians, nine identified as surgeons, five as interventional cardiologists, and one as a cardiologist. Among the nine nurses, one identified as a nurse practitioner (NP), one as a clinical nurse specialist (CNS), and seven as registered nurses in varying roles (e.g., TAVI clinic nurse, TAVI or cardiac surgery coordinator). Refer to Table 2.

Table 4.2. *Participants' Sociodemographic Characteristics*

Characteristic		**N=21 of 24 participants (%)[1]**
Age	30-39	5 (20.8%)
	40-49	4 (16.7%)
	50-59	8 (33.3%)
	60-69	4 (16.7%)

Sex	Female Male	7 (29.2%) 14 (58.3%)
Education	University Degree Post Graduate University Degree	4 (16.7%) 17 (70.8%)
Ethnicity	Caucasian/White South Asian West Asian Syrian Middle Eastern Asian/Oriental/Pacific Islands	9 (37.5%) 4 (16.7%) 1 (4.2%) 1 4.2%) 2 (8.3%) 4 (16.7%)
Current Employment Status	Full-time Part-time	19 (79.2%) 2 (8.3%)
HCP Role[2]	Nurse/APN Cardiologist Cardiac Surgeon	7 (29.2%) 7 (29.2 %) 7 (29.2%)
Years worked in this role	<5 years 6-10 years 11-15 years >16 years	3 (12.5%) 4 (16.7%) 3 (12.5%) 11 (45.8%)
Years providing care to patients with AS	<5 years 6-10 years 11-15 years >16 years	4 (16.7%) 1 (4.2%) 4 (16.7%) 11 (45.8%)

[1]Three participants did not complete the demographic survey. As a result, Table 3 reflects N=21 instead of total 24 included participants.[2]Demographic data collected through the surveys captured participants' HCP roles at a broad level. During the qualitative interviews, participants provided more detailed descriptions of their roles. As a result, the participants' identifiers used in this study reflect the more specific role descriptions provided during interviews

Findings

The way in which HCPs considered patients' cognition can be understood across four overarching themes: 1) Focus of cognition as a complication, not a comorbidity, 2) On-demand

cognitive expertise within established heart teams, 3) Importance of family insights into cognition and decision-making, and 4) Nursing expertise in early detection of cognitive changes.

Focus of Cognition as a Complication, not a Comorbidity

Both physicians and nurses tended to frame cognition as a potential post-operative complication, due to stroke or delirium, rather than an intersecting comorbidity that should inform the AVR decision-making process. Discussions about cognition most often occurred during the process of explaining the risks associated with each treatment option. When asked how they discuss brain-heart health with patients, one participant said, "*That's a good question. I don't address it directly. I do talk about stroke and how it happens,"* and added, *"In terms of brain health, I actually don't, unless they ask."* (HCP-014, NP). This illustrates how HCPs tend to link cognition primarily with post-operative complications rather than to a patient's brain health status or its relevance to AS generally outside of AVI conversations. Some conversations also occurred about how TAVI, as a less invasive procedure, carries a lower risk of cognitive complications. As one HCP explained, "*...the cognitive decline from a TAVI is a lot less than what we would see in surgery. So, we would probably guide the conversation there.*" (HCP-011, cardiac surgeon). This shows how data used and shared with the patient on cognitive procedural risks shaped treatment discussions, with this HCP emphasizing TAVI as a potentially safer option. Participants acknowledged that cognition as a comorbidity was often addressed only when patients or families themselves raised the issue. Overall, many physicians' and nurses' conversations about cognition largely focused on post-operative outcomes and their potential impact on patients. It was only when concerns about cognitive impairment were noted in the referral process from family members or in nursing assessment findings that the team would

initiate a referral to a geriatrician, a geriatric psychiatrist, or occupational therapists (OTs) for assessment.

On-Demand Cognitive Expertise Within Established Heart Teams

Participants noted that, because heart teams do not usually include members with expertise in cognitive decline, they rely on referrals to other HCPs outside the heart team when such expertise is needed. Referrals were typically initiated when family reported or staff observed, memory problems, confusion, functional decline, or when a prior history of cognitive issues was known. Several HCPs described strong working relationships with their colleagues with cognitive expertise, particularly geriatricians and OTs. One HCP stated, "*We will refer these patients to geriatricians who help guide us and help educate the families on mild cognitive issues*." (HCP-022, cardiac surgeon). Their expertise was sought to conduct cognitive assessments (e.g., MoCA or MMSE educate patients about new or worsening cognitive impairment and weigh in on appropriate treatment options based on the individual's cognitive status. In many cases, it was staff or family members who first noticed subtle memory changes, confusion, or functional decline that had not yet been formally diagnosed, prompting a request for a cognitive assessment. One nurse reported, "*... if family express any concerns, if the staff noticed that there is some confusion or any inabilities, we will often ask for an OT assessment for a mini mental review and geri[atric] psych[ichiatry] often gets consulted*." (HCP-002, surgery coordinator nurse). Across sites, both physicians and nurses described addressing cognitive concerns in a largely reactive, rather than proactive or systematic way. Although cognitive expertise was available and accessible, it was not embedded in routine heart-team workflows. There was one exception. One participant described their site's embedded geriatric model, explaining that it involves "*geriatric physicians that are interested and dedicated to the TAVI*

clinic. They, their approach to basically looking at the patient holistically... Their focus, of course, is 90% on cognition and social situation." (HCP-023, interventional cardiologist). HCP-023 went on to say, *"[The collaboration is] very fruitful, and I'm just always talking to them."* This example illustrates a more integrated brain-heart team model than was described at the other sites.

Importance of Family Insights into Cognition and Decision-Making

Participants emphasized the critical role of family members in identifying early cognitive changes, supporting patients' understanding of treatment options, and providing essential functional assistance at home following the procedure. When family members reported functional and/or cognitive decline with the HCP, the heart team was prompted to assess. A nurse reported, "*If they [patient] have a baseline cognitive impairment, so either diagnosed or family is starting to notice it or [the nurse] sees evidence. [The nurse] will do a frailty assessment if I'm seeing any kind of memory [in]capacity*." (HCP-014, NP). Nurses described how collaboration with family members often enabled a more accurate understanding of a patient's cognitive status. Family could also help patients process and understand their treatment options. As one nurse explained, *"Sometimes those patients with a cognitive decline, they're not as engaged as the families are...But, um, but I usually have engagement from some, somebody within the system, like their support system.*" (HCP-021, TAVI coordinator nurse). This demonstrates how families often act as communication partners alongside the heart team. Families also played an important role in aligning treatment decisions with patient values. One physician noted that when dementia is present, *"....and you've got, you know, more than moderate dementia, it's about discussing with the family what the, what the goals of the patient would be*." (HCP-024, interventional cardiologist). In these situations, family members often

take an advocacy role to ensure that patient-centered care remains central to decision-making. Finally, participants emphasized that strong family support is essential for recovery after AVR, particularly in the presence of cognitive impairment. A nurse emphasized this point, "*We, we rely heavily on when we speak to the patient, what we gather from them and what the family supports are like afterward.... that should play into whether they would be successful after the procedure*." (HCP-001, CNS). The likelihood of a successful post-operative course at home is closely tied to the availability of strong, reliable family support, including assistance with recovery and follow-up.

Nursing Expertise in Early Detection of Cognitive Change

Both physicians and nurses consistently described nurses as integral members of the heart team, particularly well positioned to detect early cognitive concerns. Through repeated patient interaction across clinic visits nurses interact with patients multiple times throughout their AS journey of care. These frequent encounters allow nurses to develop a deeper familiarity with patients and more astute observations of their cognitive capacity over time. This ongoing contact creates opportunities for nurses to raise concerns, advocate for further cognitive evaluation, and support early identification of cognitive changes. A nurse summarized this nicely, "*...We've always had a nursing visit embedded into this process-so [nurses] are sort of the first ones to kind of catch a potential undiagnosed cognitive problem"* (HCP-001, CNS). The nurse was also described as a bridge between patients, families, and physicians, communicating to physicians what was learned during their longer visits with patients, beyond what a physician's workload would allow. This includes preferences for treatment attributes, the patient's personal circumstances that would lead to a preferred option, and other person-centered concerns. This is exemplified by the following described clinic visit conversations with a patient and family, "*I*

[nurse] go in and see the patient first and do my teaching," following this they will update the physician, "*so that they're aware of, you know, patient function, cognitive status. If there's any concerns there- [and] a little bit about the family members that are with them,*" to provide a comprehensive view of the patient and their support (HCP-021, TAVI coordinator nurse). Prioritizing this information in exchanges with the physician highlights nurses' expertise and judgment in integrating clinical observations with information from the family.

Table 4.3. *Description of Themes with Supporting Quotations*

Theme	Description	Supporting Quotations
Focus of Cognition as a Complication, not a Comorbidity	Physicians and nurses primary viewed cognition as a post-operative complication (e.g., stroke or delirium) rather than a comorbidity that should inform AS decision-making.	"*[Cognitive impairment in AS treatment] So two separate, two different things in a lot of cases."* (HCP-022, interventional cardiologist) "*My teaching [on brain-heart connection], so when I go to the discussion of stroke I talk about these are the signs of stroke-I talk about delirium very often. Especially if I've had delirium before*." (HCP-014, NP) "*But for the patients who are ongoing surgery, I do discuss with them delirium, stroke, mortality, you know, wound infection, transfusion, and the above*." (HCP-016, cardiac surgeon) *"We often use cognition to decide if we should offer anything"* (HCP-014, NP)
On-Demand Cognitive Expertise Within Established Heart Teams	Lacking cognitive expertise within heart teams, they rely on referrals when needed.	*"If I'm unsure, then I will ask for a geriatrics assessment before we even get to the consent discussion. And then I'll incorporate into the consent discussion."* (HCP-014, NP) *"Quite often we will get a geriatric assessment done if they haven't been seen by geriatrics before."* (HCP-021, TAVI coordinator nurse) *"So, but we go into a very detailed discussion with that, involving often our geriatric colleagues. We will refer these patients to geriatricians who help guide us*

		and help educate the families on mild cognitive issues." (HCP-022, interventional cardiologist)
Importance of Family Insights into Cognition and Decision-Making	Family members played a key role in identifying early cognitive changes, supporting treatment understanding, and providing post-procedure care at home.	*"Most patients they [would] like [to] make a decision with the family, not just by... themselves."* (HCP-020, TAVI coordinator nurse)
Nursing Expertise in Early Detection of Cognitive Change		*"I think the nurse practitioner plays a big role in helping them make decision[s] together."* (HCP-020, TAVI coordinator nurse)

Discussion

In this qualitative study using an ID approach, we explored HCPs' consideration of patients' cognition and cognitive function when deciding on AS treatment approach. From 16 interviews and two focus groups with physicians and nurses, we identified 4 key themes. First, participants emphasized cognition as a complication rather than a comorbidity. Second, it was noted that the heart teams would outsource and refer for cognitive expertise when cognitive assessments were required. Third, family members are critical partners in raising concerns about their loved one's cognition and in AS treatment decision-making. Lastly, nurses are well positioned to detect early cognitive concerns in this patient population through repeated patient interactions across multiple clinic visits. These findings lead us to three points of discussion.

