

REVIEW

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Application of family-centered care in cardiac surgery: a scoping review

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Abstract

Background Family-centered care (FCC) has been widely implemented in various medical settings, its application in cardiac surgery remains underexplored. Given the complexity of cardiac surgery and the significant impact on both patients and families, understanding FCC's role in this context is essential to improving patient outcomes and family well-being.

Objectives To identify the current state of the application of FCC in the families of cardiac surgery.

Methods This study followed Arksey and O'Malley's methodology and the PRISMA extension for Scoping Reviews. A systematic search was conducted across ten databases between July and August 2024. Two researchers independently retrieved literature, extracted data, and cross-checked findings following predefined inclusion and exclusion criteria. The results were organized and synthesized using a structured spreadsheet.

Results A total of 23 studies were included, 95.65% of which were quantitative, spanning nine countries. FCC interventions focused on collaboration, communication, negotiation, and support, primarily delivered by healthcare professionals. The main intervention formats were training sessions (100.00%), written materials (71.43%), and visual media (42.86%). FCC was linked to improved psychological well-being and greater satisfaction, with anxiety (52.38%) being the most commonly assessed outcome using validated scales. Qualitative findings highlighted the importance of FCC in patient recovery, emphasizing the need for systematic support to alleviate caregiving burden.

Conclusions This scoping review highlights the core characteristics and interventions of FCC for cardiac surgery patients, emphasizing the need for a multidisciplinary approach. While FCC has shown benefits in improving emotional well-being and satisfaction, there is a lack of robust longitudinal studies and objective outcome measures. Future research should focus on interactive, personalized interventions, integrate technology, and include a broader range of outcome indicators to better assess FCC's clinical effectiveness.

Keywords Family-centered care, Cardiac surgery, Scoping review

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Background

Despite the global decline in age-standardized cardiovascular disease (CVD) mortality rates, the absolute number of cardiovascular-related deaths has risen significantly [1]. In 2022 alone, CVD caused an estimated 19.8 million deaths worldwide, corresponding to 44.9 million years lived with disability [2]. Surgery remains a primary intervention for heart disease, especially when medication and other non-surgical approaches prove ineffective or insufficient. However, due to the complexity of the procedures, patient health conditions, and the quality of post-operative care, cardiac surgery patients still face varying risks of developing complications, such as neurological and digestive system issues. These complications impose a substantial burden on families and strain healthcare resources [3,4].

Family-centered care (FCC) is a healthcare approach that respects and responds to the unique needs and values of families [5]. By prioritizing family involvement, FCC seeks to improve care quality, mental health, clinical outcomes, and the overall experience for both patients and their families. Family-centered care has been implemented in various fields, including pediatrics [6], adult intensive care units (ICU) [7], and surgery [8]. There is increasing recognition that families are integral members of the healthcare team, playing a crucial role in the health and well-being of their loved ones. Growing evidence indicates that FCC can strengthen family functioning, enhance satisfaction with care, and reduce healthcare costs [7,9,10].

For cardiac surgery patients, the long progression of illness often affects family members as much as the patients themselves. Collaborative interventions are thus critical to achieving positive outcomes [11]. FCC has been implemented in various cardiac procedures, including coronary artery bypass grafting (CABG) and valve replacement, across different demographic groups and clinical scenarios [12,13]. FCC interventions typically involve structured communication with family members, shared decision-making (SDM), and tailored educational support. For example, Lin et al. reported that FCC strategies, such as bedside family presence and enhanced caregiver education, reduced delirium incidence and ICU stays among valve surgery patients [8]. Similarly, Jafarnejad et al. demonstrated that virtual training sessions and peer support groups for family caregivers significantly alleviated caregiving burdens in pediatric cardiac surgery [14]. These findings highlight FCC's potential to address both clinical and emotional dimensions of cardiac care, making it increasingly relevant to patients and families alike. Other common FCC activities include scheduled multidisciplinary team meetings with

family members, personalized discharge planning, and the use of digital platforms to facilitate ongoing communication and emotional support [5,8,14]. The approach's widespread acceptance stems from its ability to respect family values and preferences while providing comprehensive social and emotional support [5].

However, despite growing interest in FCC, the evidence surrounding its applications in cardiac surgery remains fragmented. Existing studies vary widely in intervention design, target populations, and outcome measures, making it challenging to establish standardized FCC protocols in cardiac surgery settings [8,12,14]. A scoping review was assessed as the most applicable, aiming to map existing evidence, identify heterogeneity, and provide information for updating knowledge and practice in relevant fields [15]. This review aims to provide an overview of FCC applications in cardiac surgery, examine the features of existing interventions, and compare outcome measures. The goal is to enable healthcare professionals to leverage FCC more effectively in cardiac surgery through refined strategies.

Methods

Scoping review is a method for knowledge synthesis and evidence identification based on the principles of evidence-based practice. This study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses, extension for Scoping Reviews (PRISMA-ScR) guidelines (Supplementary material 1) [16]. We used Arksey and Malley's five stage framework to ensure the clarity of purposes and results of the review [17]. The research was registered on the Open Science Framework (<https://doi.org/10.17605/OSF.IO/KEWNJ>).

Stage 1: identifying the research questions

This review was guided by the research question, "What is known about FCC as a health intervention for cardiac surgery?" The sub-questions are:

- (1) Which attributes of FCC are included in the included studies?
- (2) What are the key characteristics of the FCC interventions?
- (3) What health and well-being outcomes are reported in the literature investigating FCC interventions, and how are these outcomes measured?