In this study, our findings showed that heart teams generally do not integrate cognitive specialists in their team, instead referring on an as-needed basis. Across all sites, core members

included surgeons, interventionalists, and nurses, including both registered nurses and advanced practice nurses (APNs).[2] This composition of team members aligns with VHD clinical practice guidelines, which endorse interprofessional heart teams.[14,15] This endorsement is situated in an evidence landscape in which interprofessional approaches to care can improve patient outcomes by considering varying clinical factors, risk assessment, long-term prognosis and patients' preferences to determine the best treatment plan for the individual.[33,34]

When additional expertise was needed, study participants reported that the core heart team would refer to additional members on an as-needed basis. This included geriatric specialists, neurologists, or allied health team members, such as OTs, who could assist with cognitive assessment, particularly when cognitive impairment was previously known or suspected. These experts led cognitive assessments and recommendations for functional optimization and support needs. However, this “as needed” approach could be challenged. With population aging, the number of comorbidities rising, and patient needs becoming increasingly complex, timely access to cognitive expertise with a good understanding of VHD when appropriate is necessary. The field could consider defining criteria/considerations for when referrals are warranted. Also, this is an opportunity to leverage nurses’ expertise who could administer the mini-Cog or equivalent as a first step and then escalate consultation to a full geriatric team for further examination and diagnosis. The expertise brought forth by these specialists will be increasingly needed and, as such, could possibly be integrated into the core heart team model. This position is also supported by Lauck et al. (2025b), who, in their review article, propose that VHD interprofessional heart teams must evolve to reflect contemporary

[2] Advanced practice nurses – the clinical nurse specialist (CNS) and nurse practitioner (NP) –are Registered Nurses (RNs) with post-graduate education and advanced clinical training. They work to meet the complex health needs in a wide variety of settings.

issues/priorities.[15] We would argue that a holistic approach to brain-heart health, in this context of cognition and AS, represents an emerging priority within an aging patient population with complex care needs.

Many HCPs in this study emphasized the critical role of families as providers of key insights into patients' cognitive status when facing a treatment decision for their AS. Research supports family members' unique position in decision-making, given their proximity to the patient, allowing them to detect early signs of cognitive decline and offer critical insight into its impact on the patient's daily life that heart teams would otherwise not know.[35,36] Beyond contributing to decision-making, their role also involves ensuring that treatment decisions align with patients' preferences and values, as well as supporting appropriate post-AVR care and follow-up. [35,36,37]

In a mixed-methods study, van Beek-Peeters et al. (2025a) explored the role of informal caregivers in SDM for AS treatment.[37] Findings revealed that 75% of caregivers reported not being included in discussions about their loved one's treatment options and rather were passive recipients of the treatment options in name only. [37] Only 25% of caregivers reported experiencing the highest level of SDM. [37] This indicates a gap that could be addressed with further research exploring the family role in this context and how heart teams can better invite them into the conversation and collaborate with them.

In our study, nurses were the most consistently engaged HCP with patients and families across the AS care continuum, positioning them to identify subtle or new cognitive changes. Evidence shows that nurses have clinical expertise in face-to-face assessments, ongoing monitoring, and surveillance of AS treatment and care from referral to follow-up.[38,39,40]

Many of the nursing responsibilities related to cognitive assessment appear to exist within an intuitive domain of nursing practice, where clinical judgment, relational knowledge, and ongoing patient interactions guide the recognition of early cognitive vulnerability – rather than it being systematically built into practice. Creating a more standardized nursing approach to ensure cognition is addressed within AS treatment decision-making may help to strengthen a brain-heart health delivery model across Canada. This would involve increasing nurses' awareness, knowledge, and skills of both the brain-heart connection and SDM. Strategies may include wider implementation of SDM training, including the use of PtDAs, and leadership/policy support. [41,42]

Strengths and Limitations

This study has several strengths and limitations. A key strength is its inclusion of diverse HCP perspectives from seven Canadian sites, offering a pan-Canadian view of how cognition is considered in SDM for AS treatment. However, we did not include primary care providers (e.g., GPs, NPs) whose perspectives would have been valuable for understanding the flow of initial assessments and referrals for specialized AS services and their incorporation of cognition. The study also lacked the perspective of specialists with cognitive expertise (e.g., neurologists, geriatricians, OTs). Including a broader range of HCPs would have provided deeper insights into how different specialties conceptualize their role in considering cognition in relation to AS treatment. Additionally, because this was a secondary analysis, the data was limited by the scope of the parent study, which did not specifically focus on cognition.

Conclusion

In patients with AS and their families contemplating AVR treatment decisions, cognition is seldom considered as a contributing factor in the treatment decision-making process. Rather, it

is viewed as a complication of AVR. When considered, family members and nurses are at the forefront of its incorporation, then mobilizing the necessary resources and expertise to ensure patient-centered care. Further research should prioritize exploring the roles of nursing and allied health professionals in SDM through a holistic brain-heart approach to AS care.

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Chapter 5: Integrated Discussion

The aim of this final chapter is threefold. I will first summarize the key findings from the previous chapters, including the literature review, theoretical underpinnings, and the qualitative study. Second, I will discuss and interpret my findings within the broader literature on the intersections among cognition, AS, and SDM, and situate how they contribute to existing knowledge. Finally, I will offer implications for nursing practice, education, research, and policy arising from this work, including its strengths and limitations.

Thesis Summary

The purpose of this thesis was to explore how HCPs consider cognition and cognitive function when making treatment decisions with patients living with AS and their families. In the literature review (Chapter 2), I found that within the heart team, nurses have the capacity to facilitate SDM, family and caregivers play an invaluable role in SDM, and that the intersection of AS, cognition, and SDM is multifaceted. Further, emerging literature suggests improved cognitive function post-AVR in some patients, highlighting the need to further explore cognitive-related outcomes in the context of AVR. Other gaps include a need for greater clarity regarding roles and responsibilities within the heart team and family/caregivers, as they relate to decision-making and cognitive assessment; increased team-based HCP training in SDM; and standardized cognitive assessments in this brain-heart, AS, and cognition context. To fill these gaps, I conducted a secondary analysis of interviews and focus groups with HCPs across seven Canadian VHD sites using Thorne's (2016) ID approach (Chapter 4). My study was theoretically grounded in the IP-SDM and CCT, which provided a structured lens for examining how HCPs think about and engage in decision-making along a continuum of rationality within both individual and team-based shared decision-making. This theoretical scaffolding, as

recommended by Thorne (2016), permitted the exploration of clinically relevant themes and patterns grounded in the participants' experiences.

My study findings demonstrated a lack of holistic exploration of the brain-heart connection in AS and cognition in practice, rather with a focus on post-operative brain-related complications. In line with the literature review findings (Chapter 2), there is significant variability in the cognitive and frailty assessment tools and strategies that HCPs use across the programs in which they work. This lack of standardization can lead to inconsistent treatment options and care. Lastly, the literature emphasized the need for greater use of SDM in cognition, AS, and treatment planning, a need also found evident in the current practice of included HCP participants of my study (Chapters 2 and 4). Study participants reported a lack of a clear understanding of roles or delegation of responsibilities among heart team members, including nurses, in the SDM process. As a result, there is a need for increased training and education for HCPs to build their SDM knowledge, improve skills to facilitate true SDM in practice, and provide role clarity. These findings led me to three main points for this integrated discussion.

Enhancing our Understanding of the Brain-Heart/Cognition-Aortic Stenosis Connection

Across the literature review (Chapter 2) and from study participants (Chapter 4), our understanding and integration of AS and cognition in research and practice are still evolving. Most studies in the literature review reported that cognitive function may improve after AVR due to reductions in cerebral blood flow, inflammation, microvascular damage, and aging (Auffret et al. 2016; Abawi et al. 2018; Khan et al., 2018; van Nieuwkerk et al., 2023). Yet there remains a limited understanding of underlying pathophysiology, relevant risk factors, and the influence of comorbidities on this potential for improvement (Auffret et al., 2016; Khan et al., 2018; Lai et al., 2015). In my secondary analysis, nurses and physicians both focused on how cognitive status

influences treatment eligibility in a dichotomous way (rendering patients eligible or ineligible for AVR) or as potential postoperative AVR complications (Chapter 4). NP Participant HCP-014 stated, *"We often use cognition to decide if we should offer anything",* demonstrating that a certain degree of cognitive impairment may restrict the offering of treatment options presented to patients and families. In conversations, HCPs would also discuss post-operative complications such as stroke or delirium with patients and families to indicate that cognition may worsen post-intervention. This framing may impact genuine SDM opportunities.