Stage 2: identifying relevant studies

The research team collaborated with a health-specialized librarian to develop a comprehensive search strategy through group discussions. Keyword selection

included two concepts (Family-Centered Care and Cardiac Surgery) coupled with different synonyms. The initial search was conducted in PubMed and Web of Science databases. Text words and index terms in the titles and abstracts of retrieved papers were analyzed. All identified key terms were subsequently used to search CINAHL, Cochrane Library, Embase, ProQuest, PsycInfo, CNKI, Wanfang, Vipp database. The search strategy was adjusted as needed to improve its comprehensiveness and accuracy. The retrieval period spanned from the establishment of each database to July 10, 2024. Additional file 1 provides the specific search strategy.

Stage 3: study selection

To be included, the studies had to meet the following inclusion criteria according to PCC framework. (1) Participants: FCC focuses on the family as the unit of care. This study included cardiac surgery patients and their family members, without age restrictions. (2) Concept: studies were included if they involved any form of FCC. FCC is a nursing model that recognizes the family as an essential partner in the care process, emphasizing respect, effective communication, and collaboration to address the diverse needs of both patients and their families comprehensively [5]. Strategies for delivering FCC typically included open family presence at the bedside, regular and structured communication with family members, and multidisciplinary support [18]. (3) Context: FCC applications occurred in various settings, including homes, hospitals, and other relevant environments. Eligible study designs included quantitative, qualitative, and mixed-methods approaches. Articles were required to be written in Chinese or English. Exclusion criteria: (1) reviews, systematic reviews, and other non-original studies; (2) studies for which the full text was unavailable, conference papers, and study protocols; and (3) duplicate publications.

We managed references using Zotero software and removed duplicate records. Two reviewers independently screened the remaining titles and abstracts, and studies meeting the inclusion criteria underwent further full-text review. Discrepancies during the screening phase were resolved through discussion, with a third reviewer making the final decision if necessary (see Fig. 1 for the PRISMA flow chart). Two reviewers thoroughly reviewed 23 studies to capture all relevant information and ensure no critical content was missed. A quality assessment of the studies was not performed, as scoping reviews do not aim to evaluate the robustness or generalizability of findings.

Stage 4: charting the data

D.Z. and H.Y.Z. collaboratively designed a charting framework to guide the extraction of key background information from each study. This framework included general information (e.g., authors, country, year); methods (e.g., study design, outcome measures); participants (e.g., number, age, demographic characteristics); main findings; and any other special information. Discrepancies in the extracted data were resolved through discussion until consensus was reached. Y.R.Z. independently reviewed all extracted data to ensure accuracy.

Stage 5: collating, summarizing, and reporting the results

The research team conducted an iterative data summarization process, utilizing descriptive analysis for quantitative data and thematic analysis for qualitative data. Descriptive analysis was employed to summarize study characteristics, including intervention types and key outcomes, while thematic analysis focused on the key attributes, specific contents and intervention characteristics of FCC in the studies included. NVivo software facilitated systematic coding and organization of qualitative data. Z.D. and Z.H.Y. performed line-by-line coding based on predefined research questions, categorizing initial codes into broader themes. Discrepancies were resolved through regular meetings, and final themes were validated through team discussions and cross-referencing with the extracted data.

Results

Basic characteristics of the included studies

We included a total of 23 studies in our review: 22 quantitative (95.65%) and 1 qualitative (4.35%), with a combined total of 1624 participants [8,12–14,19–37]. Six studies were conducted in China (26.09%), six in Iran (26.09%), three in the United States (13.04%), two in Turkey (8.70%), two in Canada (8.70%), and one each in South Korea (4.35%), Northern Ireland (4.35%), Sweden (4.35%), and Spain (4.35%). Notably, 11 of these studies (47.83%) were published after 2021. Seven (30.43%) studies have explored the application of FCC in patients with coronary artery disease (CAD). Table 1 provides an overview of the key characteristics of the included studies.

The FCC attributes involved in included studies

FCC is a care model based on a collaborative relationship between healthcare providers, patients, and their families or caregivers. The attributes of FCC can be grouped into four areas: collaboration, communication, negotiation, and support [11]. A total of 21 studies (91.30%) included interventions involving these FCC attributes [8,12–14,19,21–32,34–37], although the specific content varied.