These findings challenge the current practice of considering cognition merely a contraindication to treatment or an indicator of poor prognosis and instead call for including it as a key point to discuss with patients and family members when presenting treatment options and deliberating the best choice for their circumstances. Despite this, none of our participants discussed the potential cognitive benefits of treating AS. While not explicitly asked in the interviews and focus groups, this general absence may be explained by HCPs not being aware of emerging data on this topic or the belief that this data is not strong enough to present to patients and families at this time. These findings may also reflect a siloed approach to healthcare, where specialties remain focused only on their area of practice. A more rational decision by the HCPs to discussing this evidence may facilitate more individualized assessments and better incorporation of patients' cognitive status when presenting and discussing available treatment options. Conversations with patients and their families could be more forthcoming about this emerging evidence and its potential implications for quality-of-life post-intervention.

Nevertheless, uncertainty remains in our understanding of the relationship between cognition and AS. Future research is needed to better understand the relationship between cognition and AS, including how cognitive function is incorporated it into conversations with

patients and their families. Research is also needed to identify strategies that support a SDM approach, enabling treatment recommendations to be tailored to individual patient needs while promoting meaningful patient participation in decisions to the extent possible. A key first step is ensuring that cognition is systematically considered and assessed when initiating AVR-related treatment discussions.

Variability Across Valve Clinics: A Need for a Standardized Comprehensive Approach to Cognitive Assessment

There is a need to consider risk-stratified cognitive assessment and screening practices in heart valve clinics to reduce practice variation and better identify at-risk patients. In this study, the cognitive assessment tools used varied from site to site with little report on what decisions were made with the findings. In the interviews and focus groups, HCPs from different sites referred to the MoCA, frailty assessment, or general geriatric assessments, either completed by the nurses or, most often, completed in collaboration with geriatric specialists and/or OTs (Chapter 4). Consistency was noted within sites. This finding was consistent with the literature review: cognitive impairment is indeed assessed using a variety of approaches, instruments, and tools, particularly in the older TAVI population (Afilalo et al., 2014; Chin et al., 2024; Khan et al., 2018). In fact, multiple systematic reviews have also confirmed this finding (Ghezzi et al., 2020; Khan et al., 2018). A meta-analysis by Ghezzi et al. (2020) included 15 studies, among which 14 used different cognitive assessment tools. Further research in this area needs to identify better ways to identify at-risk patients and then further study if and how these may be beneficial or not.

The need to reconsider cognitive screening approaches is critical for the following reasons. First, the inconsistent and varied use of cognitive assessment tools across valve clinics

may contribute to inconsistent scoring and care for vulnerable cognitively impaired older adults, as each tool has different thresholds for defining impairment/treatment eligibility. While not assessed in depth in participant interviews, three separate HCPs across two sites stated that they used MoCA scores to indicate one treatment option over the other. Without clear standardizations, this can lead to significant practice variations as HCPs may be using different thresholds to offer or withhold certain treatment options.

Second, heterogeneous use of cognitive assessment tools across studies precluded investigators from drawing conclusions on the benefits of a specific cognitive assessment tool (Chin et al., 2024). Chin et al. (2024) highlighted this challenge in their systematic review and cautioned against relying solely on frailty assessments, as these may overlook broader issues such as cognition, social support, mental health, and functional capacity. Supporting these findings, my study showed that some HCPs reported relying more on a patient's ability to engage in activities of daily living (ADLs) and on home support requirements than-a single cognitive score (Chapter 4). These findings suggest that risk-stratified patient assessment should incorporate standardized measures of cognitive status alongside comprehensive evaluations of frailty, functional capacity, ADLs, and available familial/community support systems.

Currently, while cognitive tools such as MoCA and MMSE are frequently used in research and practice there are no cognitive screening tools that have been validated or specifically recommended for the VHD patient population (Afilalo et al., 2014; Chin et al., 2024; Khan et al., 2018). Neither do the 2020 ACC/AHA and 2025 ESC VHD guidelines address cognitive screening strategies (Otto et al., 2021; Praz et al., 2025). This is a critical area for future research, as earlier detection of cognitive dysfunction can help-guide treatment planning,

increase brain-heart consideration in care, and ultimately improve patient outcomes (Bo et al., 2020; van Nieuwkerk et al., 2023).

A Need for Team-Based SDM Training in the Context of Cognition and Aortic Stenosis

A key finding from this study was the inconsistent integration of cognitive consideration with AS treatment planning, highlighting a need for strengthened team-based SDM training. As discussed in Chapters 1 and 2, decision-making in heart valve guidelines is encouraged for implementation in practice (Otto et al., 2021). However, reports among the participating HCPs lean more towards a traditional paternalistic approach to care, particularly when cognitive impairment was present. Statements such as, "*[when asked about cognitive impairment as a comorbidity in treatment decision] Strong incentive for TAVI, avoid as much as I can-surgery.... We know that surgery will, worsen that. Much worse, much more than TAVI."* (HCP-013, Cardiologist). This illustrates how treatment decisions are often swayed by the HCP, with a focus on cognition as a post-operative complication, without full explanation of the risks and benefits, nor consideration of the patients' or families' preferences and values.

These findings are supported by the literature (Chapter 2), which shows that a gap remains in effectively incorporating SDM into heart valve practice. A survey of 101 heart team physicians and interviews with nine heart team physicians found that SDM is not consistently implemented in a valvular heart context (Dharmarajan et al., 2017; Lindeboom et al., 2021; Lytvyn et al., 2016). Despite these findings, physicians agree on the importance of involving patients in treatment decisions, however, half lean toward the heart team making the final decision.

These findings call for the critical need for increased SDM training among all members of the heart team. Although this topic was not specifically explored with study participants, the IP-SDM model emphasizes the importance of equipping all members of the healthcare team with the knowledge, skills, and collaborative practices required to engage patients in SDM processes (Légaré et al., 2011). Lindeboom et al. (2021) and Boland et al. (2019) recommend training sessions that involve the entire interprofessional team to ensure collective buy-in, participation, and clear roles/responsibilities. Outside of individual and team-based efforts, implementation will also require meaningful support from organizational leadership and policy to facilitate positive change in our approach to SDM in this context (Donnelly et al., 2021).

Incorporating the connections between AS and cognition into SDM conversations will require clear team roles and responsibilities. Given the nursing focus of this thesis, I paid particular attention to how nurses' roles can be defined and utilized in this context. A study by González-Cebrian et al. (2025) showed that nurses, whether TAVI nurses or coordinators, already assume leadership roles in this realm. Nurses are well positioned to complete a comprehensive assessment of the patient, including frailty, cognitive impairment, and social risk situations. (Gonzalez-Cebrian et al., 2025; Lauck et al., 2021). This aligns exceptionally well with our findings, where most study participants referred to nurses as navigators of care, advocates of patient preferences, communicators within the heart team, and experts in comprehensive clinic assessment. Their physicians' colleagues also recognized the nurse's ability to spend more time with patients and family for education and assessment collection purposes.

In summary, this integrated discussion showcases the complex intersections of cognition, SDM, and AS. Findings from both my literature review and the qualitative investigation suggest that cognition remains inconsistently assessed and integrated into AS treatment decision-making

processes nationally. Contemporary approaches to cognitive assessment, combined with greater attention to frailty, functional status, and social supports, may help reduce variation and support more equitable treatment decisions. Furthermore, strengthening team-based SDM competencies and clarifying professional roles within the heart team may facilitate more meaningful interprofessional collaboration. Increased HCP SDM engagement supported by policy, team-based education, and strong nursing leadership may increase the uptake of SDM in practice (Lauck et al., 2016; Sepucha et al., 2017).

Nursing Implications

My thesis leads to several nursing implications regarding HCPs' consideration of cognition to support SDM with AS patients and their families. These implications span nursing practice, education, research, and policy.

Nursing Practice

At the core of this work are nurses' strong communication skills, establishment of therapeutic relationships, advocacy for patient preferences, and provision of resources (including PtDAs). This situates them well for roles in SDM and patient-centered care (Gonzalez-Cebrian et al., 2025; Lauck et al., 2021; Lewis et al., 2016). This expectation aligns with professional nursing standards, which emphasize patient-centered care, advocacy, therapeutic communication, informed decision-making, and collaboration within interprofessional teams (Registered Nurses' Association of Ontario (RNAO), 2025). However, there is a need for greater awareness, leadership, and role clarification among nurses to facilitate SDM within interdisciplinary teams (Gonzalez-Cebrian et al., 2025; Lauck et al., 2021; Lewis et al., 2016).

While all nurses have a role in supporting cognitive assessment and SDM, their responsibilities vary depending on their scope of practice. In a heart valve clinic, RNs are well

positioned to conduct cognitive screening, provide patient education, and explore patient preferences. APNs, through their advanced practice role, can conduct comprehensive assessments and lead the implementation of standardized cognitive assessment practices within VHD programs (Gonzalez-Cebrian et al., 2025; Lauck et al., 2021). Further, NPs can independently initiate diagnostic investigations and referrals for patients with VHDs (RNAO, 2021).

Beyond SDM, nurses can also advocate for a standardized, comprehensive cognitive assessment tool for VHD care (Afilalo et al., 2014; Chin et al., 2024; Khan et al., 2018). This allows for equitable care across HCPs and organizations (Khan et al., 2018). As nurses are often involved in patient visits and assessments, they would benefit from standardizing their approach to care.

Nursing Education

Within nursing education, there is an opportunity to strengthen teaching on expanding knowledge of brain-heart connections in the Bachelor of Science in Nursing (BSN) curriculum, graduate curriculum, and continuing education/professional development (Lee et al., 2022). This can help break down silos of care and view patients through a more holistic lens. For example, in a pathophysiology course, case studies on heart failure and depression could be used to view the conditions as interacting rather than as separate comorbidities. In lab simulations, nurses and student nurses could be challenged to care for a patient with multiple interacting conditions, such as cognitive impairment and AS, to strengthen their comprehensive assessment and treatment planning skills.