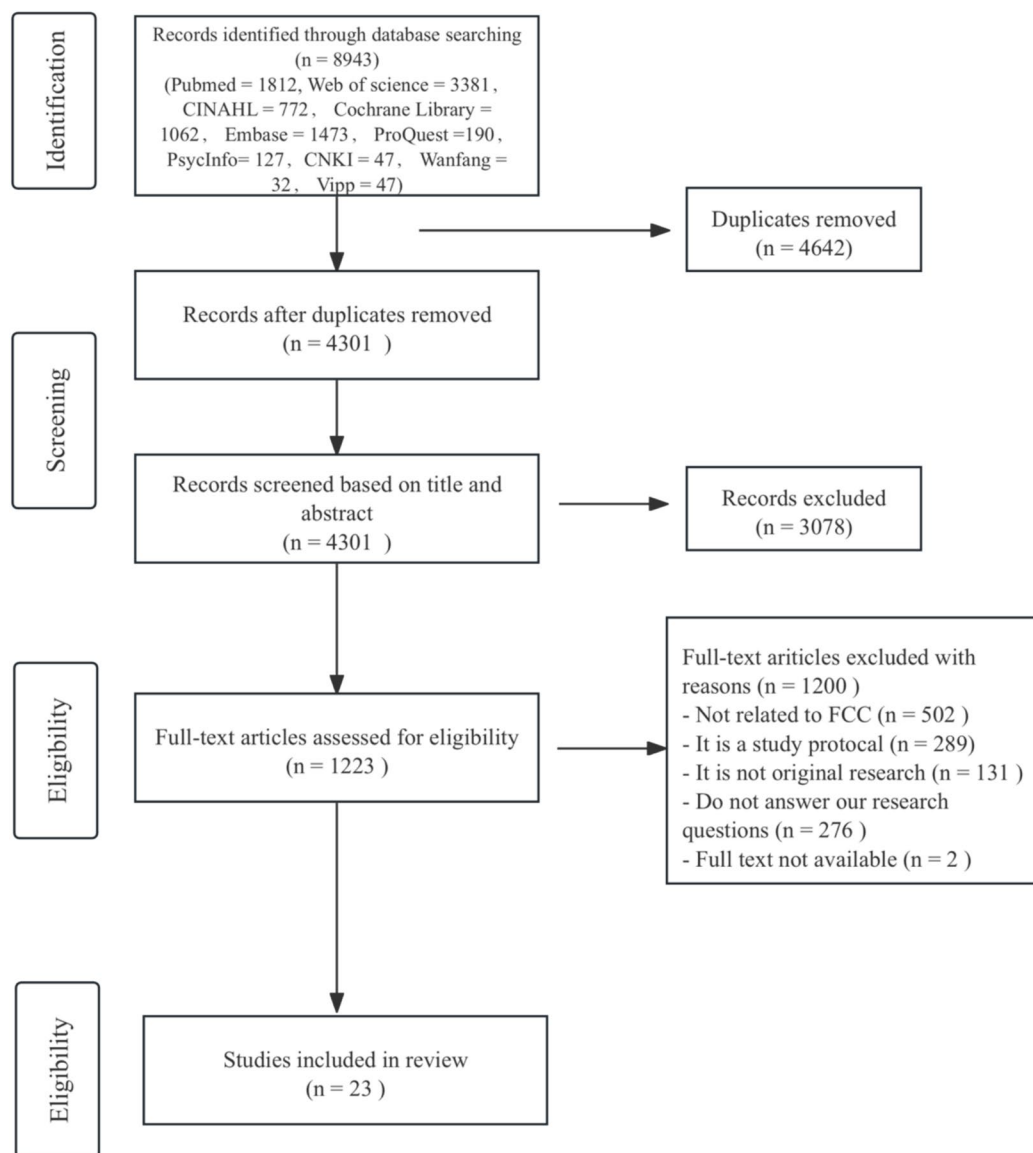


Fig. 1 PRISMA flow chart

The core of FCC lies in establishing a mutually beneficial partnership between families and healthcare providers [6]. This model emphasizes systematic and close communication to optimize information exchange and achieve collaborative success. Consequently, the principles of “family-centeredness,” “information sharing,” “knowledge-sharing,” “educating the family,” “Respect,” and “informal and formal support” are integral to FCC interventions (100%). In addition, 13 studies (56.52%) focused on interpersonal relationships and assessing family needs. Table 2 outlines the specific FCC attributes addressed in the included studies.

The characteristics of an intervention protocol

Twenty-one studies (91.30%) provided detailed descriptions of FCC interventions (Additional file 2) [8,12–14,19,21–32,34–37]. The primary interveners included nurses, doctors, researchers, social workers, information support staff, and physiotherapists. The study participants included both adults and children, with sample sizes ranging from 20 to 144. Outcomes were measured at multiple timepoints, with a maximum of seven measurements. Due to significant heterogeneity in sample characteristics, we did not conduct a meta-analysis of the results. Most studies reported that FCC interventions

Table 1 Basic characteristics of studies ($n = 23$)

First author/year/country	Aims of study	Methodology	Sample size (males/females)	Funding
Lenz ER, 2000, United States of America	To evaluate the impact of FCC intervention on CABG surgery patients and their families	Quasi-experiment study	Unclear	Yes
Gu Ying, 2008, China	To explore the impact of FCC on patients and parents	Quasi-experiment study	64/39	Unclear
Young LE, 2010, Canada	To describe the impact of social processes within the family and between the family and health-care providers on the health of family caregivers and the family unit	Constructivist grounded theory approach	The total sample size was 27	Unclear
Lawrence KS, 2011, United States of America	To assess patients' and parents' knowledge about critical aspects of heart transplantation and the treatment regimen before and after they received the FCC	Quasi-experiment study	Patients: 12/8	Yes
McCusker CG, 2012, Northern Ireland	To evaluate the impact of the CHD Intervention Programme–School study on children and families	RCT	44/24	Yes
Ågren S, 2015, Sweden	To evaluate the impact of FCC intervention on caregiver burden in partners of patients with postoperative heart failure	RCT	42/42	Unclear
Ni Z, 2016, China	To assess the effectiveness of an empowerment health education program in enhancing caregiving skills and self-efficacy among parents of children with CHD	Quasi-experiment study	Unclear	Yes
Feng Fangfang, 2016, China	To explore the impact of FCC on patients and parents	Quasi-experiment study	60/40	Unclear
Zhang Zheng, 2017, China	To explore the application and effects of FCC in children undergoing interventional occlusion for CHD	RCT	44/36	Yes
Eghbali-Babadi M, 2017, Iran	To evaluate the impact of family participation in ICU patient care on the incidence of delirium	RCT	44/24	Yes
Mailhot T, 2017, Canada	To determine the effect of a nursing intervention involving FCC in delirium management following cardiac surgery	RCT	Unclear	Yes
Abedini F, 2020, Iran	To investigate the effects of the family-centered empowerment model on self-efficacy and self-esteem among the family caregivers of patients with prosthetic heart valve	Quasi-experiment study	17/21	Yes
Bahramnezhad F, 2021, Iran	To determine the effect of partnership-based education on adherence to the treatment plans in open heart surgery	Quasi-experiment study	58/28	Yes
Nouri JM, 2021, Iran	To determine the effect of the FCC on anxiety and agitation in patients undergoing CABG	RCT	52/18	None
Koyuncu A, 2021, Turkey	To investigate the effect of FCC intervention in ICU on patients' stress response after CABG	Quasi-experiment study	56/17	Yes
Yoo HJ, 2021, South Korea	To assess the impact of FCC interventions on ICU patient family members	Quasi-experiment study	22/34	Unclear
LaRonde MP, 2022, United States of America	To determine the status of individualized FCC for infants with congenital heart disease	Cross-sectional Study	The total sample size was 25. (Nurses at each participating center)	Yes

Table 1 (continued)

First author/year/country	Aims of study	Methodology	Sample size (males/females)	Funding
González-Martín S, 2022, Spain	To evaluate the effects of the relatives' visit prior to hospital admission(s) on the patient's scheduled cardiac surgery	RCT	18/20	Unclear
Jafarnejad S, 2022, Iran	To determine the effects of a FCC program on anxiety and care burden among the parents of children undergoing heart transplantation	RCT	17/33	Unclear
Lin L, 2023, China	To investigate the effects of FCC intervention on the ICU prognoses of patients undergoing cardiac valve surgery	RCT	Patients: 48/32 Parents: 34/46	Yes
Hao X, 2023, China	To evaluate the impact of FCC interventions on perioperative patients receiving coronary interventional therapy	RCT	59/41	Yes
Yuruk E, 2024, Turkey	To investigate the effectiveness of family-centered personalized nutrition training on the growth and development of children with CHD	RCT	22/20	Unclear
Lotfalipoor R, 2024, Iran	To determine the effect of FCC on anxiety levels among family members of patients undergoing cardiac surgery	RCT	56/88	None

IG Intervention Group, *CG* Control Group, *CHD* Congenital Heart Disease, *RCT* Randomized controlled trial, *CABG* Coronary artery bypass grafting

Table 2 Key attributes and specific contents of FCC in included studies ($n = 21$)

Key attributes	Specific contents	Number of cases	Percentage (%)
Collaboration	Partnership	21	100.00
	Family-centeredness	11	52.38
	Empowerment	21	100.00
	Dignity	5	23.81
	Respect	3	14.29
	Interpersonal relationships	21	100.00
		13	61.90
Communication	Information-sharing	21	100.00
	Choices	21	100.00
	Participate in shared decision-making	5	23.81
		6	28.57
Negotiation		21	100.00
	Knowledge-sharing	21	100.00
	Educating the family	21	100.00
	Building confidence	21	85.71
	Sharing expectations of roles and responsibilities	11	52.38
	Assessment of families' needs	8	38.10
	Holistic and individualized care	13	61.90
		12	57.14
Support		21	100.00
	Adapting care to family background	21	100.00
	Providing care in the context of the family and community	12	57.14
	Informal and formal support	6	28.57
	Socio-emotional support	21	100.00
		18	85.71

improved psychological well-being and increased satisfaction levels.

The 21 intervention programs (91.30%) [8,12–14,19,21–32,34–37] reviewed exhibit characteristics of standardized procedures, personalized interventions,

dynamic feedback mechanisms, comprehensive and scientifically sound content, and diverse forms of delivery. Table 3 contains specific content. The studies included ICU patients undergoing cardiac surgery, with family-centered care primarily focusing on family visits and

Table 3 Intervention characteristics of FCC

Intervention characteristics	Number of cases	Percentage (%)
Standardized procedures	21	100.00
Conduct comprehensive practitioner training	21	100.00
Define clear objectives and standard operating procedures	15	71.43
Standardized assessment tools and methods	21	100.00
Maintain consistent communication protocols	1	4.76
Personalized interventions	19	90.48
Perform personalized assessments and design targeted interventions	11	52.38
Implement phased interventions aligned	16	76.19
Dynamic feedback mechanisms	21	100.00
Conduct regular evaluations of intervention effectiveness	21	100.00
Modify intervention strategies based on feedback	12	57.14
Comprehensive and scientifically sound content	21	100.00
Provide comprehensive psychological and physiological support	21	100.00
Deliver essential information on surgical procedures and rehabilitation plans	21	100.00
Offer knowledge based on evidence	3	14.29
Support from a multidisciplinary team	4	19.05
Diverse forms of interventions	21	100.00
Written educational materials	15	71.43
Diary	1	4.76
Booklet	14	66.67
Illustrated guides	3	14.29
Educational cards	1	4.76
Visual media materials	9	42.86
Surgical procedure videos	2	9.52
Educational instructional videos	5	23.81
Photo album	4	19.05
Educational slides	1	4.76
Animated films	3	14.29
Physical educational materials	4	19.05
Models (e.g., heart models)	4	19.05
Stethoscope	1	4.76
Online information resources	1	4.76
Website	1	4.76
Database	1	4.76
Training	21	100.00
Individual session	21	100.00
Lectures and seminars	5	23.81
On-site demonstration	2	9.52
Training courses	3	14.29
Group discussions	2	9.52
Simulations	2	9.52
Telephone calls	3	14.29

companionship. Consequently, not all interventions were personalized (90.48%). The intervention forms mainly included written educational materials (71.43%), visual media materials (42.86%), physical educational aids (19.05%), online information resources (4.76%), and training sessions (100.00%). Effective FCC necessitates high levels of interaction and communication to understand and address the emotional and practical needs of families. All studies promoted family-centered care in clinical practice through individual sessions. However, some challenges, such as technical barriers, information overload, and trust issues between humans and machines, may hinder the effective use of online information resources [12,21,22,32].