Similarly, greater emphasis on SDM knowledge and skills should be placed in both the BSN and graduate curricula, as well as in continuing education/professional development plans,

particularly for vulnerable populations such as those with cognitive impairment (Noordam et al., 2024). Additional training could focus on the types of questions to ask, standardized cognitive tools, and how to engage family as key partners in assessing the patient's true cognitive status, which can aid their approach to SDM. Simulation scenarios can be used at the undergraduate, graduate, or continuing professional development levels to help build confidence in effective SDM (Koukourikos et al., 2021). For example, participants could assess and provide guidance to a patient and family member facing an AS treatment decision. Ultimately, enhancing nurses' knowledge in both the brain-heart connection between cognition and AS and effective SDM can help to facilitate treatment choices that better align with patient-centered care.

Nursing Research

Future research should explore the brain-heart connection between cognition and AS, as well as how to weave this into nursing practice for patients and family members (van Nieuwkerk et al., 2023). This could involve further qualitative exploration of nurses' awareness of the brain-heart connection and how they approach patient care and then measuring whether level of awareness makes a different in patient outcomes. Similarly, SDM interventions for patients with AS have demonstrated effectiveness in increasing patient knowledge, incorporating patient preferences, and decreasing decisional conflict. Yet most do not incorporate strategies or considerations for patients with cognitive impairment (Elwyn et al., 2016; Harris et al., 2024; Otto et al., 2021; Praz et al., 2025). Advancing our knowledge in the space of cognition, AS, and SDM would help to inform clinical practice and improve patient outcomes (Chin et al., 2024; Khan et al., 2018; Sepucha et al., 2017; van Nieuwkerk et al., 2023).

Nursing Policy

Funding and policy initiatives should encourage routine use of SDM approaches that support patient engagement and informed treatment choices (Otto et al., 2021; Lauck et al., 2025). In recent years, Ontario explored moving to a procedure-agnostic, single bundled payment for all patients with AS, meaning hospitals would receive the same funding bundle whether a patient underwent SAVR or TAVI. This was part of the AVI Reimbursement Model Project, yet due to pandemic-related re-prioritizations, the initiative was never implemented. This recommendation aligns with the UK National Institute for Health and Care Excellence (NICE) Shared Decision-Making Guideline (2021)**,** which recommends embedding SDM at a policy level through leadership support and staff training to increase patient-centered care. In the context of AS, this is important as the treatment options (TAVI, SAVR, or conservative medical management) require consideration of clinical risk, frailty/cognition, QOL, and patient preferences. Guidance such as the Ontario Transcatheter Aortic Valve Implantation Patient Eligibility Criteria Guideline highlights the importance of interprofessional assessment and comprehensive evaluation when determining treatment eligibility (CorHealth Ontario, 2025). Patient education resources, such as decision-support materials, further reinforce the importance of active participation in treatment decisions for families and patients (Global Heart Hub, 2024).

Policy efforts should also aim to embed geriatric-cardiology heart team models of care to recognize the complex, overlapping conditions, such as AS and cognition, that are often seen in this population (Batchelor et al., 2023). These interprofessional models can help to ensure that the patient is seen holistically rather than as a single disease-specific case. Additionally, policies supporting early standardized cognitive assessment for cognitive screening can help to inform care (Afilalo et al., 2014; Chin et al., 2024; Khan et al., 2018). Overall, together these policies,

paired with changes to nursing practice, education, and research, can help improve treatment decisions for AS patients who also face cognitive concerns (Lauck et al., 2025).

Strengths and Limitations

This thesis is novel in that it explores HCPs' perspectives on how they incorporate cognitive processes into AS decision-making. It has several strengths. First, the study was co-produced with two researchers with expertise in SDM, decision support interventions, and VHD who are co-PIs on the parent study. In addition, a practicing NP and member of an exemplary heart team that values SDM provided critical perspectives as a knowledge user on my team. Second, using an ID approach as my qualitative approach produced clinically useful findings (Thorne, 2016). These flexible and reflexive methods allowed me to rely on and incorporate expertise from the research team, with varying educational and cardiovascular nursing backgrounds, to analyze data and produce findings from the lens of HCPs. Third, I developed a data analysis tool that incorporated key concepts of interest: AS, cognition, and SDM, including question prompts to guide the data analysis process. An early draft of the tool was shared with the research team (CC, KBL, and SG), piloted, with feedback incorporated into the final version. Lastly, a key strength of my secondary analysis is its inclusion of diverse HCP perspectives across Canada. As HCPs who work directly with patients with AS, the participants offered valuable insight into how cognition is considered in SDM for AS treatment.

As is the case with secondary analysis, the data were limited by the scope of the parent study, which did not specifically focus on cognition and was not guided by my chosen theoretical perspectives (IP-SDM and CCT). Furthermore, the parent study did not include primary care providers (e.g., GPs, NPs) or specialists with cognitive expertise (e.g., neurologists, geriatricians, OTs), whose perspectives would have provided deeper insights into how different specialties

conceptualize cognition in relation to AS treatment. Regarding my literature review, due to the rapidly evolving nature and evidence of effectiveness of AS treatment options across various risk groups, emerging research into the brain-heart connections, and increased attention to SDM in this area, the articles identified in my search during October 2025 may soon be superseded by newer evidence and evolving clinical practice.

Conclusion

Cognition is increasingly a critical component of AS care and treatment decision-making. In this thesis, I explored the current intersections between cognition, AS, and SDM through a review of the current literature and a qualitative secondary analysis of 24 HCPs who work directly with this population. Findings revealed important gaps in the integration of cognition within AS care and SDM. These included a need for greater understanding of the brain–heart connection, the development of a standardized approach to comprehensive cognitive assessment, clearer definitions of interprofessional heart team roles and responsibilities, meaningful involvement of family members in care and decision-making, and recognition of nurses' expertise in providing holistic, patient-centered care.

Future research should prioritize exploring the connection between cognition and AS, including the underlying mechanisms connecting the two systems of neurological and cardiovascular health. Given the growing evidence and interest in broader brain-heart health, understanding the underlying mechanisms is imperative for how we approach treatment decisions within AS. Additionally, proposing and evaluating contemporary cognitive assessment approaches to identify at-risk patients may enhance equitable care to patients and families. The findings also highlighted the significance of nurses' expertise/role in cognitive screening, teaching, advocacy, and communication with both families and the heart team, which was clear

in both the literature and the qualitative study. However, defining roles and responsibilities more clearly among the interprofessional heart team may also better align practice with genuine SDM. There is also a need for enhanced SDM education and training for HCPs on SDM implementation, particularly in this complex brain-heart decision-making context involving AS and cognition.

Ultimately, a holistic approach to AS care that pays attention to and incorporates cognition can enhance SDM, improve patient and family-centered care, and increase equitable care for patients and their families.

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Appendix A
Literature Review Supporting Tables and Figures

Figure A1

Aortic Stenosis and Shared Decision-Making PRISMA Diagram

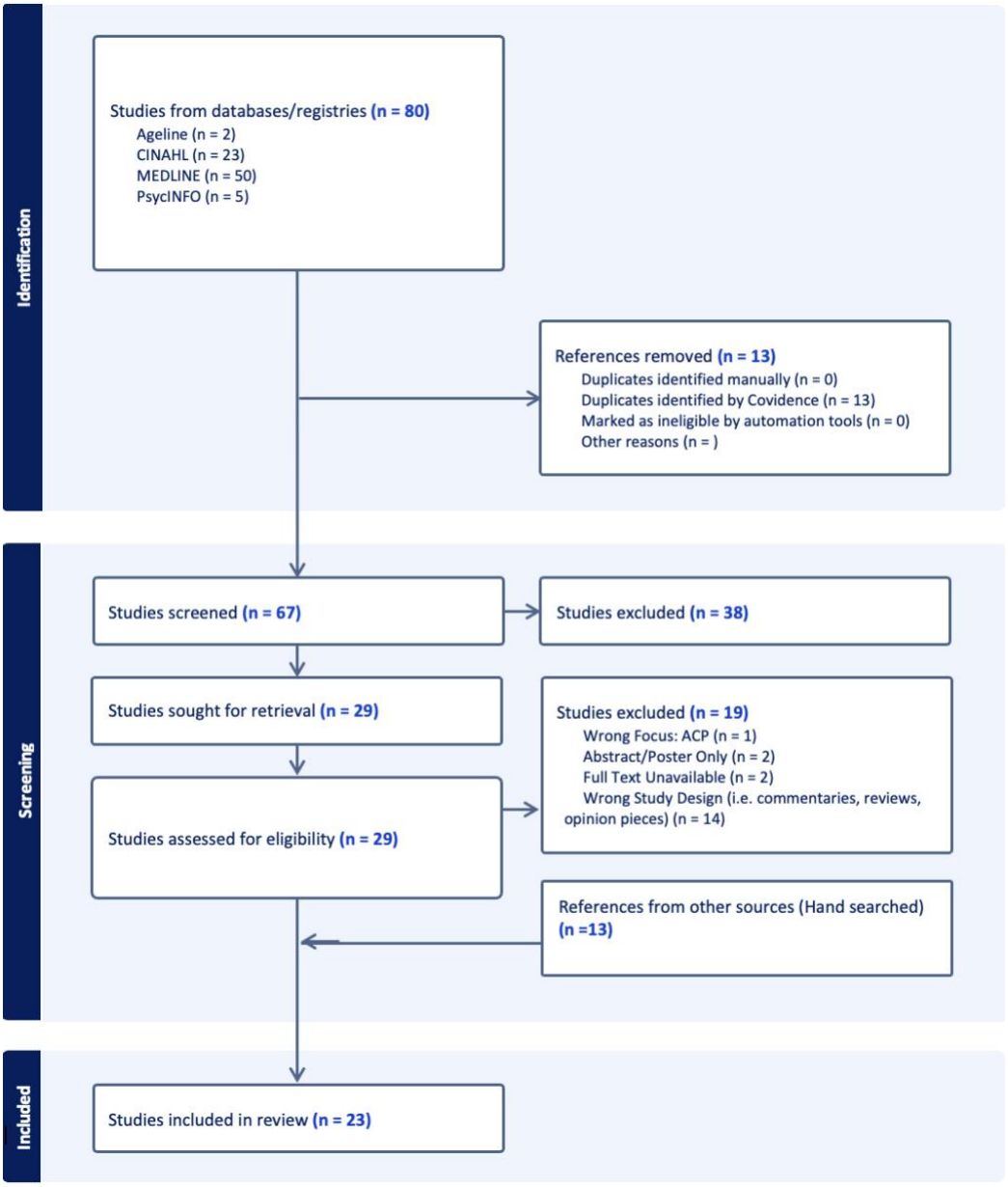


Table A1

Literature Review Search Strategy (Aortic Stenosis and Shared Decision-Making)

Database and/or source	**Keywords searched**	**Number of records yielded**
AgeLine	Aortic Stenosis **or** aortic valve stenosis **AND** shared decision making **or** shared decision-making **or** SDM	2
CINAHL	Aortic Stenosis **or** aortic valve stenosis **AND** shared decision making **or** shared decision-making **or** SDM	23
Medline	Aortic Stenosis **or** aortic valve stenosis **AND** shared decision making **or** shared decision-making **or** SDM	50
PsycINFO	Aortic Stenosis **or** aortic valve stenosis **AND** shared decision making **or** shared decision-making **or** SDM	5
Reference List Search	Revised the list of references of all included articles	13

Figure A2

Shared Decision-Making and Cognition PRISMA Diagram

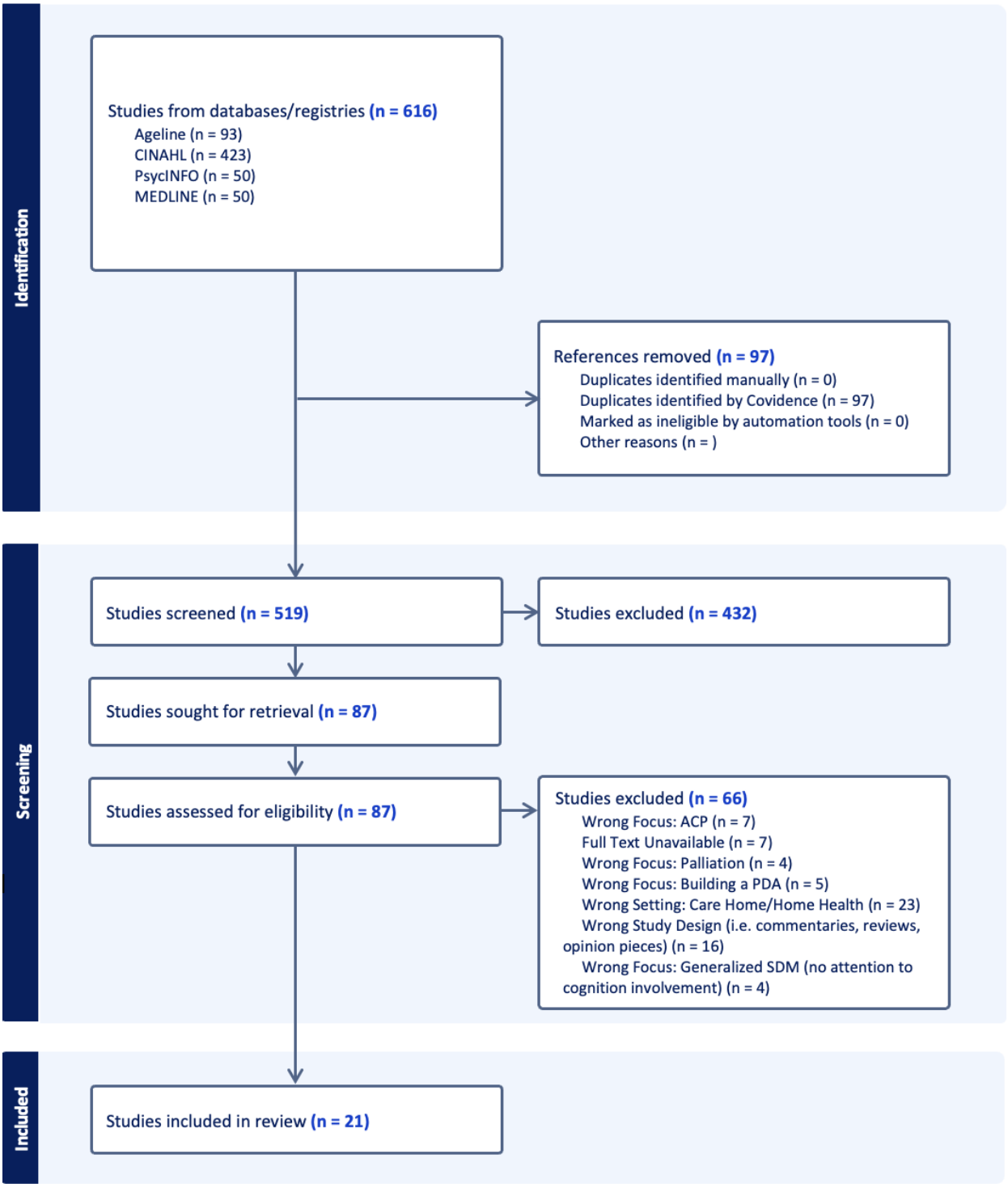


Table A2

Literature Review Search Strategy (Cognition and Shared Decision-Making)

Database and/or source	**Keywords searched**	**Number of records yielded**
AgeLine	Shared decision making **or** shared decision-making **or** SDM **AND** cognition or cognitive function **or** cognitive impairment **or** cognitive health **or** dementia or Alzheimer's or fragility	93
CINAHL	Shared decision making **or** shared decision-making **or** SDM **AND** cognition or cognitive function **or** cognitive impairment **or** cognitive health **or** dementia or Alzheimer's or fragility	423
Medline Electronic	Shared decision making **or** shared decision-making **or** SDM **AND** cognition or cognitive function **or** cognitive impairment **or** cognitive health **or** dementia or Alzheimer's or fragility	50
PsycINFO	Shared decision making **or** shared decision-making **or** SDM **AND** cognition or cognitive function **or** cognitive impairment **or** cognitive health **or** dementia or Alzheimer's or fragility	Total # 50
Reference List Search	Revised the list of references of all included articles	0

Figure A3

Aortic Stenosis and Cognition PRISMA Diagram

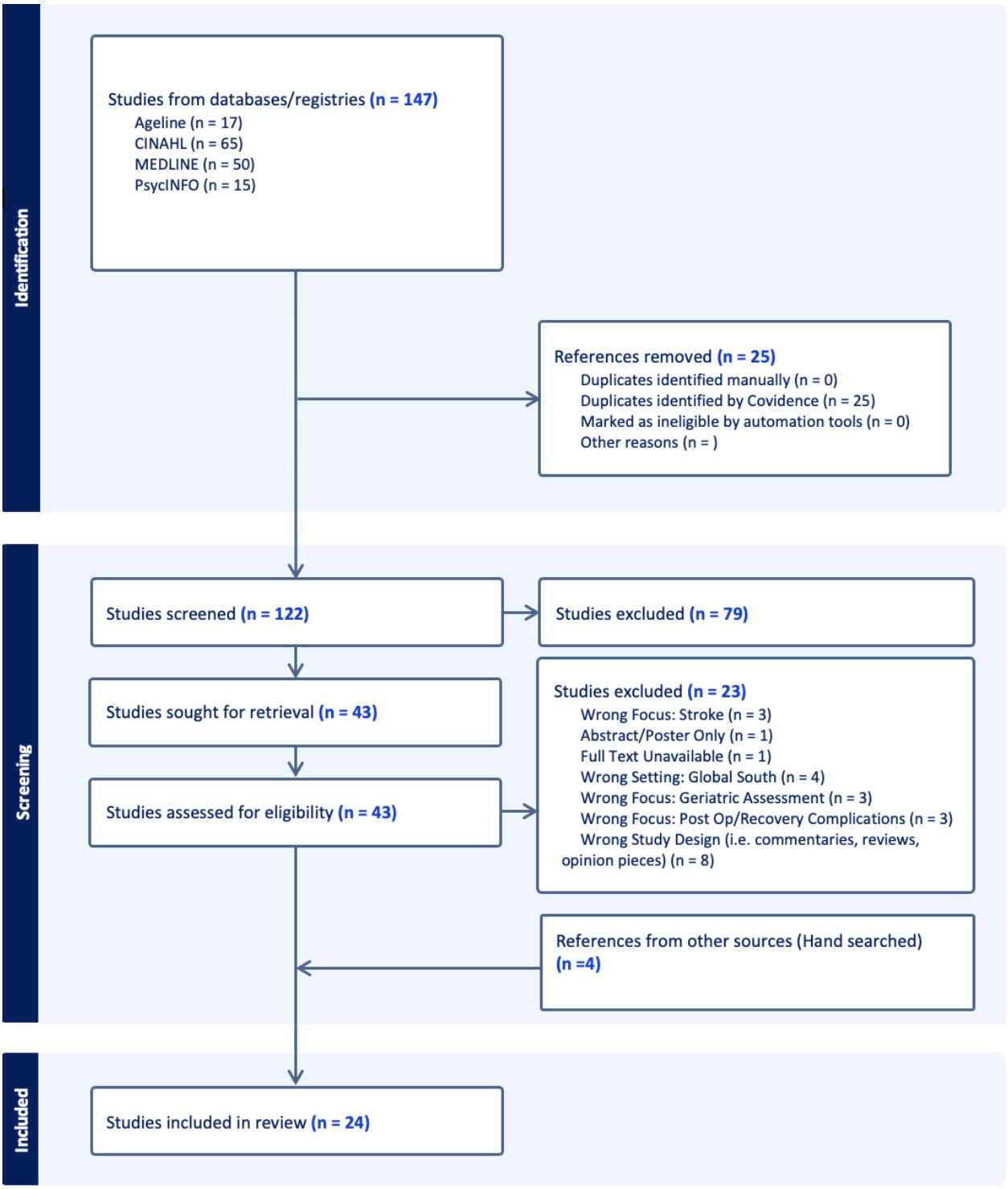


Table A3

Literature Review Search Strategy (Aortic Stenosis and Cognition)