Key indicators and assessment tools

The 21 included studies (91.03%) [8,12–14,19,21–32,34–37] measured outcomes such as physical health status (23.81%), neuropsychological indicators (76.19%), behavioral indicators (38.10%), service satisfaction indicators (33.33%), education and knowledge indicators (14.29%), family functioning (23.81%), and other metrics (14.29%). Anxiety (52.38%) was the most commonly assessed outcome for evaluating the effectiveness of family-centered care, using tools such as the Visual Analog Scale (VAS), the Hospital Anxiety and Depression Scale (HADS), and the Beck Anxiety Inventory (BAI). Family satisfaction (23.81%) was the second most frequently assessed outcome. Detailed information is provided in Table 4.

Discussion

This scoping review is the first to examine the application of FCC for cardiac surgery patients. The findings highlight the core characteristics of FCC, key intervention points, and outcome indicators, providing valuable insights for the future development of this field. Studies predominantly originate from China and Iran, where diverse intervention strategies, including standardized, personalized, and dynamic approaches, aim to benefit both patients and their families. However, despite the substantial population of cardiac surgery patients, there is a limited number of studies validating the current application of FCC and reporting patient outcomes.

In the reviewed studies, FCC was applied to various cardiovascular conditions, including CAD and valvular heart disease (VHD), with interventions facilitated by multidisciplinary healthcare professionals. Notably, only four studies mentioned the involvement of psychologists, physiotherapists, and other specialists—an important gap, given FCC's multifaceted nature [21–23,37]. Effective FCC interventions require a comprehensive multidisciplinary team, including healthcare providers, IT specialists, psychologists, physiotherapists, and other

professionals tailored to FCC's specific needs. The limited integration of these specialists may undermine the holistic support FCC aims to provide. Future research should focus on defining the optimal team composition, clarifying roles, and establishing evidence-based guidelines to ensure FCC interventions comprehensively address both medical and psychosocial aspects of patient and family care.

Family engagement plays a crucial role in enhancing prognostic awareness (PA) within FCC, especially in cardiovascular clinical contexts, where complex, time-sensitive decisions are required [38,39]. Effective FCC hinges on structured communication frameworks that standardize family–clinician interactions, including scheduled meetings, decision aids, and digital health solutions (e.g., patient portals), to mitigate barriers such as medical jargon, fragmented updates, and workflow constraints [40]. These protocols not only operationalize SDM but also enhance clinical communication fidelity, enabling families to act as dynamic intermediaries who contextualize medical information and buffer patient distress [39]. Moreover, caregivers are essential in ensuring that patients' values are reflected in decision-making, particularly in high-stakes scenarios [41]. Their involvement also requires cultural and linguistic competence from healthcare providers to ensure that communication is inclusive and accessible. By systematically integrating family-mediated values into prognostic discussions, clinicians foster informed consensus that bridges therapeutic realities with patient-centered outcomes [41].

This study confirms FCC as a multidimensional intervention addressing both biomedical and psychosocial needs in surgical populations, particularly in mitigating perioperative moral and spiritual distress—a critical yet understudied dimension of high-risk surgical care [32,36,42]. While FCC frameworks universally prioritize collaborative communication and tailored education to enhance emotional well-being and quality of life [8,14,19,26,28,30–32,34,35,37], their capacity to alleviate existential suffering through structured family engagement remains inadequately operationalized in current protocols. Notably, meta-analytic evidence demonstrates FCC's efficacy in improving neurodevelopmental outcomes for preterm infants via family–clinician co-regulation strategies [43], yet comparable mechanisms for resolving value conflicts or spiritual anguish in adults undergoing major surgeries remain unexplored. This gap is exacerbated in cardiac surgery cohorts, where heterogeneous outcome measures and methodological limitations preclude robust synthesis [32,36].

Crucially, families serve not merely as informational intermediaries but as moral agents who contextualize clinical risks within patients' existential frameworks—a

Table 4 Key indicators and assessment tools ($n=21$)

Indicators	Number of cases	Percentage (%)	Evaluation instruments
Physical health status	5	23.81	
Prenatal characteristics	1	4.76	A personal information form
Growth and development information	1	4.76	Ankara Developmental Screening Inventory (AGTE)
Nutritional status	1	4.76	A personal information form
Left ventricular ejection fraction (LVEF)	1	4.76	Medical Equipment
Peripheral oxygen saturation (SpO ₂)	1	4.76	Medical Equipment
New York Heart Association Disease Classification	1	4.76	New York Heart Association Disease Classification
Pain	3	14.29	Visual Analog Scale (VAS), Face Legs Activity Cry Consolability (FLACC)
Serum cortisol level	1	4.76	Blood sample collection
Neuropsychological indicators	16	76.19	
Anxiety	11	52.38	Visual Analog Scale (VAS), Hospital Anxiety and Depression Scale (HADS), Beck Anxiety Inventory (BAI), Faces Anxiety Scale (FAS), The State-Trait Anxiety Inventory state (STAI-S), The Self-Rating Anxiety Scale (SAS), Modified Yale Preoperative Anxiety Scale (mYPAS)
Depression	4	19.05	Hospital Anxiety and Depression Scale (HADS), Center for Epidemiologic Studies Depression Scale (CES-D), The Self-Rating Depression Scale (SDS)
Self-efficacy	2	9.52	General Self-efficacy Scale (GSES), Empowerment Questionnaire
Worry	1	4.76	Maternal Worry Scale
Delirium	3	14.29	Confusion Assessment Method-Intensive Care Unit (CAM-ICU), The Delirium Index (DI)
Sedation and agitation	2	9.52	Richmond Agitation-Sedation Scale (RASS)
Self-esteem	1	4.76	Empowerment Questionnaire
Global emotional distress	1	4.76	Brief Symptom Inventory (BSI), Global Severity Index (GSI)
Behavioral indicators	8	38.10	
Parental caring behaviors	1	4.76	Parental Caring Behaviors Scale (PCBS)
Child behavior	1	4.76	Child Behavior Checklist (CBCL), The Comprehensive Behavior Rating Scale for Children (CBRS)
Functional status	2	9.52	COOP/WONCA Charts, Sickness Impact Profile (SIP)
Sedation and agitation	2	9.52	Richmond Agitation-Sedation Scale (RASS)
Sleep quality	1	4.76	The Pittsburgh Sleep Quality Index (PSQI)
Functional capacity	1	4.76	Activities of Daily Living (ADLs)
Adherence	1	4.76	Modified Treatment Adherence Questionnaire
Days sick from school	1	4.76	An information form
Days absent from school	1	4.76	An information form
Service satisfaction indicators	7	33.33	
Family satisfaction	5	23.81	The Family Satisfaction with Care in the Intensive Care Unit (FS-ICU), Chinese Critical Care Family Satisfaction Survey (C-CCFSS), Client Satisfaction Questionnaire (CSQ-8), Measure of Processes of Care (MPOC), Newcastle Satisfaction with Nursing Scales (NSNS)
Patient Satisfaction	2	9.52	Patient Satisfaction Questionnaire
Education and knowledge indicators	3	14.29	
Knowledge familiarity	2	9.52	Knowledge Scale
Risk perception	1	4.76	Empowerment Questionnaire
Family functioning	5	23.81	
Impact of the illness	3	14.29	The Impact on Family Scale, COOP/WONCA Charts, Event Scale-Revised (IES-R)
Caregiver burden	2	9.52	Zarit Care Questionnaires, The Caregiver Burden Scale (CBS)
Caregiving tasks performed	1	4.76	The Dutch Objective Burden Inventory (DOBI)
Family needs	1	4.76	Critical Care Family Needs Inventory (CCFNI)
Others	3	14.29	

Table 4 (continued)

Indicators	Number of cases	Percentage (%)	Evaluation instruments
Unspecified symptoms and complications	3	14.29	Self-report and Medical Records, etc
Acceptability and feasibility of the intervention	1	4.76	The Treatment Acceptability and Preference Questionnaire (TAPQ)
Length of postoperative hospital stay	1	4.76	Medical Records

function requiring systematic integration into perioperative FCC models to address the dissonance between technical safety and holistic recovery [42]. The timing and context of FCC interventions were identified as critical factors influencing outcomes [32]. Several studies demonstrated that applying FCC during the recovery process significantly enhances the self-efficacy and self-esteem of family caregivers [13,24,32]. Among the studies reviewed [14], measured outcome indicators three times or fewer [8,13,14,21–24,26,29,31,32,34,36,37]. Given FCC’s potential for implementation during hospitalization and post-discharge, more robust longitudinal studies are necessary to validate its effectiveness. Furthermore, the scientific foundation of FCC must be emphasized, as evidence-based support is crucial for validating the effectiveness of these practices.

Several studies in our review utilized FCC as an adjunctive approach to manage symptoms such as delirium and agitation, primarily through family visits [8,27,28]. Traditional approaches to managing ICU delirium have relied on pharmacological interventions, but growing evidence supports FCC as an effective non-pharmacological strategy [44]. Evidence from our review suggests that FCC may reduce the need for sedative medications and decrease the incidence of delirium, potentially attributable to its facilitation of family involvement and provision of emotional support, which contribute to a more comforting and reassuring environment that may help mitigate stress and agitation in patients [45]. In the ICU, patients often perceive themselves as passive participants in complex medical processes, whereas family caregivers play a vital role in communicating with medical staff, providing information, and supporting patients. However, most studies in our review had small sample sizes, which requires careful consideration of the findings. The impact of FCC on medical outcomes, particularly high-risk events such as delirium and infections, remains an area of ongoing investigation.

A major concern is that current interventions predominantly rely on written materials and educational programs. While these approaches are effective for disseminating information, they may not fully meet the practical needs of patients and families. More interactive and personalized interventions could enhance family engagement and improve the overall care experience.

One study employed artificial intelligence (AI) to simulate the voices of family members, creating audio messages tailored to each patient’s medical condition and psychological needs [46]. Patients interacted with the system using voice commands or alternative interfaces suited to their physical and cognitive abilities, resulting in enhanced emotional well-being. This innovative approach highlights the importance of integrating personalization and technology into FCC.

In the reviewed studies, anxiety was the most commonly used outcome indicator, followed by family satisfaction. The variety of outcome indicators and the differing measurement methods pose challenges for data integration. While some evidence indicates improvements in physical and psychological conditions, scale-based surveys are often subject to subjective bias. Only a limited number of studies used objective indicators, such as LVEF and SpO₂, to evaluate FCC’s clinical effectiveness [24]. This highlights the need for a more comprehensive research approach in future studies, incorporating a range of outcome measures across biopsychosocial dimensions. Future studies should also include objective physiological data, continuous monitoring, and tailored support throughout the research process.

Limitations

This study systematically reviewed FCC in cardiac surgery, focusing on research trends and key areas of interest. We identified core characteristics and intervention strategies, offering guidance for future research. However, several limitations should be acknowledged. First, the broad scope and complex search strategies typical of scoping reviews may have led to the omission of relevant studies. Variability in terminology across cultural and academic contexts may also introduce inconsistencies in conceptualization and interpretation. Despite strict adherence to PRISMA–ScR guidelines and the registration of a predefined protocol to enhance rigor and transparency, these challenges persist. Second, the heterogeneity of measurement tools in FCC studies, including subjective self-reports of varying reliability and limited use of objective indicators (e.g., LVEF, SpO₂), complicates data synthesis and comparability. Future research should adopt standardized, integrated measurement approaches to enhance consistency and reliability. Third,

the limited inclusion of qualitative research restricted the depth of psychosocial and existential analysis, while reliance on heterogeneous quantitative data may have introduced interpretive bias. Future studies should prioritize qualitative methodologies to capture nuanced patient and caregiver perspectives and contextual factors influencing FCC implementation and effectiveness. Fourth, we limited our review to English and Chinese literature, primarily due to constraints in time, language proficiency, and resources. We acknowledge that a broader, language-inclusive search might yield more comprehensive results. Finally, we excluded certain publication types due to concerns about clinical applicability, which may have resulted in the omission of relevant research. Future studies could address these gaps by refining search strategies, expanding database coverage, removing language restrictions, and considering a wider range of publication types to uncover additional valuable insights.