Database and/or source	**Keywords searched**	**Number of records yielded**
AgeLine	Aortic Stenosis **or** aortic valve stenosis **AND** cognition or cognitive function **or** cognitive impairment **or** cognitive health **or** dementia or Alzheimer's or fragility	17
CINAHL	Aortic Stenosis **or** aortic valve stenosis **AND** cognition or cognitive function **or** cognitive impairment **or** cognitive health **or** dementia or Alzheimer's or fragility	65
Medline	Aortic Stenosis **or** aortic valve stenosis **AND** cognition or cognitive function **or** cognitive impairment **or** cognitive health **or** dementia or Alzheimer's or fragility	50
PsycINFO	Aortic Stenosis **or** aortic valve stenosis **AND** cognition or cognitive function **or** cognitive impairment **or** cognitive health **or** dementia or Alzheimer's or fragility	15
Reference List Search	Revised the list of references of all included articles	4

Table A4

Literature Matrix

Author/ Year/ Country	Methodology	Method	Aim	Sample	Data Collection/Source	Results
Aortic Stenosis, Shared Decision -Making, and Cognition						
Skaar et al., 2021 Norway	Quantitative	Prospective, observational study	To assess baseline frailty status and important clinical outcomes, to inform SDM in older adults receiving TAVI.	82 TAVI patients.	MMSE, NEADL, NYHA.	Baseline frailty predicted patient-centered outcomes (e.g., quality of life, recovery); underscored the importance of including frailty in SDM discussions.
Aortic Stenosis and Shared Decision-Making						
Beishuizen et al., 2021 The Netherlands	Mixed Methods	Observational prospective cohort study	To assess patients' expectations and goals before TAVI treatment and whether these were met after treatment; To evaluate how meeting these goals aligned with quality of life and functional recovery.	74 patients before and after TAVI.	Expectations and goals were assessed qualitatively before treatment. 6-12 months post procedure; MMSE, GARS-4, CGA.	TAVI patients were capable of eliciting treatment goals; goals varied from alignment with functional outcomes (measured with IADL scale). Most important treatment goal for patients was to engage in a specific activity or hobby, followed by reducing symptoms.
Carulli et al., 2024 UK	Quantitative	Prospective observational study	To assess and implement a structured SDM pathway for patients undergoing TAVI.	23 patients prior SDM pathway (Pre SDM) and 38 patients after the SDM pathway (Post SDM).	Custom-designed patient questionnaire; 12 core questions rated on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree)	Global satisfaction, as measured by mean Likert score, was significantly higher for the post-SDM group than for the pre-SDM group (4.46 ± 0.14 vs. 3.78 ± 0.30, $P < 0.001$ Implementing a dedicated SDM pathway improved patient understanding,

						satisfaction, and perceived involvement in decisions.
Col et al., 2022 USA	Mixed Methods	Exploratory sequential design	To identify, prioritize, and organize patient-reported goals and features of treatment for sAS.	51 adults with sAS and 3 caregivers with experience choosing treatment.	Structured focus groups using the nominal group technique.	Patients prioritized independence, quality of life, and symptom relief over survival length; Helping patients with sAS clarify their goals and preferences and share them with their HCPs may improve the patient-centeredness of care.
Coylewright et al., 2024 USA	Mixed Methods	Prospective multi-centered pilot cohort study	To assess the feasibility and impact of a novel decision aid for sAS at point-of-care.	30 patients with sAS and 14 clinicians.	Online interactive decision aid AVITA; Patients were assessed at baseline (T0), after using the intervention (T1), and after the clinical encounter (T2); clinicians were assessed at T2.	Patients reported AVITA easy to use [89.3%] and helped them choose treatment [95.5%]. Clinicians reported the AVITA summary helped them understand their patients' values [80.8%] and make values-aligned recommendations [61.5%]. Patient knowledge significantly improved at T1 and T2 ($p = 0.004$). Decisional conflict, decision-making stage, and decision quality improved at T2 ($p = 0.0001$, 0.0005, and 0.083, respectively).
Coylewright et al., 2016 ' USA	Qualitative	Retrospective analysis	To assess patient-defined goals from elderly patients facing treatment decisions for sAS.	46 patients with severe AS and eligible for TAVI.	Quality improvement project initially through facilitated discussion with the patient and family regarding processes of care.	Defined preferred outcomes as maintaining independence, staying alive, reducing symptoms or, most commonly, increasing their ability to do a specific activity or hobby.
González-Cebrian et al., 2025 Spain	Quantitative	Single-center observational retrospective study	To compare outcomes in patients undergoing TAVI within a nursing lead program including a nurse with those of patients in the standard program.	154 patients were included: 87 in the TAVI program and 67 in standard practice groups.	MMSE, EQ-D5, NYHA, KATZ scale, Perceived Quality of Life and Experience.	Both groups achieved high procedure success without differences in mortality during admission and follow-up (median 13.4 months). The TAVI program group showed better functional class more frequently and had significantly fewer emergency department visits (11.8% vs. 31.3%) and less frequency of readmission (1.2% vs. 23.4%). The

						TAVI nurse group reported significantly higher overall satisfaction with the process (9.8 vs. 8.9 scores), with the information received and the nurse treatment being the best rated items.
Harris et al., 2024 International	Mixed Methods	Systematic review and meta-analysis	To assess PtDAs for chronic CAD and AS.	10 studies and 21 PtDAs included for review.	Five databases (Cochrane, CINAHL, Embase, MEDLINE, and PsycInfo), clinical trial registers, and 30 PtDA repositories/websites were searched.	Patients who use PtDAs when considering treatments for AS or chronic CAD are likely to be better informed than those who do not.
Lindeboom et al., 2021 The Netherlands	Mixed Methods	Exploratory, cross-sectional study	To assess Heart Team attitudes to SDM for VHD.	An international survey of 101 heart team physicians specialized in VHD; In-depth interviews with 9 of the surveyed physicians.	Online survey and qualitative interviews.	While physicians recognized the importance of involving patients in treatment decisions, half leaned toward the heart team making the final decisions. Barriers to SDM Implementation: Limited understanding of SDM concepts, lack of evidence-based decision aids. Perceived Needs for SDM Implementation: Education on SDM principles, development and integration of decision support tools.
Lauck et al., 2016 Canada	Qualitative	Exploratory qualitative study	To assess actors influencing patients' decision making to undergo TAVI eligibility assessment to	15 patients awaiting TAVI.	Semi structured interviews.	Multiple, intersecting factors that included biomedical, functional, social and environmental considerations influenced patients' decision.

			inform practice, programme development, health policy and future research.			
Sepucha et al., 2024 USA	Mixed Methods	Study protocol for cluster-randomized trial	To assess effects of structured SDM training and tools on decision quality and satisfaction in AS patients.	N/A	Eligible patients will be surveyed before and after visits with the heart valve team; clinicians will be surveyed after visits. Reach of DAs and adoption of training will be tracked. Clinicians will be interviewed regarding barriers and facilitators to implementation.	N/A
Van Beek-Peeters et al., 2025a The Netherlands	Mixed Methods	Descriptive exploratory study	To assess the insight into experiences, preferences and needs of IC in SDM sAS.	99 ICs completed the baseline questionnaire, 82 ICs the follow-up questionnaire, 10 ICs participated in two focus group.	A questionnaire at baseline and 3-month follow-up and focus groups.	Caregivers play crucial roles in facilitating understanding, emotional support, and decision-making. They experience unmet needs for information and involvement in SDM.
Van Beek-Peeters et al., 2025b The Netherlands	Mixed Methods	Descriptive exploratory study	To assess the insight into the experiences, preferences, and needs for SDM of older patients with sAS and the associations between perceived SDM levels and patients' quality of	127 patients completed the baseline questionnaire, and 120 were included in the analysis at 3-month follow-up, 10 in focus group, 7 in interviews	A survey, focus groups, and individual interviews.	Older patients valued being heard and supported; desired individualized information but often felt excluded from SDM; cognitive and emotional challenges affected participation.

			life, depression, and anxiety.			
Aortic Stenosis and Cognition						
Abawi et al., 2018 The Netherlands	Quantitative	Prospective observational study	To assess the impact of TAVI on mid-term cognitive outcome using neurocognitive test batteries.	30 patients before and after TAVI.	Cognitive assessment was performed at baseline, and 4 months post-TAVI: IRMT, DRMT, RVIT, MMSE, TMT, CDT.	There was a significant improvement in IRMT (27±5 vs. 30±4, p = 0.016), with a trend toward improved DRMT (4±2 vs. 5±2, p = 0.079). Patients with lower baseline MMSE and IRMT improved significantly during follow-up.
Auffret et al., 2016 Canada	Quantitative	Prospective cohort study	To assess changes in global cognition and specific cognitive domains up to 1-year post-TAVI.	51 patients before and after TAVI.	MoCA DSST, TMT, and verbal fluency tests at baseline, short-term (30 days), and 1-year post-TAVI.	20 patients (39.2%) were considered cognitively impaired using a cutoff of <23 of 30 points. Mean total MoCA score improved at short-term post-TAVI and remained stable at 1 year (p= 0.022). 15% among those with baseline cognitive impairment. TAVI was associated with global improvement in cognitive status, more pronounced among those with cognitive impairment.
Bo et al., 2020 Switzerland	Quantitative	Prospective, observational cohort study	To assess predictors of TAVI procedure and clinical outcomes among these patients.	154 patients before and after TAVI.	CGA for geriatric assessment; Surgical risk was evaluated according to STS score one-year follow-up assessed survival, and functional and cognitive performance.	Among CGA variables, gait speed and number of medications were associated with the decision to perform TAVI instead of SAVR, even in patients at low surgical risk. 30-day and one-year survival and one-year functional and cognitive decline were similar between groups, despite a relevant prevalence of frailty in the TAVI group.
De la Rubia-Molina et al., 2025	Quantitative	Single-center prospective observational study	To assess the discriminative capacity of different scales used in CGA	142 patients were selected as candidates for TAVI (80.2%), and	The SPPB frailty and Barthel functional assessment scales were the main scales of the CGA for	In the present study, in addition to frailty as assessed by the SPPB scale, patient autonomy and the Barthel scale were predictors of selection for TAVI