Conclusions

We conducted a scoping review of existing literature on FCC in cardiac surgery. Despite the large population undergoing cardiac procedures, research in this area remains limited. In the field of cardiac surgery, FCC can advance through technology-driven service expansion, optimization of standardized clinical practices, and culturally adaptive, individualized interventions. In addition, policy-driven resource integration is essential to supporting its effective implementation. The primary objective is to transition from a disease-centered model to one focused on the “family health ecosystem,” thereby enhancing both patient recovery and family well-being. To solidify the evidence base, future research should focus on standardizing outcome measures, integrating subjective and objective indicators, and exploring the role of artificial intelligence in personalizing and improving FCC interventions.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s40001-025-02415-8>.

Below is the link to the electronic supplementary material. Supplementary file1 (DOCX 67 KB)

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Author contributions

Study design: D.Z., Y.R.Z., and H.Y.Z.; Literature searching: Y.Z. (Author 5) and X.Y.Y.; Quality appraisal: D.Z., Y.Z. (Author 5), X.Y.Y., and Y.Z. (Author 8); Data extraction: D.Z. and H.Y.Z.; Study supervision: Y.G., Y.R.Z., and Z.L.C.; Manuscript drafting: D.Z., H.Y.Z., and X.C.C.; Critical revisions for important intellectual content: W.C.C. and Y.R.Z.

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Availability of data and materials

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

This scoping review used data from published studies, and thus, ethical approval and consent to participate were not required.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

- Mensah GA, Fuster V, Roth GA. A heart-healthy and stroke-free world: using data to inform global action. *J Am Coll Cardiol*. 2023;82(25):2343–9.
- Mensah GA, Fuster V, Murray CJL, Roth GA, Global Burden of Cardiovascular Diseases and Risks Collaborators. Global Burden of Cardiovascular Diseases and Risks, 1990–2022. *J Am Coll Cardiol*. 2023;82(25):2350–473.
- Semrau JS, Motamed M, Ross-White A, Boyd JG. Cerebral oximetry and preventing neurological complication post-cardiac surgery: a systematic review. *Eur J Cardiothorac Surg*. 2021;59(6):1144–54.
- Landolfo K, Belli E. Secondary sclerosing cholangitis following cardiac surgery: an uncommon but deadly gastrointestinal complication. *J Thorac Cardiovasc Surg*. 2017;154(3):913–4.
- Davidson JE, Aslakson RA, Long AC, et al. Guidelines for family-centered care in the neonatal, pediatric, and adult ICU. *Crit Care Med*. 2017;45(1):103–28.
- Myers L, Karp SM, Dietrich MS, Looman WS, Lutenbacher M. Family-centered care: how close do we get when talking to parents of children undergoing diagnosis for autism spectrum disorders? *J Autism Dev Disord*. 2021;51(9):3073–84.
- Duong J, Wang G, Lean G, Slobod D, Goldfarb M. Family-centered interventions and patient outcomes in the adult intensive care unit: a systematic review of randomized controlled trials. *J Crit Care*. 2024;83:154829.
- Lin L, Peng Y, Huang X, Li S, Chen L, Lin Y. A family intervention to prevent postoperative delirium in patients undergoing cardiac valve surgery: a randomized controlled study. *Heart Lung*. 2024;63:1–8.
- Franck LS, Axelin A, Van Veenendaal NR, Bacchini F. Improving neonatal intensive care unit quality and safety with family-centered care. *Clin Perinatol*. 2023;50(2):449–72.
- Donney JF, Ghandour RM, Kogan MD, Lewin A. Family-centered care and flourishing in early childhood. *Am J Prev Med*. 2022;63(5):743–50.