Spain			on the decision of suitability for TAVI implantation and the influence on prognosis after TAVI implantation.	121 were finally implanted.	the TAVI candidacy decision.	implantation after a comprehensive CGA.
Hollenbeck et al., 2021 USA	Quantitative	Retrospective cohort study	To assess the independent association between having a diagnosis of ADRD at the time of AVR, stratified by TAVI and surgery, and outcomes.	173,643 AVR procedures among Medicare beneficiaries, of which 17,541 had ADRD.	Multivariable regression to assess the association ADRD and AVR outcomes.	Broader implementation of AVR in patients with ADRD did not come at the expense of increasing Medicare institutional days or mortality at 1-year after the procedure.
Khan et al., 2018 International	Quantitative	Meta Analysis	To quantitatively summarize changes in cognitive performance in individuals with sAS undergoing TAVI.	27 articles included if they assessed cognition using standardized neuropsychological measures before and after a TAVI intervention in individuals with severe aortic stenosis.	cognitive tests MMSE, MoCA, RBANS, SKT, DemTect, and the global cognitive dimension battery Meta regression analyses were conducted to assess the association between population and procedural characteristics and cognitive outcomes.	There were no significant changes from baseline in perioperative cognitive performance (SMD = 0.05, 95% confidence interval (CI) = 0.08–0.18; z = 0.75, P = .46), although overall cognitive performance had improved significantly 1 month after TAVI (SMD = 0.33, 95% CI = 0.50 to 0.16; z = 3.83, P < .001). There were no differences in cognitive performance 3 and 6 months after TAVI or over the long term.
Lai et al., 2015 International	Quantitative	Systematic Review	To assess the literature assessing the possible link between TAVI and cognitive changes.	6 articles assessed cognition before and after TAVI using the MMSE.	MMSE.	Cognitive preservation or improvement after TAVI in a population with a declining cognitive trajectory already set in motion by aging and significant underlying vascular disease may suggest benefit. The balance between positive changes associated with TAVI and already existing predisposing factors is

						currently obscured by various limitations in these studies.
Ollson et al., 2017 Sweden	Quantitative	Prospective observational cohort study	To assess and describe patients' self-reported outcomes after TAVI and SAVR.	24 patients treated with TAVI; 24 patients treated with SAVR.	The EQ-5D questionnaire, MMSE Katz Index of Independence in ADL, the SF-36, and the EuroQol five-dimension self-report questionnaire (EQ-5D).	Found no change in cognitive function or dependence at follow-up. There was no difference in the size of improvement between groups.
Cognition and SDM						
Bosco et al., 2019 International	Qualitative	Systematic review and meta-ethnography	To assess the experience of agency in people living with dementia.	20 studies included.	Searched IBSS, MedLine, PsychINFO, EMBASE, and CINAHL; Used meta-ethnography for data analysis.	Three levels of decision-making pathway identified autonomous decision-making, shared decision-making, and pseudo decision-making. Findings highlight inter-relational processes acts as facilitator or barrier to agency in patients with dementia.
Donnelly et al., 2021 Ireland	Qualitative	Qualitative-exploratory design	To assess experiences of assisted decision making in acute care hospitals in Ireland from the perspective of different HSCPs involved in their care.	26 HSCPS.	Semi-structured interviews.	Identified barriers (e.g. time constraints, lack of training) and facilitators (e.g. team collaboration) for assisted decision-making in older patient care.
Festen et al., 2021 The Netherlands	Quantitative	Retrospective cohort study	To assess the most important health outcome for older patients on the verge of making a treatment decision, using the OPT	350 patients referred to a geriatric outpatient clinic.	During geriatric assessment, patients prioritized between four health outcomes, using the OPT.	The main health outcome of older patients on the verge of making a treatment decision was maintaining independence, followed by extending life. Patients with cognitive impairment more often prioritized extending life.

Pel-Littel et al., 2021 International	Mixed Methods	Systematic Review	To assess barriers and facilitators for SDM as experienced by older patients with multiple chronic conditions.	28 studies included that address barriers and facilitators that older patients with MCCs, their informal caregivers and health professionals experience in SDM.	5 databases; Data synthesis was achieved using deductive content analysis.	Although poor health is perceived as a barrier to participate in SDM, the personal experience of living with MCCs is considered valuable input in SDM. An explicit invitation to participate in SDM is important to older adults. Health professionals need a supporting organizational context and good communication skills to devise an individualized approach for patient care.

Abbreviations: (ADRD) Alzheimer's Disease and Related Dementias, (AS) Aortic Stenosis,(AVITA) Aortic Valve Improved Treatment Approaches, (AVR) Aortic Valve Replacement, (CAD) Coronary Artery Disease, (CDT) Clock-Drawing Test, (CGA) Comprehensive Geriatric Assessment, (Das) Decision Aids, (DRMT) Delayed Recall Memory Test, (DSST) Digit-Symbol Substitution Test, (EQ-D5) EuroQol 5-Dimension,(GARS-4) Groningen Activity Restriction Scale, (HCP) Health Care Provider, (HSCPs) Health and Social Care Professionals, (IADL) Instrumental Activities of Daily Living, (IC) Informal Caregivers, (IRMT) Immediate Recall Memory Test, (KATZ Scale) Katz Index of Independence in Activities of Daily Living, (MCC) Multiple Chronic Conditions, (MMSE) Mini-Mental State Examination, (MoCA) Montreal Cognitive Assessment, (NYHA) New York Heart Association, (NEADL) Nottingham Extended ADL Scale, (OPT) Outcome Prioritization Tool, (PtDAs) patient decision aids, (RBANS) Repeatable Battery for the Assessment of Neuropsychological Status, (RVIT) Recognition of Verbal Information Tt, (SAVR) Surgical Aortic Valve Replacement, (sAS) Severe Aortic Stenosis, (SDM) Shared Decision Making, (SPPB) Short Physical Performance Battery, (SKT) Stroke Knowledge Test, (STS) Society of Thoracic Surgeons, (TAVI) Transcatheter Aortic Valve Implantation, (TMT) Trail Making Test, (VHD) Valvular Heart Disease.

Appendix B
AMSTAR 2 Table for Included Systematic Reviews

AMSTAR 2 Criteria	Bosco et al., 2019	Harris et al., 2024	Khan et al., 2018	Lai et al., 2015	Pel-Little et al., 2021
Did the research questions and inclusion criteria for the review include the components of PICO?	Yes	Yes	Yes	Yes	Yes
Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?	No	Yes	Partial Yes	No	Yes
Did the review authors explain their selection of the study designs for inclusion in the review?	Yes	Yes	Yes	Yes	Yes
Did the review authors use a comprehensive literature search strategy?	Yes	Yes	Yes	Partial Yes	Partial Yes
Did the review authors perform study selection in duplicate?	Yes	Yes	Yes	Yes	Yes
Did the review authors perform data extraction in duplicate?	Yes	Yes	Yes	Yes	Yes
Did the review authors provide a list of excluded studies and justify the exclusions?	Partial Yes	Yes	Yes	Partial Yes	Partial Yes

Did the review authors describe the included studies in adequate detail?	Yes	Yes	Yes	Yes	Yes
Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	Partial Yes	Partial Yes	Yes	Partial Yes	Partial Yes
Did the review authors report on the sources of funding for the studies included in the review?	No	Yes	Yes	No	Yes
If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?	N/A	Yes	Yes	N/A	N/A
If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	N/A	Yes	Yes	N/A	N/A
Did the review authors account for RoB in individual studies when interpreting/ discussing the results of the review?	No	Yes	Yes	Yes	Yes
Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	No	Yes	Yes	Yes	No
If they performed quantitative synthesis did the review authors carry out an adequate	N/A	Yes	Yes	N/A	N/A

investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?					
Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?	Yes	Yes	Yes	Yes	Yes
AMSTAR 2 Rating					
Overall rating	Low	Low	Moderate	Low	Low

Note. Detailed AMSTAR 2 assessments for each included systematic review are available upon request.

Appendix C
Standards for Reporting Qualitative Research

Standards for Reporting Qualitative Research (SRQR)

Title/Abstract

Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	Title Page.
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	Abstract, pg. iv.

Introduction

Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	Background, pg. 11-22.
Purpose or research question - Purpose of the study and specific objectives or questions	Background, pg. 22.

Methods

Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	Methods, pg. 60-65.
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	Methods, pg. 62-63.

Context - Setting/site and salient contextual factors; rationale**	Methods, pg. 65-66.
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	Methods, pg. 65-37.
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	Methods, pg. 70.
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	Methods, 67-68.
Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	Methods, pg. 67-68.
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	Results, pg. 84-85.
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	Methods, pg. 68-69.
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	Methods, pg. 68-70.
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	Methods, pg. 70-71.

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	Results, pg. 76-95.
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Results, pg. 76-95.

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	Discussion, pg. 104-118.
Limitations - Trustworthiness and limitations of findings	Discussion, pg. 116-117.

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	N/A.
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	Acknowledgements, pg.iii.

Appendix D
SEEK-AS Interview Guide

Focus group/Interview guide for Health Care Workers
Shared Decision Making for Aortic Stenosis: Implementation of a Patient Decision Aid (SEEK-AS)

My name is _____, and I am a researcher at the University of British Columbia. This is _____, a research team member who will be taking notes during the session. This session will take around 30-40 minutes. Please help yourself to the food and beverages available.