11. Coyne I, Holmström I, Söderbäck M. Centeredness in healthcare: a concept synthesis of family-centered care, person-centered care and child-centered care. *J Pediatr Nurs*. 2018;42:45–56.
12. Lenz ER, Perkins S. Coronary artery bypass graft surgery patients and their family member caregivers: outcomes of a family-focused staged psychoeducational intervention. *Appl Nurs Res*. 2000;13(3):142–50.
13. Abedini F, Zareyan A, Alhani F. The effects of the family-centered empowerment model on self-efficacy and self-esteem among the family caregivers of patients with prosthetic heart valve: a controlled clinical trial. *Nurs Midwifery Stud*. 2020;9(2):61–7.
14. Jafarnejad S, Ebrahimi HK, Saremi H, Esmaeilian S, Mandavi M, Mostafavi A. Assessment of the effect of family-centered care on anxiety and care burden in parents of children undergoing heart transplantation. *Iran Heart J*. 2022;23(2):87–95.
15. Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol*. 2018;18(1):143.
16. Tricco AC, Lillie E, Zarin W, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467–73.
17. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005;8(1):19–32.
18. Hart JL, Turnbull AE, Oppenheim IM, Courtright KR. Family-centered care during the COVID-19 era. *J Pain Symptom Manage*. 2020;60(2):e93–7.
19. Gu Y. Research of family-centered care to children with congenital heart disease during peri-operative period. Fudan University; 2008.
20. Young LE, Molzahn A, Starzomski R, Budz B. Families and heart transplantation: reversing the trajectory of end stage heart disease. *Can J Cardiovasc Nurs*. 2010;20(2):6–17.
21. Lawrence KS, Stillely CS, Pollock JA, Webber SA, Quivers ES. A family-centered educational program to promote independence in pediatric heart transplant recipients. *Prog Transplant*. 2011;21(1):61–6.
22. McCusker CG, Doherty NN, Molloy B, et al. A randomized controlled trial of interventions to promote adjustment in children with congenital heart disease entering school and their families. *J Pediatr Psychol*. 2012;37(10):1089–103.
23. Agren S, Stromberg A, Jaarsma T, Luttik MLA. Caregiving tasks and caregiver burden; effects of a psycho-educational intervention in partners of patients with post-operative heart failure. *Heart Lung*. 2015;44(4):270–5.
24. Ni Z, Chao Y, Xue X. An empowerment health education program for children undergoing surgery for congenital heart diseases. *J Child Health Care*. 2016;20(3):354–64.
25. Feng FF. The study of applying "Family Centered Care" to children with congenital heart disease under going transcatheter closure. Xinxiang Medical University; 2016.
26. Zhang Z, Wan S, Ai LY. Application study of family-centered nursing model in transcatheter closure of children with congenital heart disease. *China Modern Med*. 2017;24(33).
27. Eghbali-Babadi M, Shokrollahi N, Mehrabi T. Effect of family-patient communication on the incidence of delirium in hospitalized patients in cardiovascular surgery ICU. *Iran J Nurs Midwifery Res*. 2017;22(4):327–31.
28. Mailhot T, Cossette S, Côté J, et al. A post cardiac surgery intervention to manage delirium involving families: a randomized pilot study. *Nurs Crit Care*. 2017;22(4):221–8.
29. Bahramnezhad F, Sanaie N, Jackson AC, Shariati E, Atashzadeh-Shoorideh F. The effect of partnership-based education on adherence to the treatment plans in open heart surgery. *J Educ Health Promot*. 2021;10(1):353.
30. Nouri JM, Safaeipour L, Vafadar Z, Moradian ST. The effect of the family presence on anxiety and agitation of patients under mechanical ventilation after open heart surgery: a randomized clinical trial. *Perioperative Med*. 2021;10(1):40.
31. Koyuncu A, Yava A, Yamak B, Orhan N. Effect of family presence on stress response after bypass surgery. *Heart Lung*. 2021;50(2):193–201.
32. Yoo HJ, Shim J. The effect of a multifaceted family participation program in an adult cardiovascular surgery ICU. *Crit Care Med*. 2021;49(1):38–48.
33. LaRonde MP, Connor JA, Cerrato B, Chiloyan A, Lisanti AJ. Individualized family-centered developmental care for infants with congenital heart disease in the intensive care unit. *Am J Crit Care*. 2022;31(1):e10–9.
34. González-Martín S, Becerro-de-Bengoa-Vallejo R, Rodríguez-García M, et al. Influence on depression, anxiety, and satisfaction of the relatives' visit to intensive care units prior to hospital admission for elective cardiac surgery: a randomized clinical trial. *Int J Clin Pract*. 2022;2022:1746782.
35. Hao X, Wang D, Xiao X. Influence of family-centered health intervention on perioperative mental health of patients receiving coronary interventional therapy. *Altern Ther Health Med*. 2023;29(8):401–5.
36. Yuruk E, Cetinkaya S. The effect of individualized nutrition training of children with congenital heart disease (CHD) on their growth and development a randomized controlled trial. *Curr Probl Cardiol*. 2024;49(7):102567.
37. Lotfalipoor R, Jafaraghaee F, Kazemnejad Leyli E, Ghorbani Vajargah P, Karkhah S, Javadi-Pashaki N. Effect of family-centered care on the anxiety levels among family members of patients undergoing cardiac surgery: a randomized controlled trial. *Ann Med Surg (Lond)*. 2024;86(3):1370–5.
38. Khan A, Spector ND, Baird JD, et al. Patient safety after implementation of a coproduced family centered communication programme: multicenter before and after intervention study. *BMJ*. 2018;363:k4764.
39. D'Andria Ursileo J, Bottussi A, Epstein AS, Agosta VT, Monaco F, Rosa WE. Communicating about the end of life: the path of prognostic awareness. *Palliat Support Care*. 2025;23: e23.
40. Zhang D, Zhou Y, Liu J, et al. Application of patient decision aids in treatment selection of cardiac surgery patients: a scoping review. *Heart Lung*. 2022;56:76–85.
41. D'Andria Ursileo J, Bottussi A, Monaco F. Talk before they sleep: strategies for patient-centred communication in anaesthesiology. *Br J Anaesth*. 2024;133(5):934–9.
42. D'Andria Ursileo J, Cali C, Losiggio R, Limone V, Mucci E, Monaco F. Spiritual care in palliative medicine and end of life: a bibliometric network analysis. *J Palliat Med*. 2025;28(2):265–79.
43. Raghupathy MK, Parsekar SS, Nayak SR, et al. Effect of family-centered care interventions on motor and neurobehavior development of very preterm infants: a systematic review and meta-analysis. *Phys Occup Ther Pediatr*. 2025;28:1–30.
44. Kim NY, Ryu SA, Kim YH. Factors related to delirium of intensive care unit patients in Korea: a systematic review. *Iran J Public Health*. 2021;50(8):1526–35.
45. Li J, Fan Y, Luo R, et al. Family involvement in preventing delirium in critically ill patients: a systematic review and meta-analysis. *Int J Nurs Stud*. 2025;161: 104937. <https://doi.org/10.1016/j.ijnurstu.2024.104937>.
46. Zhou H, Wu X, Yu L. The comforting companion: using AI to bring loved one's voices to newborns, infants, and unconscious patients in ICU. *Crit Care*. 2023;27:135.

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