Housekeeping items: location of washrooms, fire exits, etc.

Just a reminder that your participation is completely voluntary, which means you are free to leave the interview/focus group at any point, and your participation will not affect your employment/the care you receive. We will be audio recording this session to ensure we don't miss anything you tell us. While the study team will take precautions to protect your confidentiality, we cannot guarantee that other focus group members will respect your privacy or keep the discussion of the group confidential. Notes from this focus group and the recordings and transcripts will be kept in a locked cabinet and in a password-protected folder on the computer. In the reports that will follow we will be using individual quotes, but we will not identify anyone by name.

We ask that you please keep the discussion we have here today completely confidential and that you do not discuss the names of other participants or their experiences outside this room.

Any questions?

Shared decision-making (SDM) is becoming increasingly important in heart valve disease, where patients play an active role in their healthcare choices, and the focus is on the patient's needs. Healthcare practitioners guide patients and their families, ensuring they understand their condition and options, consider what matters most to them, and receive support in their decisions about their care. To assist in the SDM process, patient decision-making aids have been developed by both our research team and other health care agencies. Patient decision aids are especially valuable when a patient's personal priorities need to be factored into the decision-making process. These aids give patients detailed information about their options, including the risks and benefits of each, and help them clarify their own values and preferences in relation to the different choices available.

Today we would like to learn more about your thoughts and experiences with SDM. We will also share with you some patient decision-making tools.

We seek to understand how SDM is understood and applied in the context of severe AS, and the factors that influence its implementation (or not). We define SDM as a process that involves an individualized, intentional, and bidirectional exchange among patients, family, and healthcare providers that integrates the best available evidence about treatment options, patient's preferences, values, and priorities to reach a high-quality consensus treatment decision. SDM ensures that patients are invited to participate in the decision-making process, that they are adequately informed about the treatment options they face, that their preferences are elicited, and that their priorities are integrated into treatment recommendations. This process can be facilitated by patient decision aids, tools that make explicit decisions and present available options in a balanced manner.

The time is ripe for SDM in aortic stenosis treatment:

- emerging equipoise of the safety and efficacy of the two modalities based on recent trials conducted across the spectrum of surgical risk. Further, AVI may not be an option for some people who are excessively frail and/or burdened with multiple comorbidities and would be better served with a transition to a palliative approach.
- Endorsement of SDM in national and international valvular heart disease management clinical practice guidelines
- increasingly integrated in health policy, including changes in funding models supporting bundles of care rather than procedure-based funding

Current processes- Individual

- In your practice, what do the conversations with patients and families with severe aortic stenosis look like
- By the time the patients reach you in your clinic, are you having conversations about choice between various treatment options?
- At what point of the patient's trajectory do choice awareness conversations happen – if at all? (example at the time of diagnosis or at the time of referral)
- Do you integrate content about stroke, cognitive impairment, and delirium in your conversations with patients? For example:
    - How do you and your team consider or raise patient's cognitive status when discussing AS treatment options?
    - How do you talk with patients about their risk of stroke?
    - What other members of the healthcare team are typically involved in these conversations?

Current processes- Team

- In thinking about your team's workflow, are principles of shared decision-making evident?
- How do you build an environment within your team and organization that supports SDM?
    - Prompt: What challenges do you face in implementing a true to form SDM approach in the context of aortic stenosis management?

    - Prompt: Is there anything in place that supports it? Makes it easy to do?

- How well does SDM and decision support interventions fit with the culture, values and norms of your team at your organization?
- Do you think incentives could help promote the implementation of SDM in clinical practice? If so, what could they be?
- What resources would you count on?
- Who are the key people who need to get on board with implementing a shared decision-making approach for severe aortic stenosis in this hospital and the community? Why are they important? What strategies do you think would work to engage these people?

Characteristics of the intervention

Shared decision-making includes several implementation strategies. These include health care training, patient activation strategies, patient decision aids, decision coaching, built-in evaluation, and coproduction of interventions. The following questions pertain to how SDM as an intervention could influence patients with valvular heart disease.

- In your view, is there value to SDM and patient decision aids to support patients with Aortic stenosis?
- Looking at these patient decision aids we have shared, how different are these tools compared with resources you have used with patients at your organization?
- Do you see any advantages to using the patient decision aids compared to existing resources/processes?
- Do you see any disadvantages to using the patient decision aids compared to existing resources or processes?
- In your view, what would be needed to implement SDM approach in the AS workflow?

Current Process- Outer Setting

- What role or influence do external policies and incentives play in the success of implementing SDM for the treatment of aortic stenosis?
- In your view, how well does SDM fit with the culture of the healthcare system in this province?

Other

- What worries you? / What concerns do you have?
- What barriers/challenges do you think patients and families will face with SDM and using patient decision aids?
- What barriers/challenges do health care professionals face when using them?
- Overall, what do you think of the value of SDM and the PDAs for aortic stenosis?
- Is there anything else you would like to share?
- Is there anyone you could suggest for us to connect with who might offer additional valuable insights for this study?

Appendix E
Sociodemographic Survey for HCP Participants

Shared Decision Making for Aortic Stenosis: Implementation of a Patient Decision Aid

Sociodemographic Questionnaires

Sociodemographic Questionnaire for Healthcare Professionals/Administrators

STUDY ID	
Healthcare Professionals / Senior Administrators	Responses
1. Age (in years)	☐18-29 years ☐30-39 years ☐40-49 years ☐50-59 years ☐60-69 years ☐70+ years
2. Sex	☐Female ☐Male ☐Prefer not to disclose
3. Which category best describes your ethnicity / cultural heritage? Please check one only.	☐Asian / Oriental / Pacific Islands ☐Black North American / African / Caribbean ☐Caucasian / White ☐Chinese ☐East Indian ☐First Nation / Inuit / Metis / Aboriginal ☐Japanese ☐Korean ☐Latin American ☐South Asian (e.g. Pakistani, Sri Lankan) ☐Southeast Asian (e.g. Cambodian, Indonesian, Vietnamese) ☐West Asian (e.g. Afghan, Iranian) ☐Other. Please specify: _____
4. Level of education	☐Some College or University ☐University degree ☐Post Graduate University degree

	☐Other. Please specify: _____
5. Your role at [Organization]	☐Cardiologist ☐Electrophysiologist ☐General Practitioner ☐Registered Nurse / Advanced Practice Nurse ☐Other. Please specify: _____
6. How many years have you worked in this role?	☐≤5 years ☐6 - 10 years ☐11 - 15 years ☐≥ 16 years
7. How many years have you provided care for patients with aortic stenosis?	☐≤5 years ☐6 - 10 years ☐11 - 15 years ☐≥ 16 years
8. How many years have you worked at this [organization]?	☐≤5 years ☐6 - 10 years ☐11 - 15 years ☐≥ 16 years
9. Do you hold a senior health care administrative position?	☐No ☐Yes
10. Current employment status	☐Full time ☐Part Time ☐Casual
11. Have you ever used or referred your patients or their family to a patient decision aid when facing any health decisions?	☐No ☐Yes
12. Have you ever used or referred your patients or their family to a patient decision aid when facing aortic stenosis treatment decisions?	☐No ☐Yes

Appendix F
Data Analysis Tool

Aim of the study: To explore how HCPs consider cognition when making treatment decisions with patients with AS and their families.

Study research questions:

1. To explore how a patient's cognitive status is considered and integrated into the decision-making process, from the perspective of HCPs working with aortic stenosis patients.
2. To explore the strategies HCPs, use to assess and manage cognition when making AS treatment decisions.
3. To explore the role of the nurse in this process.

Theoretical Frameworks:

1. The Interprofessional Shared Decision-Making (IP-SDM) Model
2. The Cognitive Continuum Theory (CCT)

The purpose of this data analysis tool is to support the interpretation of extracted data by grounding findings within the conceptual framework of the IP-SDM Model and CCT. The 5W Overview Table serves as an initial, high-level summary of each transcript, enabling reviewers to develop a broad understanding of the context and key elements before proceeding to a more detailed examination using the Concept Table.

5W General Overview Table

**These are high-level questions to be used as a base for the concepts in the table below. Not expecting in-depth responses to each W.*

WHO Who is involved (i.e. heart team members, allied health, other HCPS, family, etc.). - What is the role of nursing? What is the degree to which they are valued?	
WHAT What method of treatment decision-making is integrated into the care of patients with AS (i.e. SDM, paternalistic, etc.)	
WHEN When in the trajectory of the patient journey for AS treatment, does decision-making take place?	
WHERE Where are patients with AS being assessed, treated, and followed up? (i.e. clinic models, referral process, etc.)	
WHY What drives (if stated) the HCP(s) process for treatment decision-making for patients with AS?	

Concept Table

Concepts	**From the HCPs' perspectives**	**Supporting quotations**	**Notes/Reflections**
Aortic Stenosis and Cognition ***Definition:*** The association between aortic valve obstruction and changes in cognitive function	Does the HCP mention: a) Relationship of AS and cognition (e.g. hypo-perfusion, comorbidities, age-related factors, etc.)? b) Types of cognitive assessments/approach completed for evaluation (i.e. MMSE, MoCA, questions asked, etc.)? c) How is cognition explicitly addressed with this patient population? d) Role of frailty in assessment of treatment eligibility?		
Cognition and Shared decision-making ***Definition:*** How an individual's cognitive abilities influence their understanding, reasoning, and participation in collaborative healthcare decisions.	Does the HCP speak on: a) Patient's ability to consent to treatment? b) How cognition influences treatment options/eligibility? c) Communication techniques/strategies for cognitive impairment and SDM?		

	d) Involving caregivers as partners in SDM or as substitute decision makers? e) Involvement of others not on the Heart Team (i.e. geriatrician, neurologist, etc.)? f) HCP decision making process (intuitive, patient and/or peer aided judgment, critical review of experiential and research evidence, combination, etc.)		